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Andhra University

THE UNIVERSITY CODE

VOLUME II

1942-44

Regulations and Syllabuses

PRINTED AT
THE ANANDA PRESS, MADRAS.

1942

[Price : Rs. 2.

ANDHRA UNIVERSITY

THE UNIVERSITY CODE

VOLUME II

1942—44

ERRATA

P. 138. Put an * at the beginning of lines 10, 12, 18 and 21 and *add* the following as a foot-note :—

* The detailed syllabuses under this subject will come into effect as from the examinations of 1944.

P. 184. *Read* '1943' *for* '1945' occurring in line 1 of the foot-note on the page.

THE UNIVERSITY CODE—VOL. II.

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ANDHRA UNIVERSITY CODE

VOLUME II

CHAPTER XXXIII

ADMISSION OF S. S. L. C. HOLDERS TO UNIVERSITY COURSES OF STUDY

1. Admission of holders of Secondary School-Leaving Certificates to University courses of study shall be made in accordance with the following regulations which shall apply in the case of those who have appeared for the qualifying Secondary School-Leaving Certificate Examination completing a course of instruction in the VI Form in one of the Schools situated in the University area of affiliation namely—Ganjam, Vizagapatam, East Godavari, West Godavari, Kistna, Guntur and Nellore districts.

2. Only such holders of completed Secondary School-Leaving Certificates may be admitted to University courses of study and registered as Matriculates under section 1 of Chapter XXXVII (Andhra University Code) as (*a*) have completed not less than 15 years of age on the first day of the month in which the Examination qualifying for such certificates is held unless specially exempted from the operation of this age-limit, and (*b*) have been declared eligible for such admission by the Syndicate.

3. A complete list of certificate holders declared eligible for admission to University courses of study will be published annually in the Fort St. George Gazette and a copy of this list will be furnished to the Principals of affiliated colleges. A certificate holder not included in one of those lists will not be entitled to registration as a Matriculate under section 1 of Chapter XXXVII mentioned above except as provided in paragraph 8 below.

4. (*a*) All Secondary School-Leaving Certificate holders whose certificates are issued under the authority of the Government of Madras will be declared eligible for admission to University courses of study who qualify under the following regulations :—

(i) They should have presented at one time for the Secondary School-Leaving Certificate Examination (*a*) all the five subjects in Group A (subject to the condition that students who have been specifically exempted by the Director of Public Instruction from the study of the Vernacular Composition and Translation need not sit for the examination in that subject) and (*b*) one subject under Group C.

(ii) Those who secure not less than 35 marks in English, not less than 35 marks in the selected Second Language, and not less than 105 marks in the remaining three subjects of Group A taken together, with at least 25 marks in each of these three subjects and not less than 30 per cent of the marks in the subject under Group C.

(iii) Those who secure not less than 35 marks in English, not less than 35 marks in the selected Second Language (except in the case of pupils who are exempted by the Director of Public Instruction from the study of the Second Language) and 135 marks in the remaining four subjects, including the C Group subjects, the marks being not less than 35 per cent in any two of these four subjects and not less than 25 per cent in each of the other two.

(*b*) The Principals of affiliated colleges will be permitted to admit for Mathematics in the Intermediate course only such eligible candidates as have presented Algebra and Geometry under Group C of the Secondary School-Leaving Certificate Examination ;

Provided that the Syndicate, on the recommendation of a Principal of a college, shall have power to exempt from the operation of this regulation, a student who, in the opinion of the Syndicate, is likely to profit by the study of Mathematics in the Intermediate course.

(*c*) Notwithstanding anything contained in the foregoing regulations, a certificate holder who obtains in the aggregate not less than 60 per cent of the total marks (i.e., 300 in five or 360 in six subjects as the case may be) will be declared eligible for admission to University courses of study though he may fail to obtain qualifying marks in one or more subjects, provided that he shall secure at least 20 per cent in each subject except English in which it should be 30 per cent.

5. The Syndicate shall appoint a Moderation Board to consider and modify, if need be, the results of the examination before publication.

6. Any candidate for admission to University courses of study who in any year fails to qualify by reason of deficiency in any subject or subjects in which he has undergone examination will be required to appear again at the Public Examination in all the five subjects of Group A and one subject in Group C and his eligibility for admission will be determined according to the preceding rules by the marks obtained by him at the last examination.

7. Certificates once scrutinized, the holders of which were found ineligible under the regulations in force at the time of scrutiny, will not be reconsidered.

8. Notwithstanding anything contained in the foregoing regulations, the Principals of colleges will be permitted to make admission at their discretion of (1) women holders of Secondary School-Leaving Certificates whether the names of such holders of certificates are included in the published list of certificate holders eligible for admission to University courses of study or not, provided such students appeared for the qualifying Secondary School-Leaving Certificate Examination after completing a course of instruction in the VI Form in one of the schools in the University area of affiliation, and provided that they secure not less than 30 per cent in English and 30 per cent in the Second Language, (2) women holders of Secondary School-Leaving Certificates whose parents or guardians are either domiciled or resident in the Andhra University area, and who, after having studied in an institution in Madras or

in the Ceded districts or in Chittoor district, obtain marks qualifying for eligibility under the above regulations. Certificate holders so admitted to colleges will be registered as Matriculates under section 1 of Chapter XXXVII.

9. The lists published annually in the Fort St. George Gazette will contain the names of all certificate holders, except those whose cases may be considered under the preceding section found to be eligible for admission to University courses of study in affiliated colleges, under the regulations adopted from time to time. It is, however, to be clearly understood that inclusion in the list confers on no certificate holder the right of admission to any affiliated college. The Principals of colleges are not only at liberty to restrict admission to such applicants as they may select but are further required to confine admission to such eligible certificate holders, as judged by their certificates, may be expected to profit by the particular course of study upon which they propose to enter in the college selected.

CHAPTER XXXIV

ADMISSION TO EXAMINATIONS

1. Every candidate for a University Examination shall, unless exempted from the provisions of this section by an order of the Syndicate made in accordance with conditions laid down by the Academic Council, be an enrolled member of an affiliated college.

Act, Sec. 33 (2).

2. No candidate shall be admitted to any examination until he has been registered. A candidate shall be registered afresh on each occasion on which he presents himself for examination and no candidate shall be registered until he has paid the fee prescribed for the examination.*

Registration Fee for each Examination: Regulation

3. A candidate applying for admission to the Matriculation examination for the first time shall furnish as his date of birth the date as entered in his S. S. L. C. register.

Date of Birth in University records: Ordinance.

Candidates for whom S. S. L. C. register has not been maintained, the date as entered in the school register at the time when he last studied in the highest class of the secondary department shall be furnished.

A candidate permitted to apply for admission to the Matriculation examination without having studied in any recognized institution shall at the time of the first appearance for the Matriculation examination furnish the exact date of birth.

A candidate applying to be matriculated without appearing for the Matriculation examination of the University, shall furnish the date of birth as given in his S. S. L. C. register or as registered by the authority which conducted the examination which in his case has been considered equivalent to the Matriculation examination of the Andhra University.

Candidates who apply for post Intermediate examinations after passing an examination recognized as equivalent to the Intermediate or a corresponding examination of the Andhra University,

*Vide Chapter XXXVI

shall be called upon to furnish the date of birth as given by them to the body conducting that examination at the time they applied for admission to the examination.

An entry once made shall not be altered so far as University purposes are concerned and will have to be repeated at subsequent examinations

Subject to the proviso that the date of birth of a candidate shall be corrected in the University records if the date of birth in his S. S. L. C. has been corrected and duly attested by a competent authority.

Refund of fee : Stat.

1. No candidate for examination shall be entitled to a refund of any fee he may have paid, but the Syndicate may at its discretion grant such a refund in any particular case or class of cases.

Qualifications of Candidates : Regulation.

5. Each candidate for an examination shall produce such evidence as the Syndicate may direct of having previously passed the qualifying examination prescribed by the Code if any. He shall also, unless otherwise exempted, produce in the prescribed form the necessary certificate or certificates required by the Code.

Teacher and Woman Candidates : Regulation.

6. The Syndicate shall have power to exempt by a special order a candidate for a University examination belonging to any one of the following categories, from being an enrolled member of an affiliated college :—

(i) Women ;

(ii) *Pandits and Munshis who hold Oriental Title Diplomas ; provided that in the case of Hindi pandits who qualified for the Diplomas prior to 1938 and Munshis who have qualified subsequent to 1933, the possession of the Oriental Title Diploma of the University need not be insisted upon ;

---

*The following examinations of other institutions, are accepted as equivalent to the corresponding examinations of this University for purposes of this Regulation :—

Hindi Pandits.—Vidwan of Madras University, Prabhakara of the Punjab University. The Sahitya Ratna (Uttama) and Visharad (Madhyama) of the Hindi Viswavidyalaya, Allahabad.

Munshis.—Oriental Title Diplomas awarded by the Madras University

(iii) Commercial Instructors who have passed the concerned technical examinations and the Technical Teachers' Certificate examination of the Higher Grade conducted by the Secretary to the Commissioner for Government Examinations ; provided that in the case of commercial instructors of Secondary schools employed prior to 29th November 1929 the possession of a Technical Teachers' certificate of the Higher Grade in commercial subjects need not be insisted upon ;

(iv) Teachers who have put in an approved service of not less than five years and whose qualifications are such that there is no provision for them to take the Teachers' Training Certificate in their special subjects ; and

(v) Any other teacher who has passed an examination in Teachers' training of the grade for which he is qualified by his general educational attainments.

Provided however that no one coming under (ii), (iii) and (v) shall be considered eligible for exemption unless he has put in after passing the special examination noted against each at least three years' service in a college affiliated to, or recognised by, the University or an institution situated in the Andhra University area recognised by the Syndicate after due enquiry or the Director of Public Instruction, Madras, or the District Educational Council.

No candidate however shall be permitted to present himself for an examination in a Science subject for which a practical course is necessary under the Regulations, unless he produces a certificate from the Principal of an affiliated college to the effect that the candidate has taken such a course in the laboratory attached to the said affiliated college.

The Syndicate shall satisfy itself in each case before granting exemption of the candidate's good conduct and diligent and regular study.

No person shall be considered eligible for exemption unless he or she has lived continuously within the area of affiliation of the

University for a period of not less than two years immediately preceding the date of application for exemption or, in the alternative, passed the examination of this University immediately below the examination for which exemption is sought, provided however that in the case of the latter category of candidates, service in any educational institution recognized by the Education Departments of a Provincial Government or in an Educational institution in the British Administered areas, Secunderabad (Deccan), shall be deemed as equivalent to service in a recognized institution as prescribed above.

For purposes of this section candidates employed in the inspection branch of the Educational Department shall be treated as though they are employed in the profession of teaching.

Regulations *re* exemption from attendance certificates.

7. In the case of a student who has failed to keep during the year three-fourths of the attendances prescribed by the institution of which he is a member and is therefore unable to produce his annual certificate of attendance, the Syndicate may grant exemption from its production, provided that—

For shortage of attendance.

(1) the shortage of attendance does not exceed five days ;

(2) the case is recommended by the Principal of the College of which the student is a member ; and

(3) the Syndicate considers that the reasons given for failure to secure the prescribed attendance are satisfactory.

Exemptions in the case of students whose shortage of attendance exceeds five days shall be given only in exceptional circumstances. Exemptions in such cases may be granted by the Syndicate but each case should be reported to the Academic Council.

For students who appeared for examinations in other Universities.

8. The Syndicate shall have power to grant exemption from the production of prescribed attendance and progress certificate for the first year course leading up to either the Intermediate or B. A. Pass or B. Com. Pass Degree Examination in the case of students who, after having undergone satisfactorily the prescribed course for the corresponding examination of any other University recognized by the University for the purpose, appeared for the examination of

that University and for some satisfactory reason desire thereafter to appear for the Intermediate or B.A. Pass or B. Com. Pass Degree Examination of this University provided such students belong to the University area and provided also that they present the same subjects which they had studied in that University and for which there is provision in this University.

For new optional subject in Inter. or B.A.

9. The Syndicate shall have power to grant exemption from the production of certificates of attendance for Part II or Part III of the Intermediate or B.A. Degree Examination to a student who having passed Part I or Parts I and II as the case may be, desires to present a new subject or set of optional subjects under Part II or Part III of Intermediate or B.A. provided that the student had failed in the Part at least on two occasions and that the new subject or subjects offered do not require a course of Laboratory training.

For language course in Intermediate or B.A.

10. The Syndicate shall have power to grant exemption from the production of the prescribed certificates of attendance for the course in any language other than English and Telugu in any part of the Intermediate or the B.A. Degree Examination to a student studying in a college in which the language in respect of which exemption is sought is not taught provided that the Syndicate is satisfied

(1) as to the reasons assigned by the student for not studying in a college where the language in question is taught, and

(2) as to the arrangements made for instruction being received by the student in that language.

For Music in Inter-mediate.

11. The Syndicate shall have power to grant exemption from the production of the prescribed certificates of attendance for the course in Music as one of the optional subjects under Part III of the Intermediate or B.A. Degree Examination to a private candidate or one studying in a college in which Music, in respect of which exemption is sought, is not taught, provided that the Syndicate is satisfied

(1) as to the reasons assigned by the candidate for not studying in a college where Music is taught, and

(2) as to the arrangements made for instruction being received by the candidate in Music.

In the case of candidates studying in a College, a certificate from the Principal of the Affiliated College to the effect that the candidate has undergone practical training under a competent Tutor in Music shall be produced.

In the case of private candidates the certificate shall be produced either from the Principal of a College affiliated in Music or from a member of the Board of Studies in Music or from any other competent scholar recognised by the Syndicate.

For students migrating from one college to another in the middle of the year.

12. The Syndicate shall have power to grant exemption from the production of the prescribed certificate of attendance for one or more terms of the first year course in a non-science subject under Part III of the Intermediate Examination in the case of a student who, after having studied for some time in one of the Affiliated Colleges, has to leave that college due to unforeseen circumstances to prosecute his studies in another college, provided that the Syndicate is satisfied as to the reasons assigned by the student for not studying in the first college and with the arrangement made by the Principal of the new college for instruction being given to the student in the completed portions of the subject requiring exemption.

For the Final M.B.B S. Degree.

13. The Syndicate shall have power to grant exemption in the case of a candidate for the Final M.B.B.S. Degree Examination who having failed in the examination is unable to produce an additional certificate of attendance for six months in one or more subjects of the examination in accordance with the Regulations, provided that he is recommended for exemption by the Principal of an affiliated Medical College.

For candidates who passed one part of the M.U.B.A. Degree Examination under the old by-laws.

14. The Syndicate shall have power to grant exemption from the production of the required attendance certificates, to candidates for the Degree of Bachelor of Arts who have passed at least one of the Divisions of the B.A. Degree Examination under the old by-laws of the Madras University and permit them to appear for the B.A. Degree Examination of the Andhra University in the

Parts or Groups corresponding to the Divisions of the B.A. Degree Examination under the said old by-laws which they have not passed.

For B.Sc. Degree holders with one group to appear for another group.

15. The Syndicate shall have power to grant exemption from the production of the required attendance certificates to candidates who having passed the B.Sc. Degree Examination with one optional group are desirous of appearing for the same examination in another optional group, provided that there shall be an interval of at least one academic year between the passing of one optional group and appearance in another group and provided also that such candidates shall be required to produce a certificate of having completed a practical course from the Principal of a college affiliated in the subjects for which such certificates are required, to the effect that the candidate has undergone such a course satisfactorily in the laboratory attached to his college for a period of not less than one academic year, subject however to the condition that no candidate who has already passed any subject in one group, either as subsidiary or as main shall be required to undergo a practical course in that subject as a subsidiary nor shall he be required to sit for the examination in that subject as a subsidiary and pass thereat.

For Intermediate or B.A. Degree holders with one group to appear for another group.

16. The Syndicate shall have power to grant exemption from the production of the required attendance certificates to candidates who, having passed the Intermediate Examination or B.A. Degree examination with one optional group, are desirious of appearing for the examination in another optional group or another language in the same group, provided that there shall be an interval in each case of at least one academic year between the passing one optional group of the Intermediate Examination or B.A. Degree Examination and appearance at another group, another optional group or another language in the same group provided that the candidate has not joined a higher class or passed a higher examination and provided also that a candidate, in case he wishes to present himself in any subject for which a practical course is necessary under the Regulations, shall produce a certificate from the Principal of a College affiliated in that subject to the effect that the candidate has taken such a course in a laboratory for a period of not less than one academic year.

For B. Com. Pass Degree holders with one special subject to appear for another special subject.

17. The Syndicate shall have power to grant exemption from the production of the required attendance certificates to candidates who having passed the B.Com. Pass Degree Examination with one special subject are desirous of appearing for the same examination in another special subject, provided that there shall be an interval of at least one academic year between the passing of one special subject and appearance in another special subject.

For other Degree holders to appear for B.A. Degree.

18. The Syndicate shall have power to grant exemption from the production of the required attendance certificates to candidates who, having passed a Degree Examination other than the B.A. Degree Examination and desirous of appearing for the B.A. Degree Examination, provided that there shall be an interval in each case of at least one academic year between passing the first Degree Examination and appearance at the B.A. Degree Examination and provided also that a candidate, in case he wishes to present himself in any subject for which a practical course is necessary under the Regulations, shall produce a certificate from the Principal of a college affiliated in that subject to the effect that the candidate has taken such a course in a laboratory for a period of not less than one academic year.

B.A. Hons. Degree holders of this University with Branch VI Telugu Language and Literature shall be exempted from passing in that language under Part II of the B.A. Degree Examination.

For certain candidates to appear for Telugu under Part II B.A.

19. The Syndicate shall have power to grant exemption from the production of the prescribed certificates of attendance in respect of the following classes of candidates who are desirous of appearing privately for Telugu under Part II of the B.A. Degree Examination as an additional subject:—

(i) Those who have passed a degree examination of the University with a language other than Telugu ;

(ii) Those who are eligible to take a degree examination of the University for which no second language is prescribed ;

(iii) Those studying Pass and Honours Degree Courses in Commerce at any time during or after their course of study.

Candidates under category (ii) above shall be permitted to offer Telugu under Part II of the B.A. Degree Examination as on additional subject along with the other subjects of their respective examinations in the same year provided the Time-tables for the examinations admit.

For students undergoing course pending affiliation.

20. The Syndicate shall have power to grant exemption from the production of an annual certificate of attendance (1) to students who have been attending classes opened in a college with the sanction of the Syndicate pending affiliation, and (2) to students who are unable to obtain the necessary attendance certificate owing to the college of which they are members having to close for a time for reasons recognised by the Syndicate as satisfactory.

For Oriental Titles.

21. The Syndicate shall have power to grant exemption from the production of either or both of the annual certificates of attendance required by candidates for the Oriental Title examinations provided that the candidate—

(1) is at the time of the examination at least twenty-five years of age, subject to the provision that this age rule shall not apply in the case of (i) women candidates *or* (ii) candidates who, after getting themselves qualified for one Oriental Title, wish to appear for another examination in Oriental Titles or a Certificate of Proficiency in Oriental Learning, *or* (iii) candidates who have passed the B.A. Degree Examination of this University or an examination recognized as equivalent thereto

(2) is certified by the head of an Affiliated or Recognised institution, or by a member of the Board of Studies dealing with the subject of language offered for the examination or by a Mahamahopadhyaya or a Shamsul-ul-ulama or any other competent scholar, recognised by the Syndicate, to be qualified by his attainments to appear for the examination.

Dates of applications.

22. All applications for exemption shall reach the Registrar not later than the 1st October for March-April Examinations and 1st April for September Examinations provided, however, that applications received after the above prescribed dates may, under special circumstances, be accepted on payment of a penalty to be fixed by the Syndicate.

Exemptions permanent.

23. Orders of exemptions granted under this Chapter shall be permanent.

24. Notwithstanding anything that may be contained, to the contrary in the Regulations of the University it shall be competent for the Syndicate, with regard to students whose courses of studies in countries involved in or affected by the war (in September 1939) have been interrupted, to dispense with a strict compliance with the Regulations in regard to admission and attendance to courses of studies, admission to examinations of this University, syllabuses and text-books, or such other conditions as may be laid down in the Regulations each case being decided on its merit.

N.B.—The following examinations have been recognised (by the Academic Council on 15-3-41) as equivalent to the corresponding examinations of this University:—

Name of the University.	Examinations of the University.	Corresponding examinations of the Andhra University.	Conditions.
(1)	(2)	(3)	(4)
(1) Benares Hindu University, Benares.	1 M.Sc in Chemistry. 2. M.Sc. in Physics.	M Sc in Chemistry. M.Sc. in Physics.	Subject to the condition that the candidates seeking such recognition obtain the number of marks prescribed for the M.Sc. Degree of Andhra University viz. 50 *per cent.*
(2) Osmania University, Hyderabad.	1. Matriculation. 2. Intermediate.	Matriculation. Intermediate.	Subject to the condition that the candidates seeking admission to higher courses in the Andhra University should have obtained 50% of the marks in English in the Osmania University
(?) Travancore University, Trivandrum.	1. Intermediate. 2. B.A. (Pass) 3. B.A. (Hons.) 4. B.Sc. (Pass) 5. B.Sc. (Hons.) 6. M.A. 7. M.Sc. 8. L.T. 9. Sanskrit Entrance Examination.	Intermediate. B.A. (Pass) B.A. (Hons.) B.A. with science groups. B.Sc. (Hons.) M.A. M.Sc. B.Ed. Admission Test Examination.	

CHAPTER XXXV

GENERAL RULES RELATING TO EXAMINATIONS

1. (a) Examinations shall be held at such places as may be appointed by the Syndicate. A list of centres at which examinations will be held shall be published annually in the Gazette in the preceding April. Place of Examinations: Ordinance.

(b) When there is more than one centre for a written examination, question papers shall be given out to candidates on the same day and at the same hour in every centre.

2. Examination in any second language or optional subject or group for which no affiliated or recognized colleges are presenting candidates shall be conducted once in the year, i.e. in March-April only.

3. Gazetted holidays shall be considered *dies non* for the purposes of the University Examinations. Gazetted holidays *dies non*: Ordinance.

4. The text-books to be prescribed and the syllabuses required by the Code other than those detailed in the Code shall be determined and notified from time to time by the Academic Council after considering the recommendations of the Boards of Studies. Text-books and syllabuses: Regulation.

5. The papers set in all examinations shall be such as a candidate of decided ability, well prepared in a subject can reasonably be expected to answer within the time allotted. Standard of question papers: Regulation.

6. No question shall be put at any University examination calling for a declaration of religious belief on the part of the candidate, and no answer or translation given by any candidate shall be objected to on the ground of its giving expression to any particular form of religious belief. Religious belief: Regulation.

7. All examinations, except practical and *viva voce* examinations, shall be conducted by means of printed or written papers to be answered, except in the case of Vernaculars or Asiatic Classical Languages, in English unless otherwise stated therein; Conduct of examinations: Regulation.

Provided that the question papers in non-language subjects, viz., Mathematics, Elementary Science and History and Geography, for the Matriculation Examination shall be set in English and shall be answered either in English or in the concerned Vernacular;

Provided also that the question papers in Music in Part III of the Intermediate and B.A. Degree Examinations shall be answered either in English or in Telugu.

Provided also that the question papers in Sanskrit in Matriculation Examination and in Parts II and III of the Intermediate and B.A. Degree Examinations may be answered either in English or Sanskrit at the option of the candidate.

Duties of Examination Boards Ordinance

8. The Examination Boards shall report to the Syndicate the results of all examinations conducted or supervised by them, and the Syndicate shall publish lists of those candidates who have passed the examinations in accordance with the regulations.

Pass certificates: Ordinance

A certificate signed by the Registrar shall be given to each successful candidate at an examination other than an examination for a degree, title or diploma.

Application for certificates.

Applications for certificates of having passed the Matriculation and Intermediate Examinations shall reach the Registrar not later than the 1st September or 1st February succeeding respectively the March or September Examination. A fee of three rupees shall be charged for all certificates issued on applications received after that date.

Certificate of Merit.

9. A special Certificate of Merit signed by the Registrar, shall be awarded to candidates who, at the Final Honours, Pass and Post-Graduate Degree Examinations, obtain not less than 85 per cent of the marks in the aggregate.

CHAPTER XXXVI.

FEES.

1. Fees payable to the University are classified under the following heads :— Classification of fees : Stat. and Ord.

(a) Matriculation fee.

(b) Examination fee.

(c) Fee for registration of graduates.

(d) Fee for supplying marks.

(e) Fee for recognition of change of names.

(f) Fee for migration certificates.

(g) Fee for furnishing copy of application for an examination.

(h) Fee for certificates not applied for in time.

(i) Penal fee for non-attendance at Convocation.

(j) Fee for scrutiny of S.S.L. Certificates.

(k) Fee for exemption from production of attendance certificates.

(l) Fee for recognition of examinations of other Universities and of S.S.L.C. Examinations or the European High School Examinations conducted by bodies outside the jurisdiction of this University.

(m) Fee for the issue of a duplicate pass certificate.

(n) Fee for the issue of a provisional certificate.

(o) Fee for supply of an extract from the Register of candidates for an examination or the Register of Matriculates.

(p) Fee payable to the University Colleges :—

1. Fee for registration of an application for admission.
2. Admission fee.
3. Tuition fee.
4. Fees for residence.
5. Games or athletics fee.
6. Reading Room and Magazine fee.

7. Library fee.
8. University Union fee.
9. Laboratory fee
10. Caution fee.

(q) Fee for scrutiny and verification of the correctness of the additions of the marks recorded on the answer books by examiners.

(r) Fee for supply of eligibility Certificates to eligible S.S.L.C. holders of the University.

For Matriculation: Stat.

2. Every candidate applying for registration as a Matriculate of the University shall pay a fee of Rs. 5 on receipt of which his name will be registered as a Matriculate.

For Examinations: Stat.

3. Candidates for examinations and degrees shall pay the following fees :—

Matriculation Examination—	...	Rs. 15
Intermediate Examination—		
Whole Examination	...	,, 28
Part I only	...	,, 12
Part II only	...	,, 10
Part III only	...	,, 20

Provided that no candidate shall pay more than Rs. 28 at a time whatever be the number of parts in which he appears.

Note :—In the case of candidates with Science subjects, an additional fee of Rs. 3/- for each Science subject shall be charged.

B. A. Pass Degree Examination—		
Whole Examination	...	Rs. 45
Part I only	...	,, 20
Part II only	...	,, 10
Part III only	...	,, 25
B. A. Hons. Degree Examination—		
Preliminary Examination (Whole)	...	,, 15
Do. English only	...	,, 10

Preliminary Translation or Early South Indian History only	...	Rs. 10
Final Examination	...	,, 60
M. A. Degree	...	,, 25
Ph. D. Degree Examination	...	,, 200
Ph. D. for submitting a revised thesis	...	,, 100

B. Com. Pass Degree Examination—

Part I	...	,, 15
Part I (*a*) or Part I (*b*)	...	,, 10
Part II	...	,, 30
Part II-A	...	,, 20
Part II-B	..	,, 20

B. Com. Pass Degree Examinations (Under the Revised Regulations)—

Whole Examination	...	Rs. 45
Part I	...	,, 20
Part II	...	,, 10
Part III	...	,, 25

B. Com. Honours Degree Examination—

Part I (Preliminary Examination)	...	,, 15
Part I (*a*) or Part I (*b*)	...	,, 10
Part II (*a*) and Part II (*b*) together	...	,, 60
Part II (*a*)	...	,, 35
Part II (*b*)	...	,, 35

B. Com. Honours Degree Examination (Under the Revised Regulations)—

Part I (Preliminary Examination)	...	Rs. 20
Part I (*a*)	...	,, 15
Part I (*b*)	...	,, 10
Part II	...	,, 55

B. Sc. Pass Degree Examination—

Part I	...	,, 10
Part II Main subject and two subsidiary subjects		,, 45
,, Main subject	...	,, 25
,, Each subsidiary subject	...	,, 15

B.Sc. Hons. Degree Examination (Physics Main)—

Part	I (Whole)	... Rs.	15
Part	I (*a*) or Part I (*b*)	... ,,	10
Part	II (Whole)	... ,,	60
,,	Main subject	... ,,	40
,,	Two subsidiary subjects	... ,,	25
,,	One subsidiary subject	... ,,	15

B.Sc. Hons. Degree Examination (Chemistry Main)—

Part	I (Whole)	... ,,	15
Part	I (*a*) or Part I (*b*)	... ,,	10
Part	II (Whole)	... ,,	60
Part	II Main subject	... ,,	40
Part	II two subsidiary subjects	... ,,	25
Part	II Physics (subsidiary)	... ,,	15
Part	II Mathematics (subsidiary)	... ,,	10

B.Sc. Hons. Degree Examination (General Chemical Technology as Main)—

Part	I (*a*) Mathematics	... Rs.	10
,,	(*b*) Physics	... ,,	15
,,	(*c*) Chemistry	.. ,,	20
,,	(*d*) Descriptive Engineering	... ,,	15
,,	(*e*) Pharmaceutical Botany	... ,,	15
Part	I Physics, Chemistry and Descriptive Engineering together	... ,,	45
Part	I Physics, Chemistry, Descriptive Engineering and Pharmaceutical Botany	... ,,	55
Part	II	... ,,	30

B.Sc. Hons. Degree Examination (Botany or Zoology or Geology as Main)—

Part	I (Whole)	... Rs.	15
Part	I (*a*) or Part I (*b*)	... ,,	10
Part	II (Whole)	... ,,	60
Main subject		... ,,	40
Each subsidiary subject		... ,,	15

Under Old Regulations : —

M. A., M. Sc., Ph. D. Degree Examinations—	Rs.	100
Do. do. (For submitting the thesis a second time) ...	,,	50

Under Revised Regulations—

M. Sc. (Physics and Chemistry) Examination — (thesis and written whole examination) ...	,,	80
Written and Practical examination ...	,,	50
Thesis ...	,,	50
M. Sc. Exam. for B. Sc. Pass (First and second class) *and for B. Sc. Hons.* (Third class) at the end of I year— ...	,,	35
For submitting a revised thesis ...	,,	50
M. Sc. in Applied Physics ...	,,	50
Do. Examination for pass Graduates at the end of first year ...	,,	25
M. Sc. in Chemical Technology ...	,,	60
M Sc. in Chemistry (special subject—Foods, Drugs and Water) ...	,,	40
Do. Examination for pass Graduates at the end of first year ...	,,	25
D. Sc. Degree Examination— ...	,,	200
For submitting a revised thesis ...	,,	100
B. Ed. Degree Examination—		
Whole Examination ...	,,	25
Practical Examination only ...	,,	10
Written Examination only ...	,,	15
M. Ed. Degree Examination— ...	,,	100
M. B. B. S. Degree Examination—		
Pre-Registration Examination (first appearance) ...	,,	30
Separate subjects—each ...	,,	15

First M. B. B. S. Examination—

Whole Examination	... Rs.	45
Part I only	... ,,	15
Part II only	... ,,	35

Separate subjects after first appearance—

Organic Chemistry	... ,,	15
Anatomy or Physiology	... ,,	20

Second M. B. B. S. Examination—

Whole examination	... ,,	60
Part I only	... ,,	20
Part II only	... ,,	50

Separate subjects after first appearance—

Pharmacology	... ,,	20
Ophthalmology	... ,,	15
Hygiene or Pathology	... ,,	20

Final M.B.B.S. Examination (first appearance)—	... ,,	60
Part I only	... ,,	15
Part II (first appearance only)	... ,,	50
Medicine or Surgery	... ,,	20
Obstetrics and Gynaecology	... ,,	15

M.B.B.S. Degree Examination (Under New Regulations) :—

Pre-Registration—Same as under the Old Regulations.

First M.B.B.S. Examination—

Whole examination	... Rs.	45

Separate subjects after first appearance—

Organic Chemistry	... ,,	15
Anatomy or Physiology	... ,,	20

Second M.B.B.S. Examination—

Whole examination	... ,,	45

Separate subjects after first appearance—			
Pharmacology	...	Rs.	20
Hygiene	...	,,	20
Forensic Medicine	...	,,	15
Final M.B.B.S. Examination—			
Whole examination	...	,,	75
Separate subjects after first appearance—			
Medicine or Surgery	...	,,	20
Obstetrics and Gynæcology	...	,,	15
Ophthalmology	...	,,	15
Pathology and Bacteriology	...	,,	20
M.D. or M.S. Degree Examination—	...	,,	200
Oriental Title Examinations—			
Vidya Praveena—Preliminary or Final	...	,,	12
Bhasha Praveena—Entrance Test	...	,,	5
Bhasha Praveena—Preliminary or Final	...	,,	12
Bhasha Praveena—Sanskrit only	...	,,	5
Bhasha Praveena—Modern Indian Language only		,,	10
Certificate of Proficiency—	...	,,	10
Master of Oriental Learning—	...	,,	100
Diploma in Librarianship—			
Whole examination	...	,,	20
Each group	...	,,	10
Diploma in Music	...	,,	15

Note :—It shall however be competent for the Syndicate to waive payment of the examination fees by students belonging to the depressed classes subject to the following conditions :—

(1) that the candidate is appearing for the first time for the examination concerned ;

(2) that he is poor ;

(3) that in the case of a college student, he is recommended for the grant of the concession by the Principal of the college in which he completed his course for the examination ;

(4) that he could not get the benefit of the concession shown in G.O. No. 2396 L. of the Public Works and Labour Department dated 20th October 1927 for want of sufficient funds with the Labour Commissioner, Madras ; provided that in the case of students belonging to the depressed classes a half-fee concession will be granted in respect of examination fees, if they satisfy the first three conditions above mentioned.

For registration of graduates: Statute.

4. A fee for Registration of graduates shall be levied as fixed under Section 3 of Chapter XXIV of the Code (Vol. I).

For Supplying marks: Ordinance.

	Rs.	A.
5. (*a*) For supplying marks to a candidate obtained at any examination other than the B.A. and B.Com. Degree Examinations ...	2	0
(*b*) For supplying marks to a candidate obtained at the B.A. and B.Com. Degree Examinations for each part ...	2	0
(*c*) For supplying marks to a candidate obtained at the Intermediate examination for each part passed separately ...	2	0
(*d*) For supplying detailed marks to a candidate obtained at examinations—for the details of each subject comprising a minimum (additional fee) ...	1	8

For Change of name: Ordinance.

6. The fee for recognition of change of name in each case shall be Rs. 10.

For Migration Certificate: Ordinance.

7. A fee of Rs. 5 shall be charged for issuing a migration certificate giving permission to graduates and under-graduates of this University proposing to apply for examinations of other Universities ;

Provided however that no fee will be charged in respect of students migrating to other Universities to take up courses leading to degrees not provided for in the Andhra University ;

Provided also that applications for refunds of Migration fees under the above proviso, shall reach the Registrar not later than six months from the date of issue of the Migration Certificates.

8. A fee of Rs. 2 shall be charged whenever a copy of an application for any of the University examinations is furnished. For Copy of an Examination application : Ordinance.

9. A fee of Rs. 3 shall be charged for each certificate (Matriculation or Intermediate) issued on application received after the prescribed date. For Certificates not applied for in time : Ordinance.

10. The penal fee levied for non-attendance at Convocation after applying for permission to attend the same shall be that prescribed in Section 2 of Chapter XVI of the Code (Vol. I). For non-attendance at Convocation : Statute.

11. A fee of Rs. 3 shall be charged for scrutiny of the S.S.L. Certificate of a candidate who sat for S.S.L.C. Public Examination in a previous year. For Scrutiny of the S.S.L.C.: Ordinance.

12. A fee of Rs. 5 shall be charged for each application for xemption from the production of attendance certificates. For Exemption from production of attendance certificate Ordinance.

Note.— Applications for exemption received within 10 days after the prescribed dates will be accepted on the payment of penalty of Rs. 5/- at the discretion of the Vice-Chancellor subject to the condition that the reasons given for delay are satisfactory.

13. A fee of Rs. 5 shall be charged for each application for recognition of an examination of another University and of the S.S.L.C. Examination or European High School Examination conducted by bodies outside the jurisdiction of this University. For Recognition of outside examinations · Ordinance

14. A fee of Rs. 5 shall be charged for issuing a pass certificate. For Duplicate Certificate Ordinance.

15. A fee of Rs. 2 shall be charged for issuing a provisional certificate to a successful candidate before the Degree is conferred or before a certificate is ordinarily issued. For Provisional Certificate Ordinance.

For Extract from Register Ordinance.

16. A fee of Rs. 2 shall be charged for issuing an extract from the Register of Candidates for an examination or from the Register of Matriculates.

For Eligibility Certificate: Ordinance.

17. A fee of Rs. 5 shall be charged for supplying an Eligibility Certificate to eligible S.S.L.C. holders of the University.

For Colleges of the University: Ordinance.

18. (a) The fee for registration of an application for admission to Colleges of the University shall be Rs. 2.

(b) The admission fee to Colleges of the University shall be Rs. 5 which shall be paid together with the first fees payable to the University.

(c) The tuition fee shall be Rs. 40 for Honours courses, M.Sc. Degree Examination and Diploma courses in Science and Rs. 38 for Pass courses per term each academic year consisting of three terms.

Note.—It shall however be competent for the Vice-Chancellor to sanction the levy of tuition fee at half the rate prescribed above for deserving poor students, preference being given to Mussalmans, Oriyas, girls and members of the backward classes and castes approved under Section 92 of the Madras Educational Rules subject to the following conditions :—

(1) Concession shall be given only in the case of those students whose parents or gurdians have been proved to the satisfaction of the Vice-Chancellor as being so poor that without the grant of the concession it would not be possible for those students to continue their studies.

(2) That the students are natives of the districts within the territorial jurisdiction of the Andhra University.

(3) That certificates of poverty, if any, submitted by the students shall be from the Principals of Affiliated Colleges or officers of the Revenue Department of rank not lower than that of a Deputy Tahsildar and shall indicate the approximate annual income from all sources of the parent or guardian.

But no student who is in receipt of any scholarship or stipend or other monetary assistance from the funds or resources of the University shall be eligible for the grant of the concession.

The total of the fee income foregone by way of such concessions shall not exceed 5 per cent of the total fee income estimated on the basis of enrolment for the year.

(d) The fees for residence shall be those prescribed by the Syndicate from time to time.

(e) The games or athletics fee shall be Rs. 3 per term which shall be paid with the tuition fee for each term.

(f) The Reading Room and Magazine fee shall be Rs. 3 per term which shall be paid with the tuition fee for each term.

(g) The Library fee shall be Rs. 2 per term which shall be paid with the tuition fee for each term.

(h) The University Union fee shall be Re. 1 per term which shall be paid with the tuition fee for each term.

(i) The Laboratory fee (in the case of the Jeypore Vikrama Deo College of Science and Technology) shall be Rs. 5 per term which shall be paid with the tuition fee for each term.

(j) The Caution fee (in the case of the Jeypore Vikrama Deo College of Science and Technology) shall be Rs. 15 which shall be paid with the tuition fee on admission.

Note.—This mount will be refunded to the student at the time of his leaving the College after deducting the moneys, if any, due from him to the University on account of loss or damage caused to the properties of the University.

(k) The Stationery fee of Re. 1 per year shall be paid with the tuition fee for the first term.

(l) Medical Inspection fee of Re. 1 per annum payable with the tuition fee for the first term.

(m) The University Colleges and Chronicle fee shall be Re. 1 per year payable with the tuition fee for the first term.

The above fees are compulsory for all students, and shall be paid within a week of the commencement of the term. The penal fee for the non-payment of fees on due date shall be reckoned at annas 4 for each day intervening between the due date and the date of payment or one rupee per week, whichever is less. Should however the period of default extend beyond fifteen days, the student's name shall be removed from the roll of the College and shall not be re-entered during the course of the term till all the prescribed fees and an additional penal fee of Rs. 5 are paid. Penal fees on defaults extending beyond a term shall be decided by the Syndicate.

For Librarianship Course Ordinance

19. The fee for registration of an application for admission to the course in Librarianship shall be Rs. 2 and the tuition fee per term for the course shall be Rs. 20.

For verification of valuation of answers and totalling of marks Ordinance.

20. Information as to whether a candidate's answers in any particular head or heads of any examination have been valued and marked will be supplied to the candidate on his forwarding, in case he is a candidate appearing from any college, through the Head of the Institution, and in case he is a private candidate,

directly, within one month of the declaration of the results in the examination in question, an application accompanied by a fee of Rs. 25 for each head. If as a result of the verification made under this clause it is discovered that there has been an omission to value or mark any answer or answers or a mistake in the totalling of the marks, the fee for verification shall be refunded to the applicant.

The fee is only for verification whether the candidate's answers in any particular head have been valued and whether the totalling has been correct and not for revaluation of answers. No answer paper shall be revalued by an examiner after the marks have once been sent to the Registrar.

CHAPTER XXXVII

MATRICULATION

(*Regulations*)

Matriculation of S.S.L.C. holders.

1. *Subject to such rules and directions as the Syndicate may issue from time to time, holders of completed Secondary School Leaving Certificates issued under the authority of the Government of Madras or such other authority as may have been accepted by the Syndicate, may be admitted by the Head of an Affiliated College to a University course of study, and when so admitted shall be registered as Matriculates of the University. Women holders of such certificates who wish to study privately for the Intermediate Examination may submit their certificates to the Syndicate, and the Syndicate, if satisfied with their certificates, shall order their registration as Matriculates of the University.

Matriculation of those other than S.S.L.C. holders.

2. Other candidates for Matriculation shall be required to pass some other examination accepted by the Syndicate as equivalent thereto.

Register of Matriculates.

3. The Registrar shall maintain a register of all the Matriculates of the University.

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*Note.—The following examinations have been recognized by the Academic Council, in accordance with Section 33 (1) of the Act, as equivalent to the Matriculation Examination of the Andhra University :—

S.S.L.C. Public Examination conducted by the Provincial Government
European High School Examination
Matriculation Examination of any other Statutory Indian University including the Admission Examination of the Benares Hindu University.
Mysore S.S.L.C. Examination
Hyderabad (Deccan) High School Leaving Certificate Examination (1st and 2nd Class Certificates only)
Matriculation Examination of the Osmania University subject to the condition that the candidate seeking admission to higher courses obtains 50% of the marks in English.
Travancore S.S.L.C. Examination.
Cochin S.S.L.C. Examination.
Royal Indian Military College Diploma.
Cambridge Senior Certificate Examination.
London Matriculation Examination.
Oxford School Certificate Examination.
Dufferin Final passing out Certificate Examination in respect of both Executive and Engineering cadets.
High School Examination, and Intermediate Exam. in Commerce conducted by the Board of High School and Inter. Education, Rajputana (including Ajmere-Merwara), Central India and Gwalior.
The High School Examination conducted by the Board of High School and Intermediate Education, Allahabad.
The High School Examination conducted by the Board of Secondary Education, Delhi.
The High School Certificate Examination conducted by the Board of High School Education, Central Provinces and Berar.

CHAPTER XXXVIII

MATRICULATION EXAMINATION

(Regulations)

Conditions of admission

1. No candidate shall be admitted to the Matriculation Examination unless he shall have completed the age of fifteen years on or before the first day of the examination ; provided that the Syndicate may exempt from the operation of this Regulation any candidate who is specially recommended for such exemption by the Head Master of the school of which he is a pupil and who produces a certificate of physical fitness from a Registered Medical Practitioner. Applications for such exemption must be forwarded so as to reach the Registrar before the 1st of December preceding the examination.

2. Unless specially exempted by the Syndicate no candidate who is not a pupil of a recognized high school shall be permitted to appear for the examination.

3. A candidate who fails to pass the examination on the first occasion shall, on the next occasion on which he seeks admission to the examination, forward a second certificate in the form prescribed under Regulation 9 of Chapter LIX. No further certificates need be produced for subsequent appearances.

Recognition of Schools.

4. Schools falling under any of the following classes shall be recognized by the University :—

(*a*) Schools recognized by the Director of Public Instruction of Madras as teaching up to the standard of the Matriculation Examination.

(*b*) Schools in Ceylon certified by the Director of Public Instruction, Ceylon to be organized and conducted so as to ensure efficient training up to the standard of the Matriculation Examination.

(*c*) Schools in Indian States of Southern India certified by the Darbars of the State in which they are situated to be organized and conducted so as to ensure efficient training up to the standard of the Matriculation Examination.

Exemption from attendance certificate

5. The Syndicate shall have power to exempt from the production of the prescribed certificate of attendance (a) candidates who hold completed Secondary School-Leaving Certificates issued under the authority of the Government of Madras or such other authority as may have been accepted by the Syndicate and who have twice appeared for the Final Examination qualifying for such certificates, (b) candidates who, during the previous three years have been educated privately or in schools outside the territorial limits of the Andhra University, and (c) women candidates, provided that in each case they produce satisfactory evidence that they are of good character and that they have received suitable instruction. Applications for exemption from the production of the certificate of attendance should be forwarded so as to reach the Registrar before the 1st October preceding the examination.

Courses of study and subjects for examination.

6. The examination shall comprise five divisions : (i) English Language , (ii) Second Language ; (iii) Mathematics ; (iv) Elementary Science ; (v) History and Geography.

(*i*) *English Language.*

Text-books shall be prescribed of which a detailed knowledge may be required.

There shall be two papers set upon the English language : one paper of two-and-a half hours' duration, which shall be mainly upon the prescribed texts, and shall be designed to test the candidate's proficiency in composition and his knowledge of grammar and idiom ; and one paper of two-and-a half hours' duration, which shall consist of (a) composition and paraphrase not based on the texts, and (b) the conversion, expansion and condensation of sentences. Some of the exercises in the second paper shall be based on the texts. Paraphrase shall be treated as a test of the candidate's power to understand and give the general meaning of passages of prose and poetry.

(*ii*) *Second Language.*

One of the following languages at the option of the candidate :—

(a) Classical—Sanskrit, Arabic, Persian.

(b) Foreign—French, German.

(c) Modern Indian—Telugu, Kannada, Tamil, Oriya, Sinhalese, Hindi, Urdu, Marathi, Malayalam.

In each classical or foreign language there shall be one paper of three hours' duration divided into two parts, of which the first shall contain passages for translation from the text-books and questions on grammar and idiom, and the second shall contain unseen passages for translation from the selected language into English and from English into the selected language. To the second part of the paper not less than half the total number of marks shall be assigned.

In each of the Modern Indian Languages there shall be one paper of three hours' duration divided into two parts, of which the first shall contain questions on the text-books and on grammar and idiom, and the second part shall consist of original composition. The text prescribed shall be mainly in modern prose. To the second part of the paper not less than half the total number of marks shall be assigned.

(*iii*) *Mathematics.*

There shall be two papers set in Mathematics, one in Arithmetic and Algebra of three hours' duration, and the other in Geometry of two-and-a-half hours' duration.

(a) *Arithmetic.*—The principle and process of Arithmetic applied to whole numbers and vulgar and decimal fractions. The metric system. Approximations to a specified degree. Contracted methods of multiplication and division of decimals. Practice, ratio and proportion. Square and cubic measure. Direct application of the term *per cent* ; including interest, present-worth, profit and loss, exchange. Square root.

(b) *Algebra.*—Symbolical expression of general results in Arithmetic. Algebraical laws and principles and their applications. Factorization of simple functions. Equations, conditional and identical. Equations of the first degree in one, two and three variables and the principles involved in their solution. Solution of problems by means of such equations. Equations of the second degree in one variable and the principles involved in their solution.

Theory of positive integral indices. Square root. Graphs of simple algebraic functions. A working knowledge of logarithms (a knowledge of the theory is not required).

(c) *Geometry* : *Experimental.*—Construction of lines, angles, circles, perpendiculars, parallels, tangents, chords, triangles and regular polygons from given data Division of lines in given ratios. Bisection of angles. Graphical extraction of Arithmetical square roots.

Theoretical.—Angles at a point. Parallel straight lines. Triangles and rectilinear figures Areas. Ratio and proportion of similar triangles. Simple loci. Elementary propositions on circles. Proofs of the constructions in Experimental Geometry. Easy deductions.

A detailed syllabus in Geometry will be prescribed from time to time.

(*iv*) *Elementary Science.*

There shall be one paper of three hours' duration in Elementary Science comprising Elementary Physics and Elementary Chemistry, as defined in a syllabus.

(*v*) *History and Geography.*

There shall be two papers set in History and Geography each of two hours' duration.

(i) History.

(1) Outlines of the History of Great Britain and Ireland—a period or periods, as defined in syllabus, to be prescribed each year.

(2) Outlines of the History of India—a period or periods as defined in a syllabus, to be prescribed each year.

(ii) Geography

(1) Geography of India, Great Britain and Ireland, as defined in a syllabus

(2) Geography of Europe, Asia, Africa, America and Australia as defined in a syllabus.

Marks qualifying for a pass.

7. A candidate shall be declared to have passed the examination if he obtains not less than forty per cent of the marks in the English Language and not less than thirty-five per cent of the marks in each of the remaining divisions, provided that a candidate who fails to obtain the required minimum in one subject only but who passes in English and gains fifty per cent of the total number of marks shall be declared to have passed. All other candidates shall be deemed to have failed in the examination.

Classification of successful candidates.

Successful candidates who obtain not less than sixty per cent of the aggregate marks shall be placed in the first class and ranked in the order of proficiency as determined by the total marks obtained by each. Successful candidates who obtain less than sixty per cent and not less than fifty per cent of the aggregate shall be placed in the second class and ranked in the order of proficiency as determined by the total marks obtained by each. All other candidates who pass shall be placed in the third class.

SYLLABUSES

I. Theoretical Geometry

Angles at a point.—If a straight line stands on another straight line, the sum of the two angles so formed is equal to two right angles; and the converse.

If two straight lines intersect, the vertically opposite angles are equal.

Parallel straight lines.—When a straight line cuts two other straight lines, if

(i) a pair of alternate angles are equal, or

(ii) a pair of corresponding angles are equal, or

(iii) a pair of interior angles on the same side of the cutting line are together equal to two right angles,

then the two straight lines are parallel; and the converse

Straight lines which are parallel to the same straight line are parallel to one another.

Triangles and rectilinear figures.—The sum of the angles of a triangle is equal to two right angles.

If the sides of a convex polygon are produced in order, the sum of the angles so formed is equal to four right angles.

If two triangles have two sides of the one equal to two sides of the other each to each, and also the angles contained by those sides equal, the triangles are congruent

If two triangles have two angles of the one equal to two angles of the other, each to each, and also one side of the one equal to the corresponding side of the other, the triangles are congruent.

If two sides of a triangle are equal, the angles opposite to these sides are equal; and the converse.

If two triangles have the three sides of the one equal to the three sides of the other, each to each, the triangles are congruent.

If two right-angled triangles have their hypotenuses equal and one side of the one equal to one side of the other, the triangles are congruent

If two sides of a triangle are unequal, the greater side has the greater angle opposite to it, and the converse.

Of all the straight lines that can be drawn to a given straight line from a given point outside it, the perpendicular is the shortest

The opposite sides and angles of a parallelogram are equal; each diagonal bisects the parallelogram, and the diagonals bisect one another.

If there are three or more parallel straigh lines, and the intercepts made by them on any straight line that cuts them are equal, then the intercepts made by them on any other straight line that cuts them are also equal.

Areas.—Parallelograms of the same altitude on the same or equal bases are equal in area.

Triangles of the same altitude on the same or equal bases are equal in area.
Equal triangles on the same or equal bases are of the same altitude

Illustrations and explanations of the geometrical theorems corresponding to the following algebraical identities :—

$$k(a+b+c+\ldots) = ka + kb + kc + \ldots$$
$$(a+b)^2 = a^2 + 2ab + b^2$$
$$(a-b)^2 = a^2 - 2ab + b^2$$
$$a^2 - b^2 = (a+b)(a-b)$$
$$(a+b)^2 - (a-b)^2 = 4ab$$
$$(a+b)^2 + (a-b)^2 = 2a^2 + 2b^2$$

The square on a side of a triangle is greater than, equal to or less than the sum of the squares on the other two sides, according as the angles contained by those sides are obtuse, right or acute The difference in the cases of inequality is twice the rectangle contained by one of the two sides and the projection on it of the other

Loci.—The locus of a point which is equidistant from two fixed points is the perpendicular bisector of the straight line joining the two fixed points

The locus of a point which is equidistant from two intersecting straight lines consists of the pair of straight lines which bisect the angles between the given lines.

The locus of the vertices of all triangles which have the same base and the sum of squares of their sides equal to a given square is a circle having its centre at the middle of the base

The locus of the vertices of all the triangles which have the same base and the difference of the squares of their sides equal to a given square is a straight line perpendicular to the base

The locus of the vertices of all the triangles which have the same base and their vertical angles equal to a given angle is the arc of a segment of a circle.

The Circle - A straight line drawn from the centre of a circle to bisect a chord which is not a diameter, is at right angles to the chord; conversely, the perpendicular to a chord from the centre bisects the chord

There is one circle and one only, which passes through three given points not in a straight line

In equal circles (or, in the same circle) (i) if two arcs subtend equal angles at the centres, they are equal; (ii) conversely, if two arcs are equal they subtend equal angles at the centres.

In equal circles (or, in the same circle) (i) if two chords are equal, they cut off equal arcs, (ii) conversely, if two arcs are equal, the chords of the arcs are equal.

Equal chords of a circle are equidistant from the centre, and the converse.

The tangent at any point of a circle and the radius through the point are perpendicular to one another

If two circles touch, the point of contact lies on the straight line through the centres.

The angles which an arc of a circle subtends at the centre is double that which it subtends at any point on the remaining part of the circumference.

Angles in the same segment of a circle are equal, and if the line joining two points subtends equal angles at two other points on the same side of it, the four points lie on a circle

The angle in a semi-circle is a right angle, the angle in a segment greater than a semi-circle is less than a right angle; and the angle in a segment less than a semi-circle is greater than a right angle.

The opposite angles of any quadrilateral inscribed in a circle are supplementary; and the converse

If a straight line touches a circle, and from the point of contact a chord be drawn the angles which the chord makes with the tangent are equal to the angles in the alternate segments

If two chords of a circle intersect either inside or outside the circle, the rectangle contained by the segments of the one is equal to the rectangle contained by the other and the converse.

Ratio and Proportion—(a) Definition and elementary theorems connecting the antecedents and consequents.

A given straight line can be divided internally in a given ratio at one and only one point and externally at one and only one point.

A straight line drawn parallel to one side of a triangle cuts the other two sides or those sides produced, proportionally; and the converse

If the vertical angle of a triangle is bisected internally or externally the bisector divides the base internally or externally into segments which have the same ratio as the other sides of the triangle; and the converse.

In equal circles, angles, whether at the centres or circumferences, have the same ratio as the arcs on which they stand.

If two triangles have one angle of the one equal to one angle of the other their areas are proportional to the rectangles contained by the sides about the equal angles Similarly for parallelograms having one angle of the one equal to one angle of the other.

Similar Triangles.—If two traingles are equiangular, then their corresponding sides are proportional; and the converse.

Two traingles, which have one angle of the one equal to one angle of the other and the sides about these equal angles proportional, are similar.

The areas of similar triangles are in the ratio of the squares of the corresponding sides

2. Elementary Science

[*The examination shall test whether the subjects included in the following syllabus have been taught by the aid of the experimental demonstration—wherever this is possible. The application of physical and chemical facts and principles to experience in ordinary life should receive particular attention.*

It is desirable that, as far as the accommodation and equipment of the school will allow, pupils receive practical instruction in the physical and chemical processes included in the syllabus.]

a. *Physics.*—Measurement of length Meaning of a unit and the measurement of a physical quantity. British and metric units; their multiples and sub-multiples. Derived units of area and volume. Measurement of area and volume (a) Physics.

Measurement of time. Unit of time. Rotation of the earth. Measurement by simple pendulum.

Speed: its measurement involving length and time; calculation of speed in given cases. Elementary ideas regarding acceleration Illustration of First Law of Motion; definition of force

Matter: definitions. Measurement of mass. British and metric units; determination of mass by spring balance, and by ordinary balance. Density and specific gravity

Gravitation: All matter attracted by the earth; illustration of Second Law of Motion; attraction is mutual; illustration of Third Law of Motion Universality of gravitation Weight of a body. Distinction between mass and weight

Properties of matter: extension, inertia, gravitation, divisibility, porosity, hardness, elasticity, transparency and opacity, cohesion, ductility, malleability, brittleness, plasticity, viscosity The three states of matter Changes of state produced by heating and cooling. Permanent and temporary effects of heating different substances; effects on organic substances, tempering of metals.

Simple machines. The lever its general principle and application to the common balance, and the wheel and axle The pulley, and the inclined plane · application to the screw.

Centre of gravity: definition. Experimental determination of centre of gravity in simple cases. Condition of equilibrium of a body resting in a given position; stable, unstable and neutral equilibrium. The common balance; how mass is measured by weighing.

Solids: Permanence of shape and volume which are only altered by application of forces.

Liquids: no permanent shape. Surface of liquid at rest horizontal. Pressure defined. In fluids it acts in all directions and is greater at greater depths. Transmission of pressure and its evaluation. Bramah Press. The principle of Archimedes; its experimental proof and applications.

Gases: how distinguished from liquids Gases have weight. Balloons. Pressure of the atmosphere; the mercury barometer; variation of atmospheric pressure with height proved by mercury barometer; the water barometer. Evalution of pressure of atmosphere by means of barometer; applications, Air-pump; Water pump. Pressure of a gas; Boyle's Law.

Temperature: Liquids expand by heat, the special case of water. Thermometer used for measuring temperature by observing change of volume of liquid. The mercury thermometer; method of graduating, determination of fixed points; fundamental interval; the Centigrade and Fahrenheit scales. Thermal expansion of solids, liquids and gases

Distinction between heat and temperature. Heat as a quantity and how it may be measured the thermal unit; specific heat Changes of physical state due to heat Fusion and latent heat of fusion, evaporation and ebullition and latent heat of evaporation Water vapour present in the atmosphere and determination of its amount. Cooling produced by solution and evaporation; freezing mixtures. The conduction and convection of heat; convection currents in the atmosphere and ocean: the trade winds; land and sea breezes and gulf stream. The circulation of water vapour in the atmosphere, clouds, rain

Light Rectilinear transmission Rays and pencils of light, shadows etc. produced by different sources, and images of sources produced by pin-holes The laws of reflection of rays of light reflection of pencils by plane mirrors and images formed by plane mirrors. Direct reflection of pencils from concave spherical mirrors; experimental proof of law of distances. The laws of refraction of light: refraction of rays through a plate and a prism. Refraction through a convex lens experimental proof of law of distances, the principle focus of a lens Image formed by a convex lens: the simple microscope; the photographic camera; the telescope Analysis of white light by a prism; the method of producing, and order of colours in the spectrum. The spectrum of sunlight, and of candle light. Recombination of the colours of the spectrum into white light.

Electrification by friction, positive and negative electrifications. Laws of attraction and repulsion. Conductors and non-conductors. Simple voltaic cell; Grove's cell. Electric current Magnetic effects of currents in straight and coiled wires. Simple galvanometer Heating effects of currents. Simple facts of electrolysis.

Magnetic substances. Laws of magnetic attraction and repulsion. Magnetic induction. Methods of magnetization.

Graphic representation by use of squared paper of the relation between any two of the physical quantities referred in the syllabus

(b) Chemistry.

b. *Chemistry*—Examples of mixtures and solutions. (1) sand and sugar, (2) sulphur and iron filings, (3) sand and salammoniac, (4) copper sulphate and water. Explanation of the processes of separating the ingredients of these mixtures. filtration, decantation, mechanical or magnetic separation, evaporation, distillation, sublimation.

Chemical compounds. Characteristic differences between compounds and mixtures; illustration.

Chemical combination illustrated by (1) candle burning in air, (2) sulphur burning in air, (3) magnesium wire burning in air, (4) quicklime combining with water.

Chemical decomposition illustrated by (1) heating mercuric oxide, (2) action of sodium on water, (3) heating potassium chlorate, (4) heating lead nitrate.

Iron in contact with air and water is converted into rust. Rusting is oxidation Copper, lead, mercury, magnesium, sulphur and phosphorus, also oxidize; but their oxidation takes place at different temperatures. Rapid oxidation. Combustion of candle, the products of the combustion are heavier than the candle itself. One of these products is a gas which turns lime-water milky and it is the same product which is obtained when charcoal burns in air. Water is another product of the combustion Similar observation may be made and similar conclusions deduced when oil burns in air Structure of a candle flame.

The rust or oxide is always heavier than the substance from which it is formed. When a substance (e. g iron or phosphorus) oxidises in a confined volume of air, about one fifth of the air ultimately disappear Remaining air is inactive (e. g. candle will not burn in it) Composition of air has two components active (oxygen) and inactive (nitrogen)

Oxygen: its discovery, its mode of preparation and properties Oxides: products formed when a candle, charcoal, sulphur, phosphorus, sodium or iron burns in Oxygen Burning in oxygen and air compared Illustrations of acid and alkaline properties

Hydrogen produced by the action of sodium on water Products of the decomposition. Same gas is produced by dilute sulphuric acid or hydrochloric acid on zinc, or on iron Properties of hydrogen, its density, and its combustion with air or oxygen Water the sole product of this combustion.

Elements and compounds Two ways of determining the composition of compounds (i) by synthesis, (ii) by analysis, illustrated by the case of water Synthesis of water (i) by burning hydrogen in air or oxygen, (ii) by passing hydrogen over heated copper oxide. Analysis or decomposition (i) by action of sodium on water, (ii) by passing steam over red hot iron filings, and (iii) by electric current Composition of water by weight and by volume Constancy of composition and chemical compounds illustrated by the case of water Solvent action of water, crystallization, forms of crystals, water, Solvent action. Solubility of gases in water, carbonic acid gas, air and oxygen. Soda water, spring, river, well and sea water Suspended and dissolved impurities. Purification by distillation. Extraction of salt from sea water by evaporation; salt pans.

Carbon: the different forms in which it occurs, their properties and uses. Carbon burnt in air or oxygen produces carbon dioxide. This gas is always formed when candles, oil, etc burn. Its preparation and properties. Action on lime-water exhaled by living animals, action of plants on carbon dioxide. Solution of carbon dioxide in water and properties of the solution. Hard and soft water; permanent and temporary hardness. Methods of softening hard water.

Nitrogen the inactive constituent of air; preparation and properties. Two of its important compounds, *viz* nitric acid and ammonia.

(a) Nitric acid its preparation from nitre and sulphuric acid. Its properties; power of dissolving copper and mercury and many other metals. Relations between acids, bases and salts illustrated by (1) nitric acid and caustic soda, (2) magnesium oxide and sulphuric acid, (3) lime and hydrochloric acid.

(b) Ammonia. its preparation and properties. Solubility in water; power of neutralizing acids and forming salts, such as ammonium chloride and nitrate; behaviour of these salts on heating.

Hydrochloric acid and chlorine. Treatment of common salt with sulphuric acid and production of hydrochloric acid gas. Properties of this gas, solubility in water. Production of chlorine from hydrochloric acid and manganese dioxide. Its properties: its power of combining with hydrogen and with metals, such as antimony, to form chlorides. Bleaching action of chlorine.

Sulphur: the different forms: their properties. The changes induced by heat—when burnt in air or oxygen produces sulphur dioxide. Sulphuric acid its properties and uses.

Phosphorus: the different forms, their properties and uses.

Silicon: occurrence in nature. Chief compound silica. Occurrence of silica in nature, free and combined as silicates. Chief form of silica, quartz, sandstone, flint.

Metals and non-metals: their general properties.

Sodium and potassium their occurrence and properties. Distinguishing properties of the alkaline metals; their more important compounds, common salt, Glaber's salts, washing soda, sodium bicarbonate, caustic soda, potassium carbonate, potassium chlorate, caustic potash, saltpetre, potassium permanganate. Gunpowder.

Calcium: Chief compound calcium carbonate. Its occurrence and various forms. Limestone burnt into lime in lime-kilns. Slaked lime. The use of lime in making mortar and plaster.

Calcium sulphate · gypsum and plaster of Paris.

The occurrence, general method of preparation, properties and uses of the following Metals:—

Zinc, iron, copper, mercury, lead and silver. Their chief oxides and their salts which have been used or produced in experiments and illustrations included in the above syllabus.

3. History of Great Britain and Ireland

Pre-Norman Period.—The early inhabitants of Britain: their modern descendants; what languages they speak, where they live. The Roman occupation; Agricola. The coming of the English; their original homes their chief tribes. The conversion of the English Celtic and Roman Christianity; the supremacy of the latter, reasons and results, the struggle for supremacy between the Heptarchy Kingdoms the supremacy of Wessex The coming of the Northmen; who they were, the results of their coming The struggle between Wessex and the Northmen, the victory of Wessex Alfred · Athelstan; Edgar Dunstan The Danish conquest reasons · Canute The English line restored

The Norman and early Plantagenet Period—The Norman conquest · its causes and effects. Character of the Norman kings and of their rule. Feudalism. The opposition of baronage to the royal power The anarchy of Stephen's reign Order restored by Henry II. His aims his quarrel with Becket: reasons and results. The reforms of Henry II His foreign possessions; extent. His quarrel with the barons. The loss of Normandy, its effects. The baronage of a national party struggle with John the Great Charter The weak rule of Henry III subservience to the Papacy; foreign favourities The Barons' War: Simon de Montfort, his character and aims Revival of the monarchy under Edward I effect of the baronial war seen in his reforms. The beginnings of Parliament The conquest of Wales The attempted conquest of Scotland. Scotland and France. Edward II's reign Bannockburn: temporary supremacy of the baronial party.

The later Plantagenet Period.—Edward III's reign. The Hundred Years' War causes Sluys Crecy Poitiers the treaty of Bretigny. the Black Prince. Increased power of the parliament Social and economic changes: the Black Death, its result Wat Tyler the 'Peasants' Rebellions. The attempted autocracy of Richard II: his overthrow. Literary activity: Langland and Chaucer. The Lancastrian kings the strength of Parliament at the beginning. Beginning of dynastic troubles. Early religious reforming movement · Wycliff · the Lollards. Rebellions against Henry IV. Renewal of the Hundred Years' War reasons. Havre Agin-court: the Treaty of Troyes. The minority of Henry VI: failure in the Hundred Years' War, reasons, close of Hundred Years' War, effects Renewed social troubles. Outbreak of

dynastic Wars of the Roses; causes chief events. Warwick, the king-maker. The Yorkist Dynasty: its character and aims: reasons for its power. The effects of the Hundred Years' War on English political, commercial and social life.

The Tudor Period.—The strength of the Tudor possession of the throne. Their despotic rule The overthrow of rival claimants. The final suppression of the old baronage The creation of a new subservient baronage. The need for peace. Henry VII's policy. Henry VIII's character. The career of Wolsey: foreign policy. Ecclesiastical reform: the Reformation in England its causes. The overthrow of the Papal authority. The phases of the Reformation in England under Henry VIII, Edward VI, Mary and Elizabeth. Comparison with continental Reformation Luther and Calvin Social results of the Reformation: the rebellions under Edward VI: Elizabeth's Poor Law. The jealousy of England and Spain: cause. English navigators: the development of English commerce. Elizabeth's foreign policy: the war with Spain: its results Literary activity of the sixteenth century, its connections with the Reformation and the Renaissance. The three religious parties under Elizabeth: the Roman Catholics: the Anglicans: the Puritans their aims and characteristics: chief sects of Puritans. The Anglicans supreme: policy of uniformity: absence of idea of toleration. The Puritans and royal political supremacy.

The Stuart Period.—King and Parliament. The difference between the absolutism of the Tudors and the Stuarts. Suppression of the Roman Catholics; attempted suppression of the Puritans by James I. Growing hostility to royal power: the influence of Puritanism in the party of opposition. The chief points of dispute between the Crown and Parliament. The failure of Charles I's foreign policy: increased opposition met by further claims of the prerogative. The Petition of Right. Temporary victory of the Crown. Renewed opposition over Ship Money and Laud's religious policy. The Bishop's Wars. Summoning of Parliament. Early acts of Long Parliament. Outbreak of Civil War immediate and remote causes. Chief events of the war. The victory of the Parliament: reasons; Breach between the Parliament and the Army. The execution of Charles I. The Commonwealth: rule of the Puritan Minority. Cromwell in Ireland and Scotland. The Protectorate Cromwell's character and aims. Reasons of his success and the failure of his system. The Restoration: why possible. Net gains of the Rebellion. Puritan Literature: Milton: Bunyan. The despotic and Catholic policy of Charles II and James II: the ministers of Charles II: his French intrigues. The Whigs and Tories: their respective aims. The Exclusion Bill. Temporary triumph of absolutism. Its overthrow at the Revolution: James's rashness compared with Charles's discretion.

The Bill of Rights: the triumph of Parliament. James II in Ireland: William III and Scotland. The beginnings of Party Government under William III and Anne: the unscrupulousness of party politicians: Harly: St. John:

Marlborough. The reforms of William III · the Act of Settlement. The wars with France : causes Marlborough as a general : the chief events of the war. The treaty of Utrecht : English colonial gains.

The Hanoverian Period.—The Whig supremacy . Reasons for the discredit of the Tories 1715 rebellion. The rise and power of Walpole, his policy and method. The establishment of Party Government with Prime Minister and Cabinet. The reasons for Walpole's long tenure of Office. The rise of an opposition. The Family Compact · hostility with Spain and France · reasons Overthrow of Walpole. Whig supremacy continued with a war policy. The rise of the Elder Pitt. The war of the Austrian succession : England's share in it Colonial rivalry of France and England The Seven Years' War : its phases chief events. English gains in 1763. Pitt as a popular minister : his character and aims. The colonial policy of Pitt s successors · the loss of the American colonies. Chief events · Overthrow of the Whig supremacy ; reasons for the weakness of the Whig party. Final check to royal control of politics.

The Revolutionary Period.—The Tory rule of the Younger Pitt. Internal reforms and domestic policy of Pitt : comparison with the policy of Walpole. The outbreak of the French Revolution : Pitt forced into war. The revolutionary and Napoleanic wars : Chief events on sea and land. Death of Pitt : his character.

Nelson and Wellington : their careers and characters. Reasons for the success of England at sea. The role played by England in resisting the Napoleonic schemes. The downfall of Napoleon. Religious and literary activities of the period : Wesley . Burke. The industrial development : its nature and causes.

The 19th Century. (1815-1902).—The influence of the French Revolution in England. The great period of reform. Economic and social evils : their causes aud remedies : riots : socialists movements : the Chartists : the repeal of Corn Laws : Sir Robert Peel, Cobden and Bright and Free Trade : Factory Laws · the spread of education. Political reform : the extension of the franchise : Cabinet government municipal reforms Great ministers of the period : Russel · Palmerston · Disraeli : Gladstone : Salisbury. Colonial expansion during the period. Wars of the period : mainly frontier and colonial : the Crimean war : the Boer war : causes, results and chief events. The life and influence of Queen Victoria. Great poets and novelists of the century.

4. Indian History.

Pre-Mussalman Period :

1. Physical configuration of India. Distribution of land and water : mountains, rivers and the sea. Position in relation to the rest of the world. Historical consequence of the foregoing.

2. The aboriginal and non-Aryan races.

3. The Indo-Europeans (so-called Aryans). Their immigrations and settlement. Aryan culture. Social and economic conditions. Caste (till circa 500 B.C.]

4. Social, economic, religious and political conditions in the sixth century B.C Jainism and Buddhism The growth of the kingdom of Magadha

5 The satrapy of Darius (circa 500 B.C.). The invasion of Alexander. Its consequences and results.

6. Breakdown of local independence. The Mauryan Empire. Chandragupta, Asoka. Social, religious and economic conditions under the early Mauryans.

7. The disruption of the Mauryan empire. Rivalry between Brahmanism, Buddhism and Jainism and the Prakrit dialects and Sanskrit. The Sunga, Kanva and Andhra dynasties (circa A.D 250).

8. Foreign influence, invasions and immigrations, Indo-Greek, Indo-Bacterian, Indo-Parthian, and Indo-Scythian dynasties Revival of Buddhism Kanishka's empire. Graeco-Roman influence The Great Satraps of the West Religious and social conditions (till circa A D. 300)

9. The Gupta dynasty and empire. Brahmanic revival Literary activity. Religious and social conditions. Fa Hian.

10. The Huns, break up of the Gupta empire.

11. The reign of Harshavardhana Social, economic and religious conditions (till circa A.D 650) Hiouen Tsang. The early Chalukyan empire in the Dekhan. The Pallavas in South India.

12. Minor local dynasties in North India—Kabul, Punjab, Sindh, Magadha, Kanouj, Delhi; Behar and Bengal: Bundelkhand and the Central Provinces, Ajmir, Malwa and Gujarat.

13. The empire of the Dekhan to circa A D. 1300—The early Chalukyas, the Rashtrakutas, the later Chalukyas and the Yadavas of Devagiri.

14. The South Indian supremacy. The Pallavas. The Chola supremacy. Cheras and Pandyas. Hoysalas and the Kakatiyas. Economic and social conditions. Dravidian literary and religious activity.

Mediaeval India (to circa 1761):

1. Early Muhammadan invasions

2. Mahamud of Ghazni; Mahamud of Ghori. The Slave, Khalji, Tuglakh Shahi dynasties. Social, religious and literary conditions (circa A.D. 1400).

3. Break up of the empire of Delhi. Local Muhammadan dynasties in Jaunpur, Bengal, Malwa and Gujarat.

4. The Bahmini kingdom of the Dekhan; its break up, 1526; final conquest and absorption by the Mughal Empire.

5. History of the empire of Vijayanagar till A.D. 1565. The successors of Vijayanagar to circa 1750.

6. Rajputana till A.D. 1556.

7. The Great Mughals, 1526–1707.

8. The Maharathas to 1714.

9. Routes of Indo-European trade. The Saracen conquests and the results on Indo-European commerce. The age of discovery The Portuguese in India. Albuquerque Causes of the decline of the Portuguese power in India (till circa 1600.)

10. The decline of the Mughal empire 1707–1761. The Maratha conquests, 1714–1761. Rise of the Sikhs. Panipat.

Modern India down to the death of Queen Victoria:

1. Importance of sea power in Indian History. Early English attempts to reach India. Rivalry between the Dutch and the English till 1623. The French in India till 1741.

2. The Karnatic wars. Duplex and Clive. French supremacy in South India. The English in Bengal. The Black Hole tragedy Plassey. Final French attempts. Coote and Lally (till 1761)

3. The administration of Bengal, 1758–1771.

4. Rise of Haidar Ali. The First Mysore war The revival of the Maratha Confederacy Madhava Rau Peshwa (till 1772).

5. Warren Hastings.—English politics and Indian affairs (1748-72). The Regulating Act. Rohillas Benares. The first Maratha and second Mysore wars. Effects of the American War. Suffren on the Indian seas. The First Armed Neutrality. Successful end of Hastings' administration. His work. Pitt's India Bill

6. Cornwallis and Sir John Shore.—The Mysore war, Economic and administrative reforms. The policy of non-intervention.

7. Wellesley.—England and revolutionary France. War with Tippu. The second Armed Neutrality. The battle of Aboukir Bay. The Subsidiary System. Second and third Maratha wars. Minor reforms. Wellesley's work.

8. Cornwallis and Minto. Administrative reforms. Conference of Tilsit, Capture of Java.

9. Marquess of Hastings and Lord Amherst. Ghurka war The Pindari war. Last Maratha war. Extinction of the Peshwaship. First Burmese war. The Bhartpur affair. Internal affairs.

10. Bentick—His reforms

11. Auckland and Ellenborough.—Rise and history of Ranjit Singh. Afghanistan and Punjab. The first Afghan war and the 'avenging expedition.' Conquest of Sindh Gwalior affairs

12. Hardinge and Dalhousie.—The first and second Sikh wars. Annexation of the Punjab. The Second Burmese war. The doctrine of lapse. Dalhousie's annexations. Railways and Telegraphs

13. Canning.—The Mutiny. Canning's clemency. The Queen's proclamation. India under Crown. Financial and military reforms.

14. India under the Crown to the death of Queen Victoria.

5. Geography.

1. South Continents.

Australia.

1. Relief and Rivers of Australia.

2. Climate of Australia. The Seasonal distribution of temperature and rainfall.

3. Vegetation and animals; relation between rainfall and natural vegetation; regions of Australia; peculiarity of its animal life.

4. Life and work of the people with special reference to (a) East Coast Region, (b) Murray-Darling Basin, (c) Mediterranean regions of West Australia and Victoria.

5. Favourable position for trading with lands around the Pacific and Indian Ocean.

Africa.

6. Structure—effect upon the coastline, rivers and lakes of Africa, relief and drainage.

7. Climate and vegetation of Africa; apparent seasonal migration of the sun and the duplication of climatic and vegetation belts North and South of the Equator.

8. Chief natural regions of Africa.

9. Peoples of Africa.

10. Trade routes of the Indian Ocean.

South America.

11. Structure and relief ; rivers.

12. Climate and vegetation of South America ; the effect of a mountain barrier, of a cold current and of altitude upon rainfall and temperature ; Andean Zones.

13. People and states of South America ; the importance of minerals in the past and present development of the continents.

14. Temperate countries of South America—Argentina, Uruguay and Chille.

15. Tropical countries of South America—Brazil—the world's chief store house of tropical products

II. North America.

1. Structure and relief ; the work of rivers as illustrated on a large scale by the Colorado and Mississippi and as seen by actual observation of local streams.

2. Climate and vegetation : factors that modify climate as evidenced in North America ; natural regions of North America.

3. Population and political divisions ; immigration.

4. United States—

(a) North-eastern industrial and commercial region.

(b) South-eastern plantation region.

(c) Central farming region.

(d) The basins and mining regions of the Rockies.

(e) Pacific shorelands—fruit, grain, timber and minerals.

5. Dominion of Canada and Newfoundland.—

(a) Eastern Canada–agriculture, dairying, timber, fisheries, mining and manufacture.

(b) Prairie provinces.

(c) British Columbia.

6. Mexico, Central America and West Indies.

7. Transport and communications of North America and important links inround-the-world routes.

III. Eurasia and India.

1. Surface, relief and rivers of Eurasia.

2. Climate of Eurasia · the major climatic regions, comparison of temperature; conditions on east and west margins; effect of latitude and distance from the sea on range of temperature, causes of monsoons and their effect on climate of South-east Eurasia.

3. British Isles: relief; influence of the sea and the climate upon the life and activities of the people; fisheries and farming; the chief industrial regions and their outlets.

4. Western Mainland of Europe.—France—agriculture and industry; position of Paris and Marseilles. Belgium—plain of Flanders and the Sambre-Meuse Valley. Holland—a delta land reclaimed from the sea; its colonies and sea trade. Denmark—co-operative dairy-farming. Germany—plain and plateau, forestry and development of social industries; industries of Ruhr and Saxon coalfields.

5. Baltic Region—the new border states; Scandinavian peninsula—forestry and woodwork of Sweden.

6. Central Highlands of Europe; Czecho-Slovakia; its minerals and industries; agriculture of the Mid-Danubian plain. Alpine region—development of hydro-electric power and effect on industrial development.

7. Mediterranean region—influence of climate on plant adaptation and fruit culture. Spain—its mineral wealth but lack of coal. Italy—alluvial plain of Lombardy and its industrial development—peninsular Italy.

8. South-western lands of Asia—region of plateau and deserts with one important alluvial plain; its historical importance as a highway.

9. Central and Northern Eurasia—rich wheat and pasture lands as Rumanian and Russian plains—desert conditions of the Aral Sea Basin; tundra, tagia and steppe of Siberian plain; contrast development of this region with similar region in North America.

10. China—her dependencies. Effect of climate and relief upon occupations and industries.

11. Japan—A mountainous country, yet productive; agricultural, mineral and industrial development—importance of Korea.

12. South-east Asia and the East Indies.

13. Position, relief, soils and minerals of India and Burma.

14. Climate of India; her chief climate regions; means of irrigation.

15. Vegetation and animal life of India.

16. Peoples of the Indian Empire.

17. Survey of the Provinces and States—

(a) Mountain States.

(b) Great Plain

(c) Plateau states and provinces

(d) Madras.

(e) Bombay.

18. Occupations and Industries of India.

19. Trade, Transport and Seaports.

20. Ceylon.

IV. The World

1. Studies in climate—size and shape of the earth—movements of the earth, day and night, the seasons, annual and seasonal distribution of temperature, pressure winds and rainfall, ocean currents, natural vegetation.

2. Regions of the world—

(1) Tundra and Ice-cap.

(2) The Cold Forests.

(3) Broad-leaved Forests.

(4) Temperate grasslands.

(5) Mediterranean Lands.

(6) Desert Lands.

(7) Equatorial forests and tropical grasslands.

(8) Monsoon Lands.

(9) Islands of the Pacific.

(10) High mountain and plateau.

(11) Industrial Regions of Europe

(12) Industrial Regions of North America.

(13) Regions of the Empire.

Books recommended:

Text-books—

(1) The New Regional Geographies—Book IV. The World: Leonard Brooks. London University Press.

(2) Any one of the following :—

(*a*) India, World and Empire: Herbert Pickles. Oxford University Press.

(*b*) Our World · Morrison. Macmillan.

(*c*) Our World : Morrison and Subrahmanyam. Macmillan.

(*d*) The World : Dudley Stamp. Longmans, Green & Co.

Reference Books for Teachers :—

(1) Physiography : Herbertson. Oxford University Press.

(2) Every one's Book of the Weather : Franco Williams ; Sheldon Press.

(3) Out-door Geography : Hasted. Blackie.

(4) Surface of the Earth : Pickles. Cambridge University Press.

(5) Human Geography for Secondary Schools : Fairgrieve and Young. G. Philip and Son.

(6) A Graded Course of Geography · E. S. Price. G. Philip & Son.

(7) The Rambler Travel Books. Blackie.

(8) The World · Howarth and Bridewell. Oxford University Press.

CHAPTER XXXIX

INTERMEDIATE EXAMINATION IN ARTS AND SCIENCE

(Regulations)

Courses of Study.

1. Matriculates proceeding to a University course of study shall for two years each consisting of three terms ordinarily consecutive, undergo in an affiliated college courses of study in the following three parts :—

Part I—English.

Part II—Second Language.

One of the following languages at the option of the candidate—

(*a*) Classical—Sanskrit, Latin, Arabic, Persian, Pali.
(*b*) Modern European—French, German.
(*c*) Modern Indian—Telugu, Kannada, Tamil, Oriya, Hindi, Urdu.

Part III—Any three of the following subjects provided however no candidate shall be permitted to offer Biology along with either Botany or Zoology nor shall be permitted to offer any combination of subjects not approved in the foot-note * to this section ;

(1) Mathematics.
(2) Physics.

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* The following combinations are approved —

1. Mathematics, Physics, Chemistry
2. Mathematics, Physics, Electrical Engineering.
3. Mathematics, Physics, Mechanical Engineering.
4. Mathematics, Economics & Banking, Accy. & Gl. Com. Knowledge.
5. Physics, Chemistry, Botany.
6. Physics, Chemistry, Zoology.
7. Physics, Chemistry, Biology.
8. Physics, Chemistry, Logic.
9 Physics, Chemistry, Agriculture.

(Continued on the bottom of the next page)

(3) Chemistry

(4) Botany

(5) Zoology including Human Physiology

(6) Biology

(7) Geography

(8) Logic

(9) Indian History

(10) British History

(11) World History in outline

(12) Civics and Indian Administration

(13) An Advanced Language—an advanced course if the language taken be one taken under Part I or II or a less advanced course in a really third language.

(14) Economic Geography and Economic History

(15) Economics and Banking

(16) Accountancy and General Commercial Knowledge

(17) Agriculture

(18) Electrical Engineering

(19) Mechanical Engineering

(20) Surveying

(21) Drawing

(22) Music

(Continued from the bottom of the previous page)

10. Chemistry, Botany, Zoology.
11. Chemistry, Zoology, Agriculture.
12. Chemistry, Botany, Agriculture.
13. Chemistry, Biology, Agriculture.
14. Logic, Indian History, World History.
15. Logic, Indian History, British History.
16. Logic, Indian History, Advanced Language.
17. Logic ,Indian History, Music.

(Continued on the bottom of the next page.)

Transitory Regulations

(i) For the benefit of candidates who failed in September 1935 or earlier in languages, each forming as one of the optional subjects under Part III of the Intermediate Examination, the examination in those languages (with the same syllabuses and text-books in force up to the examination of 1935) will be held under Part III of the Intermediate Examination in March-April and September 1936, Thereafter no examination in those languages will be held and the candidates who fail in them in 1936 examination shall be permitted to offer any other subject approved by the Syndicate provided the new combination is one of those approved by the Academic Council.

(ii) For the benefit of candidates who failed in Ancient History as one of the optionals under Part III of the Intermediate Examination in 1935 or earlier, an examination in that subject shall be held in March and September 1936.

2. (i) The course of study in English under Part I shall consist in— English.

(a) the detailed study of certain of the set books.

(b) the perusal as distinct from detailed study of the other set books.

For this course, books in English Prose and Poetry shall be prescribed. The books prescribed under (a) above in any year

(*Continued from the bottom of the previous page.*)

18. Indian History, World History, Civics & Indian Administration.
19. Logic, Advanced Telugu, Advanced Sanskrit.
20. Indian History, Civics & Indian Administration, Advanced Language.
21. Indian History, World History, Music.
22. Indian History, British History, Advanced Language.
23. Indian History, British History, Economics & Banking.
24. Indian History, British History, Music.
25. Indian History, Advanced Telugu, Advanced Sanskrit.
26. Indian History, Advanced Sanskrit, Music.
27. Advanced Telugu, Advanced Sanskrit, Music.
28. Economic Geography & Economic History, Economics & Banking, Accountancy & General Commercial Knowledge

shall not be more than one play of Shakespeare ; about 900 lines of Modern Poetry and two Prose books while those prescribed under (b) above shall not exceed two books.

Second language.

(ii) The course of study in a second language under Part II shall consist in the detailed study in all the languages of the prescribed text-books and in the case of Modern Indian Languages the perusal also as distinct from detailed study of the prescribed books.

Optional subjects.

(iii) The course of study in the subjects under Part III shall be as prescribed in the syllabuses.

As for the languages the course shall be as indicated or regulated by the text-books which will be prescribed from time to time.

First appearance.

3. A candidate applying for the examination on the first occasion shall pay the fee prescribed for all the three parts of the examination though he may not be able to sit for all the parts thereof and thereafter may appear for any part or parts of the examination.

Subjects of examination and duration of papers.

4. A candidate shall be examined in—

Part I—*English*. There shall be three papers in English each of three hours' duration.

The first paper shall be on the books of poetry set for detailed study. The second paper shall be on the books of prose set for detailed study. The third paper shall be on composition and shall contain exercises designed to test the candidate's power to apply the principles studied in the course ; in particular, it shall contain (a) exercises in epitomising and paraphrasing passages of prose and poetry which shall not be taken from any of the books prescribed for detailed study or for perusal and (*b*) subjects for two short essays drawn from the subject matter of the books prescribed for perusal as distinct from detailed study and from topics of general interest. The papers in the examination shall be so set that candidates shall be able to get full marks in the examination without

answering questions on matters relating to purely literary criticism or scholarship.

Part II—*A second language.* There shall be two papers, each of three hours' duration, the first on prescribed text-books on prose and poetry and applied grammar, and other on (1) translation from and into English of seen and unseen passages in the case of classical languages, or (2) Composition, subjects for which will be selected from the set books prescribed for non-detailed study and translation from and into English of passages unseen by the student in the case of Modern European and Indian languages.

Note :—In the case of Telugu, not more than one question carrying 20% of the total marks for the whole paper shall be set on Grammar (as per syllabus prescribed) in the paper on prescribed text-books.

Part III—Special Subjects : There shall be two papers each of two hours' duration in theory in each of the subjects—Physics, Chemistry, Botany, Zoology, Biology and Agriculture. Each paper shall carry 50 marks. There shall also be one paper in practical in each of these subjects. The paper in practical shall be of three hours' duration and shall carry 50 marks—40 marks for the practical test and 10 marks for the laboratory note-books.

Candidates shall submit to the Examiners before the hour of the practical examination, their laboratory note-books duly certified by their Professors as a bona fide record of work done by them.

In the remaining special subjects (other than the six subjects mentioned above) there shall be two papers in each subject. Each paper shall be of 2½ hours' duration and shall carry 50 marks each.

Advanced Language.—In the case of classical languages there shall be two papers, the first paper being set on prescribed text-books relating to prose, poetry, grammar and rhetoric and the second on translation from and into English of unseen passages only. In the case of Modern Indian Languages there shall be two

papers, the first paper being set on prescribed text-books relating to prose, poetry, drama, and the second paper being set on grammar, prosody and poetics according to a prescribed syllabus. In the case of English there shall be two papers, the first paper being set on prescribed text-books and the second on rhetoric and prosody.

The text-books for each of the languages shall be prescribed from time to time on the recommendations of the Boards of Studies concerned.

Marks qualifying for a pass.

5. A candidate shall be declared to have passed the Intermediate Examination if he obtains (1) not less than 35 per cent of the marks in English under Part I, (2) not less than 35 per cent of the marks in a Second Language under Part II and (3) not less than 35 per cent of the marks in each of the three special subjects selected under Part III.

All other candidates shall be deemed to have failed in the examination.

Classification of successful candidates.

Out of candidates who pass in all the three Parts at one and the same examination, those who obtain fifty per cent and more of the total number of marks shall be placed in the first class and ranked in the order of proficiency as determined by the total marks obtained by each, and those who obtain less than fifty per cent of the total number of marks shall be placed in the second class.

Candidates who pass in all the Parts at the same examination and obtain not less than sixty per cent in Part I or Part II or in any subject of an optional group under Part III shall be declared as having gained distinction in that subject.

Candidates who obtain the prescribed minimum number of marks in each part in separate examinations and are declared to have passed the whole examination shall be placed in a separate list in the second class; provided that a candidate offering any one or more of the six Science subjects mentioned in section 4 *supra* shall not be declared to have passed the examination in that subject or subjects in Part III unless he *also* obtains a minimum of 30 per cent of marks in each division of the examination in each

subject, viz., (i) written examination and (ii) practical examination including note-books.

(Transitory Regulations)

6. No examination under the Old Regulations (i. e. in force prior to the academic year 1928-29) shall be held as from the Intermediate Examination of March 1931.*

7. Candidates for the Intermediate Examination who commenced their courses of study for that examination under the Regulations in force prior to the academic year 1928-29 shall be permitted to complete the Intermediate Examination under the New Regulations subject to the following provisions :—

(a) A candidate who has passed Part I of the examination under the Old Regulations shall be deemed to have passed in Parts I and II under the New Regulations.

(b) A candidate who has passed Part II of the examination under the Old Regulations shall be deemed to have passed in Part III under the New Regulations.

(c) A candidate who has failed in both parts of the examination under the Old Regulations shall be required to pass in all the three parts of the examination under the New Regulations provided that he shall take for Part II of the examination under the New Regulations the same language in which he appeared for Part I-B of the examination under the Old Regulations and for Part III of the examination under the New Regulations the same subjects in which he appeared for Part II of the examination under the Old Regulations, it being at the option of candidates who took Group (ii) (Natural Science, Physics and Chemistry) under the Old

*For the Old Regulations, *vide*, Appendix to the A. U. Code for 1929-30.

Regulations to offer any three of the following subjects :—Botany, Zoology, Physics and Chemistry —for the examination under the New Regulations. It shall be permissible in the case of candidates coming under this Regulation to take two languages under Part III of the New Regulations and the Examination in those languages shall in each be as for an advanced course in a second language.

On and after the 1st June 1929 candidates for the Intermediate examination who had completed the first year course of study prescribed for the examination under the Regulations in force immediately prior to the academic year 1928-29 and had earned the attendance and progress certificates prescribed for that year and were unable to complete the course under those Regulations, will be permitted to complete the second year course of study by attending classes under the New Regulations and to appear for the examination under the New Regulations. They shall be exempted from the production of attendance certificates required for the first year of the course.

8. Candidates who fail in Part III of the Intermediate Examination with the combinations deleted from the examination of 1941 or 1942 shall be permitted to complete the examination with those combinations (with the same syllabuses and text-books prescribed for the examinations of 1941 or 1942 as the case may be) up to and including the examination of September 1944. Thereafter, they should select the combinations from the approved list only.

SYLLABUSES

Part II-Telugu

Applied Grammar

I

1. ఆంధ్రవర్ణ సమామ్నాయము :—అచ్చులు, హల్లులు, ఉభయములు, హ్రస్వములు, దీర్ఘములు, పరుషములు, సరళములు, ప్లుతములు.

2. కళాద్రుతప్రకృతికములు.

3. సంధులు.

(i) అకారసంధి, ఇకారసంధి, ఉకారసంధి, ఆమ్రేడితసంధి, ప్రకృతి ప్రత్యయసంధి, సంహితలో యడాగమము.

(ii) ద్రుతములైన అచ్చు నిలుచునప్పటి కార్యములు :—అవసానద్రుత కార్యములు, సరళస్థిరపరకద్రుతిసంధి, సరళాదేశసంధి.

(iii) సహజ సంధి.

(iv) సామాన్యములగు సంస్కృత సంధికార్యములు :—సవర్ణదీర్ఘసంధి, గుణసంధి, వృద్ధిసంధి, యణాదేశసంధి.

II

4. ఛందఃప్రకరణము

(i) గురు లఘు సామాన్యలక్షణము.

(ii) మాత్రాగణములు, ఇంద్ర సూర్యగణములు.

(iii) యతిప్రాసముల స్వరూపము. (దిఙ్మాత్రము.)

(iv) కందము, తేటగీతి, ఆటవెలది, సీసము, ద్విపద, ఉత్పలమాల, చంపకమాల, శార్దూలము, మత్తేభము—వీని లక్షణములు.

5. అలంకారప్రకరణము :—ఉపమ, రూపకము, ఉత్ప్రేక్ష, అతిశయోక్తి, స్వభావోక్తి, అర్థాంతరన్యాసము.

Part III—(1) Mathematics

In addition to the portions prescribed for the Matriculation the course shall comprise Algebra, Plane Trigonometry and Geometry A candidate shall be required to be acquainted with the use of logarithmic tables and to be able to solve questions by graphic methods.

(*a*) *Algebra.*—Algebraical laws and principles and their applications Ratio and proportion. Theory of indices

Elementary Theory of Logarithms. Variation Simple surds. Solution of equations of the second degree in one or two variables and of equations of higher degree whose solution depends on them. Theory of the equation and expression of the second degree in one variable. The three progressions and other series whose summation depends on arithmetical and geometrical series. Permutations and combinations where, the things are all unlike The Binomial theorem for the positive integral exponent and direct applications of the theorem for any exponent.

(*b*) *Plane Trigonometry*—Measurement of Angles. Trigonometrical functions and their relations to one another. Solution of simple trigonometrical equations. Addition, multiplication and division formulæ. Properties of triangles, and of the circles connected with them. Solution of triangles Application of logarithms to trigonometrical computations, measurements and distances.

(*c*) *Geometry* (1) *Pure Geometry* (*plane*).—Similar figures Concurrence and collinearity. Properties of triangles Properties of circles. Harmonic Sections.

N.B.—The order in which the theorems are stated in the Syllabus *is not imposed as the sequence of their treatment and practical questions may be asked in the examination bearing directly on the theory.*

Similar Figures.—If two triangles are equiangular their corresponding sides are proportional and the converse.

If two triangles have one angle of the one equal to one angle of the other and the sides about these equal angles proportional, the triangles are similar.

Two triangles are similar, if the sides of the one are respectively parallel or perpendicular to the sides of the other.

If two triangles have two sides of the one proportional to two sides of the other, and an angle in each opposite one corresponding pair of these sides equal, the angles opposite the pair are either equal or supplementary.

If from the right angle A of a right-angled triangle ABC, AD is drawn perpendicular to BC, then (1) AD is the mean proportional between BD and BC, (2) BA is the mean proportional between BD and BC, and (3) CA is the mean proportional between CB and CD.

If two triangles are similar, their corresponding lines such as medians, altitudes, inradii, etc. are to one another in the ratio of their corresponding sides.

Similar triangles are to one another as the squares on their corresponding sides

Two similar polygons can be divided into the same number of triangles similar to each other and similarly placed ; and the converse

The perimeters of two similar polygons are to each other as any corresponding sides.

Concurrence and Collinearity.—The use of signs as applied to lines, angles and areas. If two parallel lines are cut by three are more concurrent transversals, the corresponding segments are proportional and the converse.

If X, Y, Z are points in the sides BC, CA, AB of a triangle ABC, such that the perpendiculars to those sides at these points are concurrent, then

$$(BX^2-XC^2)+(CY^2-YA^2)+(AZ^2-ZB^2)=0;$$

or $$BX^2+CY^2+AZ^2=CX^2+AY^2+BZ^2$$

and the converse.

If any transversal meets the sides, BC, CA, AB of a triangle in D, E, F, then

$$AF.\ BD.\ CE=AE.CD.\ BE.$$

and conversely, if the three points D, E, F, taken on the sides BC, CA, AB of a triangle, satisfy the relation AF. BD. CE. equals AE. CD. BF, then D, E, F, are collinear.

If the lines joining any point to the vertices A, B, C of a triangle meet the opposite sides in D, E, F, then

$$AF.\ BD.\ CE=FB.\ DC.\ EA.$$

and conversely, if three points D, E, F, taken on the sides BC, CA, AB of a triangle, satisfy the relation AF. BD. CE equals FB. DC. EA, then AD, BE, CF are concurrent.

If two unequal similar figures are similarly placed, the lines joining the vertices of one to the corresponding vertices of the other are concurrent.

Properties of Triangles.—The three medians of a triangle meet in a point, and this point is a point of trisection of each median, and also of the line joining the circumcentre to the orthocentre.

If D is a point in the side BC of a triangle ABC such that BD equals $1/n$ BC, then

$$(n-1)\,AB^2 + AC^2 = n.\,AD^2 + (1-1/n)\,BC^2$$

The perpendiculars from the vertices of a triangle on the opposite sides meet in a point, and the distance of each vertex from the orthocentre is twice the perpendicular distance of the circumcentre from the side opposite to that vertex.

The circle through the middle points of the sides of a triangle passes also through the feet of the perpendiculars of the triangle and through the middle points of the three lines joining the orthocentre to the vertices of the triangle.

If a perpendicular drawn from the vertex to the base of a triangle is produced to meet the circumcircle, then the distance of this point of intersection from the base is equal to the distance of the orthocentre of the triangle from the base.

The feet of the perpendiculars drawn on the sides of a triangle from any point P on the circumcircle of that triangle are collinear.

The pedal line of P bisects the line joining P to the orthocentre of the triangle.

If the vertical angle of a triangle is bisected by a straight line which cuts the base, the rectangle contained by the side of the triangle is equal to the rectangle contained by the segments of the base together with the square on the straight line which bisects the angle

If from the vertical angle of a triangle a straight line is drawn perpendicular to the base, the rectangle contained by the sides of the triangle is equal to the rectangle contained by the perpendicular and the diameter of the circle described about the triangle.

Properties of Circles.—The locus of the points of intersection of tangents drawn at the extremities of chords of a circle which pass through a fixed point, is a straight line.

If the polar of A passes through B, then the polar of B passes through A.

If P and Q are any two points in the plane of a circle whose centre is O, then OP bears to OQ the same ratio as the perpendicular from P on the polar of Q bears to the perpendicular from Q on the polar of P.

The locus of points from which the tangents to two given co-planar circles are equal is a line perpendicular to the line of centres.

In two circles, if any two parallel radii are drawn (one in each circle), the straight line joining their extremities cuts the line of centres in one or other of two fixed points (called centres of similitude).

If through a centre of similitude S of two circles, a line is drawn cutting the circles, the radii to a pair of corresponding points are parallel.

If through a centre of similitude S of two circles, a line is drawn cutting the circles, then the rectangle under the distances of one pair of non-corresponding points from S is equal to the rectangle under the distances of the other pair of non-corresponding points from S; and each of these rectangles is a constant.

In a cyclic quadrilateral, the sum of the product of opposite sides is equal to the product of the diagonals.

(1) *Harmonic Section* :—

If AB is divided harmonically at P and Q, then (i) PQ is divided harmonically at A and B; (ii) AB is a harmonic mean between AP and AQ.

If AB is divided harmonically at P and Q, and if O be the middle point of AB, then OP. OQ=OA^2 and the converse.

Any chord of a circle through a fixed point P is divided harmonically by P and the polar of P.

(2) *Plane Analytical Geometry* .—

The straight line and circle referred to rectangle axes.

Co-ordinates of a point: Distance between two points Co-ordinates of a point dividing a segment of a line in a given ratio. Area of a triangle whose vertices are given.

Equations of a straight line (i) in terms of its gradient and the interception of the y-axis; (ii) in terms of the length of the perpendicular from the origin and its inclination to the axis; (iii) passing through a point and having a given gradient.

(3) *Passing through two given points* :—

Co-ordinates of the point of intersection of two straight lines, and the angle between them; conditions of perpendicularity and parallelism of two straight lines; Distance of a point from a straight line. Equations of a circle in the forms

$$x^2+y^2=a^2 \text{ and } x^2+y^2+2gx+2fy+c=0$$

Condition that a given straight line may touch a circle (by using the property that the distance from the centre is equal to the radius).

In the Intermediate Examination, there shall be two written papers of two hours and a half each, and each shall carry 50 marks. The first paper shall deal with Algebra, Trigonometry and the second paper shall deal with Geometry, pure and analytical.

Part III—(2) Physics

No question shall be asked which cannot be answered by simple mathematical methods.

The course shall include a more detailed study of the matter included in the Matriculation syllabus and in addition the following :—

Dynamics.—The units of length and time. Displacement, speed, velocity and acceleration of a particle moving in a straight line. Newton's laws of motion ; the units of mass and force. Motion of a particle in a straight line under the action of a force in that line under the action of gravity. Energy, work, power and their units. Simple illustrations of the conservation of energy

*Conditions of equilibrium of a body under three concurrent forces (the parallelogram law), and under parallel forces. Centre of gravity. Simple machines.

*The motion of simple pendulum, determination of g.

Hydrostatics.—Pressure at a point in a fluid ; definition and illustrations ; transmissibility of pressure. Evaluation of pressure at a point in a heavy fluid at rest ; its uniformity in all directions. Resultant thrust in simple cases. The principle of Archimedes, floating bodies, hydrometers. Applications to practical determination of density and specific gravity The pressure of a gas and its determination ; the barometer. Boyle's Law ; air pumps and water pumps.

Heat.—Temperature and its measurement ; the construction and graduation of thermometers. The thermal expansion of solids, liquids and gases and their accurate determination ; the air thermometer. Heat as a quantity ; the unit of heat, specific heat and the more direct methods of calorimetry, Laws of fusion, evaporation and ebullition ; latent heat ; vapour pressure and how it is measured. Conduction and convection of heat ; thermal conductivity. Radiation ; absorption and reflection; law of cooling. The dynamical equivalent of heat ; the conservation of energy.

Light.—The experimental facts and laws of transmission, reflection and refraction of light ; simple geometrical deductions from these, applicable to

*Only experimental proofs are required in these cases.

small direct pencils incident on plane and spherical surfaces. Applications to the lens, telescope, microscope. The dispersion of light; the spectroscope. Radiation and absorption spectra. Total reflection. Determination of refractive indices.

Magnetism.—Properties of magnets, poles; Laws of magnetic force; unit poles. Lines of force; uniform magnetic fields and experimental methods of comparing them.

The earth magnetic field; the compass. Magnetic Induction; the magnetic properties of iron and steel.

Electricity.—The more common forms of voltaic cells and the actions that go on in the cell while producing a current. The action of currents on magnets; galvanometers depending on such action including suspended coil type. Metallic conductors and electrolytes. Laws of electrolysis. Electro-Motive Force; Ohm's Law; resistance and the simple methods of determining it. Dissipation of energy in circuit by current and heating effects. Electromagnet, Potentiometer and measurement of E. M. F.

Sound.—The production and propagation of sound; the velocity of sound in air and its determination. Nature of wave motion and sound waves; Frequency of vibration; pitch, Amplitude of vibration; loudness: Laws of vibration of strings and air columns. The deflection of sounds echoes.

Practical Physics.

(1) The Balance—to weigh a body correct to a milligram.
(2) Vernier.
(3) Calipers.
(4) Spherometer.
(5) Screw gauge
(6) Simple pendulum—Determination of 'g'.
(7) Determination of acceleration with a Fletchres' Trolley.
(8) Parallelogram Law of Forces.
(9) Parallel forces.
(10) Inclined plane.
(11) Specific gravity of Solids—Principle of Archimedes.
(12) Specific gravity of Solids—Specific gravity bottle.
(13) Specific gravity of Liquids.
(14) Nicholson's hydrometer.
(15) Boyle's law.
(16) Co-efficient of Linear Expansion of Solids.
(17) Co-efficient of Apparent Expansion of Liquids.
(18) Volume co-efficient of air.
(19) Pressure co-efficient of air.

(20) Specific heat by the Method of mixtures.
(21) Latent heat of steam.
(22) Relative Humidity—Regnault's Hygrometer.
(23) Comparison of Thermal Conductivities of solids.
(24) Specific heat of a liquid by the Method of Cooling.
(25) Mechanical Equivalent of heat—Frictional cone's method.
(26) Reflection at plane surface.
(27) Refraction at plane surfaces.
(28) Angle of prism and minimum deviation by the pin method-i-curve.
(29) Critical angle by the pin method—Refractive Index.
(30) Focal length of concave mirrors.
(31) Focal length of convex lenses.
(32) Arrangement of lenses to form a simple microscope and a telescope.
(33) Sonometer—Laws of Transverse Vibrations of Strings.
(34) Resonance—Velocity of sound in air.
(35) Mapping of magnetic fields—Null points.
(36) Deflection Magnetometer—comparison of Magnetic Movements.
(37) Vibration Magnetometer—comparison of field strengths.
(38) Measurement of current—Tangent Galvanometer
(39) Measurement of current—copper voltameter
(40) Verification of Ohm's law.
(41) Comparison of E.M.F.'s—Potentiometer.
(42) Measurement of Resistance—Metre Bridge.
(43) Mechanical Equivalent of heat (Electrical Method).

Part III—(5) Chemistry

I. General.

Chemical change, its characteristics and distinction from physical change. Distinction between chemical compound and mechanical mixture. Conditions that influence chemical action. Different kinds of chemical changes. Elementary and compound substances. The fundamental laws of chemical combination, (1) Conservation of mass, (2) Definite proportions, (3) Multiple proportions, (4) Equivalent proportions, and (5) Gaseous volumes.

Statement and applications of Boyle's Law, Charles' Law, Dalton's Law of Partial pressures, Gaseous diffusion, Graham's Law and its application to the determination of molecular weights.

Simple methods of the determination of equivalent weights of elements.

Atoms, molecules, the atomic theory and Avogadro's hypothesis.

Definition of molecular weight and the application of Avogadro's hypothesis to the determination of molecular weights of volatile substances by Victor Meyer's method. Molecular weight of gases from G.M.V.

Atomic weight—Simple methods of determination of atomic weights. Atomic weight from molecular weights. Dulong and Petit's Law and Law of Isomorphism.

Valency—Relation between equivalent and atomic weights.

Chemical symbols and formulæ. Calculation of empirical formula from percentage composition and vice versa. Significance of empirical and molecular formulæ. Positive and negative radicals and their valencies. Writing the formulæ of acids, bases and salts.

The chemical equation and its significance. Methods of balancing equations. Calculations involving weight and volume based on equations.

Acids, bases and salts, General methods of their preparation, their general characters, classification and nomenclature, Neutralization.

Relationship between molecular weight, equivalent weight, basicity and acidity—Normal solutions. Their usefulness in chemical calculations.

Solution—determination of solubility, solubility curves, crystallization, water of crystallization, Efflorescence and Delliquescence, supersaturation.

Oxidation and reduction—Catalysis. Elementary ideas of the theory of electrolytic dissociation.

Elementary idea of the Periodic Law.

Elementary ideas of the qualitative aspects of the law of Mass action

II. Non-Metals.

Occurrence, preparation (together with the industrial preparation of those in italics), properties, important uses of the following elements and compounds and proof of the composition of the compounds marked * :—

Hydrogen, Oxygen, water,* Hardness of water.

Ozone,* Hydrogen peroxide.

Flourine, Hydrogen Flouride, Chlorine, hydrogen chloride, *hydro-chloric Acid*, chlorides, chlorine monoxide and peroxide, hypochlorous acid, hypochlorites, chloric acid and chlorates. *Bleaching powder.**

Bromine Iodine, their hydracids and salts. Bromic and Iodic acids, and I_2O_5 and their salts.

Sulphur. Hydrogen sulphide * and metallic sulphides. Sulphur dioxide and trioxide, Sulphurous and *Sulphuric acids*, sulphites, sulphates and thiosulphates.

Nitrogen, important constituents of air.* *Ammonia.** Ammonium salts. Dissociation. Nitrous and Nitric Oxides, Nitrous Anhydride and *nitrous acid*, nitrogen peroxide and nitric acid. Nitrites and Nitrates.

Phosphorus. Phosphine. Phosphorus trioxide and pentoxide. The corresponding acids and their salts. Phosphorus trichloride and pentachloride.

Arsenic. Arsine. Arsenic trioxide and Arsenic pentaxide. Their corresponding acids and salts. Sulphides of arsenic.

Carbon, carbon monoxide and *carbon dioxide** carbonates. Elementary ideas about combustion and structure of flame.

Silicon, Silica, Silicic acid, silicon flouride, Silicates of K, Na, and Ca. Elementary ideas of glass.

Boron, *Boric acid* and Borax.

III. Metals.

(*a*) Occurrence, properties and important uses of the following metals together with the important methods of extraction of those in italics :—

Sodium. Potassium, Ammonium, *copper*, *silver*, calcium, barium, Magnesium, *Zinc*, *Mercury*, *Aluminium*, *tin*, *lead*, Chromium, Manganese, and *Iron.*

(*b*) Study of the following metallic compounds, including their methods of preparation and important uses together with the important methods of manufacture of those in italics :—

Sodium—*Hydroxide*, peroxide *carbonate*, bicarbonate, chloride, sulphate, thio-sulphate, nitrite, Nitrate and Phosphate.

Potassium—*hydroxide*, Chloride, *Chlorate*, *Bromide*, *Iodide*, *Carbonate* and *Nitrate.*

Ammonium—Chloride, Carbonate, Sulphide and sulphate.

Copper—Oxide , Chloride , *sulphate*, Nitrate and sulphides.

Silver—Oxide, chloride, bromide, Iodide, Nitrate and sulphate.

Calcium—*Oxide*, and Hydroxide, plaster of Paris, Calcium carbonate, *Carbide*, Sulphate and Nitrate

Barium—Oxide, hydroxide, carbonate, chloride, sulphate and Nitrate.

Magnesium—Oxide, Hydroxide, Carbonate, Chloride, Nitrate and sulphate.

Zinc—oxide, hydroxide, chloride, carbonate and sulphate.

Mercury—oxides, *chlorides*, Nitrates, and Mercuric sulphide.

Aluminium—oxide, hydroxide, chloride, sulphate and *Alum.*

Tin—oxides, chlorides and sulphide.

Lead—Litharge, Lead peroxide, Red lead, Acetate, Carbonate, Chloride, Chromate, Nitrate and sulphate, *White lead.*

Chromium—*Chrome Alum*, Potassium chromate and Dichromate, Chromic salts, Chromic oxide and anhydride, Equivalent weight of potassium Dichromate.

Manganese—Manganese dioxide, *Potassium permanganate*, and Manganous salts, Equivalent weight of potassium permanganate.

Iron—oxide, chlorides, sulphates and Ferrous sulphide.

IV. Courses of Instruction in Practical Chemistry.

The practical instruction in Chemistry in the Intermediate courses shall be on modern lines such as are indicated in Dr. Alexander Smith's Experimental Inorganic Chemistry revised by Kendall.

V. Tables.

Tables, such as Clark's Mathematical and Physical Tables (published by Oliver and Boys, Edinburgh) are recommended for use by students undergoing the Intermediate course of study in Physical Science.

Syllabus for the Practical examination in Chemistry.

Cutting and bending of glass tubing, fitting up of simple apparatus, e.g., wash bottle, separation of a mixture. Preparation and study of the principal properties of hydrogen, oxygen, hydrogen chloride, hydrogen sulphide, sulphur-dioxide, nitric acid, nitrous oxide, nitric oxide, chlorine, ammonia, carbon monoxide, carbon-dioxide.

Crystallization and preparation of the following salts:—Potassium nitrate, lead nitrate from litharge, ferrous sulphate from iron, magnesium sulphate from magnesium carbonate, ferrous ammonium sulphate, and copper sulphate from copper carbonate and oxide.

Experiments illustrating the laws of definite and multiple proportions. Determination of the equivalent weight of metals with reference to oxygen and chlorine and by displacement of hydrogen and one metal by another. Determination of the solubility of solids and air in water. Estimation of the water of crystallization of hydrated salts, Molecular weights of oxygen, carbon-dioxide, sulphur dioxide, air and carbon monoxide.

Qualitative Analysis (by dry and wet methods) of simple substances containing not more than one basic and one acidic radical (excluding insoluble salts) included in the following list :—

Sodium, potassium, ammonium, barium, calcium, magnesium, zinc, manganese, aluminium, iron, lead, tin, mercury, copper, silver, chlorides, bromides, iodides, nitrates, sulphides, sulphites, sulphates and carbonates.

Simple volumetric analysis involving the estimation of the strengths of acids and alkalies by titration, estimation of ferrous salt by titration with a standard solution of potassium permanganate. Estimation of Iodine with standard sodium thio-sulphate.

Use of the simple balance.

Part III—(4) Botany.

First Part —

1. Living and non-living things and their main features; protoplasm; cell; cell structure; cell division; changes seen in the cell contents and the nature of the cell wall; meristem; increase in the plant body and division of labour; tissues.

Organic and inorganic substances and their main properties; plants and animals—differences and resemblances; similarity of vital function such as feeding, respiration, movement, response to stimuli and reproduction.

2. Green leaf; its external and internal structure; photo-synthesis—parastic flowering plants, insectivorous plants; transpiration; adaptations to facilitate and check transpiration; leaf form and internal structure as well suited to carry on the above two functions.

Leaf adjustments to light; phototropism; arrangement of leaf on the plant; struggle for light among plants; climbing plants and epiphytes.

General leaf forms; stipules and their work; modifications of leaves and stipules.

3. Root—its external form and internal structure; apex of root; work of roots; absorption and fixation; root cap; root hairs; region of root hairs; osmosis; root pressure.

Study of the soil; structure and nature of the soil in relation to water contents.

Branching of roots; elongation and growth of roots in thickness; different kinds of roots; modifications of roots; response of roots to gravity; light and water.

4. Stem :—Work of the stem; supporting and conduction; its internal structure; apex of the stem; path of the sap current; intercellular spaces: lenticel increase of the stem in thickness; cork formation; hard wood and sap wood, modifications of the stem; response of the stem to gravity and light; stems of water plants.

Second Part:—

5. Flower—Parts of flower; functions of different parts; pollen grains; pollen tube; ovule; egg cell; fertilisation; seed formation; parts of a seed; germination. Arrangement of the parts of a flower; insect visitors; cross and self-pollination, wind pollination and inconspicuous flowers; inflorescences.

Fruits; kinds of fruits; seed and fruit dispersal and its advantages; vegetative reproduction.

A study of the following families; Anonaceae; Malvaceae; Capparideae; Leguminoseae; Cucurbitaceae· Rubiaceae; Compositae; Convolvulaceae; Solanaceae; Asclepiadaceae; Acanthaaceae; Labiateae; Euphorbiceae; Hydrocharideae; Liliaceae; Musaceae; Palmeae.

6. Euglena—structure and locomotion; all the life functions carried out by the single cell

A brief account of Chalmy domonas, Pandorina, Volvox origin of Soma.

Life histories of Ulothrix; origin of sex; Spirogyra; Oscillacia; Sargassum (only external characteristics); Moss; Fern.

External Characters of Gymnosperms (Cycas) and Angiosperms.

7. Bacteria—their structure and life history, Fermentation; Enzymes; Symbiosis, Pathogenic bacteria; Fungi; Parasites; Saprophytes; Yeast plant; Mucor; Mushroom.

Struggle for existence; survival of the fittest; variety; species; heredity and evolution.

8. Plant products—starch; oils; sugars; alkaloids; gums; resins; caoutchouc; fibres; the plants and the parts of the plants producing them.

Practical Work:—Students are expected to examine with hand lens the external features of all the plants and to be able to refer the plants to their families. They should be able to prepare free hand sections of the various parts of the plant body for microscopical examination and identify the prepared sides of the forms mentioned in paras, 6, 7 and 8. Special attention must be given to experimental demonstrations of the various physiological functions of the plant organs.

NOTE.—The first paper shall contain questions on Part I of the Syllabus and the second paper shall contain questions on Part II of the Syllabus.

Syllabus in Practical Work.

PART I.

A. Technical description of flowering plants.

B. Detailed examination of an epiphyte (Vanda) Parasite (Loranthus or Cssytha and Orobanche), Insectivorous plant (Bladderwort), Water plant (nymphaea), Xerophite (Opuntia).

C. Examination of Bean, Curcurbita, Castor, Paddy or Maize, Date, Coconut and Rhizophora with a view to study the structure and germination.

D. Examination of fruits and seeds with a view to study the dispersal mechanism.

E. Examination of Type plants belonging to the Families included in the course.

The students will be expected to draw floral diagrams and longitudinal sections of flowers examined.

PART II.

A. Cytology:

Parts of the cell as seen in onion scale peeling; stages in mitosis as in root tip of onion (slides), streaming movements of protoplasm as seen in Hydrilla leaf and Tradescantia staminal hairs, organic cell contents like starch grains in potato and Aleurone grains in wheat, inorganic cell contents like raphides in Colocasia and cystoliths in Ficus; living contents like plastids in Hydrilla (chloroplasts), Thevetia (chromoplasts) and Potato leucoplasts)

**B.* Histology:

Cutting free hand sections, single staining and mounting of the parts of Dicotyledonous and Monocotyledonous plants for the study of normal internal structure (Root, stem and leaf).

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*The following change will come into force as from 1944 examination:—

(*a*) Under Part II of the syllabus in Section A. Cytology *add* the words "and paddy" after starch grains in Potato and *substitute* the words "and Castor" for the comma after the words "aleurone grains in wheat".

(*Continued on the bottom of next page*)

C. **Physiology :**

Study of the main physiological functions in plants by demonstration experiments—

1. Osmosis illustrated by Thistle-funnel experiment.
2. Experiment to demonstrate Root pressure in plants.
3. Ringing experiment to demonstrate the path of sap current.
4. Experiment to illustrate Transpiration in plants (Bell-Jar Experiment)
5. Experiment to illustrate the rate or Transpiration (Ganong's potometer).
6. Experiment to demonstrate evolution of oxygen during carbon assimilation.
7. Experiment to demonstrate the absorption of oxygen and evolution of carbon-dioxide during respiration.
8. Experiment to illustrate the release of heat (Energy) during respiration (Dewar's Flask Experiment)
9. Measurement of growth in plants ; simple auxo-meter.
10. Experiments on Phototropism and Geotropism (shoot and root) and the use of Klinostat.

D. **Cryptogams and Gymnosperms :**

1. Examination under the microscope of the following forms : Bacteria, Oscillaria, Euglena, Chlamydomonas, Pandorina, Volvox, Spirogyra Ulothrix, Sargassum (only external characters), Yeast, Mucor and Agaricus.
2. Detailed study of vegetative and reproductive structures of Moss, Fern and Cycas.

(Continued from the bottom of previous page)

(*b*) In Section B. Histoloy, *add* as the first paragraph the following :—

"Examination and identification of the different important tissues like

Meristematic tissue
Parenchymatous tissue
Epidermal tissue
Cork tissue
Vascular tissue
Mechanical tissues in Angiosperm plants"

keeping the existing paragraph as the second one.

(*c*) In Section C. Physiology, *substitute* the following for the existing 9th experiment :—

"Experiment to show that light is necessary for Photosynthesis."

(*d*) *Add* the following at the end of the syllabus as a foot-note :—

NOTE.—Candidates shall submit to the Examiners before the hour of their practical examination their Laboratory Practical records and the records of their field observations.

Part III—(5) Zoology including Human Physiology

Zoology.

The chief characters of living organisms. Protoplasm. Cell. Plants and animals; how they agree and how they differ. Meaning of the terms Biology, Morphology and Physiology. The theory of evolution treated in an elementary manner. Fossils, their bearing on evolution.

The structure of the following animals treated in an elementary manner with special reference to their physiology. Amoeba, Paramoecium, Hydra, Obelia, Tapeworm, Round-worm, Earth-worm, Fresh water mussel, Prawn and Scorpion. Outline of their reproduction

A more detailed study of the external character and of the general arrangement and relation of the chief internal organs revealed by dissection in the Cockroach, Fish (Teleost) Frog, Bird and Rabbit General outline of their life history. Life history of the butterfly and mosquito.

All the types above mentioned to be studied with special reference to their environment.

Candidates will be expected to be able to draw simple diagrams to show the arrangement and general features of the chief organs and structures in the animals enumerated in the above syllabus

Human Physiology.

The human skeleton and its parts. The action of muscles. The arrangement of the chief viscera in man The leading facts of human physiology The nature of food and the manner in which it is digested and absorbed. Glands. The liver, its structure and functions. The nature and functions of blood The heart and the circulation. Respiration. Waste products and their removal. The temperature of the body and how it is maintained. The chief functions of the central nervous system, nerves and sensory organs.

NOTE.—The first paper will include questions on Zoology and the second paper on Human Physiology.

Syllabus in Practical Zoology.

1. Microscopic examination of Amœba, Paramœcium, Hydra (Ectoderm, Endoderm and Nematocysts), Obelia (Perisarc, Cœnosarc and members of the colony).

2. Earth-worm—External characters, dissection of the alimentary canal up to the level of the 22nd segment, Spermatheca, nerve ring and the nerve card. Microscopic examination of the transverse section.

3. Prawn—External characters, examination of the appendages

4. Cockroach—External characters. Removal and examination of the mouth parts. Dissection of the alimentary canal and of the ventral nerve card.

5. Scorpion—External characters.

6 Fresh-water-mussel—External characters of the shell and soft animal Dissection of the Pericardium and its contents Examination of the Transverse Section.

7 Teleost—External characters (including gills) Dissection of the heart and the alimentary canal.

Frog External characters including those of the mouth. Dissection of the alimentary canal. Dissection of the heart. Systemic arches. The dorsal aorta and its main branches. Examination of skull and the limb girdles.

Human Physiology Examination (by prepared slides) of the chief tissues including blood, the parts of the skeleton. Examination of the section of the wall of the stomach, intestine, kidneys, skin and spinal cord.

The practical examination will bear upon the above syllabus only. In addition, the students may be encouraged to do such further practical work, as will help them in their theoretical course.

Part III—(6) Biology

Theory.

1 Biology—General:

The distinctive properties of living and non-living things. Differences between animals and plants. The nature and properties of protoplasm. The structure of the cell; cell division; gametogenesis, conjugation and fertillization.

Variation. Evidences for evolution.

*II. Botany—

Theory:

(1) Study of the life-histories of the following Chlamydomonas, Volvox, Spirogyra, Moss, Fern Origin of soma and sex. Alternation of generations

Life-history and Physiology of Bacteria Saccharomycas and Mucor.

(2) The external morphology of Angiosperms, characteristics of the following families:—

Anonaceæ, Malvaceæ, Papilionaceæ, Rubiaceæ, Compositae, Acanthaceæ, Labiatæ, Euphorbiaceæ, Amaryllideæ, Palmæ.

(3) Internal structure of root, stem and leaf in Dicotyledonous and Monocotyledonous plants

The main facts in relation to nutrition, growth and movements in plants.

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*The following changes will come into effect as from the examination of 1944:—

(i) *Botany—Theory.*

(*a*) Under section 2, *read* "Liliaceæ" *for* "Amaryllideæ"

(*b*) Under section 3, *add* "respiration" after "nutrition" and "Structure and germination of seeds like bean, castor and paddy" after "seed formation" mentioned at the end.

(ii) *Botany—Practical.*

(*a*) At the end of the second and third paragraphs in section 1, *add* the word "Slides" within brackets.

(*b*) In section 3, *add* at the end of the word "normal" within brackets.

(*c*) In section 4, *add* the following as a fresh paragraph:—

Experiment to demonstrate Osmosis (Thistle funnel experiment).

Experiment to demonstrate Transpiration (Bell jar experiment).

Experiment to show that light is necessary for Photosynthesis.

Experiment to demonstrate that Oxygen is evolved during Photosynthesis.

Experiment to show that Oxygen is consumed and Carbondioxide is evolved during respiration.

Experiment to show that heat is evolved during respiration.

(*d*) *Add* the following at the end of the syllabus as a foot-note:—

NOTE:—Candidates shall submit to the examiners before the hour of the practical examination their Laboratory Records and the records of their field observations.

Reproduction, vegetative and sexual. Anther and Pollen grains; parts of the mature ovule; pollination, fertilization and seed formation.

Practical:

(1) Examination under the microscope of Chlamydomonas, Volvox, Spirogyra, Bacteria, Saccharomycas, Mucor.

Sections showing antheridia and archegonia in Moss and Longitudinal section of Moss capsule.

Sections of Fern prothallus showing antheridia and archegonia. Fern leaf showing sori and sporangia.

(2) Technical description of Angiosperm plant and identification of plants belonging to the families included above.

(3) Cutting free hand sections of parts of a Dicot or Monocot plant for the study of internal structure.

(4) Sample experiments to demonstrate the main physiological functions in plants.

III. Zoology—

Theory:

(1) The structure, life-history and physiology of Amœba, malarial parasite, Euglena, paramœcium, Hydra, Obelia colony, Round-worm, Earth-worm, Freshwater mussel, and Cockroach. The life history of mosquito.

(2) The anatomy of a common Teleost, Frog, and Rabbit (muscular system and the nerves in these three types to be omitted).

(3) Life histories of the Frog and Rabbit.

(4) The general characters of the Phyla to which all the above-given types belong.

(5) Comparative study of the axial skeleton, vascular system, the central nervous system and urino-genital system of the Teleost, Frog and Rabbit (Dog's skull may be substituted for the Rabbit's).

Practical:

(1) Examination under the microscope of:

Amœba, malarial parasite, Euglena, Paramœcium, Hydra (including Transverse Section).

Obelia colony. Transverse Section of the Round-worm and of the Earth-worm.

(2) *Freshwater mussel*—Examination of the shell and the external features of the soft animals.

Earthworm—External features and dissection of the nerve ring, anterior part of the ventral nerve cord and spermathecæ.

Cockroach—External characters: mounting of the mouth-parts. Dissection of the alimentary canal.

Teleostean fish—External features including the gills—Dissection of the heart and ventral aorta

Frog—External characters including those of the mouth. Dissection of the heart and the main arteries and of the alimentary canal.

Rabbit or Dog—Examination of the larger bones of the skull and of a single dorsal vertebra.

Part III—(7) Geography

I. THE PHYSICAL BASIS OF GEOGRAPHY :—

(*a*) *The Atmosphere.*—The local and world distribution of temperature, humidity (including precipitation) and pressure ; the circulation of the atmosphere—permanent, seasonal and local winds. The collection of climatic data, and the preparation of weather charts and climatic maps. Types of climate.

(*b*) *The Hydrosphere* —The form, extent and distribution of the oceans, depth, configuration and compo ition of the ocean floors, continental shelf, composition of sea-water, distribution of salinity and temperature, movement of sea-water—waves, tides and currents, coral reefs and islands.

(*c*) *The Lithosphere.*—Land-forms ; materials of the earth's crust and the forces that shape it ; soils ; changes in the earth's crust, elevation and subsidence ; the agencies and processes of denudation rivers and the development of river-systems, under-ground water ; snow and ice ; lakes. Wind as an agent of transport and deposition, Volcanoes and earth-quakes ; shore-lines ; rising and sinking coasts ; deltas and estuaries.

II. GENERAL REGIONAL GEOGRAPHY ON WORLD BASIS :—

Structure and relief—climate—vegetation—a study of the major natural regions with reference to prevailing economic conditions—distribution of population—chief world commodities, vegetable, animal and mineral—localisation of industry—transport—routes and trade centres

III. DETAILED STUDY OF EURASIA AND INDIA :

Eurasia.—Coast-line—structure and relief—climate—vegetation—communications and population of Eurasia as a whole. The study of the

characteristic geographical features of the following natural regions:—tundra, forest-lands and steppe lands of Eurasia; the British Isles, the Central Plains of Europe; the Central Highlands of Europe;—the Mediterranean Region—the South-western Lands of Asia—Mid-Asian deserts—the Monsoon Regions.

Detailed study of India, Burma and Ceylon.

IV. PRACTICAL WORK —

(*a*) Shape of the earth—determination of position—angular measurement and latitude—parallels and meridian—Greenwich time and Indian standard time—a study of the simple types of map projection.

(*b*) Study and interpretation of Indian Ordinance Survey maps—methods of showing relief.

(*c*) Principles of field mapping by plane-table, prismatic compass, clinometer, the use of a levelling stave, and aneroid barometer in determining height.

(*d*) Collection and tabulation of data—diagrammatic and catographic methods of expression.

Part III—(8) Logic.

Elementary principles of Logic as indicated in Creighton's Logic Parts—I and II.

Part III—(9) Indian History.

The first paper shall deal with Ancient and Mediaeval Indian History down to 1526 A. D. and the second paper shall deal with Indian History from 1526 A. D. to the present day. A knowledge of Geography shall be required from candidates.

Part III—(10) British History.

The History of Great Britain and Ireland.

The first paper shall deal with History down to 1603 A.D. and the second paper shall deal with History from 1603 A. D. to the present day.

A knowledge of Geography shall be required from the candidates.

Part III—(11) World History in outline.

The first paper shall deal with World History up to 1450; and the second paper shall deal with World History from 1450 to the present day.

NOTE.—It is only the main heads under which the subject has to be studied that are given below. The exact scope of the subject is to be inferred from the text-books recommended which is the practice followed in the University in respect of History of India, British History and Ancient and Mediæval History.

Section 1 · The Pre-historic Age and Early Man. The old and the new stone Ages The age of Metals. Human migrations. Languages of Man. Evolution of writing. Counting and the calendar.

Section 2 · The Far East in Ancient times China. Chinese Society and culture. India. Indian society and culture. Buddha and Confucius.

Section 3 : The Near East in Ancient times. Egypt. Egyptian Society and culture. Babylonia and Assyria Syria. Phoenecia and Palestine History and culture of the Medes and the Persians.

Section 4 · Greece. The Aegean age. The Greeks. Their city states. Greek expansion. Sparta and Athens. Persian Wars. The rise of the Athenian Empire. The age of Pericles. The rise of Macedonia. Alexander and his empire. The Hellenistic age. Greek life and thought.

Section 5 : Rome. Plebeians and Patricians Unification of Italy. Rome and Carthage. Roman conquest of the Hellenic East. Economic and social changes. The decline of the Republic. Julius Cæsar. Transition to Empire. Augustus and his successors. The later empire. Government and law. Graeco-Roman culture

Section 6 : Transition from classical civilisation. Rise and spread of Christianity. Development of the Christian Church. The barbarian invasions. The fall of Rome.

Section 7 : The rise and spread of the Muhammadan power. The Caliphate, Islamic culture and civilisation.

Section 8 : European civilisation in the middle ages—Charlemagne. The Byzantine Empire The Holy Roman Empire. The power of the mediæval church. Feudalism The growth and development of towns. Mediæval Art, Architecture ; Languages and Literatures. Science and Invention.

Section 9 · The transition from Mediæval to modern civilisation in Europe. The Crusades. The Mongols and the Turks. Geographical explorations—The classical revival and the invention of printing.

Section 10: The beginnings of modern times. The break in the church. The growth of national states. The rise of autocracy.

Section 11: The grand Monarchy in the 17th and the 18th centuries—expansion of Europe—The colonial trade and empires. The enlightened despots.

Section 12: The American and French Revolutions. The Era of Napoleon.

Section 13: The Industrial Revolution—Improvements in Agriculture, Manufacturing, Transportation and Communications. Modern capitalism.

Section 14: Democracy and Nationalism. The unification of Italy and Germany. The Balkans. The growth of Democracy in England and France.

Section 15: Imperialism and Expansion. Russia in Asia. The opening up and partition of Africa. The great powers in Asia. The United States and Japan.

Section 16: The Great War and After. The causes and results of the War. The problem of World peace. The League of Nations. Its achievements and failure. Dictatorships.

Part III (12) Civics and Indian Administration.

The first paper shall be set on Civics and the second paper on Indian Administration.

Civics.

The nature and scope of Civics.

The individual and society—The variety of social institutions—The family, the caste, the class, the religious group, the vocational group, the nation and the state.

The State—The citizen as a member of the state. The citizen's duties and rights—Law and Liberty.

Forms of Government—Democracy and its character. Its merits and defects. Public opinion—Parties—The electorate.

Organs of Government—The Legislature—The Executive. The Judiciary—Civil Service. How the Laws are made. How they are carried out.

Different levels of Government—Central, Provincial and Local. Federal and Unitary types of Government.

Activities of the modern state—protection, welfare and national development.

Nationalism—Internationalism—The ideal of World Peace.

Indian Administration.

NOTE.—The scope is indicated by the text-book recommended.

A short historical introduction—The main land-marks.

The 'Home' Government. (*a*) The Parliament—Its control over India. (*b*) The Secretary of State for India. His relation to the Cabinet and the Parliament. His powers and functions. (*c*) The Secretary of State's advisers. (*d*) The High Commissioner of India.

The Central Government of to-day. (*a*) The Central executive. The Governor-General. The Executive Council. The relations between the two. (*b*) The Central Legislature. The Legislative Assembly. The Council of State. (*c*) The relation between the Executive and the Legislature.

The Federation of India—Unitary and Federal states. Reasons for introducing Federation. The Distribution of powers. The position of states and the provinces. The Federal executive. The Governor-General, the Viceroy and the Crown's representative—The council of ministers. Dyarchy. The Federal Legislature. The two chambers. The Federal Court. Federal Finance. The Federal Railway Authority. The Reserve Bank.

The Provincial Governments—Provincial Autonomy—The Provincial Executive—The Governor. His powers and functions. The council of ministers—Collective responsibility—The Provincial Legislature—Bicameralism. Constituencies and Franchise—Functions and powers. The relation of the Executive to the Legislature.

Local Self-Government—Municipalities and Local Boards.

Judicial Administration—Organisation of Courts—The Executive and the Judiciary.

Some Departments of Administration—Defence, Police, Land Revenue, Education, Welfare and Economic development.

Part III—(13) An Advanced Language.

1. Telugu Grammar, Prosody and Poetics as Advanced Language :—

I. అక్షర ప్రకరణము

1. ఆంధ్రవర్ణసమామ్నాయము : అచ్చులు, హల్లులు, ఉభయములు, హ్రస్వ దీర్ఘ ప్లుతములు, పరుషసరళశ్లిష్టరములు.

2. అర్ధానుస్వార శకటరేఫములు, పదాది యకారవకారములు దంత్యతాలవ్య చ, జ, లు అను వీ విషయమున దిఙ్మాత్ర ప్రదర్శనము.

II. పద ప్రకరణము

1. శబ్దములైదువిధములు : నామవాచకములు, సర్వనామములు, విశేషణములు, క్రియలు, అవ్యయములు అను వీని లక్ష్యలక్షణములు.

2. మహదమహద్బోధకత్వ వాచకములు, ఏకవచన బహువచనములు, ప్రథమాది విభక్తిప్రత్యయములు, జడవాచకముల విభక్త్యర్థ విశేషములు.

3. సాధారణములగు నామవాచకములయొక్కయు, సర్వనామముల యొక్కయు, ఔపవిభక్తికములయొక్కయు, విభక్త్యంత సిద్ధరూపముల యుదాహరణములు.

4. ద్వివిధవిశేషములు : గుణవిశేషణములు; ధాతుజవిశేషణములు, విశేషణములకు విభక్తివిపరిణమించునప్పటి తచ్ఛబ్దాను ప్రయోగము. తత్సమ విశేషణముల లింగ విభక్తివచనముల విషయమున దిఙ్మాత్రోపదేశము. విశేషణ విశేష్యముల నడుమ "అగు" ధాతుజవిశేషణములు నిలుచుట.

5. (i) ధాతువులు : ఆచ్చికధాతువులయొక్కయు, తెల్గుధాతువులయొక్కయు దిఙ్మాత్రవివరణము. సకర్మకములు, అకర్మకములు, ద్వికర్మకములు, భూతకాలము, వర్తమానకాలము, భవిష్యత్కాలము, తద్ధర్మాద్యర్థకములు, వ్యతిరేకార్థములు అను విషయముల దిఙ్మాత్ర ప్రదర్శనము. సామాన్యములగు ధాతువులనుండి పై కాలములందును అర్థములందును గల్గెడి సమాపక క్రియల యుదాహరణములు.

(ii) సామాన్యసులగు ధాతువుల యసమాపక్రియల సిద్ధరూపములు. అస మాపక్రియలు మూడువిధములు :

(a) నామవాచకములు—భావార్థక, వ్యతిరేక భావార్థక, కృదం తములు.

(b) విశేషణములు—భూతార్థక, వర్తమానార్థక, భవిష్యద్వ్యర్థక, తద్ధర్మాద్యర్థక, వ్యతిరేకార్థకములు.

(c) అవ్యయములు—క్త్వార్థక, వ్యతిరేకక్త్వార్థక, శతృతుమున్నా నంతర్యచే దాద్యర్థకములు.

(iii) కర్మార్థకధాతువులు, ఆత్మనేపదార్థకధాతువులు, ప్రేరణార్థక ధాతు వులు అనువాని వివరణము.

(iv) క్రియలరూపసాధనములో పచ్చెడి సాధారణములైన పర్యవశ్యాది కార్యములు.

6. అవ్యయము : లాక్షణికములు, ప్రతిపదోక్తములు.

7. అచ్చులెలుగు పదములలోఁగల్గు వర్ణముల మార్పులు : "అ = ఎ"; "అయి=ఏ ; అవు=ఓ ; ఇయ=ఎ" ఇట్టి సాధారణవిషయములను మాత్రమే చూపవలయును. సాధారణములగు నాచ్చికకృదంత తద్ధితాంతముల రూపములు.

III. వాక్య ప్రకరణము

1. కర్తృర్థకవాక్యము, కర్మార్థకవాక్యము, ప్రేరణార్థకవాక్యము, అను వీని స్వరూపముల వివరణము.

2. అన్వయలక్షణము (analysis) : శబ్దలక్షణము (Parsing).

3. సమాసములు : సిద్ధసాధ్యసమాసములు ; సాంస్కృతికాచ్చిక మిశ్ర సమాసభేదములు ; తత్పురుషాది సమాసభేదములు.

4. కవిద్రుతప్రకృతికములు.

5. సంధులు :

(i) నియతములగు స్వరసంధులు : ఉకారసంధి, మధ్యమపురుషైకార సంధి, ఆమ్రేడితసంధి, ప్రకృతి ప్రత్యయసంధి.

(ii) అనియతములగు స్వరసంధులు : ఆకారాదిసంధి ; ఇకారసంధి, సంహితలో యకారాగమస్థలములు, అది రానిచోటులు.

(iii) ద్రుతము పైని అచ్చునిలుచునప్పటి కార్యములు, అవసానద్రుత కార్యములు, సరళస్థిరపరకసంధి ; సరళాదేశసంధి, (దిఙ్మాత్రము) ; పడ్వాదిపరక మువర్ణకసంధి ; అనుకృతిసంధి; (దిఙ్మాత్రము); గసడదవాదేశసంధి, (దిఙ్మాత్రము); టుగాగమసంధి, ద్విరుక్తటకారాదేశము ; నుగాగమ రుగాగమములు ; పుంపులు పచ్చుట ; వాక్యాంతసంధి వైకల్పికత్వము.

(iv) సామాన్యములగు సంస్కృత సమాసములలోని సంధికార్యములు.

IV. ఛందఃప్రకరణము

1. గురులఘులక్షణము : మాత్రాస్వరూపము. మగణాదివిసర్గగణములు; చతుర్మాత్రాగణములు ; ఇనగణములు ; ఇంద్రగణములు.

2. యతిప్రాసముల సామాన్యభేదములు.

3. కందము - తేటగీతి - ఆటవెలది - సీసము - ఉత్పలమాల - చంపకమాల - కార్దూలము - మత్తేభము - మత్తకోకిల - ఉత్సాహ - పంచచామరము.

V. అలంకారశాస్త్ర ప్రకరణము.

1. కావ్యలక్షణము - కావ్యభేదములు - రసములు (సామాన్యవివరణము.)

2. అలంకారములు ; అనుప్రాసము ; ఉపమ ; రూపకము ; ఉత్ప్రేక్ష ; అతిశయోక్తి ; స్వభావోక్తి ; అంతరన్యాసము.

2. Oriya :

Syllabuses in Grammar, Poetics and Prosody in Oriya.

Grammar.—Krudanta, Taddhita, Samasa, Kriyaprakarana, Upasarga, Sandhi, Stripratyaya, Avyaya (Reference: Vyakarana Pravesha by Radhanath Roy)

Prosody.—Chakrakeli, Asabari, Astadhasukla, Kamodi, Chokhi, Ramakeri, Rasakoila, Bangalasri, Shankarabharana, Kali, Kalasa.

Poetics.—Upama, Rupaka, Utpreksa, Atisayokti, Drustanta, Prativastupama, Nidarsana, Samasokti, Kavyalinga, Arthanataranyasa, Smarana, Svabhavokti, Bakrokti, Byajastuti, Shlesha

3. English :

The course shall consist of:—

(*a*) A course in Rhetoric and Prosody.

(*b*) A detailed study of set books in prose and poetry.

Rhetoric and Prosody.—A student taking up optional English should have a sound knowledge of the principles of Rhetoric and Prosody as a basis for further study either in B. A. Group vi—optional English or in English Honours.

The scope of the paper may include questions on—

(*a*) Sentence and paragraph structure.

(*b*) Sentences to correct or criticize with regard to grammar, idiom etc.

(*c*) Figures of speech to be recognised or illustrated.

(*d*) Explanation of metres.

(*e*) Scansion of simple passages.

(*f*) The principles and forms of style.

(*g*) The structure and outlines of essays.

(*h*) Exercises in punctuation.

The paper on set books Prose and Poetry.—The portion shall consist of about 1,500 lines of verse and about 125 pages of prose. The books will be of slightly more advanced standard than the book set for detailed study under Part I. The prose books will not be earlier than the Age of Johnson.

Part III—(14) Economic Geography and Economic History

(Syllabus in force till the end of 1943 Examinations.)

SECTION—I (ECONOMIC GEOGRAPHY)

1. General Geography · Detailed study of India under the following heads :—

   Structure and relief ; climate and rainfall ; irrigation, vegetation, population, occupations and industries, communications and trade centre, including ports, survey of the chief Provinces and States.

2 Climate, temperature, pressure of air, the wind system, rainfall and distribution, ocean currents, weather reports.

3 Climatic and vegetation regions of the world ; influence of climate and physical features on the economic activities and organisation of simple human societies and advanced peoples

4. Forest resources of the world and of India. Forest industries.

5. Agriculture : The staple crops of the world and of India in particular. Conditions of consumption, production and trade of rice, wheat, millets, and oilseeds, sugar, tea, coffee, rubber, cotton, jute and silk.

6. Live stock ; particularly sheep and cattle—wool and dairy produce ; Other animal products.

7. Geographical aspects of manufacture. Localisation of industries —British and Indian examples. The supply of raw materials ; mineral resources of the world and of India. Power resources of the world and of India coal, oil and hydro-electricity.

8. Study of the following industries with special reference to India : Iron and Steel industry, textiles, paper, leather, glass, sugar, oils.

9 Transport and communications—land routes ; roads and railways. Waterways ; river and canal transport, ocean transport ; Steamship routes. Air Transport and air routes.

10. Development of trade centres and ports—relation to interland and to world markets.

SECTION—II (ECONOMIC HISTORY)

Recent Economic History from the Industrial Revolution to 1914.

Economic History of Great Britain.—The state of industries on the eve of Industrial Revolution ; the meaning of the term 'Industrial Revolution ;' favouring conditions ; features : inventions ; economic and social effects of

the Revolution. The industrial and economic policy during the 19th century ; the Agrarian Revolution ; the development of mechanical transport ; its effect ; on trade and agriculture, the Corn Laws and their repeal ; administration of Poor Laws ; Factory Legislation, Co-operative movement ; the origin and history of trade unions ; finance and banking ; free trade and protectionist reaction ; individualistic movements and collectivism ; their economic achievements ; Constructive Imperialism.

Economic Development of India.—Growth of the empire ; system of farming revenues ; its evil effects ; land revenue settlements ; Zamindari Settlement in Bengal and in other tracts administered by the Company ; Ryotwari Settlements in Madras and Bombay ; Mahalwari Settlement in Northern India ; Land Settlements in the Punjab and in the Central Provinces. Tenancy Legislation under the Crown in the various provinces. Permanent *versus* temporary settlement.

Decline of handicrafts ; rise of Plantations and Factories, Indian duties ; tariffs and their history from 1858 ; famines and remedial measures adopted ; railways and irrigation ; finance and economic drain ; the Indian Debt ; Local Cesses ; industrial transition and transition in agriculture ; labour and trade unions ; factory legislation ; imperial preference ; protection to industries ; Growth of towns ; rural reconstruction ; Co-operative movements.

Part III—(14) Economic Geography and Economic History

(*Syllabus in force as from 1944 Examinations*)

SECTION I (ECONOMIC GEOGRAPHY)

1. *General Geography*

Structure and relief, climate and rainfall, irrigation, vegetation, population, occupations and industries, communications (Examples from Indian conditions)

2. *Natural regions of the World* ·

Influence of climate and physical features on the economic activities and organisation of simple human societies and advanced peoples.

3. *Forest resources of the World and of India*

4. *Agriculture* ·

The staple crops of the World and of India in particular. Conditions of consumption, production and trade of rice, wheat, millets and oilseeds, sugar, tea, coffee, rubber, cotton, jute and silk.

5. *Live stock* :

Particularly sheep and cattle-wool and dairy produce. Other animal products.

6. *Geographical aspects of manufacture* :

Localisation of industries-British and Indian examples. The supply of raw materials ; mineral resources of the World and of India. Power resources of the World and of Indian coal, oil and hydro-electricity

7. *Study of the following industries with special reference to India* :

Iron and steel, textiles and sugar

8. *Transport and communications*

Road, river, canal and ocean transport, trade routes, development of trade centres and ports-relation to inter-land and to world markets.

SECTION II (ECONOMIC HISTORY)

Recent Economic History from the Industrial Revolution.

1. *Economic History of Great Britain* —The state of industries on the eve of Industrial Revolution ; the meaning of the term 'Industrial Revolution ;' favouring conditions ; features ; inventions ; economic and social effects of the Revolution. The industrial and economic policy during the 19th century ; the Agrarian Revolution ; the development of mechanical transport ; its effect on trade and agriculture , the Corn Laws and their repeal ; administration of Poor Laws ; Factory Legislation, Co-operative movement, trade unions ; finance and banking, free trade and protectionist reaction ; individualistic movements and collectivism ; their economic achievements ; Constructive Imperialism.

2. *Economic Development of India* —Development of Agriculture, permanent *vs.* temporary settlements, history of tenancy legislation in the Madras Presidency, development of irrigation, famines and remedial measures adopted, Co-operative movement

3. *Decline of handicrafts.*—Rise of Plantations and Factories ; Development of transport, railways, factory legislation, trade unions, imperial preference ; protection to industries ; Growth of towns ; small scale industries and rural reconstruction.

Part III—(15) Economics and Banking

(Syllabus in force till the end of 1943 Examinations)

(1) *Economics*

Scope of Economics—Relation of Economics to other sciences.

Fundamental concepts—Wants—economic goods, utility, demand and supply

Consumption—Necessaries, comforts and luxuries. Law of diminishing utility, consumer's surplus.

Agents of production—Land—Law of diminishing returns.

Labour—Law of population. Efficiency of labour.

Capital—Its growth and forms.

Organisation—Its place in Indian Economy, the entrepreneur.

Division of labour—Localisation of industries. Large and small scale production. Industrial combination. Trade Unions. Constant, diminishing and increasing returns.

Market—World market—influence of time on value—monopoly value Rent : interest, wages and profits.

Money—Barter economy—value of money. Forms of money. Functions of banks. The London money market, the bill of exchange, gold points.

Foreign trade—the law of comparative costs, Gains from foreign trade—Free trade and protection

Public Finance—Principles of taxation, direct and indirect taxes, incidence of taxation, public debts. Government and industry.

(2) *Banking*

General Principles.—Definition of Banking. The functions and Economic significance of banks. Growth of the cheque system and the Deposit banks The sources of a banker's profit. Banking Investments. Regulation of Note issue. Reserves and Discount Rates. Crises and seasonal Trade Depressions.

The structure of the English Banking System.—The Bank of England and its relation to Government, the banking world and the General Public. The Bank Act of 1844. The clearing House. Recent developments

History and Organisation of Banking in India.—The Imperial Bank of India ; its constitutions and its relation to the Government and the other banks. Indian Joint Stock Banks, Exchange Banks, and Indigenous Banks, and the part played by them in the Indian Money Market. The clearing system. The Reserve Bank.

Currency.—Functions of good money. Various forms of money. Metallic currencies and coinage Methods of economising Metallic currency and the service of Banks in this respect. The Gold standard, the Gold Exchange standard and the Gold Bullion standard. Token money, Legal Tender, Currency Deterioration—its causes, measures and remedies Gresham's Law Purchasing Power of money and variations therein. Paper Money. The proportion between the Note circulation and reserve in England and India. The Gold standard Reserve and the Paper Currency Reserve in India

Outlines of Foreign Exchange.—General Principles. Indian Exchanges. Functions of Council Bills and Reserve Councils.

Part III (15) Economics and Banking

(*Syllabus in force as from 1944 Examinations*)

(*i*) *Economics.*

(Principles to be illustrated from Indian conditions).

1. *Definition and scope of Economics.*—Relation of economics to other sciences.

2. *Fundamental concepts* —Wants, utility, demand, supply, wealth and income.

3. *Consumption* :—Necessaries, comforts and luxuries Law of diminishing utility, consumer's surplus.

4. *Production.*—(a) Land.

(b) Labour Demand for and supply of labour, efficiency of labour.

(c) Capital: Forms and growth of capital

(d) Organisation: Division of labour-localisation of industries large and small scale production. Growth of Joint Stock Companies. Constant, diminishing and increasing returns.

5. *Exchange*:— (a) Fundamental concepts of value, market, money and banking.

(b) International trade—advantages—free trade and protection

6. *Distribution*:—Income from property. Income from labour.

7. *Public income and expenditure* —Growth of public expenditure in modern times, Sources of public income. Direct and indirect taxation. Public loans.

(*a*) *Banking.*

Money —Functions of money. Various forms of money. Metallic currency and coinage. Bank money. Standard money and token money Gresham's Law Monetary standards.

Banking —

(a) *General Principles*.—Definition of Banking. Functions and economic significance of banks. Growth of Cheque system and the Deposit Banks. Sources of banker's profit Banking investments. Regulation of note issue Banking crises.

(b) *English Banking System*.—Bank of England and its relation to Government, the banking world and the General Public. The Bank Act of 1844. The clearing House, Recent developments

(c) *Banking in India* —Reserve Bank of India; its constitution and functions, its relation to the Government and other banks Imperial Bank of India, Indian Joint Stock Banks, Exchange Banks, Indigenous Banks, Indian Money Market, Recent developments in Indian Banking

*Part III—(16) Accountancy and General Commercial Knowledge

SECTION—I. *Accountancy*

(1) Book-keeping; its principles and practices by mean of double entry. The uses of subsidiary books. Accounts of trading and non-trading concerns. Preparation of Final Accounts (viz., Trading and Profit and Loss accounts) and the compilation of Balance Sheet of sole traders, Partnerships and Joint Stock Companies.

(2) Depreciation, Reserves. Reserve Fund. Sinking Funds.

(3) Capital and Revenue, Receipts and Payments and Income and Expenditure accounts.

(4) Accounts Current and Average Due Date.

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*For the revised syllabus to come into effect from 1944 examinations, *vide* at the end.

(5) Treatment of Accounts in respect of Bills of Exchange, Consignments and Joint Adventures.

(6) Single Entry. Book-keeping, its defects and conversion to Double Entry.

(7) Partnership Accounts including question of goodwill and dissolution.

SECTION—II. *General Commercial Knowledge*

(1) Joint stock company accounts. Share capital and share records. Issue of shares. Allotments. Calls. Statutory Books and Returns. Debentures Premium and Discount on Shares and Debentures. Purchase of business, Conversion of Partnership into a Limited Company—Goodwill. Reduction of Capital. Elements of Reconstruction; amalgamation and absorption.

(2) *Industry and Trade.*—Divisions of Industry into Extracting, Manufacturing, etc. Home Trade—wholesale and retail, Departmental and Multiple shop, Mail order business and co-operative stores. Foreign Trade—Importing and Exporting, Customs and Excise, Insurance, Documents used and methods of payment for goods. Advertising.

(3) Outlines of Money, Exchange and Banking. (Fundamental notions only.)

(4) *Carriage and Affreightment.*—Common carriers, Railway Companies and Shipping Companies. Warehousing.

(5) *Organised Markets.*—Business intermediaries. Produce Markets. Spot Transactions and Futures. Hedging operations, Stock Exchange, its organization and influence.

Part III—(17) Agriculture.

Theoretical: (2 hours a week for 2 years, each year consisting of 32 working weeks—total 128 hours).

Weather: Climate, seasons, monsoons and rainfall, as affecting the growth of crop.

Soils: Origin and formation. Weathering agencies. Soil and sub-soil, Different kinds of soils in the Madras Presidency, alluvial, black cotton, red,

laterite and sandy soils. The proximate constituents of soils and their effect on the condition of soils and crop growth. The chemical composition of soils. Elements in which soils are usually deficient and their replenishment. Biological changes in soils. Nitrification and denitrification. Root nodules. Soil fertility, its maintenance and improvement.

Land Measurement: Measurement of land. Laying out of fields. Calculation of areas.

Tillage and Tillage Implements: Necessity for and effects of tillage. Tilth. Tillage operations in wet and dry lands. Ploughs and ploughing. Wooden and iron ploughs. The parts of a plough and general adjustments. Harrows, Guntakas, Cultivators, Rollers. Tools employed in tillage operations.

Seeds and Sowing: Preparation of land for sowing. Deep and shallow sowing. Broadcasting and drilling. Implements used. Preparation of seed for sowing. Quantity and quality of seed. Selection of seed. Germination of seed. Seed beds Nurseries. Transplanting

Plant Life Plant nutrition as illustrated by the growth of farm crops. Functions of roots, stems, leaves, flowers and seeds. Reproduction from seed and by vegetative growth. Weeds and their distribution in land. Eradication of weeds. Interculturing. Implements and tools used.

Irrigation Necessity for water. Sources of water-supply. Laying out irrigation channels in the field. Methods of lifting water.

Manures and Manuring: Necessity for Manures. General principles governing the application of manures. Classification of manures. Farm manures, their collection and preservation Synthetic Farm Yard Manure Green manuring, oil-cakes, bone-meal, fish-manure Ammonium Sulphate, Sodium Nitrate, Ammophos and superphosphate.

Harvesting Harvesting, threshing, cleaning and measuring or weighing of produce. Storage of produce.

Crops and Cropping: Crops and Cropping. Rotations and mixed cropping. Fodder and Green manure crops. The Chief Cereal pulse and industrial crops of the Circars. *Paddy, Ragi, Cumbu, Cholam, Groundnut, Green and Black Gram, Gingelly, Tobacco, and Sugarcane.

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*Deccan: Cholam, korra, cumbu, ragi, paddy, cotton, groundnut, Bengal gram, red gram.

Carnatic: Paddy, cumbu, cholam, ragi, tenai, groundunt, green gram, red gram, and gingelly.

(Continued on the bottom of next page)

A practical working knowledge of the local crops is required, deduced as far as possible, from the students having taken part in all field operations including the preparation of the land, sowing and planting, manuring, irrigation, weeding, harvesting, threshing and preparation for the market.

Damage caused by the following crop pests—Control measures —

Insect Pests · Paddy caterpillar (Spodoptera mauritia); Rice hispa (Hispa aenesceus); Paddy stem-borer (Schocnobious intertellus), Grass hopper (Hieroglyphus banian and oryzivorous); the Pink Ball worm (platyedragossypiella); the Spotted Boll worm (earias insulana E—Fabia); Mango hopper (Idiocerus); Rhinocerus beetle (Oryctes); Mealy-wing bugs (Aleurodes).

Fungoid Pests · Paddy 'Blast' Piricular oryzae. Paddy (Helmin thosporium spp) Groundnut 'Wilt' (rhizoctonia bataticola). Cholum 'Smut' Sugarcane 'Red rot' (Collectotrichum falcatum).

Farm Animals and Feeding: Care and management of cattle. Breeds of cattle, Breeding. Points of good animal. Common ailments and First-Aid treatment. Cattle foods, roughages and concentrates. Rations for growing animals. Working cattle and milching cows. Milk and its general properties.

Practical work in Agriculture.

1. Recording the local rainfall and its effect on crops and cropping
2. Calculating the area of a given field by chain survey.
3. Laying out plots of given area.
4. Ploughing with country and improved ploughs to study the difference in structure and function of their parts.
5. Assembling the parts of an improved plough. A study of their adjustment for width and depth of furrows.
6. Ploughing under water (puddling) to study its effect on tilth.
7. Other uses of the country plough; to cover seeds and manures and to conserve moisture.
8. Use of the Gorru (the Madras Seed-drill).
9. The planet junior hœ for the inter cultivation of sugarcane.

(*Continued from the bottom of previous page*)

Central: Paddy, cholam, ragi, groundnut, red gram, sugarcane and gingelly.

South: Paddy, ragi, groundnut, red gram, cotton, sugarcane, tobacco and gingelly.

West Coast: Paddy, cocoanuts, pepper, plantains, arecanuts, ragi, gingelly and groundnut.

10. Harrows and their use; the triangular harrow and the blade harrow.
11. Use of agricultural tools; the spade, the crowbar, the pick axe, the hand hœ and the sickle.
12. A study of the qualities of good seed; the seed rate crops; the depth of sowing.
13. Making germination test to find the percentage of germination of seeds.
14. Methods of sowing seeds :—
    (*a*) Broadcasting.
    (*b*) Dibbling.
15. Sowing seeds with a drill (Madras seed-drill).
16. Preparation of nurseries, such as those of paddy, ragi and tobacco.
17. Lifting ragi seedlings and transplanting them in plough furrows.
18. Transplanting paddy and tobacco.
19. Planting surgarcane. A study of the vegetative method of propagation.
20. Selecting sugarcane seed material free from Red rot, and picking Jonna seed for protection against smut.
21. A study of the parts of a plant and their functions.
22. A detailed study of the flower.
23. A study of the important local dry land and wet land weeds and their identification.
24. Constructing beds and channels, ridges and furrows for irrigation.
25. Checking evaporation of water from the surface of the soil by hœing and mulching.
26. Working a picotah.
27. Working a single mhote.
28. Preparing farm yard manure by different systems; the heap, the pit, the loose box and urine dry earth. Its storage.
29. Preparing the synthetic farm yard manure.
30. Making compost: the ryots method and the indore method.
31. Green manures and green leaf manures; their incorporation into the soil.
32. A study of the cakes and other concentrated manures; their identification.
33. Application of manures; the farm-yard manure, bone and bone products and the fish manure.
34. Application of concentrated manures. Mixing manures. A study of the principles governing the mixing of manures.
35. Trenching. Wrapping and propping sugarcane.

36. Harvesting sugarcane and preparing jaggery.

37. Harvesting crops.

38. Threshing by different methods.

39. Curing tobacco.

40. Different methods of storing produce.

41. Methods of seed selection, from the field and from the bulk.

42. A study of the external characters of the important groups of insects. Their identification.

43. Preparing the Bordeaux mixture, the crude-oil emulsion and the tobacco decoction.

44. Working the sprayer; Dusting and fumigation

45. Mechanical methods of control such as hand-picking, netting and using light traps.

46 Selection of a cow for milk and a pair of bullocks for work.

47. Feeding cattle with bulky and concentrated foods. Working out the cost of maintaining a milch cow and a pair of working cattle.

48. Making ensilage.

49. A study of the important breeds of cattle the Ongoles, the Alambadis, the Kangayams and the Scindhis.

50. A study of the general properties of milk and common methods of its adulteration.

Notes of Instructions.

1. The subject should be treated from a practical point of view. Applied sciences will be taught to a minimum extent: just enough to elucidate the general principles of agricultural practice.

2. (*a*) The subjects should be taught with special reference to Rural Economics and Marketing.

(*b*) The lectures on Elements of Practical Horticulture should be arranged.

3. Local crops should be grown on the farm in preference to others supplemented when possible by those specified in the syllabus which are not cultivated in the immediate vicinity.

4. Sufficient area of land should be attached to a college for ploughing and other field operations by students, and this farm should be well-equipped with the necessary implements, tools and other accessories and cattle.

5. Students should be taken on short excursions to typical tracts with a view to enable them to have a wider outlook than they learn in a small farm.

Part III—(18) Electrical Engineering.

Section I.—Mechanical Engineering.

1. *Geometry (under Mathematics—Experimental Geometry).* Add tangents, inscribe and describe figures. Areas of plane figures, plane curves such as parabola, ellipse and hyperbola, methods of drawing and chief properties, cycloidal, spiral and other common curves and loci.

2. *Solid Geometry.*—Lines, points and planes. Projection of simple solids, Regular solids. Sections of solids. Isometric projection.

3 *Graphics.*—Problems relating to the reduction of a system of forces in two dimensions. Arithmetic. Plotting of the curves from given data.

4. *Machine Drawing.*—Ability to copy accurately to scale and supply additional views. The preparation of drawings of simple machines from dimensioned sketches, models or actual parts of machines.

5. *Strength of Materials.*—Mechanical properties of Engineering materials. Stress and strain. Modulus of elasticity. Elastic limit. Ultimate strength. Factor of safety and working strength. Statics and application to structures. Co-planar forces. Application by graphical methods to simple frames within joint such as cranes, etc. Elementary study of beams Bending moment and shearing force. Sections in iron, steel and wood Struts and columns. Formula of Gordon and Euler. Simple sheer and torsion. Strength of shafts. Principle of work. Potential and Kinetic energy. Centrifugal force.

6. *Materials.*—Characteristics of cast iron, wrought iron and steel. Ordinary forms of wrought iron and steel. Working strength of these materials in compression, tension and shear. Characteristics of copper, brass, gun metal and aluminium.

7. *Shafting and Bearings.*—Forms of shaft and shaft couplings, friction and dog clutches, universal joints, arrangements of simple pedestals and footstep bearings. Materials for belts. Forms of ordinary spur and bevel wheels and their velocity ratios.

Section II.—Electrical Engineering.

8. *General Principles.*—Electric magnetic C. G. S. System of units; Principles of Electro-magnets induction: practical system of electric units; Electro-magnets; Magnetic force and magnetic induction; Hysteresis loop;

Eddy currents; Production of alternating currents. Commutation. Alternating E. M. F. and current R M S values; Frequency; Power; Factor; Polyphase currents: Capacity, Inductance and Impedance. Star and mesh connections.

9. *Measurements.*—Ammeter, Voltmeter, Megger, Watt-meter, Watt-hour meter, Power factor meter, Frequency meter

10. *Generators.*—Continuous current generator (Shunt series, Compound). Alternators their characteristics and methods of testing their efficiency and voltage regulation. Transformers and their uses.

11. *Motors.*—Continuous current motors, shunt series and compound, their characteristics and uses. Alternating current motors, inductions motors, synchronous motors; methods of starting and their application

12. *Batteries.*—Construction and management of secondary batteries, their practical applications.

13. *Transmission* —Methods of transmitting electrical energy, calculation of conductor, size and transmission losses

14. *Distribution* —Methods of distributing electric power in streets, overhead and underground mains

15. *Illumination* —Candle power, Photometers, use of shades.

Part III—(19) Mechanical Engineering

Geometry (*under Mathematics—Experimental Geometry*)—Add tangents, inscribe and describe figures, areas, figures, plane curves such as parabola, ellipse and hyperbola methods of drawing and chief properties; cycloidal, spiral and other common curves and loci

Solid Geometry.—Lines, points and planes Projection of simple solids. Regular solids. Sections of solids. Isometric projection.

Graphics.—Problems relating to the reduction of a system of forces in two dimensions. Arithmetic Plotting of the curves from given data.

Machine Drawing.—Ability to copy accurately to scale and supply additional views. The preparation of drawings of simple machines from dimensioned sketches, models or actual parts of machines.

Strength of materials.—Mechanical properties of Engineering materials. Stress and strain. Modulus of elasticity Elastic limits. Ultimate strength. Factor of safety and working strength. Statics and application to structures. Co-planar forces. Application by graphical methods to simple frames with pin joint such as curves, etc. Elementary study of beam. Bending moment and shearing force. Sections in iron, steel and wood. Struts and columns.

Formula of Gordon and Euler. Simple shear and torsion. Strength of shafts. Principle of work. Potential and Kinetic energy. Centrifugal force.

Heat Engines.—Properties of steam, sensible and latent heats. Dry saturated and superheated steam. Boiling point of liquids. Relation between temperature and pressure of steam. Laws of perfect gases. Curves of volumes and pressures. Theoretical diagram of work and estimates of mean pressure. Work done in the conversion of water into steam. Work done in cylinder. Efficiency.

Steam Engines.—History and early types. Modern type of land, marine and locomotive engines. High speed engines. Uniflow engines and steam turbines, description and working, essential differences and scope of usefulness. General design as affected by conditions of working.

Internal Combustion Engines.—Early history and development. Later types. Modern, high duty, high efficiency engines. Carnot's cycle, fire engine cycle. Modern engine cycles and their applications. Types of engines as affected by requirements of power and the nature of available fuel as petrol, kerosine oil, crude oil and gas (suction and pressure)

General construction of the above types of engines —Characteristic properties of coal, lignite, peat, crude oil, light oils, petrol, benzole and tar oils, alcohol and vegetable refuse (Begasse and Paddy husk), Producer gas Suction gas plants.

Boilers.—Description and working of Cornish, vertical Lancashire Locomotive. Water tube and Marine Boilers. Feed heaters, economisers, superheaters and other accessories and mountings.

Machine construction and design —The production of sketches, working drawings, tracings and finished drawing of more complex parts of machines, the dimensions being taken from actual machines or models The details will be chosen from the following:—Engines, gearing, valves, hand and machine tools, workshop fittings and appliances, boilers and riveted joints, screws, belts and nuts, flanges, cottered joints, plumber blocks and brasses and stuffing boxes.

Materials.—Characteristics of cast iron, wrought iron and steel. Ordinary forms of wrought iron and steel. Working strength of these materials in compression, tension and shear. Characteristics of copper, brass, gun metal and aluminium.

Connections:—Forms and properties of rivets and arrangements of rivets in lap and butt joints, single and double riveted. Pitch of rivets. Treatment of three or four overlapping plants. Junction of plates by angle and T-irons. Forms and proportions of bolts and nuts. Flange joints: different forms of screw threads; lock nuts; key and cotter fastenings.

Shafting and bearings —Forms of shafts and shaft couplings, friction and dog clutches, universal joints, arrangement of simple pedestals and footstep bearings; methods of lubricating bearings.

Belt and toothed gearing :—Forms of belt pulleys Velocity ratio of a pair of pulleys. Stepped speed cones. Tension of belts, joint of belting. Materials for belts. Forms of ordinary spur and bevel wheels and their velocity ratios.

Engine details :—Usual forms of cranks and levers. Methods of fixing crank pins. Forms of excentrics. Ordinary arrangements of connecting rods, cross heads and coupling rods. Forms of cylinders, flanges and covers, simple forms of pistons and methods of packing, attachment of piston rods. Simple forms of stuffing box and gland. Construction of simple slide valve.

Mechanical Engineering and Electrical Engineering :—The instruction in these subjects should include considerable practical work in workshop and laboratories supplemented by visits to various Engineering works. The range covered by each of these subjects is necessarily very wide and the knowledge expected in many portions of the syllabus can only be general and descriptive. It may be necessary to allot extra hours for practical work as for example—Saturday mornings. For satisfactory instruction, equipment by way of workshop and laboratories are required.

Part III—(20) Surveying.

Chain :—Prismatic Compass and Plane Table :—Running a chain lines; measuring offsets; use of the cross staff; optical square, survey of area; with chain only; well conditioned triangles, check or tie lines; testing the chain; modes of passing obstacles; chaining across a river or other obstacle; survey of areas with prismatic compass; keeping the field book; plotting surveys made with chain and compass; survey of areas with plane tables; inaccessible points; filling in a survey; finding one's place in a survey.

Setting out :—Ranging straight lines by eye. Laying out curves by chords and offsets.

Level :—Permanent and temporary adjustments: levelling field book; two methods of reducing the field book; levelling; contouring; cross sections; correction for curvature of the earth and refraction; check levels; bench marks; use of Abneys level; clinometer and Ghaut tracer; setting out gradient for railways, canals and sewers.

Theodolite —Use and adjustments of theodolite; traversing; Gale's system; setting out straight line and curves.

Drawing and mensuration :—Use of Drawing instruments, construction of scales; conventional signs; estimation of acres; use of planimeter and

pentagraph; plotting lines of levels and taking out quantities of earth-work; copying plans to different scales by squares; representation of ground by contours; section on contoured plans; location of roads and railways on contoured plans showing cuttings and embankments; estimation of areas and volumes; reduction and plotting of a theodolite traverse.

Part III—(21) Drawing

Syllabus not yet framed.

Part III—(22) Music

There shall be one paper of three hours' duration on Theory of Music and one practical test, each carrying 50 marks. In the practical test candidates will be expected to sing or play on one of the following instruments: Veena, Violin and Flute.

Theory:

1. Fundamental terms; musical sounds and intervals; laws of vibration of strings and air columns; harmonics and upper partial tones; pitch, intensity and timbre; sthayi, sruti, svarasthana and svara, consonant and dissonant intervals; vadi, samvadi. anuvadi, and vivadi.

2. Definition and lakshanas of raga; raga classification; the scheme of 72 melas, lakshanas and sancharas of ragas specified under practical.

3. Tala system; tala dasa pranas.

4. Knowledge of the different types of musical composition including Gita, Varna, Pada and Ragamalika.

5 Carnatic notation

6. History of Music with special reference to the life and work of the following scholars and composers —Govinda Dikshita, Venkatamakhi, Tulajaji and Govindacharya, Jayadeva, Tirtha Narayana, Purandaradas, Bhadrachalam Ramadas, Kshetragna, Tyagaraja, Muthuswami Dikshita, Syama Sastri, Subbaraya Sastri, Gopalakrishna Bharati, Vina Kuppier, Patnam Subramanya Ayyar.

7. Description and use of the chief musical instruments of South India.

Practical:

Knowledge and practice of the following 20 ragas with ability to render at least one classical composition in each :—

Todi, Dhanyasi, Mayamalavagaula, Saveri, Vasanta, Bhairavi, Mukhari, Anandabhairavi, Sri, Kambhoji, Madhyamavati, Mohana. Surati, Sahana, Sankarabharana, Bilahari, Arabhi, Begada, Pantuvarali and Kalyani.

Candidates will be expected to render briefly the alapana of the above ragas.

CHAPTER XL

B. A. PASS DEGREE EXAMINATION

(Regulations)

Conditions of Admission

1. Candidates for the Degree of Bachelor of Arts (B.A.) shall be required—

(i) to have passed the Intermediate Examination in Arts and Science of this University or the Intermediate Examination of any other Statutory Indian University accepted by the Syndicate as equivalent thereto ;*

(ii) to have undergone subsequently a further course of study in an affiliated college as prescribed hereunder, extending over a period of two years, each consisting of three terms consecutive ; and

(iii) to have passed the Examination for the Degree hereinafter prescribed.

Courses of Study

2. The course for the B.A. Degree shall comprise the following subjects of study :—

Part I—English Language and Literature.

Part II—A Second Language. One of the following languages at the option of the candidate :

(a) Classical—Sanskrit, Latin, Arabic, Persian, Pali.

Note—The following examinations have been recognised by the Academic Council, in accordance with Section 33 (1) of the Act as equivalent to the Intermediate Examinations of the Andhra University :—

(1) Intermediate Examination of all other Statutory Indian Universities.

(2) Intermediate Examination of the Travancore University.

(3) Intermediate Examination of the Osmania University, Hyderabad subject to the candidate seeking admission obtains 50% of the marks in English in the Osmania University.

(4) Intermediate Examination of Board of High School and Intermediate Education, Rajaputana (including Ajmer-Merwara) Central India and Gwalior.

(5) Intermediate Examination in Commerce of Board of High School and Intermediate Education, Rajaputana (including Ajmer-Merwara) Central India and Gwalior. (Subject to the conditions imposed on candidates taking commercial subjects in Inter. Exams of the Andhra University).

(6) Intermediate Examination conducted by the Board of High School and Intermediate Education (United Provinces)—Allahabad.

(b) Modern European—French, German.

(c) Modern Indian—Telugu, Kannada, Tamil, Oriya, Hindi, Urdu.

Part III—One of the following groups :—

(i) Mathematics.

(ii-A) Physics Main with Chemistry or Mathematics as subsidiary.

(ii-B) Chemistry Main with Physics as subsidiary.

(iii-A) Philosophy.

(iii-B) Philosophy.

(iv) History and Economics (History main).

(v) History and Economics (Economics main).

(vi) One of the languages included in Parts I and II above

(vii) Music.

Eligibility for the Degree

3. No candidate shall be eligible for the Degree of Bachelor of Arts until he has passed an examination in English Language and Literature and in a Second language, and in one of the Optional groups prescribed.

Option to appear at whole examination or parts

4. A candidate for the B. A. Degree Examination may at his option present himself for the whole or for a Part at any one time.

5. Candidates shall be examined in—

Part I—*English Language and Literature*

There shall be four papers in English, each of three hours' duration.

Subjects for composition and duration of papers

The course shall be (a) Composition on matter supplied by books set for perusal, (b) the study in detail of certain prescribed books and of the History of English Literature so far as it is represented by these books.

The books set under (a) shall consist of two books and may include works of fiction, literary criticism, biography, history, science, philosophy or sociology.

Books set under (b) shall be arranged in the following lasses :—

(1) Two plays of Shakespeare.
(2) Modern Poetry : about 2,000 lines.
(3) Modern Prose : Four set books, the total number of pages generally not exceeding 500.

The paper on the books under (a) which shall be of three ours' duration shall consist exclusively of subjects for short essays, nd of these the paper shall contain a larger number than the andidate is required to attempt.

Under (b) the papers on Shakespeare, Modern Poetry and rose shall each be of three hours' duration. No question shall be et on the General History of the Drama or on General English iterature in the papers on Shakespeare, Modern Poetry and Prose.

Part II—*A Second Language.*

There shall be two papers of three hours' duration each.

(*i*) Classical—Sanskrit, Latin, Arabic, Persian and Pali.

The course shall comprise (a) a detailed study of prescribed ext-books on prose, poetry and drama and applied grammar and oetics ; and (b) translation of seen and unseen passages from and nto English.

The first paper shall be upon (a) and the second upon (b).

(*ii*) Modern European—French, German : The course shall comprise (a) a detailed study of the prescribed text-books on Prose, Poetry and Drama and applied Grammar and Poetics, and (b) Translation of unseen passages from and into English and a short original composition, the subject for which shall be usually based on the text-books.

The first paper shall be upon (a) and the second paper upon (b).

(*iii*) Modern Indian—Telugu, Kannada, Tamil, Oriya, Hindi and Urdu.

The main object of the course shall be the training of the student to employ the language as a vehicle of expression of modern thought.

The course shall comprise (a) a detailed study of prescribed text-books on prose, poetry and drama and applied grammar and poetics; and (b) original composition, composition on text-books in prose set for non-detailed study and translation from English only.

The first paper shall be upon (a) and the second upon (b).

Part III—*One of the groups* mentioned under Part III in section 2 above at the option of the candidate.

Group (i) Mathematics

There shall be six papers set in this group—four of which viz. on (1) Algebra and Trigonometry, (2) Astronomy or Statistics, (3) Pure and Analytical Geometry, (4) Calculus, shall be each of three hours' duration, and two of which viz. (1) Dynamics and (2) Hydrostatics and Properties of Matter, shall be each of two hours' duration.

There shall be no practical examination in Hydrostatics and Properties of Matter for Group (i) candidates.

Group (ii-A)—Physics (Main)

The course shall comprise the study of—

(1) Dynamics and Hydrostatics, (2) Properties of Matter and Heat, (3) Light and Sound and (4) Electricity and Magnetism. There shall be four papers in theory, each of two hours' duration on each of the above four subjects.

There shall also be a practical examination of three hours' duration.

Chemistry (Subsidiary)

There shall be one paper in theory and one paper in practical each of three hours' duration. The course and examination shall be the same as that for B.Sc. Chemistry subsidiary.

Mathematics (Subsidiary)

There shall be two papers, each of three hours' duration, one on Algebra, Trigonometry and Analytical Geometry and the other on Calculus and Differential Equations. The syllabus and examination shall be the same as that for B.Sc. Mathematics subsidiary.

Group (ii-B)—Chemistry (Main)

The course shall comprise the study of—

(1) Inorganic Chemistry, (2) Physical Chemistry and (3) Organic Chemistry. There shall be three papers in theory, each of three hours' duration, one on each of the three subjects.

There shall also be a practical examination of six hours' duration.

Physics (Subsidiary)

There shall be one paper in theory and one paper in practical, each of three hours' duration. The course and examination shall be the same as that for the B.Sc. Physics Subsidiary.

Group (iii-A)—Philosophy

The course shall comprise the study of—

(1) Psychology, (2) Ethics, (3) Logic and Theory of Knowledge, (4) A philosophical work bearing upon a school or period of Indian Philosophy, and (5) A Philosophical work bearing upon a school or period of European Philosophy.

Text-books or syllabuses will be recommended from time to time as indicating the scope and standard of the examination in subjects (1), (2) and (3) above.

There shall be one paper of three hours each in Logic and Ethics, two papers of two hours each in Psychology and one paper of two and a half hours each, in European Philosophy and Indian Philosophy.

Group (iii-B)—Philosophy

The course shall comprise the study of—

(1) Psychology, (2) Ethics, (3) Any one of the following subjects at the option of the candidate :—

(a) Indian Philosophy, (b) European Philosophy, (c) Experimental Psychology and (d) Educational Psychology.

(4) & (5) Any two of the following subjects :—

(a) Economics, (b) Politics, (c) Sociology.

Syllabuses and text-books shall be the same as those prescribed in the corresponding subjects under Groups (iii-A), (iv) and (v). The scope and standard of examination in Experimental Psychology and Educational Psychology shall be indicated by the text-books recommended from year to year.

There shall be two papers, each of two hours' duration on (1) General Psychology, one paper of three hours' duration on (2) Ethics, one paper of two hours and a half duration on the optional subject under (3) above, one paper of three hours' duration on (4) Economics and a two hours and a half paper on (5) Political Science or Sociology.

Group (iv)—History and Economics (History Main)

The course shall comprise the study of—

(1) One of the following special periods of Indian History :—

(a) Early India to the death of Harsha.

(b) Mediaeval India from the death of Harsha to 1556.

(c) Moghul and Mahratta India from 1556 to 1761.

(d) India under the East India Company to 1858.

(e) Modern India from 1858 to the present day.

Note.—The students shall have an acquaintance with the Constitutional History of the prescribed special period, but shall not be required to make a detailed study of the subject

(2) Constitutional History of India during the British period.

(3) Modern History according to a syllabus.

(4) Economics—General.

(5) Politics.

There shall be set one paper of three hours' duration on each of the subjects mentioned above.

Group (v)—History and Economics (Economics Main)

The course shall comprise the study of—

(1) Economics—General.

(2) Economics—Special I.

(3) Economics—Special II.

(4) Modern History according to a syllabus.

(5) Sociology or Politics.

There shall be set one paper of three hours' duration on each of the subjects mentioned above.

Group (vi)—One of the Languages included in Parts I and II above

One of the following languages, which shall be taken in conjunction with the related subject or related language, if any, specified for each language in the following lists :—

Selected Language	*Related Subject*
Sanskrit.	Early Indian History.
Pali.	Early History of India.
Persian or Arabic.	Early Muslim History.
Urdu.	Indian History—Prescribed Period.
Telugu, Tamil or Kannada.	Early South Indian History.
Oriya.	Early History of Orissa.
Hindi.	Mediaeval History of Northern India.

Selected Language (*Main*)	*Related Language* (*Subsidiary*)
Sanskrit, Arabic, Persian.	None.
Telugu, Tamil or Kannada.	Sanskrit.
Oriya.	Sanskrit.
Hindi or Pali.	Sanskrit.
Urdu.	Arabic or Persian.
English.	None

The courses of study in the several languages shall be as follows :—

(1) Sanskrit

(A) *Sanskrit* (*Main*)

Sanskrit Language and Literature. The course shall be :—

(*a*) Selections from the early period, including Vedic Mantras, Brahmanas, Aranyakas, Upanishads and the Sutra Literature.

(*b*) Selections in prose and verse from the Later Period including the Dharmasastras and the Ithihasas, Kavya and Nataka literature.

A knowledge of Alankarasastra will be required sufficient for the correct understanding of learned and recognised commentators.

(*c*) Sanskrit Grammar treated historically and comparatively in accordance with a syllabus.

(*d*) Translation from and into Sanskrit.

(*e*) General History of Sanskrit Literature.

(*f*) Early Indian History.

In the examination there shall be two papers, each of three hours' duration in subject (*b*) and one paper of three hours' duration in each of the other subjects except Translation which will form part of the papers set on (*a*) and (*b*) above.

(B) *Sanskrit* (*Subsidiary*)

The course shall consist of the study of one drama of the classical period and portion of one Kavya. In the Examination there shall be one paper of three hours' duration which shall include pieces for translation from Sanskrit into the main language.

(2) Pali

The course shall comprise the study of—

(1) Certain prescribed text-books in poetry and prose.

(2) Pali grammar treated comparatively in relation to Sanskrit and the middle and modern Indian languages.

(3) History of the literature of the language.

(4) Translation from English into the selected language and *vice versa*.

(5) Early History of India or Sanskrit.

There shall be two papers on the prescribed text-books under 1 and one paper in each of the other subjects, all of three hours' duration.

(5) (a) Arabic or Persian (Main)

The course shall comprise the study of—

(*a*) Prose books selected from different periods.

(*b*) Poetry books selected from different periods.

(*c*) Translation from prose books other than set books; translation from the set poetry books and from English into Arabic or Persian Prose.

(*d*) Grammar including Rhetoric and Prosody.

(*e*) History of Language and Literature with special reference to the set books.

(*f*) A selected period of early Muslim History.

The periods of History for Persian or Arabic may be one or other of the following :—

(1) The four first Khalifas and Umayyad Khalifate excluding Africa and Spain.

(2) The Abbasid Khalifate, excluding Africa and Spain and the Wars of Crusades.

(3) The Muslim Conquest of Egypt and Northern Africa until the fall of the Abbasid Khalifate and excluding the wars of the Crusades.

(4) The Arab conquest of and rule in Spain.

(5) The wars of the Crusades.

There shall be one paper of three hours' duration in each of the subjects mentioned above.

(b) Arabic or Persian (Subsidiary)

The course shall consist of the study of selected pieces from one poet of the classical period and selected portions from the works of

one standard prose writer. There shall be one paper in the examination of three hours' duration which shall include pieces for translation from Arabic or Persian into the main language.

(4) Urdu

The course shall consist of—

(a) Prose books from different periods including at least one modern work.

(b) Poetry books from different periods, including at least one modern work.

(c) Translation from prose and poetry books other than the set books : translation from English into Urdu to be made in an approved modern style.

(d) Grammar including Rhetoric and Prosody.

(e) History of Language and History of Literature.

(f) Indian History—(1) Any one of the following periods to be prescribed from year to year :—

(i) 1347-1707—Deccan Kingdoms.

(ii) 1708-1857—From Aurangazeb to the Indian Mutiny.

(iii) 1858-1920

or (2) Arabic.

or (3) Persian.

There shall be one paper of three hours' duration in each of the subjects mentioned above.

(5) Telugu, Tamil or Kannada

The course shall comprise the study of—

(a) Selections representative of the several periods of the literature of the selected language including one or more inscriptions.

In the case of Telugu the scope of the prescribed books shall be as follows :—

(1) Poetry : About 1,000 stanzas—400 from the Puranic Period, 400 from the Prabandhas and 200 from Modern Poetry.

(2) Prose : General Prose works including works bearing on Literary Criticism and the History of Language and Literature.

(3) Drama : Two dramas one of which should be a translation from Sanskrit.

(4) Ancient Inscriptions.

(b) Outlines of the History of Language and Literature according to prescribed syllabus.

(c) Grammar, prosody and poetics according to prescribed syllabus.

(d) The elements of the Comparative Grammar of the Dravidian Languages

(e) Composition.

(f) Early South Indian History or Sanskrit.

There shall be six papers, the first paper shall be on the set books (Poetry and Drama) and Prosody and Poetics, the second on the set books (Prose and Inscriptions) and Grammar, the third on the outlines of History of Language and Literature and the remaining three papers, one on each of the subjects (*d*), (*e*) and (*f*) supra.

(6) Oriya.

The course shall be the same as for the Dravidian Languages with the substitution of Gaudian Grammar for Dravidian Grammar and of the Early History of Orissa for Early South Indian History.

(7) Hindi.

The course shall consist of—

(1) The study of certain prescribed text-books in poetry and prose.

(2) Elements of the comparative grammar of the Gaudian languages.

(3) History of literature with special reference to the set books.

(4) Composition.

(5) Mediæval History of Northern India or Sanskrit.

There shall be two papers on the prescribed text-books under (1) and one paper in each of the other subjects, all of three hours' duration.

(8) English.

There shall be six papers each of three hours' duration :—

(1) Drama : Two English plays and one classical or Indian translated into English.

(2) English Poetry : 16th century onwards. Set books, C. 2,000 lines.

(3) English Prose : 16th century onwards. Set books, four books.

(4) History of English Literature from Chaucer, and analysis of literary forms.

(5) History of English Language, and *either* (a) Select passages from Sweet's Primer of Anglo-Saxon or (b) A set book from Chaucer.

Note :—More than a third of the paper shall be on the History of the Language.

(6) General Essay.

Notes :—(i) The questions on subjects 1—4 will be on the contents and criticism of only the books prescribed.

(ii) Set Books shall be current for three years approximately one-third to be fresh each year.

Group (vii)—Music.

There shall be two papers each of 3 hours' duration on the Theory and the History of Music in the written examination and three tests in the practical examination as follows :—

Written :

(1) Theory and History of Music—I paper.

(2) Theory and History of Music—II paper.

Practical :

(1) Rendering of Compositions (2) Alapana of Ragas and (3) Rendering of Svaras.

Marks qualifying for a pass

6. A candidate shall be declared to have passed the examination in English if he obtains not less than 35 per cent of the total number of marks. A candidate shall be declared to have passed the examination in second language if he obtains not less than 35 per cent of the total number of marks. A candidate shall be declared to have passed in an optional subject if he obtains not less than 35 per cent of the total marks and not less than 30 per cent in each division of the examination as prescribed hereunder.

Divisions

Provided that a candidate offering Economics and Political Science or Sociology under Group (iii-B), shall obtain a special minimum of 30 per cent of the total marks of the two papers on the two subjects taken together. The division shall be as follows :—

Group (i)	(a) Pure Mathematics, (b) Applied Mathematics.
Group (ii-A) and (ii-B)	(a) Written examination of the Main subject, (b) Practical examination of the Main subject, and (c) Subsidiary subjects (written and practical taken together).
Group (iii-A)	All subjects to be treated as one division.
Group (iii-B)	All subjects to be treated as one division subject to the proviso under para 1 above.

Group (iv) (a) Indian, Constitutional and Modern Histories, (b) Economics and Politics.

Group (v) (a) Economics, (b) History and Sociology or Politics.

Group (vi) —(i) Languages other than English.

(*a*) Selected Language;

(*b*) Related Subject or Language.

Group (vi) —(ii) English.

(*a*) Drama, Poetry and Prose, (*b*) History of English Literature and Analysis of Literary Forms, History of English Language and Essay.

Group (vii) Music (*a*) Written Examination, (*b*) Practical Tests.

All other candidates shall be deemed to have failed in the examination.

Classification of successful candidates

There shall be separate pass and failure lists for the English language part, for the second language part, and for each of the optional groups. Successful candidates obtaining not less than 60 per cent of the total marks in English or in a second language or in the optional group shall be placed in the first class and ranked in the order of proficiency as determined by the total marks obtained by each in the part concerned. Successful candidates obtaining less than 60 per cent and not less than 50 per cent shall be placed in the second class and ranked in the order of proficiency as determined by the total marks obtained by each. Successful candidates obtaining less than 50 per cent shall be placed in the third class.

Transitory Regulations.

7. For the benefit of candidates who have failed in the B.A. Degree examination of 1931 or earlier, the B.A. Degree examination under the Old Regulations (i.e., in force up to and inclusive of the examination of 1931) will be held in the months of April and

September 1932 under Old time-tables. Candidates for the B.A. Degree examination who completed their courses of study and earned the prescribed certificates of attendance and progress for two years under the Old Regulations shall be permitted to appear for the B.A. Degree examination of 1932 under the same Regulations. Candidates who have been exempted from the production of attendance certificates may, at their option, appear for the examination of 1932 under the Old Regulations. The text-books and syllabuses will be the same as those prescribed for the examination of 1931.

8. No examination for the B.A. Degree under the Old Regulations (*i.e.*, in force up to and inclusive of the B.A. Degree examination of 1932) shall be held as from the B.A. Degree examination of 1933.

9. Candidates for the B.A. Degree examination who completed their courses of study for that examination under the Old Regulations shall be permitted to complete the B.A. Degree examination under the New Regulations subject to the following conditions :—

(1) A candidate who has passed Part I of the examination under the Old Regulations shall be deemed to have passed in Parts I and II under the New Regulations.

(2) A candidate who has passed Part II under the Old Regulations shall be deemed to have passed in Part III of the examination under the New Regulations.

(3) A candidate who has failed to pass in Part I of the examination under the Old Regulations shall be exempted from the examination in a language under Part II of the examination under the New Regulations, but shall be required to take five papers in English, comprising the four papers under the New Regulations and one additional paper in the 17th and 18th Century Prose to be set on the text-books prescribed for the examination of 1931. This Regulation shall be in force till the September examination of 1935. Thereafter candidates will have to appear for the examination under the Regulations then in force.

(4) A candidate who fails to pass in Part II of the examination under the Old Regulations in a Group other than Group ii—Physical Science or Group iii—Natural Science, shall be required to take the papers set for the corresponding group under the New Regulations.

On or after 1st June 1931, candidates for the B.A. Degree examination, who had completed the first year's course of study in a non-science or Mathematics group prescribed for the examination under the Regulations in force prior to the academic year 1930—31 and had earned the certificates of attendance and progress prescribed for that year but are unable to complete the course under those regulations, will be permitted to complete the second year course of study by attending classes under the New Regulations and to appear for the examinations under the New Regulations. They shall be exempted from the production of the attendance certificates required for the first year of the course.

SYLLABUSES

Group (i)—Mathematics

In addition to the subjects prescribed under (*a*) Mathematics and (*b*) Physics for the Intermediate Examination, the course will comprise Algebra, Plane Trigonometry, Elements of the Calculus, Dynamics, Hydrostatics, Astronomy and Properties of Matter.

PURE MATHEMATICS.

Algebra.—Inequalities, Limits, Elementary theorems in convergence and divergence of series. The binomial theorem for a rational index. Exponential and Logarithmic series. Partial fractions, elementary methods for the summation of series. The elementary properties of continued fractions. Intermediate equation of the first degree.

Elementary properties of Determinants. Typical Graphs.

$$y = ax^n,\ y = a/x,\ y = ax + b + c/x,\ y = ax + b + c/x^2$$

Graphical solution of cubic and biquadratic equations.

General properties of the equation of the *n*th degree and its roots and co-efficients. The derived functions. Simply transformations of equations. Reciprocal equations. Approximate solution of numerical equations.

Trigonometry.—Fuller treatment of the Intermediate course. Quadrilaterals inscribed in and circumscribed about circles. Regular polygons.—Limits *of sin x/x and tan x/x as x tends to zero.*—Inverse Trigonometrical Functions. Complex numbers and their geometrical representation. DeMoivre's theorem. Series of Cos x, Sin x, Tan x in terms of x (without proof). Hyperbolic Functions. Summation of elementary trigonometrical series.

Pure Geometry.—Inversion, Orthogonal Projection. Solid Geometry (Standard as in Hall and Steevens Geometry—Part VI.)

Questions in Geometry may be allowed to be answered by methods either of pure Geometry or analytical Geometry.

Geometrical Conics.

Such leading properties of conic sections as are specially suitable for treatment by elementary Geometry.

Focus : Directrix, definition of the conic, shape, axes of symmetry, centre, foci, the ellipse as orthogonal projection of a circle

Geometrical treatment of the following propositions and their immediate application —

(i) If a chord PQ of a conic, whose focus is S, meets the corresponding directrix, in R, SR is a bisector of PSQ.

(ii) The tangents from any point to a conic subtend equal or supplementary angles at a focus

(iii) The semi-latus rectum is a harmonic mean between the segments of a focal chord.

(iv) The locus of midpoints of parallel chords of a conic is a diameter.

(v) The sub-tangent of parabola is bisected at the vertex and the subnormal is constant.

(vi) The foot of the perpendicular from the focus on any tangent of a parabola lies on the tangent at the vertex.

(vii) The focal-chord of a parabola parallel to the tangent at P is 4 SP.

(viii) $PV^2 = 4$ SK. KV where PV is an ordinate to the diameter of a parabola through K.

(ix) The sum or difference of the focus distances of any point on a central conic is constant.

(x) The tangent and the normal at P, bisectors of SPP. 1 in the case of a central conic and of SP and the parallel to the axis through P in the case of a parabola.

(xi) The feet of the perpendiculars from the foci on any tangent lie on the auxiliary circle and the rectangle under these perpendiculars is constant

(xii) The sum of the squares of conjugate diameters of an ellipse is constant

(xiii) The locus of meets of perpendicular tangents to conic is a circle which reduces to a straight line when the conic is a parabola.

(xiv) Every plane section of a right circular cone or cylinder is a conic.

Analytical Geometry.—Fuller treatment of the straight line and circle referred to rectangular axes The parabola, ellipse and hyperbola referred to their principal axes, and the rectangular hyperbola referred to its asymptotes. Tracing of conics from the general equation of the second degree. The polar equations of the straight line, circle and the conic. Simple problems on the above.

Calculus.—Standard forms and fundamental processes of differentiation and intergration Simple applications of the derivative to geometry, algebra, mechanics and physics. Maxima and minima values of a function of one variable. Theorem of mean value (graphical proof). Taylor's and Maclaurin's Theorems (without proof) Approximations and small errors. Curve tracing. Curvature. Cartesian formula for the radius of curvature Integration by substitution Integration by parts. Integration regarded as summation, with simple applications to areas, volumes and surfaces and to mechanics. Differential equations of the first order and first degree Linear differential equations of the second order with constant co-efficients.

Applied Mathematics.

Dynamics.—Resolution and composition of displacements, velocities and accelerations. Curves of speed and velocity diagrams. Motion of a particle in one plane under constant accelerations Simple harmonic motion; composition of simple harmonic motions. Angular velocity and angular acceleration: moment of velocity.

Absolute units of force Resolution and composition of forces. Angular momentum: moments of inertia in simple cases, the pendulum, determination of g Work, energy, conservation of diagrams. Impact: the ballistic pendulum; Dimensions of dynamical units. Conditions of equilibrium of a body acted on by forces in one plane. Moments and couples. Centre of mass. The theory of simple machines. Laws of friction. Graphical methods of simple applications.

Hydrostatics,—Thrust of fluid on plane and curved surfaces. Centre of pressure in simple cases. Floating bodies and conditions of stability. Properties of gases; determination of heights by barometer. Pumps; pressure gauges and hydrostatic machines. Capillary phenomena and their explanation by surface tension; general theory of surface tension.

Astronomy.—The apparent motion of the heavens. Circumpolar stars. The principal constellations and the most conspicuous stars.

The celestial sphere—Points and lines on it—Horizon, zenith, pole, meridian etc., equinoxial points etc.

Celestial co-ordinates; right ascension; declination etc., Latitude and Longitude.

The transit circle, the equatorial, the clock. The transit theodolite. The sextant and chronometer.

Phenomena depending on change of latitude and longitude of the observer. Magnitude of the earth.

The apparent annual motion of the Sun. The constellations of the zodiac. The ecliptic and its obliquity. The equinoxes and the solstices. The earth's motion round the Sun. The seasons.

Sidereal time, apparent solar time, mean solar time. Equation of time. Standard time (India) Civil and astronomical reckoning Conversion of time.

Explanations of astronomical refraction and parallax. Twilight.

Determination by observation of clock; error and rate of Right ascension and declination of a heavenly body and of the latitude and longitude of a station.

The solar system and the motion of the planets. Kepler's law. Comets and meteors.

The motion of the moon and her phases. The plane of her orbit. The nodes and their motion. The moon's sidereal and synodic periods. Her diameter and distance.

Distances and magnitudes of the sun, moon and planets.

Causes of the eclipses of the sun and the moon. Ecliptic limits. Number of Eclipses in a year The Calendar. The use of the Nautical Almanac.

Formulae for the solution of right angled spherical triangles. Elementary problems on diurnal motion involving the use of right angled spherical triangles. Determination of the first point of Aries and the obliquity of the ecliptic. Precession, Nutation, Aberation.

STATISTICS.

1. *Scope and meaning of Statistics*

Collection of Statistics, taking the census as an example

2. *Statistics of variables* ·

(*a*) Necessity for classifying the data collected, choice of class interval, Frequency distribution, Frequency polygon, Histogram, Frequency curve.

(*b*) The mean, mode, median, quartiles and percentiles

(*c*) Mean deviation, standard deviation and quartile deviation, measures of skewness based on these.

(*d*) Two variables, lines of regression and co-efficient of correlation

3 *Elementary Theory of Sampling* ·

Binomial distribution, normal curve developed from symmetric binomial distribution, meaning and significance of the probable error, use of the formula for the P. E. of the mean.

4. *Graphical and numerical work* ·

The student is expected to be familiar with the following :—

(1) Calculation of averages, deviations and correlation co-efficient (using multiplication etc. tables).

(2) Drawing histograms and sketching frequency curves by free-hand drawing.

(3) Fitting of easy parabolic curves by the method of least squares.

(4) Fitting of the normal curve by the method of areas.

(5) The ogive and its use in the determination of the mode, median, etc.

(6) Logarithmic graphic representation (using semi-logarithmic paper).

(7) Index numbers.

Standard as in Gavett—First course in Statistical Method.

The following books are recommended for reference —

U. Yule—Introduction to the Theory of Statistics—Chapters I, VI, VII, VIII, XII and XV.

D. C. Jones—A First Course in Statistics—Chapters I to XIV

Properties of Matter.—Elasticity. Hooke's Law. Compressibility of gases (at high and low pressure) and liquids Compressibility and rigidity of solids; the elastic limits. Strains due to simple longitudinal pull; Young's modulus and its expression in terms of k and n. Bending in one plane of bars of simple cross sectional area; flexual rigidity; application to girders. Simple twisting of wires of circular cross sectional area by couple in plane at right angles to length, torsional rigidity, applications to torsion balance and shafts.

Diffusion of liquids and gases; analogy with conduction of heat Osmosis, viscosity. Pressure of a gas and its explanation on the kinetic theory; Avogadro's hypothesis; Van der Waal's equation

PRACTICAL PHYSICS FOR GROUP (i)

There shall be no Practical Examination in Physics for Group (i) Mathematics

The following scheme is intended to indicate the nature and extent of the course of instruction in Practical Physics for candidates in Group (i) B. I. Degree —

(1) Application of the method of least squares to the treatment of a series of observations: probable error

(2) Observation of damped oscillations: logarithmic decrement

(3) Composition of simple harmonic motions of different phases, amplitudes or periods, in the same or different directions.

(4) Calibration of a glass tube.

(5) Comparison of aneroid and standard barometers under different conditions of temperature and pressure

(6) Surface tension.

(7) Viscosity of a liquid by flow in a narrow tube.

(8) Strees-strain curves: Young's modulus: elastic limit.

(9) Determination of moments of inertia.

(10) Determination of g: compound pendulum.

(11) The balance: Zero of unloaded balances: curves of sensitiveness: ratio of arms, calibration of a set of weights.

Group (ii-A)—Physics (Main).

Properties of Matter.

Balance. Circular motion Centrifugal and centripetal forces—their practical application Centrifugal machines.

The compound pendulum; determination of 'g' Elastic oscillations of springs and determination of 'g'

Gravitation and gravity Gravitation constant, mass and density of the earth. Experiments of Cavendish and Boys and determination of 'G'. Methods of comparing 'g' at various places

Mean, solar and sidereal time Sundial, clocks, watches

Hooke's law, stress and strain Modulus of elasticity Strains due to simple longitudinal pull Elastic limits. Poisson's ratio. Compressibility and rigidity of solids. Young's modulus and its determination Expression for Young's modulus in terms of 'n' and 'k'. Simple twisting of wires of circular section by a couple at right angles to its length Torsional rigidity and its determination. Torsion balance. Uniform and non-uniform bending of rods of circular and rectangular section—Cantilevers Relation between the bending moment at a point and curvature Determination of 'Y'—'I' form girders

Compressibility and elasticity of gases. Boyle's law and deviations from it. Van der Waals' equation. Brownian motion. Elements of kinetic theory as applied to gases. Explanation of pressure, viscosity, effusion, transpiration and diffusion. Molecular speed and absolute temperature of gases. Atmospheric pressure—variation with altitude Isobars.

Hydrostatics.

Fluid Thrust: Thrust of fluid on plane and curved surfaces.

Centre of pressure in simple cases (i) rectangular lamina with one side in the surface, (ii) triangular lamina with one side in the surface, (iii) triangular lamina with vertex in the surface and the base horizontal, alteration in the centre of pressure as the body is lowered in the fluid.

Floating bodies and the conditions of stability. The common hydrometer and its graduation.

Barometers—mercury and aneroid. Determination of heights by barometer.

Meta-Centre and its practical determination.

Hydrostatic machines; Pumps—water pump, air pump, mercury pump, rotary pump and diffusion pump. Mcleod gauge.

Capillary phenomena; Surface tension of liquids and surface energy, Determination of surface tension by capillary rise. Torsion balance, drop method Variation of surface tension with temperature. Vapour pressure over curved surfaces and formation of liquid drops.

Compressibility of liquids—Regnault's experiment Diffusion of liquids and gases · analogy with conductivity, Fick's law

Osmosis and laws of, osmotic pressure, vapour pressure, Boiling and freezing points of solutions

Viscosity—Coefficient of viscosity of a liquid by capillary flow. Comparison of viscosities. Effect of temperature on viscosity

Heat

Thermometry: Liquid-in-glass, resistance, thermo-electric, vapour-pressure and gas, thermometers Pyrometry and low-temperature thermometry.

Expansion · Solids, application to temperature compensation. Liquids, apparent and absolute. Gases.

Calorimetry: Specific heats of solids, liquids and gases. Ratio of the specific heats of a gas and its determination. Latent heats and Latent Heat calorimetry. Total heat of steam.

Vapour pressure Static and dynamic methods. Vapour pressure of water and high and low temperatures. Effect of pressure on boiling and freezing points.

Isothermals · Critical temperature. Andrews and Amagat's experiments.

Change of state. Equilibrium between different states. Triple Point

Van der Waals' equation. Critical constants. Law of corresponding states.

Internal work in expanding gases; Joule's experiments, porous-plug experiment. Joule-Thomson effect. Liquefaction of gases.

Adiabatic transformation. Equation for the adiabatic of a perfect gas.

Conduction and diffusion of heat in solids. Searle's and Forbe's methods. Lees' method for bad conductors.

Convection.

Radiation: Newton's and Stefan's laws of cooling and their experimental verification Theory of exchanges. Emissive and absorptive powers. Kirchchoff's law. Measurement of radiation.

Laws of thermodynamics. Work done in isothermal and adiabatic expansions. Indicator diagram.

Carnot's theorem. Reversible cycle. Cycle of a refrigerating machine.

Steam engines and internal combustion engines.

Applications of second law. Thermodynamic scale of temperature and ideal gas scale.

Light.

Reflection and refraction Optical lever and sextant. Total internal reflection. Spherical mirrors. Thin lenses; combination of two thin lenses. Liquid lens; loss of power

Prisms · Minimum deviation and I-D curves

Dispersion and dispersive power; irrationality of dispersion.

Chromatic aberration: achromatic combination of prisms and lenses in contact. Direct-vision spectroscope and constant deviation spectroscope.

Eye-pieces · Ramsden's and Huyghens' Telescopes. Compound microscope. Epidiascope Intermittent illumination

Photometry Lummer-Brodhun Photometer.

Velocity of light · Romer's Fizeau's and Foucault's methods.

Wave theory · Huyghens' principle, Rectilinear propagation of light, zone plate.

Explanation of reflection, refraction and total internal reflection.

Action of mirrors, lenses and prisms reviewed from wave theory.

Interference: Simple interference phenomena Young' experiment.

Fresnel's bi-prism and bi-mirror Rayleigh's interferometer.

Colours of thin films. Newton's rings.

Diffraction Straight edge, narrow wire and narrow rectangular slit. Plane transmission gratings.

Resolving power of a telescope.

Spectrum analysis Emission and absorption spectra. Ultra violet and infra red spectra.

Doppler's principle and its application

Double refraction through calcite Construction of wave-surfaces.

Production and detection of plane, circularly and elliptically polarised light. Quarter-wave plate, half-wave plate.

Rotation of plane of polarisation—Fresnel's explanation.

Polarimeters.

Interference of polarised light; rings and brushes in uniaxial crystals.

Scattering of light; blue of the sky.

Magnetism.

Inverse-square law, Gauss's proof.

Magnetic potential, Equi-potential surfaces; potential at any point due to a short magnet; couple acting on a short magnet due to another magnet.

Mutual force between two small magnets with their axes in a straight line and their axes mutually perpendicular, one bisecting the other.

Magnetic shell. Potential due to a shell and its potential energy in a magnetic field.

Total normal induction and Gauss's theorem.

Molecular theory of magnetism Elements of Para, dia and Ferro-magnetism.

The magnetic field of the earth. Terrestrial magnetic elements their variation and measurement. Magnetic charts

Dip circle. Mariners' compass and its uses.

Intensity of magnetisation and magnetic induction.

Magnetic susceptibility and permeability; their measurements. B-H and I-H Curves: Magnetometer method.

Electrostatics.

Inverse-square law, Gauss's theorem.

Electrostatic potential and capacity

Electric field due to a charged sphere, charged infinite cylinder and conducting plane. Cavendish's proof of inverse square law

Coloumb's law. Mechanical force on charged conductors

Lines and tubes of force. Spherical and parallel plate condensers and their capacity. Dielectric constant. The attracted disc and quadrant electrometers.

Measurement of capacity and dielectric constant

Energy of charged conductors and condensers

Wimshurst machine. Distribution of charge and action of points Lighting conductor

Current Electricity.

Magnetic field due to a circular current and a solenoid. The Helmholtz's galvanometer. Kirchhoff's laws: application to the Wheatstones' network. Callendar and Griffith's bridge.

Electrolysis; conductivity of electrolytes. Ionisation and velocity of ions.

Cells and accumulators—lead and Edison types.

The potentiometer: Measurement of E.M.F., current and resistance.

Thermo-electricity. Seebeck, Peltier and Thompson effects. Measurement of thermal E.M.F. Thermo-electric diagrams.

Energy of a circuit carrying current when placed in a magnetic field.

Force exerted by a magnetic field on a coil carrying current.

Moving coil instruments,: Voltmeter, ammeter and Wattmeter.

Ballistic galvanometer.

Electromagnetic induction: Lenz's Law. Coefficients of induction. Induction coils. Comparison of mutual inductances. Foucault's currents. Earth inductor Measurement of H. and V.

Dynamos and motors: shunt, series and compound wound machines and their characteristics Efficiency of a motor

Technical applications of electricity to lighting and power transmission

Elementary study of wireless. Thermionic valve. Simple receiving set. The microphone, loudspeaker and gramophone pick-up.

Discharge of electricity through gases, cathode rays; X-rays Coolidge Tube.

Alpha, Beta and Gama rays

General ideas of atomic structure.

Sound.

The transmission of energy through material medium by wave motion.

Equation for a simple harmonic wave. Progressive and stationary waves

Composition of simple harmonic motions. Lissajou's figures.

Characteristics of a musical note. Velocity of sound in a gas. Effect of temperature, pressure, humidity and wind on the velocity of sound.

Reflection and refraction of sound

Interference and diffraction phenomena. Illustrations—beats.

Doppler's principle. Speed of transverse waves along a cord.

Laws of transverse vibrations of strings: Melde's experiment.

Velocity of longitudinal waves in a rod. Kundt's experiment.

Vibrations of air in pipes. Determination of frequency-stroboscopic and other methods.

Free and forced vibrations; Resonance · Helmholtz's resonators.

Musical scales. Musical instruments Gramophone.

Manometric flames, sensitive flames Maintenance of vibrations, Concord and discord

Note·—Candidates must submit to the examiners before the hour of the practical examination their laboratory note-books duly certified by their Professors as a *bona-fide* record of work done. The laboratory note-books shall be allotted 20% of the total marks under practical, the remaining 80% being allotted to the practical examination (Main subject)

Group (ii-B)—Chemistry (Main).

Physical Chemistry: Same as that of B Sc. (Pass) Chemistry (Main)

Inorganic Chemistry· Same as that of B.Sc. (Pass) Chemistry (Main) with the omission of the 1st paragraph beginning with the words "Historical development" and ending in words "quantitative period"

Organic Chemistry· Same as that of B Sc. (Pass) Chemistry (Main).

Practical examination in Chemistry shall include the following·—

(1) Qualitative analysis of Inorganic mixtures containing not more than four radicals (acids or bases).

(2) Volumetric analysis—Preparations of standard solutions, acidimetry, alkalimetry, oxidation and reduction methods involving the use of potassium permanganate, potassium dichromate, Iodometry, precipitation methods.

(3) Gravimetric analysis of Hydrochloric, Sulphuric and Phosphoric acids, copper, iron, calcium.

(4) Identification by physical and chemical tests of the following organic compounds given singly:—

Methylalcohol, Ethyl alcohol, acetone, chloroform, Formic, acetic, oxalic, tartaric, citric, acids, glycerine, urea, glucose, cane-sugar, starch, benzene, aniline, phenol, resorcinal, benzaldehyde, benzoic and salicylic acids.

Note:—Candidates must submit to the examiners before the hour of the practical examination, their laboratory note-books duly certified by their Professors as a bona-fide record of work done. The laboratory note-books shall be allotted 20% of the total marks under practical, the remaining 80% being allotted to the practical examination (Main subject).

Groups (iii-A) and (iii-B) Philosophy.

No detailed syllabus is prescribed.

Group (iv) History and Economics (History Main)

1. CONSTITUTIONAL HISTORY OF INDIA DURING THE BRITISH PERIOD.

SECTION I: INDIA UNDER THE COMPANY (1600-1858)

1. *The Company as a Trading body.*—The incorporation of the Company under the Charter of Queen Elizabeth. Its growth and acquisition of 'Sovereign' powers under royal charters after the Restoration. The struggle between rival companies after 1688 and their union under Godolphin's award. The Government of Factories, in general and their relation to the Indian rulers of the day.

2. *The Government of India.*—The Governor-General in Council, King-maker. Power without responsibility and its evils. The Diwani and its importance. The Regulating Act, its nature and defects Fox's India Bill and Pitt's India Act of 1784. The ascendency of the Board of Control. The Charter Acts of 1793, 1813, 1833 and 1853. The Mutiny and the transfer of the Indian territories to the Crown by the Act of 1858.

SECTION II: INDIA UNDER THE CROWN (1858—1918)

1. *Home Government.*—Theoretical sovereignty of Parliament and its actual control over Indian affairs. The Secretary of State in Council and his powers. The powers of the Council. Relations of the Secretary of State with his Council and with the Government of India.

2. *The Government of India.*—The Governor-General in Council, changes in the respective positions of the Governor-General and his Council since the time of the Regulating Act.

3. *The Provincial Governments.*—The growth of the Provincial system under Governors, Lieutenant-Governors and Chief Commissioners. The history of their relations with the Government of India. The Policy of Centralization culminating in the Charter Act of 1833 and the process of decentralization since 1861 and 1870. The position on the eve of the Reforms of 1919.

4. *The growth of Legislative Councils.*—Executive in the role of the Legislature. The gradual process of differentiation between the two from 1833. The Indian Councils Act of 1861 and its importance. The Indian National Congress and the Indian Councils Act of 1892. Political discontent in the country and the Minto-Morley Reforms, the principles underlying them an their working.

SECTION III: TOWARDS RESPONSIBLE GOVERNMENT (1918-1935).

Events leading to the Reforms of 1919. The Great War and its effects. The Congress-League Scheme. Agitation for Home Rule. Montagues'

announcement in the House of Commons in 1917. The Joint Report and the four cardinal principles underlying the Reform Scheme.

The Division of Powers between the Centre and the Provinces, and the sub-division of the Provincial Powers between the Governor-in-Council and the Governor acting with Ministers. Dyarchy and its peculiar features. The composition and powers of the Provincial Legislature. The Governor's extraordinary powers in relation to the legislature and the executive. Defects in the nature and working of dyarchy.

The Central Legislature—its composition and powers. The extraordinary powers of the Governor-General in Legislation.

The relaxation of control by the Secretary of State in Council over the Governments in India. The extent of Devolution and Decentralization of Power. The Government of India in its relations to the Provincial Governments.

SECTION IV · INDIA AS A FEDERATION.

1. *The forces leading to the Federation.*

2. *The division of Powers between the Central and Provincial Governments.*—The three lists. The divison of powers between the Federal Government and the Indian States.

3. *The National Government.*—The Governor-General's Reserved Departments and special responsibilities The Federal cabinet and its nature. The composition and powers of the Federal Legislature.

4. *Provincial Autonomy.*—The Governor and his Ministry. Composition and Powers of the Provincial Legislature.

SECTION V · GENERAL.

1. *The Judiciary.*—Its early history under royal charters. Reforms of Warren Hastings. The establishment of a Supreme Court in Calcutta in 1773 and later in Madras and Bombay. The Amending Act of 1781. The History of the Company's courts. Their amalgamation with the Supreme Courts under the Indian High Courts Act of 1861. Subsequent changes under the Acts of 1911, 1919 and 1935. The establishment of a Federal Court. The organization of subordinate courts. Appeals to the Privy Council.

2. *Local Self-Government.*—Municipal Government in the Presidency Towns. The Acts of 1842 and 1850. Need felt for local taxation after 1858. Lord Mayo's decentralization scheme. The Resolution of Lord Ripon and its importance. The extent of advance before the Reforms. The first principle in the Joint Report and the Local Self-Government Resolution of 1918. Progress since 1920.

3. *The Public Services.*—The early history of the services and their reform under Lord Cornwallis. The Competitive system since 1854. The problem of Indianisation. The Acts of 1861 and 1870. The Statutory Civil Service. The Aichison Commission and their recommendations. The system of listed posts. The recommendations of the Joint Report. The Services in relation to the Ministers. Their privileges. The Lee Commission and its recommendation. The Present position.

4. *The Indian States.*—The Company's relations with them. The change of policy after the Mutiny. Guarantee of their permanence in the Indian political system followed by increasing control of the Paramount power over their affairs. A new policy since 1906. The establishment of Chamber of Princes. The rights and obligations of the States. Nature of Paramountcy. How far Paramountcy is affected by their entry into the Federation.

2. MODERN HISTORY (1500—1918)

The syllabus shall be the same as that under Modern History in Group V—History and Economics (Economics Main)

3. ECONOMICS.

[Students will be required to show a clear understanding of economic principles by intelligent application of economic theory to Indian facts and problems].

General.—The scope of Economics. Relation of Economics to their Sciences. Methods of Economic enquiry; deductive and inductive (e.g. family budgets, village and city surveys, statistics), History (in broad outline) of Economic thought.

Psychological Basis of Economics and Consumption.—Classification of Wants, Stability. Wants in relation to activities. Elastic and Inelastic Demand. Economic meaning and types of Consumption. Conception of Utility and Value. Economic motive; the Economic Man. Influence of family system.

The Production of Wealth.—Definition. Production as (a) creation of use value, (b) creation of exchange value. Classification. Production for producer's use. (a) Individual. (b) Social. Production for the Market.

Factors and Production.—Natural forces and materials; soil, sun, rain, mineral, etc. The Principle of Conservation. Material capital (Classification of forms, social and individual capital). Human energies (a) physical, (b) intellectual. Theory of population. Efficiency dependent on (a) individual physique, nutrition, knowledge, skill, moral quality, (b) social conditions e. g. social order, co-operation and division of labour.

Methods of conserving past acquisitions of skill and knowledge (e g. hereditary occupations, apprenticeship; industrial education). New acquisitions (e.g. research and invention).

Characteristics of Modern Production: *Basis.*—(a) Individual Property. (b) Contract. *Character* (a) Mercantile. (b) Capitalistic *Forms.* (a) Individual (peasant and craftsman); (b) patronal (individual employer and joint stock company). (c) Co-operative. (d) Collectivist (State and Municipal) *Specialization*, Concentration in agriculture, manufacture, transport, commerce Horizontal and vertical combination Competition and monopoly.

Extent to which Indian industry possesses these characteristics

Stages of Production. Extractive Industries, Agriculture, Fishing, Forestry, Mining, etc. *Manufacture.* Laws of Diminishing Returns and Increasing Returns. *Transport and Commerce,* local, international. *Money, credit,* and *insurance* as auxiliaries to production.

Mechanism of Exchange.—Nature and functions of money. Different kinds of money. Monetary standards—the Gold Standard, the Gold Exchange Standard and the Sterling Standard. The Paper Standard. Banks and their functions. Central Bank in England and India. Value of money. Changes in the price level, their measurements and their effects. The basis of international trade. The principle of comparative advantage. Free trade and Protection. The mechanism of foreign trade. Bills of exchange. Gold points. Price levels and rates of exchange.

Exchange Value.—Theory of Value, equilibrium between Demand and Supply. Market value and normal value. Value of money; meanings of phrase. Variations in value of money.

Distribution of Wealth.—The Share of Land: Rent, Supply and Demand in relation to Land. The Ricardian Law of Rent. Economic Rent. Customary Rent. Rack-rent. The sharing of Economic rent in India.

The Share of Labour.—(i) Wages. Supply and Demand in relation to Labour. Theories of wages (a) Minimum subsistance; (b) Standard of life; (c) Marginal productivity. Combinations of employers and employees in relation to wages.

(ii) *Salaries.*—Supply and Demand in relation to acquired knowledge and skill and exceptional ability.

The Share of Capital: Interest.—Supply and Demand in relation to Capital. The accumulation of capital, Conversion of capital from unspecialized forms. Interest on loanable capital. Interest on investments. Capitalization. Promotion.

The Share of Capital: *Interest.*—Supply and Demand in relation to Business Organization. Profits and the Entrepreneur.

The Share of the State: *Taxation.*—The community as worker and sharer in the product. Duties and Expenses of Government. Forms of Taxation.

4. POLITICS.

SECTION I The nature of Political Science—Definition of Political Science—Its scope—The methods of Political Science—Its relation to other sciences like Economics, Ethics, Sociology and Psychology.

SECTION II. The nature of the State—Definition of the State—The State as distinguished from other Associations—The constituent Elements and Attribute of the State—Population, Territory, Government, Sovereignty, State in relation to Nation and Nationality—Development of the principle of Nationalism.

Historical origin of the State—Influence of kinship, religion, industry, and war—The Evolution of the State—The Tribal State—The City State—The Oriental Empire—The Roman Empire—The Feudal State—The National State—The Modern Imperial State—Theories of the nature of the State—The Divine Right theory—The Social Contract theory—Organic theory—The Idealistic theory.

Sovereignty—Its characteristics—Legal, political and popular sovereignty—Location of Sovereignty—Limitations on Sovereignty—Modern attacks on the theory of Sovereignty.

Liberty—Its relation to Sovereignty—Different kinds of liberty—Their mutual relations.

Equality—Different kinds of equality—Their mutual relations—Relation between Liberty and Equality.

Rights—Natural rights—Fundamental rights—Guarantee of rights—Rights of the Individual and of the Group.

Law—Development of Law—Enactment and creation of Law.

Forms of State and of Government—Monarchy; Its strength and weakness—Aristocracy: its strength and weakness—Democracy: its strength and weakness—Cabinet Government—Presidential Government—Unitary and Federal Governments.

SECTION III. The Organisation of the State—Constitutions—Written and unwritten constitutions—Rigid and flexible constitutions—Amendment and growth of constitutions—Conventions—Judicial interpretations.

Separation of powers—Theory of the separation of powers—Criticism.

The electorate—Nature of the electoral function—Arguments for and against universal suffrage—Minority representation—Proportional representation—Territorial versus functional representation—Compulsory voting.

The Legislature—Merits and defects of the Bicameral system—Structure, composition and powers of Upper Houses in the more prominent States—Structure, composition and powers of Lower Houses—Relation between the electorate and the representative—Organisation and procedure of the Legislature—Defects of representative legislature—Referendum, Initiative and Recall.

The Executive—Nominal and real executive—Parliamentary and Presidential executive—Their relative merits and defects—The working of the Parliamentary executive in England and France.

The Judiciary—Functions of the Judiciary—Organisation of the Judiciary—Selection and tenure of judges—Relation of the judiciary to the executive—Administrative Law and Administrative Justice—Relation of Judiciary to Legislature.

Political parties—Their functions—Two party system and Multiple-party system—Public opinion—its nature—Its formulation.

Federal Government—Sovereignty in the Federal State—Division of powers—Advantages and disadvantages of Federal Governments.

Local Government—Administrative areas for purposes of Local Government—Relations with Central Government.

Associations of States—Personal Unions—Real Unions—Confederations—The British Commonwealth of Nations—Conduct of international relations—Nature and aims of the League of Nations.

SECTION IV. The Functions of the State—The ends of the State—The nature of the functions of the modern State—Compulsory and optional, functions.

Theories of State functions—Anarchism—Individualism—State regulation—Socialism—Syndicalism—Guild Socialism—Bolshevism—Fascism.

An outline knowledge of the working of the Governments of England France, the United States and India is required.

Text-Books :—

1. Gettell—Political Science—Ginn & Co. (1933 edition).
2. Strong—Modern Constitutions.
3. Ilbert and Meston—The Indian Constitution.

Books for reference :—

1. Garner—Political Science and Government—American Book Company.
2. Laski—An Introduction to Politics—Allen and Unwin.
3. Petric—A short History of Government—Methuen.

Group (v) History and Economics (Economics Main).

1. ECONOMICS.

A. Economics General (A general survey of an elementary character) based on the Syllabus prescribed for Group (iv).

B. Economics Special.—Any two of the following subjects :—

(1) *Banking and Currency* (includes money, credit, foreign exchanges and prices).

(2) *Public Finance* (includes the economic functions of the State, the raising and spending of taxes and public loans and the regulations of tariffs.)

(3) *Labour Problem* (includes trade unionism, socialism, labour legislation, welfare work).

(4) *Indian Land Tenures* (includes the development and main features of the principal systems of land tenure in India.)

(5) *Rural Economics.* (includes the organization and financing of agriculture with special reference to the co-operative movement in relation to agriculture).

(6) Recent Economic History of India and England.

(1) BANKING AND CURRENCY.

Currency :—Money : Definition. Qualities of Money, Functions of Money, Token and Standard Money, Gresham's Law, Mint Laws, Numbers of Prices, How they are struck, and their purposes ; Value of Money, Quantity theory and other theories, Bimetallism, Gold Standard ; Its working before 1914, its failure and its future, Managed currency, Prices, Rising and Falling Prices and their effects, Inflation, Deflation, Reflation, Foreign Exchanges Purchasing Power Parity Theory.

Banking :—Early History ; Meaning of Banks and Credit, Paper currency : Laws regulating Note issue, Bank Act of 1844, Currency and Bank Notes Act of 1928, cheque system and clearing houses, Functions of a Commercial Bank. Big Five of London. Central Banks and their functions, Bank of England, Federal Reserve Bank, Bank Rate and the Money Market.

Indian Banking :—Early history, Indegenous bankers and money lenders, Joint Stock Banks and Causes for their failure during period 1913-24. Imperial

Bank of India, Foreign Exchange Banks, Land Mortgage Banks, Co-operative Banks, Reserve Bank of India, Bill market and the Bank Rate, Defects of the Indian Money Market.

Indian Currency:—Early history, Currency from 1835-1870, closing of the Mints and its causes, Herschell Committee, Fowler Committee. Evolution of the Gold Exchange Standard from 1902-1913, Its defects, Chamberlain Commission, War and its effects, Babington Smith Committee and the failure of its recommendations, Hilton Young Committee, Currency Act of 1927, Linking the Rupee with Sterling, Gold Exports, Council Bills, Reverse Councils and Sterling Tenders.

(2) PUBLIC FINANCE.

(Public Finance, including economic functions, of the state, the raising and spending of taxes and public loans and the regulation of tariffs).

I. *General Considerations*:—Public Finance, the basis of good Government, 19th Century theory of "*Laissez* Faire" in regard to governmental functions, recent socialistic influence of state activities.

II. *Public Expenditure*—Reasons for the increase in public expenditure with special reference to the increase of State functions in the post-war period.

Classification and Canons of Public expenditure—principle of maximum social advantage—effects of public expenditure on production, distribution and employment.

Public Income:—(a) Sources—Charateristics of a good revenue system—classification of public revenues.

(b) Definition of a tax—canons of taxation—progressive, regressive, proportional and degressive taxation.

(c) Taxable capacity—relative and absolute—determining factors—estimates of taxable capacity in British India.

(d) Direct and indirect taxation—merits and demerits—relative position of direct and indirect taxes in India.

(1) Taxation of land: Different bases of taxation. History of the Indian systems—applicability of Adam Smith's canons of taxation to Indian systems.

(2) Income-tax: Main types—principles of graduation, differentiation, abatement etc.—History of the Indian system—super tax and sur tax—features of the present system.

(3) Customs duties: Tariffs for revenue *vs.* Tariffs for protection—relative importance of customs revenue in India and England.

Tariff regulations: Ad valorem *vs.* Specific duties—recent tendency to the abandonment of ad valorem duties.

History of Indian Tariff policy: pre-War revenue tariff—War time fiscal measures—changes after the war.

(e) Single *vs.* multiple taxes—difficulties of avoiding double taxation.

(f) Incidence of taxation: Nature and conditions of the shifting of taxes—Incidence of customs duties, salt tax, sales taxes and tax on land.

(g) Effects of taxation: On production, distribution and other effects.

Public Debts: (a) Special features and conditions of state borrowing—merits and demerits of public debts.

(b) Forms of Public debts, voluntary and involuntary, internal and external, productive and unproductive, funded and floating.

(c) Burden of Public debts on the debtor community—method of estimating the burden—redemption of public debts—principles of conversion—question of capital levy.

(d) Comparative study of Indian and British Public debts.

III. *Indian Financial Administration* (a) Central budget: items of income and expenditure—separation of railway finance from general finance—Outline study of budget preparation, presentation and legislative sanction.

(b) Historical review of the financial relations between the central and provincial governments from 1870—central budget deficits and Meston award—allocation of revenues discussed in Layton's report, report of the Indian statutory Commission and of Federal Finance Committee. Position of Central and Provincial Finances in the Act of 1935. Financial Assistance to provinces proposed by Sir Otto Nimeyer.

(c) Local Finance in India.

(5) RURAL ECONOMICS

(N.B.—To be studied with special reference to India).

I. Importance of rural economy in World economy, Interdependence of agriculture and manufacturing industry, characteristic features of rural economy in Western countries, Japan and India.

II. *Production*:—Commercial farming viz. Subsistence farming, Transition in India. Basis for estimating agricultural production (per unit of land area or per unit of population).

(1) *Land* :—(a) Size of holding, sub division and fragmentation, Economic holding, Types of crops sown.

(b) Productive capacity, mechanical, chemical and biological properties of soils, the problem of manure supply, moisture seed, implements, etc., Rotation of crops, mixed cropping. Special study of moisture supply: Irrigation projects and Works.

(c) Extensive and intensive cultivation —The Law of Returns and its importance.

(d) Forest economy in relation to agriculture—Forest conservation.

(2) *Labour* :—(a) Human labour force : adequacy and efficiency—cultivating land-owners, casual labourers and permanent labourers—Economic dependency of permanent labourers—migration of agricultural labourers (seasonal or periodical).

(b) Animal labour: Its special importance in India—Efficiency—feeding and breeding problems - diseases of live stock and their control.

(c) Mechanical labour appliances—peculiar conditions in India.

(3) *Capital and Agricultural financing* :—Relative difficulties of agricultural financing—Threefold division of credit—Sources of Credit Supply: The role of the money lender—measures taken to combat his vagaries—Government as a supplier of credit—The place of Nidhis, Joint Stock Companies and Reserve Bank of India in agricultural financing—Co-operative credit; history of the movement and the extent of its usefulness in India

(4) *Producing Organisation* :—Private, Joint Stock and Co-operative Organisations in Denmark and Holland, and India.

III. *Distribution* :—(1) Rent of land; different systems of land tenure—Recardian Rent theory—cash rents *vs.* share rents.

(2) Wages. Low agricultural wages in India—Estimates of agricultural wages.

(3) High rates of interest in agriculture, particularly in India.

(4) Agricultural profits: Composite character—low profits of Indian agriculture—maximisation in other countries through agricultural unions combines, pools, etc.

IV. *Agricultural Marketing* :—Marketing organisations in America and Canada—conditions of marketing in India—marketing surveys—Co-operative marketing—Regulated markets—Aids to marketing - Communication lines freight rates, storage facilities, etc.—special study of the marketing of wheat o cotton.

V. *Additions to agricultural income*:—Cottage industries—mechanised small scale industries in rural areas—Importance of power supply—State aid of different kinds, the rural industries—co-operative organisation of rural industries.

(6) RECENT ECONOMIC HISTORY OF INDIA AND ENGLAND

(A) India.

I. *Agriculture*: Development—Policy of the Government—History of systems of tenure and settlements—Agricultural indebtedness—Legislation dealing with it and its value—Development of agricultural marketing.

II. *Industry*: Growth of modern large scale industries—Post War Industrial position—"Discriminating Protection" and its value. Leadership in industrial organisation—managing Agency system

III. *Transport*: Improvement of road transport—History of Railway Transport—Effect of improved communications—Steam transport—Ratewars.

IV. *Commerce*: Trend of foreign trade down to 1914—Tariff changes after the Great War—Work of Tariff Boards—India in the scheme of Imperial Preference—Present conditions.

V. *Banking and Currency*: Rise of Banks of European types—Indigenous—banking systems—Reserve Bank—Expansion of Co-operative banking system—Closure of Mints 1893—Gold Exchange Standard changes in the currency policy after 1914.

VI. *Financial system*. Financial Centralisation in the 19th Century Decentralisation movement—effect of the Reforms of 1919 and 1935.

VII. *Labour movement*: Rise of Trade Unions—Trade Union and Trade Disputes Legislation—Present position of the movement.

VIII. *Co-operative movement*: 20th Century legislation—achievements and weaknesses of the movement.

IX. *Economic prosperity*: Periodic fluctuations—Price changes and their effects—Estimates of national income.

(B) England.

I. *Industry*: "Industrial Revolution," Favouring conditions, features and economic effects—Recent Trust movement. Factory Legislation in the 19th Century Trade Boards Act of 1909.—Workmen's Compensation Legislation.

II. *Agriculture*: "Agrarian Revolution," its features and effects—20th Century tendencies.

III. *Transport*: Development of mechanical Transport—Effect of Steam Transport on the International Position of England.

IV. *Commerce*: Free Trade movement and growth of British Foreign Trade—20th Century Protectionism and Imperial preference.

V. *Banking and Currency*: Suspension of Bank Charter Act 1844—Currency and Bank Notes Act of 1928—Present position of note issue—The 'Big Five' concerns.

Vicissitudes of gold standard in the 20th century—present paper sterling standard.

VI. *Labour movement*: Origin and history of Trade Unions—Trade Union Legislation—Post War Legislative action on strikes—Growth of labour party in Politics.

VII. *Poor Relief*: Poor Laws from 1834 and their administration—unemployment Insurances—Old age pensions. Labour Exchanges.

VIII. *Cooperative movement*: Development of the distributive side—Co-operative Congress.

IX. *Socialistic movement*. Fabian movement, Guild Socialism, State Socialism etc.

2. MODERN HISTORY—(1500—1918).

(1) *Introduction*—

Features of Mediaeval Europe:—Papacy—Empire—Feudalism—their decay. Decline of Byzantine Empire.

The New Age—Renaissance—Reformation—Maritime discoveries—Transfer of political power to Atlantic States—Spain—Portugal—France—Holland—England.

(2) *Sixteenth Century*—

Supremacy of Spain under the Hapsburgs—

The development of the Hapsburg power and its extent under Charles V and Philip II. Its challenge to Europe:—

(a) France, (b) Germany, (c) Netherlands, (d) England, (e) Turkey

The relation of the Reformation and Counter Reformation to the struggle

(3) *Seventeenth Century*.—

(A) Ascendency of France.

(i) Henry IV—Richilieu—Mazarin. Opportunity afforded by religious struggle in Germany.

(ii) France under Louis XIV—His system of Alliances: Sweden—Turkey—England. The challenge to Europe: (a) Holland (b) Spain, (c) The Empire, (d) England.

(B) Northern Europe.

Ascendency of Sweden under House of Vasa. Her challenge to North Europe: (a) Denmark, (b) The Empire, (c) Poland, (d) Russia.

(C) South-Eastern Europe.

Revival of Turkish Power—its relation to Western politics—its challenge to Austria and Poland. Position of Turkey at close of century.

(4) *Eighteenth Century.*—

The rise of England—Prussia—Russia.

(A) *England*—Her position in Europe and overseas after Treaty of Utretcht—Expansion and challenge to (a) France and Spain, (b) Holland.

(B) *Prussia*—Her position under Frederic II. His challenge to Austria and German Princes—Relation with France—Russia—England.

(C) *Russia*—Her position in Baltic after Treaty of Nystadt. Her challenge to (a) Germany, (b) Poland, (c) Turkey.

(5) *French Revolution.*—

(A) Its causes, characteristics and course.—Its challenge to Europe—(a) The Empire (Netherlands, Germany and Italy), (b) England.

(B) The Napoleonic Empire.

Its rise and development—its challenge to Europe:—(a) The Empire, (b) England, (c) Russia, (d) Spain, (e) Portugal, its overthrow. Congress of Vienna.

(6) *Nineteenth Century and after*—

The challenge of Vienna to Liberalism and Nationality. Influence of Matternich.

(A) *Liberal movements.*—

(i) 1815-1825 Germany-Spain-Italy, Suppression by Quadruple Alliance.

(ii) 1830. Revolution in France and its consequences in Austria—Hungary—Italy—Prussia—England—Collapse and reaction. Fall of Metternich—establishment of the Second Empire in France.

B. *National movements*:—

(i) Union of Italy.

(ii) Unification of Germany and the establishment of the German Empire—the French Republic.

(C) *The Eastern Question.*—

Russia's challenge to Turkey—Anglo-French support to Turkey.

(i) War of Greek Independence.

(ii) Turko-Egyptain War.

(iii) Crimean War.

(iv) Balkan Risings and Russo-Turkish War. Congress of Berlin.

(D) *Growth of the Balkan State.*—The young Turk Revolution—The Balkan War—The Treaty of Bucharest.

(E) *German attempt at World Supremacy.* The Anglo-German rivalry—European Colonial ambitions—The Triple Alliance—The Triple Entete—The Great War—The Treaty of Versailles.

3. SOCIOLOGY.*

1 *Introduction* · Nature and scope of the subject: its relation to Biology, Psychology and other sciences. Methods of investigation ; evolution in social phenomena ; progress and determination ; social life as influenced by physical, geographical, biological, psychological, ethical, religious and historic factors.

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*The following will come into force as from the examination of 1944 :—

I. *The nature and method of Sociology*:—Definition and scope of the subject. The place of Sociology among the social sciences. Its relation to Biology, Psychology, Anthrology, Economics, Politics, History and Ethics, The method of Sociology. The concrete method and the scientific approach.

II *Social life and the fundamental consideration* :—(1) Man and Society ; Definition of Primary concepts ; society, community associations, institutions, modes and folkways, and customs. Origin and growth of society. In what sense man is a social animal. Individuality and society, co-operation and conflict.

(2) Environment and social life. Different aspects of total environment. Geography as a social determinant. Social heritage. The adjustment of civilised man to his environment.

(3) Heredity and social life. Theories of heredity. Natural selection and social selection. Eugenic school.

(4) Social change. Concepts of evolution and progress. Biological technological and cultural factors of social change.

III. *Social Organisation* :—1. Family, Sociological significance of family ; its functions. Early forms of family life. The family of to-day The family and the state.

2. Marriage. Types: promiscuity, Polyandry, group marriage, monogamy. Evolution of marriage. Marriage rules; endogamy, exogamy, hypergamy, levirate. The position of woman in the West and in India. Problems of consent and of divorce.

3. The clan (sib), phiatry, tribe, and nation. The class, caste and race ideas. The development from the earliest state to modern state. Federations, empires, leagues and other groupings.

IV. *Religion and Morals* :—1. Religion; origin and growth of religion. Rise of priest-hood. Different forms of religion. Animiam, ancestorworship, fetishism, magic, polytheism, henotheism, and monotheism, religious rituals and ceremonies

2. Morals and justice in early and modern communities Taboo The development of social justice, blood revenge, oath, order and other social codes. Public opinion and social control.

V *Social Pathology*:—1. The nature of social pathology. Poverty, crime, degeneracy, disease, illiteracy, defectives, and other types of human maladjustments, causes and remedies. Methods of betterment of social life and harmony.

2. *The family*: Its organisation and forms: maternal and paternal descent; kinship, relations and usages; relation of sexes; sexual division of labour, segregation, adoption, education, systems.

3. *Marriage*: Sexual communism, polygamy, polyandry, monogamy, exogamy and endogamy. Evolution of marriage.

4. *Forms of social structure*: The clan, tribe, caste, nation; the city state, modern state, federations, empires, and other groupings Social stratification, castes and classes and their devolopments.

5. *Origin and growth of moral and religious ideas*: Social value of religion: religions and their beliefs in their bearing on social relations: influence of Magic; animism: ancestorship, polytheism and world religions on social relations; religious institutions, rituals and priesthood.

6. *The Social Order*: Its development, blood feuds, retaliation, compensation. Primitive courts and processes; Oath and the Ordeal. Growth of public justice and rational procedure. Social evils and their remedies: poverty, crime, disease, illiteracy, depressed classes.

7. *Economic Activities*: Their effects on Society: Occupations and Social divisions. Property, Rank.

4. POLITICS.

N. B.—The syllabus for the above is the same as that in the case of History (Main) Group.

Group (vi)—One of the Languages included in Parts I and II.

1. Sanskrit Grammar.

[Knowledge, accurate, so far as it goes, but neither extensive nor minutely detailed is expected under each head. The following abbreviations are used hereunder: P.I.E.=Primitive Indo-European; Ind-Ir=Indo-Iranian; Skt=Sanskrit; Gk=Greek; Lat=Latin; Teut=Teutonic]

A. GENERAL.

1. *Elementary Phonetics.*—(a) The organs of speech—production and classification of speech-sounds. Quantity; accent, sentence, word—and syllable-accent. Glides.

(b) Phonetic description of all speech-sounds treated in the course. Phonetic transcription.

(c) Sound-change; isolative, conditional, defective imitation and the result of analogy. Meaning of the term 'Law' in Linguistic Science. Dialect separation. Growth of Literary Languages. Families of languages. Cognate words and loan words.

2. *The Indo-European Family of Languages.*—The original speech and its earlier dialect divisions. Branches and sub-branches of the Indo-European Family. Some distinguishing characteristics of the Indo-Iranian, Hellenic, Italic and Teutonic branches.

3. *Indo-Iranian.*—The Indian Sub-Branches, Dialects of Vedic times. Epic dialects. Classical Sanskrit Middle Indian Speeches. New Indian Speeches.

B. Phonology.

4. *The P.I.E. Vowel System—The oldest conditions*: Primary vowels: changes resultant on accent; secondary vowels and syllabic liquids and nasals. Vowel-gradation, quantitative and qualitative: its relation to accent and its bearing on morphology. The latter P I.E. vowel system prior to the period of language separation. General treatment of the P.I E. vowel-system in the oldest Ind.-Ir., Gk., Lat. and Teut

5. *The vowel system of Sanskrit* in its relation to P.I.E. and to the vowel systems mentioned in 4. Vowel-gradation in Sanskrit.

6. *The P.I.E. Consonant System*—Classification of the P I.E. consonants. Earliest dialectal variations; the 'centum' and 'satam' divisions. Treatment of the P.I.E. consonant generally in Ind-Ir., Greek and Teutonic.

7. *Representation of the P.I.E.* Consonant-system in Sanskrit liquids and nasals. Plosive consonants. Cerebral consonants (Fortunatov's Law), Palatal and velar consonants, (the law of palatalization). The law of aspirate (Grassman's Law) Spirants, Semi-vowels.

8. *Sandhi*, external and internal. Glides in Sanskrit Anaptyxis (Svarabhakti). Haplology.

C. Accidence.

9. Word-formation, Base, Stem and suffix. Prefix-Infix.

10. *Sanskrit compounds, nominal and adverbial.*

11. *Sanskrit suffixes*, primary (krt.) and secondary (taddhita).

12. *Nominal Declension.*—P.I.E.: conditions: Number, Grammatical Gender. Cases and case-endings. P.I.E. case-endings. Syncretism, Contamination, Classification of noun, declensions according to suffix. Vowel and consonant-stems.

13. *The noun declensions in Sanskrit* treated historically and comparatively with reference to P.I.E. Greek, Latin and Teutonic. Philological explanation of all case-endings. Comparison of adjectives and formation of adverbs treated philologically.

14. *Numerals.*—Philological treatment of the Sanskrit numerals

15. *Pronouns and Pronominal adjectives.*—The Sanskrit numerals.

Pronominal adjectives treated philologically with reference to P.I.E. Greek, Latin, and Teutonic.

16. *The Verb.*—The P.I.E. verbal system generally treated; voice, mood, tense, augment, reduplication, personal endings. Thematic, Athemetic stems. Types of verbal action.

17. *The Sanskrit verb* in its relation to the P.I.E verbal system, present, perfect, aorist and future system in Sanskrit. Transfer from the athematic to the thematic class. Periphrastic formations, Analogy in the Sanskrit verbal system. Derivative verbs—causative, denominative, desiderative, intensive.

18. *Voices, moods and tenses* in Sanskrit Infinitive verbal formations.

2. Telugu Grammar, Prosody and Poetics

I. భాషా ప్రకరణము.

(1) భాషా ప్రయోజనము, దానిలక్షణము. నాగరక భాషల లేఖన పద్ధతి.

(2) తెలుఁగు దేనుఁగు శబ్దముల వ్యుత్పత్తి. ఆంధ్రశబ్ద వ్యుత్పత్తి. తెలుఁగు వాడుకలోనున్న మండలములు.

(3) తెలుఁగు భాషలోఁ జేరినభాషాంతర శబ్దములు. అందులకుఁగారణములు.

(4) ఆంధ్రభాష రెండు విధములు:—"సంస్కృత సమము, వైకృతము, ఆంధ్రదేశ్యము, అన్యదేశ్యము, అనింద్య గ్రామ్యము"—వాని స్వరూపముల ప్రదర్శనము.

II. అక్షర ప్రకరణము.

(1) ఇంటర్నీడియటు సిలబసులోని యక్షర ప్రకరణమునందలి విషయము అనువాదము.

(2) సంస్కృతాంధ్ర వర్ణసమామ్నాయములు. పదాది ఱు, ఌ వర్ణములు ర, ల తుల్యములు.

(3) వర్ణోత్పత్తిస్థానముల దిఙ్మాత్ర ప్రదర్శనము. వాడుకలోనికి వచ్చిన కొన్ని నూతనధ్వనులయు, కొన్ని సంయుక్తాక్షరములయు విలక్షణోచ్చారణము.

(4) ఇంటర్నీడియటు సిలబసులోని యక్షరప్రకరణమునందలి విషయము అనువాదము.

(5) అర్ధానుస్వారోత్పత్తి క్రమము. దిఙ్మాత్రము.

సిద్ధసాధ్యనస్వారములు అరసున్న యుండు స్థలములను గనిపెట్టు నుపాయములు. అరసున్నలు డుముఖ్యపదములపట్టిక. అర్ధానుస్వారము వచ్చిచేరు స్థలములు, అర్ధానుస్వారము నిత్యముగ్ పూర్ణమయ్యెడు స్థలములు.

(6) అంతిస్థముల లఘ్వులఘూచ్చారణములు శకటరేఫముండు తావులను గుర్తించు నుపాయములు శకటరేఫములుండు ముఖ్యపదములపట్టిక.

(7) పదాది నుండరాని వర్ణముల వివరణము. పదాది యకారవిషయమున లాక్షణికాభిప్రాయభేదములు.

చ, జ, ల దంత్యతాలవ్యభేద విషయముందలి విశేషములు.

III పద ప్రకరణము.

(1) ప్రకృతి ప్రత్యయముల స్వరూపము. ఆగమాదేశానుబంధాను ప్రయోగాదుల లక్షణము. ప్రకృతుల చాతుర్విధ్యము. సంస్కృతి సమ్ప్రాపితపదికములు, ఆచ్ఛిక ప్రాపితపదికములు. సంస్కృత సమధాతువులు, ఆచ్ఛిక ధాతువులు. వీని దిఙ్మాత్ర వివరములు.

(2) చతుర్విధ ప్రకృతుల వ్యుత్పన్నా వ్యుత్పన్నతాభేదముల వివరములు.

సాంస్కృతికాచ్ఛిక వ్యుత్పన్న ప్రాపితపదికములు-కృత్ప్రత్యయాంతములు-తద్ధిత ప్రత్యయాంతములు - సాంస్కృతికాచ్ఛిక ప్రకృతులందుఁ గల్గు వర్ణముల మార్పులు

(3) (a) ఇంటరుమీడియటు సిలబసులోని పదప్రకరణమునందలి 1వ విషయము అనువాదము.

(b) నామవాచకముల యవాంతర భేదములు :—సజ్ఞానామవాచకములు, జాతినామవాచకములు, గుణనామవాచకములు, క్రియానామవాచకములు, నామము, నామవాచకము, వీనికిఁ గల భేదము - వాచ్యవాచకవిభేదము.

(4) (a) ఇంటరుమీడియటు సిలబసులోని పదప్రకరణమునందలి 2వ విషయము అనువాదము.

(b) కొన్నియెడల మహత్త్వాదులు నిరర్థకములు. స్త్రీలింగపుంసక లింగములు; మిత్రాదుల రూపద్వైవిధ్యము. విశేషణవిశేష్యముల లింగసామ్యము. అందలి విశేషవిధులు.

(c) తెలుగున ద్వివచనములేదు నిత్యైక వచనాంతములు. నిత్య బహువచనాంతములు; పూజ్యత, అజ్ఞాత, ప్రశ్నము మున్నగు స్థలములలోని బహువచన ప్రయోగము - వచనవిషయమున సంఖ్యావాచకము లందలి విశేషవిధులు, విశేషవిశేషణముల వచనసామ్యము - ఆ విషయమునందలి విశేషవిధులు.

(d) విభక్తిలక్షణము. కొన్నింటికి ప్రథమైకవచన లోపము. ఇంటరుమీడియటు సిలబసులోని పదప్రకరణమునందలి 3-వ విషయము అనువాదము-సామాన్యములగు నామవాచకములయొక్కయు, సర్వనామములయొక్కయు, ఔపవిభక్తికముల యొక్కయు, విభక్త్యంతముల రూపసాధనప్రక్రియ - కొన్నియెడల ఔపవిభక్తిత్వము నియతముకాదు. విభక్తివ్యత్యాసమునందలి విశేషవిధులు - విశేషణవిశేషముల విభక్తిసామ్యము ఆవిషయమునందలి విశేషవిధులు నామవాచకములలోను సర్వనామములలోను, ఔపవిభక్తికములలోను గల విశేషశబ్దముల విభక్త్యంత సిద్ధరూపముల పట్టిక సర్వనామ మహతీవాచకములు, సర్వనామముల విషయమున నితర విశేషవిధులు.

(7) విశేషణములు :—ఇంటరుమీడియటు సిలబసులోని పదప్రకరణమందలి 4 వ విషయము అనువాదము.

"విధేయ విశేషణములు, క్రియావిశేషణములు" అనువానివిషయమున విధుల యందు వివరణము. ఉద్దేశ్యవిధేయముల వివరణము. విశేష్యవిశేషణముల విపరీత వ్యవహారము. క్రియాజన్యవిశేషణములకు విశేష్యములతో గల అన్వయాభాసము తచ్ఛబ్దాకార ప్రకారలోపాదులు విధేయ విశేషణముల కాలపురుషవచనాదులందలి రూపభేదములు. క్రియావిశేషణము లవ్యయములనుట లెస్స. వీనికిని విధేయవిశేషణములకును సమ్యక్కాగుధాత్వర్థమును ప్రయోగము.

(8) క్రియలు: —

(a) ఇంటరుమీడియటు సిలబసులోని పదప్రకరణమందలి 5 వ విషయము అనువాదము. తద్విపులీకరణము.

(b) స్వార్థేంచుణాగమము చేరునపుడు సంస్కృతసమాదిధాతువులందుఁ గల్గెడి కార్యవిశేషములు. కర్మార్థకధాతువుల స్వరూపము. ఆత్మనేపదార్థక ధాతువుల స్వరూపము. ప్రేరణార్థక ధాతువుల స్వరూపము. ప్రేరణార్థక ధాతువిశేష రూపములపట్టిక. శబ్దప్లవధాతువుల స్వరూపము చేయు, పోవు పాలు మున్నగు వానితో గూడిన నజ్యంత ధాతువుల విశేషార్థములు.

(c) "సకర్మకములు, అకర్మకములు, ద్వికర్మకములు" అను మూడువిధములను గుఱించి విపులముగ వివరించుట సమాపకములు, అసమాపకములు, కర్తృబహుత్వమున నుత్తమాది పురుషనిర్ణయములలోని విశేషవిధులు.

కర్తృబహుత్వాది విషయములలో వచనవిషయమునందలి విశేషవిధులు.

వ్యతిరేక ప్రార్థనక్రియల స్వరూపము.

ఆశీర్వాప సంప్రార్థన విధ్యర్థక స్వరూపవిశేషములు. సామాన్యార్థక క్రియల స్వరూపము. న్యూనక్రియల విశేషవిధులు (చలయ్యాదులు) తద్ధర్మార్థ్యర్థకములు. తద్ధర్మమాత్ర బోధకములు. వ్యతిరేక క్రియలు కాలత్రయబోధకములు.

సామాన్యములకు ధాతువుల సమాపక క్రియారూపములయొక్కయు అసమాపక క్రియారూపములయొక్కయు రూపసాధనప్రక్రియ.

విశేషధాతువుల సమాపక క్రియారూపముల యొక్కయు అసమాపక క్రియారూపములయొక్కయు పట్టిక.

క్రియల విషయమునందలి యితర విషయములు

(9) అవ్యయములు:—

(a) ఇంటరుమీడియటు సిలబసులోని పదప్రకరణమందలి 6 వ విషయము అనువాదము. తద్విపులీకరణము.

(b) లాక్షణిక ప్రతిపదోక్తావ్యయముల స్వభావములు. వాని విపులీకరణము. ముఖ్యములను కొన్ని సాంస్కృతిక కావ్యయములు. ఆచ్ఛిక ప్రతిపదోక్తావ్యయముల పట్టిక

అవ్యయములు, లింగ విభక్తి వచన శూన్యములను విషయములయొక్క విమర్శనము.

ఇంటరుమీడియటు సిలబసులోని పదప్రకరణమునందలి 7 వ విషయము అనువాదము. తద్విపులీకరణము.

IV. వాక్యప్రకరణము.

1. ఇంటరుమీడియటు సిలబసులోని వాక్యప్రకరణమంచలి 1-2 విషయముల యనువాదము.

2. a) వాక్యలక్షణము "యోగ్యత, ఆకాంక్ష, ఆసత్తి" అను వీని వివరణము. వివిధ వాక్యవిశేషములు.

(b) "కారకము-ట్కృము, శేషషష్ఠి, సంబోధనము" అను వీని వివరణము, ఆంధ్రవాఙ్మయమునఁగల కారకవిశేషములు.

ధలయ్యాది క్రియలతోనుండు వాక్యములు విశేషములు, కర్తలలో ఆత్మార్థక ముఁ్నప్పటి విశేషములు.

విజాతీయ కర్తృకహేత్వనుఁగల్గు వాక్యముల దలిపచనాది విశేషములు మహత్సూహార్థక కర్తృక వాక్యములు.

వాక్యాంతర వ్యంజక వాక్యవిశేషములు, అధ్యాహార్యాదిపదములు

వాక్యవిషయము నందలి యితర విషయములు.

3. సంధులు :—

a) సంధిశబ్దార్థము. సంహితాలక్షణము. సంధికాని స్థలములు. నైపత్తిక సంధిస్థలములు.

(b) ప్రకృతిశబ్దార్థము. ప్రకృతస్వరూపము ఇంటరుమీడియటు సిలబసులోని వాక్యప్రకరణమునందలి 4 వ విషయము అనువాదము.

కళాప్రకృతి ప్రకృతికర్తృ విషయమునందలి విశేషవిధులు

(c) ఇంటరుమీడియటు సిలబసులోని వాక్య ప్రకరణమునందలి 5 వ విషయము అనువాదము. స్వరసంధులలోని విశేషవిధులు సౌలభ్యము.

ప్రకృతిప్రకరణ స్వరసంధులు.

(d) యడాగమము శ్రుతిమాత్రములోఁదిగాదు. "గసడదవాదేశసంధి, సరళాదేశసంధి, అనుకృతిసంధి" అను వానియందలి విశేషవిధులు.

(e) ప్రాథమాద్యర్థకము డుజ్జులసంధి విశేషములు. సంధివిషయమునందలి యితరవిశేషములు.

4. సమాసములు :—

(a) సమాసశబ్దార్థము. సమాసలక్షణము విగ్రహవాక్యలక్షణము. సమాస మున విభక్త్యాదుల లోపము. అలుక్సమాసములు. ఇంటరుమీడియటు సిలబసులోని వాక్యప్రకరణమునందలి 3 వ విషయము అనువాదము.

(b) సంస్కృతాచ్చిక మిశ్ర సమాసముల వివరణము. వాని నియమ ములు. మిశ్ర సమాస నియమముల వైపుల్యము. విభక్త్యుత్తరపద సమాసములు.

(c) శబ్దపల్లవములు మున్నగు బంటుపదములు. అందలి కార్యవిశేషములు.

(d) భావద్వాదము, క్త్వార్థద్వందము, మున్నగు సమాస విశేషములు.

(e) సిద్ధసమాసములలో వాంధ్రవ్యాకరణ కార్యములు వచ్చుట.

(f) వివిధములగు సమాసాశ్రయవిధులు.

సంఖ్యావాచకములను సంధికార్యములు. వ్ర్ణాగమము. న్నుగాగమము. ని గాగమము. ట్టు గాగమము. రాగమము. హ్రుంహ్రులు. ద్విరుక్తటకారము. గ్గు గాగ మము. త్రిక సమాసకార్యములు ప్రాఁతాది సమాసకార్యవిశేషములు. అచ్చిక సమాస ములలో వచ్చు వ్ర్ణాగమ వర్ణలోప వర్ణవ్యత్యయాది కార్యవిశేషములు.

(g) సమాసాంతవిధులు.

5. సంస్కృతసంధులు.

(a) సిద్ధసమాససంధి, నిత్యము.

(b) స్వరసంధులు. సవర్ణదీర్ఘసంధి, గుణసంధి, వృద్ధిసంధి, యణాదేశ సంధి, అయాద్యాదేశసంధి, ద్విత్వసంధి, యితర విశేషములు.

(c) హల్సంధులు, శ్చుత్వసంధి, ష్టుత్వసంధి, జశ్త్వసంధి, చర్త్వసంధి, రకారపరక తకారసంధి మకార నకార సంధులు. ఱరసవర్ణాదేశసంధి, చకార ద్విత్వము, ఢలోపాదిసంధి, యితర విశేషములు

(d) విసర్గసంధులు. విసర్గమునకు శ, ష, స, లోపములు వచ్చుట. శ, ష, స, లోపములకు విసర్గమువచ్చుట. జిహ్వామూలీయోపధ్మానీయములు, ఇతర విశేషములు.

(e) సిద్ధసమాసాశ్రయ విధులు.

(f) సిద్ధసమాసాంతవిధులు.

V. ఛందఃప్రకరణము.

ఇంటరు మీడియటు సిలబసులోని ఛందఃప్రకరణము అనువాదము

(a) గురులఘు మాత్రాదిలక్షణముల విశేషములు

(b) ఇసేంద్రచంద్రగణములను ప్రస్తావపరిశమునఁ జూపుట.

(c) యతిప్రాస స్వరూప స్వభావముల సౌష్ఠవము. స్వరయతి, ప్రత యతి, ప్రాణయతి, వర్ణయతి, బిందుయతి, సరసయతి, యొక్కటియతి, అఖండ యతి, ముకారయతి, అభేదయతి, అను వీని స్వరూపములు.

(d) జాతులు; ద్విపద, అక్కర, ఉత్సాహము ఉపజాతులలోని వీని భేదాది విశేషములు.

(e) వృత్తములు:—పంచచామరము, ప్రసర్పర, మాలిని, తరలము, దండక ము, పఠనీయగ్రంథస్థ పద్యలక్షణములు.

(f) కృత్యాది నిరూపణములు.

VI అలంకార శాస్త్ర ప్రకరణము.

1. ఇంటరుమీడియటు సిలబసులోని అలంకార శాస్త్ర ప్రకరణము అనువాదము.

2 (a) కావ్యప్రయోజనములు. కావ్యలక్షణము. కావ్యభేదములు. దృశ్య కావ్యములు శ్రవ్యకావ్యములు. సుఖపర్యవసాయి కావ్యములు దుఃఖ పర్యవసాయి కావ్యములు. మహాకావ్యము, ఖండకావ్యము, క్షుద్రకావ్యము.

(b) నాయకలక్షణము. చతుర్విధనాయకులు శృంగారనాయకులు. త్రివిధనాయకులు. అష్టవిధ శృంగారనాయకులు. ప్రతినాయకుఁడు పీఠమర్దనాయ కుఁడు, విదూషకాదులు.

(c) కావ్యగుణములు శ్లేష, ప్రసాదము, మాధుర్యము, అర్థవ్యక్తి, సమాధి, కాంతి.

(d) కావ్యదోషములు, శబ్దదోషములు.—వ్యర్థము, పునరుక్తి, అపుష్టార్థము, వివిధభ్రామ్యకములు, పరుషము, అశ్లీలదోషములు. అశ్లీలము పునరుక్తి, వ్యర్థము, విరుద్ధము, అనౌచిత్యము.

(e) వాక్యదోషములు.

(f) అలంకారములు—

శబ్దాలంకారములు.—అనుప్రాస విశేషములు, యమకము, ముక్తపదగ్రస్తము.

అర్థాలంకారములు—ఉపమాభేదములు, అనన్వయము, రూపకభేదములు, ఉత్ప్రేక్షాభేదములు, అతిశయోక్తిభేదములు, సందేహము. భ్రాంతిమంతము, మీలితము, విరోధాభాసము, విభావన, విశేషోక్తి. విషయము, తుల్యయోగిత, దృష్టాంతము, వ్యతిరేకము, శ్లేష, పరికరము, వ్యాజస్తుతి, సమాసోక్తి, అప్రస్తుత, ప్రశంస, కావ్యలింగము, అర్థాంతరవ్యాసభేదములు. స్వభావోక్తి కలంకారత్వనిర్ణయము, అర్థాపత్తి, యథాసంఖ్యము, సారము, సంసృష్టి, సంకరము.

(g) రసస్వరూపము, రసదశకము, విభావానుభావసంచారిభావపాత్వికభావములు, స్థాయిభావదశకము.

(h) పాత్రౌచిత్యము.

(i) కావ్యకథావస్తు సందర్భశోధనలు.

3. The Comparative Grammar of the Dravidian Languages

1. *Introductory*:—(*a*) The origin of languages. Classification of languages. Dialectal separation and growth of literary standard languages. Dialects and cognate languages.

(*b*) The Dravidian group of languages and their chief characteristics. Reasons for choosing the word Dravidian as name of this group. Enumeration of Dravidian languages. Meaning of the names 'Tamil', 'Telugu', 'Kanarese' and 'Malayalam'. Where they are spoken.

(*c*) Relation between Dravidian languages and Sanskrit, Dravidian element in North Indian vernaculars. Affiliation of Dravidian language to the Scythian Group. Tamil, the most primitive of Dravidian languages.

II. *Phonetics.*—Production and classification of speech sounds. Sound changes and their causes. Sounds and symbols. Conditions of a good orthography.

III. *Dravidian alphabets.*—Their history. Differences among existing alphabets. Their adequacy and inadequacy. Comparison of Dravidian sounds with Sanskrit and English sounds.

IV. *Dravidian Phonology.*—The primitive Dravidian parent language.

(1) Vowel system—Changes. Accent. Harmonic sequence of vowels.

(2) System of consonants.—Origin of cerebrals. Dialectic interchange of consonants. Euphonic permutation of consonants. Sandhi. Nasalization. Anusvara and Ardhanusvara. Prevention of hiatus.

(3) Dravidian syllabation.

V. Roots.—Dravidian roots arranged into two classes. Verbal root. Nouns. Lengthening of roots, Formative addition to roots.

VI. *Accidence*:

(1) *The Nouns.*

(a) Gender.—Dravidian nouns divided into two classes denoting rational beings and irrational things except in Telugu in which they are classified as Mahat and Amahat, the latter including words denoting women. Comparison between Dravidian languages on the one hand and Sanskrit and English on the other.

(b) Number—Singular and plural. No dual. Singular Masculine, feminine and neuter. Plural-principles of pluralization.

(c) Case—Principles of case formation. Dravidian cases.

(2) *The adjectives.*—Their agreement with substantives like those in Sanskrit. Formation of adjectives from substantives, relative participles of verbs and past verbal participles. Comparison of adjectives.

(3) *The numerals.*—Different views about their origin. The cardinals and ordinals. The neuter noun of number and the numerical adjective.

(4) *The Pronouns*—Light thrown by pronouns on relationship of languages. Persistence of personal pronouns. Pronouns of the first person singular. Comparison of dialects. Analogies. Pronouns of the second person singular. Comparison of dialects. The reflexive pronoun Pluralization of the personal and reflexive pronoun Demonstrative and interrogative pronouns. Demonstrative cases Interrogative cases. Demonstrative and Interrogative adjectives Demonstrative and interrogative adverbs Honorific demonstrative pronouns.

(5) *The Verbs.* –Structure of the Dravidian verb Root used either as verb or noun. Formative particle often added to root. Classification of verbs into transitive and intransitive. Ways in which intransitive verbs change into transitive. Sanskrit analogies.

(a) Causal verb.—Causals from transitives. Origin of Dravidian causal particle.

(b) Frequentative verbs.

(c) Conjugational system.—Formation of the tenses. Verbal participles. Their signification and forces. The present tense and its formation. The preterite tense and its formation The future tense. The future formation in Dravidian languages. The relative participle.

(d) Formation of Moods—Method of forming the conditional, the imperative and the infinitive, origin of the infinitive suffix.

(e) The Voice.—Active and Passive—The negative voice Combination of negative particles with verbal theme. The Dravidian negative particle.

(f) Formation of verbal nouns, derivative nouns and abstract nouns.

(6) *Adverbs.*

VII. *Vocabulary.*—(1) Borrowing and its causes Social, commercial, political and religious. Borrowings from Sanskrit, borrowings from other languages.

(2) Structure and form —The essentials for the individuality of a language. Vocabulary cannot change the character of a language. Hybrids Gain and loss from the mixed character of a language.

VIII. *Comparative Syntax.*—The Syntax of the several languages compared. Differences and similarities. The extent of Sanskrit influence over the syntax of the several languages.

4. The History of the Telugu Language and Grammar.

I. *General.*—The origin and meaning of the word 'Telugu'. The place of Telugu in the Dravidian family of languages. Its antiquity and its geographical distribution. Period of its early cultivation as inferred from the inscriptions. The extent of Sanskrit influence over Telugu Grammar.

II. *Periods of Telugu Language.*—The pre-Nannaya period, the Nannaya period, and the post-Nannaya period. Illustrative literature of each period. Grammar of each period. Difference between languages of different periods in point of vocabulary and grammar.

III. *Language and Dialect.*—The standard of literary language and spoken language. Their relation and mutual influence. Dialects. How formed. Different localities and different classes of people in the same locality have different dialects. Are dialects discernible in ancient literary works?

IV. *Telugu Alphabet*—

(a) The Script.—Its gradual development. The Telugu-Kanarese form and its relation to Brahmi, Vengi and Chalukya script.

(b) The sound-values—How far the alphabet is phonetic. Its pronunciation. The spoken sounds and the written symbols.

V. *Phonology.*—(*a*) Vowels and their relation to the primitive Dravidian vowel-system. Classification of vowels according to the place of production, Diphthongs. Accent and emphasis. Accent determining change. Mutation of vowels. Vowel harmony, vowel sandhi.

(*b*) Consonants and their relation to the primitive Dravidian consonants. Classification of Telugu consonants according to the place of production. Consonantal diphthongs. Mutation of consonants. Assimilation of consonants and consonantal sandhi. Other changes in consonants. Palatalization, Dentalization, Voicing, Unvoicing, Compensatory length, etc. The theory of ardhanusvara and the cacummunal. Dialectic interchange of consonants. Telugu syllabation.

VI. *Accidence.*—(*a*) Nouns. Gender. Nouns denoting *mahat* and *amahat* Number. No dual. Principles of pluralization. Different treatment of *tatsama* and *acchika* words with regard to the formation of number and gender. Case and case-endings. Principles of case-formation. Aupavibhaktikas.

(*b*) Adjectives. Classification of adjectives. Their agreement with substantives. Formation of adjectives from substantives. Comparison of adjectives.

(*c*) Numerals. Ordinals and cardinals. Declension of numerals.

(*d*) Pronouns. Classification of pronouns. Declension of pronouns. History of the Telugu pronouns. Demonstrative and interrogative adjectives. Demonstrative and interrogative adverbs. Honorific demonstrative pronouns.

(*e*) The verb. Structure of the verb. Causal verb. Atmanepada verbs. Voice: active and passive. Tense: present, past and future. Moods: conditional, imperative, infinitive, and negative. Formation of verbal participles. Verbal nouns, derivative nouns and abstract nouns

(*f*) Adverbs. No real adverbs in Telugu.

VII. *Vocabulary*—(*a*) General character of the Telugu vocabulary. The native element. The so-called acha-Telugu. Borrowing and its causes. Formation of compounds. Coming doublets. Dravidian basic element. Tamil and Kanarese element. Causes of admixture. Various periods of entry of Tamil and Kanarese words into Telugu.

(*b*) *Tatsama* words. *Samskritasama* and *Prakritasama*. Laws of formation. Period of extensive Prakrit borrowing, Tadbhava words. Sanskritabhava and Prakritabhava. Laws of formation. Other borrowings. Hindustani, Marathi, Oriya, English, French etc.

VIII. *Word-Buildings*.—(1) By composition. (2) By derivation. The various suffixes used to form nouns, verbs, adjectives and adverbs etc. (3) Root-creation.

IX. *Semantics*.—Changes in meaning and usage. Elevation and degradation Specialization and generalization of native and foreign words. Obsolete words.

X. *Syntax*.—Order of words in a sentence The difference between Prose and Poetry as regards syntax Deviations from the normal order of words in a sentence and their causes. San kritic construction in Telugu.

5. Outlines of the History of Telugu Literature.

(I) Pre-Nannava Period—Beginnings of Telugu Poetry and the impetus given by the Chalukyan Kings.

(II) Age of Nannaya—1050–1250.

(*a*) Nannaya's Bharatam—His style and method of translation and his personality.

(*b*) Nannechoda's Kumarasambhavam.

(*c*) Palkuriki Somanatha's poems—His Dwipada.

(*d*) Ranganatha Ramayanam and its authorship.

(III) Age of Tikkana—1250—1300.

(*a*) Tikkana's personality and genius—His style and method of translation.

(*b*) Ketana and Marana as his followers

(IV) Age of Yerrana—1300—1350.

(*a*) Yerrana's contribution to Bharatam and his claim to be regarded as Prabandha Parameswara.

(*b*) His Harivamsam compared with that of Nachena Somana.

(*c*) Bhaskara Ramayanam and its authorship.

(V) Age of Sreenadha—1350—1500.

(*a*) Growth of Prabandha Literature and Sreenadha's contribution to it—His works and style and personality.

(*b*) Bhagavatam and its authorship and Potana's lyrical nature

(*c*) Some important other poets of the age, such as Ananta, Amatya and Jakkana, etc.

(VI) Age of Krishna Deva Raya—1500—1600.

Achievement of Prabandha Poetry and a general study of some of the best Prabandhas of the age.

(VII) Nayaka Literature—1600—1775.

(*a*) Growth of various types of literature and their characteristics.

(*b*) Tanjore, Madura and Pudukottah Schools.

(VIII) Age of decadence—1775—1875.

Signs of decadence and its causes.

(IX) Modern age—1875.

Modern tendencies and the circumstances which influence them.

N.B:—In the cases of all major poets, their personalities are to be understood in relation to their works and times.

6. Oriya.

N B:—The History of Oriya Language and Literature is the same as that prescribed for Bhasha Praveena Final Examination.

7. The History of the Kannada Language and Grammar

I. *General.*—The origin and meaning of the word 'Kanarese. The place of 'Kanarese' in the Dravidian family of languages. Its antiquity and its geographical distribution. Period of its early cultivation as inferred from the inscriptions. The extent of influence of Tamil, Telugu, Malayalam and Marathi, etc if any, and of Sanskrit over Kanarese grammar.

II. *The periods of Kanarese Language—*

(1) The period of the written ancient dialect.

(2) The period of the mediæval dialect.

(3) The period of the modern dialect.

Illustrative literature of each period. Grammar of each period. Difference between the languages of different periods in point of vocabulary and grammar.

III. *Language and Dialect.*—The standard of literary language and the spoken language. Their relation and mutual influence. Dialects. How formed? Different localities and different dialects. Badaga, how an ancient Kanarese dialect. Are dialects discernible in ancient literary works?

IV. *Kanarese Alphabet*—

(a) The Script.—The Kanarese alphabet a variety of the so-called Cave-character. Its gradual development. The Telugu-Kanarese form and its relation to Brahmi, Vengi and Chalukya scripts, and the script of the *sasanas of Cochin*.

(b) The sound-values.—Unlike the Tamil and Malayalam alphabet, the alphabet is perfectly phonetic. The spoken sounds and the written symbols.

V. *Phonology.*—(*a*) Vowel system.—Vowels in Achagannada and those borrowed from Sanskrit. Vowels and their relation to primitive Dravidian vowel system. Classification of vowels according to the place of production. Diphthongs, History of the vowel sounds. Accent and emphasis. Accent determining change. Mutation of vowels. Vowel harmony. Vowel-sandhi glides.

(*b*) Consonant system. Consonants in Achagannada and those borrowed from Sanskrit. Consonants and their relation to the primitive Dravidian consonants.

Classification of consonants according to the place of production. Consonantal diphthongs Mutation of consonants. Assimilation of Consonants. Assimilation of consonants and consonantal sandhi. History of consonantal sounds, doubling of consonants, palatalization, dentalisation, voicing, unvoicing, compensatory lengthening, nasalization, dentalization, etc. Dialectic change of consonants. Theory of Kula and Kshala *L's* and the history of *r* and *l*. Kanarese syllabation.

VI. *Accidence.*—(*a*) Nouns. (1) Gender. Are Dravidian nouns naturally neuter? Nine genders according to the grammarian Kesiraja, reducible however to three, masculine, feminine, and neuter. Gender prefixes and suffixes. Gender in metaphorical diction etc.

(2) Number. Words plural in form, but with a dual signification. Principles of pluralization. The epicene plural, the neuter plural, double plurals. Gender and noun treatment, how they differ in old, mediæval and modern Kanarese.

(3) Case and case-endings in old, mediaeval and modern Kanarese. Principles of case formation.

(*b*) Adjective or attribute nouns (gunavachakas). Classification of adjectives. Formation of adjectives. Their gender and agreement with substantives. Ordinary nouns and pronominal nouns used as adjectives. Adjectives used as adverbs. Comparison of adjectives.

(*c*) Numerals. The cardinals and the ordinals, the multiplicatives, appellative nouns of number in Kanarese and the history and the principles of their formation.

(*d*) Pronouns. Classification of pronouns. Their forms in the dialects of Kanarese, Declension of pronouns, History of pronouns, Reflexive pronouns, demonstrative and interrogative pronouns.

(*e*) Verb. 1. Structure of the verb. The base, the tense suffixes. Classification of verbs into transitive and intransitive though felt but not mentioned by Kesiraja and Nagavarma, but introduced by Bhattakalanka about 400 years later. The modes of forming the causals and the transitive.

2. The passive voice. The different modes of expressing the passive significance.

3. The various modes of expressing the negative significance.

4. The imperative form of the verb, the infinitive.

5. No moods in Kanarese—the conditional or the subjunctive how expressed.

6. The primary tenses—the present, the preterite and the future, the history of their formation and their uses.

7. Other compound tenses, such as continuative perfect, imperfect future, perfective, etc., though not specified in ancient grammars, how expressed.

8. Formation of the verbal participles, verbal nouns, derivative nouns and abstract nouns.

9. The various modes of expressing the English auxiliaries in Kanarese.

10. The frequentative or iterative verbs in Kanarese, but a kind of such verbs formed by simple (fugalochcharana) or triple repetition (triprayoga).

(*f*).—Adverbs, the different modes of their formation and their history.

Conjunctives and their history.

VII. *Vocabulary.*—(*a*) General character of the Kanarese vocabulary. The so-called Achagannada. Borrowings and its causes. Periods of borrowing. Character and comparative extent of borrowing at each period. Hindustani, Marathi, English and Portuguese element. Loss of old words. Nature and extent.

(*b*) Samasamskrita words, tatsama words, tadbhavas or apabhramsas, laws of formation.

VIII. *Word building.*—(1) By composition. (2) By derivation. The various suffixes used to form nouns, verbs, adjectives and adverbs etc. (3) Root-creation.

IX. *Semantics.*—Changes in meaning and usage. Elevation, degradation, specialization and generalization to native and foreign words.

X. *Syntax.*—1 Order of words in a sentence. The difference between Prose and Poetry as regards Syntax. Deviation from the normal order of words in a sentence and their cases.

2. The different kinds of karaka or the relation of the noun to the verb.

3. The uses of the cases.

4. The uses of the singular for the plural and *vice versa* of nouns, pronouns and verbs in a sentence.

5 Use of the singular and plural of Sanskrit adjectives and their agreement with nouns.

8. History of Kannada Literature

Introductory: Definition of Literature—Influence of political, religious and social conditions on Literature—Classification of Kannada Literature—Variety and volume of the same—The Kannada people and their characteristic religious tolerance.

Pre-Nripatunga Period: Up to 814. A.D. Highly developed Kannada prose and poetry even as early as 5th century. Northern and southern schools. Bedande and Chettana as the two types of composition.

Durvineetha and others as prose writers, Srivijaya and others as versifiers —Sri Vardhadeva and his unique work containing 90,000 granthas.

Jaina Literature: The Jaina religion in the Kannada country.

Ancient Kannada Language—Champu form of composition.

(a) 814-1160. Nripatunga and his Kavirajamarga, the earliest extant Kannada work. Its informational importance. The three gems viz., Pampa, Pona and Ranna and their works.

Other poets of the period. Nagavarma I, Chavundaraya, Sridharacharya, Gunavarma, Nagachandra Kanti, the earliest known Kannada poetess, Nayasena, the protagonist of pure Kannada, Rajaditya, Keerthivarma, Nagavarma II, Durgasimha.

(b) 1160-1600. Nemichandra and his Leelavathi, the earliest known specimen of genuine fiction Janna, the third member of the trio (Ponna, Ranna and Janna) entitled as Poet-Emperor and his work. Andayya and his celebrated Acchagannada Kavya, viz. Kabhigarakava.

Other poets of the period. Mallikarjuna, Kesiraja, Rattakavi, Mangaraja I, Bacharasa, Mangaraja III, Abhinava Vadividyananda, Salva, Ratnakarayarni.

(c) 1660-1868. Bhattakalanka and his great Grammar, Sabdanusasana-Dharanipandita and his Bijjalacharite.

Other poets of the period. Madhava, Devachandra, Chandrasagaravarni.

Veerasaiva Literature: The rise of Lingayatism-Social and political conditions of the period-Transition from Ancient to Mediaeval Kannada. Numerous prose works.

(a) 1160-1430. Basava and his Vachanagalu.

Other poets of the period. Hareesvara, Raghavanka, Palkurike Somanatha Bheema Kavi.

(b) 1430-1600. Chamarasa and his Prabhulingaleela.

Other poets of the period. Singiraja, Nijagunasiva Yogi, Gubbi Mallanarya, Virupakshapandita, Shadaksharadeva.

(c) 1660-1868. Sarvajnamurti and his Padagalu.

Other poets of the period. Basavalinga, Kavi Madanna, Maruhasidda, Basavappa Sastri.

Vaishnava Literature: The rise of Vaishnavism-Ramanujacharya and his role as a religious reformer-Madhwacharya as Dwaitha Doctrinaire and inspirer of Kannada Dasakuta Literature. Transition from Mediaeval to Modern Kannada.

(a) 1160-1430: Rudrabhatta, the leading writer on Vaishnava theme. Narahari Theertha and his dwaitha lyrical songs-Kumara Vyasa and his Bharata.

(b) 1430-1750: Institution of Dasakuta-Development of Karnataka music with the composition of Dasakuta devotional songs.

Sripadaraya, Vyasaraya, Vadiraja, Purandara Dasa, Raghavendra Theertha, Varadendra Theertha, Vijaya Dasa, Gopala Dasa, Jagannatha Dasa, and their Padagalu and Suladigalu.

Other poets of the period. Kanaka Dasa, Thimmanna, Kumara Valmiki, Chaku Vittalanatha, Lakshmeesa and their works on Vaishnava themes.

Sri Vaishnava poets of the period. Tirumalarya, Chikkupadhyaya Singararya.

(c) 1750-1868. Mummadi Krishnadevaraya, Jayarayacharya, Krishnacharya and their works on Vaishnava themes.

Modern Period:—Karnata Sahitya Parishat formed—Publication of and criticism on ancient works—Translation of Sanskrit plays-Translation of novels from foreign languages-Increase of educational and informational literature. Impact of western thought and influence of English Literature on Kannada. Adoption of dialectical language and blank verse for literary composition-Attempt at short stories, poems and plays

Subjects for topical study:—

1. The Kannada country, it boundaries, political divisions, population and dialects.
2. Formal changes in ancient, mediaeval and modern Kannada.
3. (a) Characteristics of Hindu Purana, Characteristics of Jaina Purana.
   (b) Authors of Hindu Puranas, Authors of Jaina Puranas
4. Jaina version of Ramayana, Bharatha and Bhagavatha themes.
5. Kannada writers on science and arts subjects.
6. Extent of royal patronage to Kannada literature.
7. Some great poetesses.
8. Eminent writers in two languages-Sanskrit and Kannada, Telugu and Kannada.
9. Development of Kannada prose
10. Volume of Sataka literature
11. Development of Kannada plays.
12. Dasakuta literature and its outstanding characteristics.
13. Some popular indigenous metres.
14. Influence of Sanskrit and English on terminology and technique of Kannada compositions.
15. Leading European scholars and their service to Kannada Language and Literature.

9. History of the Tamil Language

I. *General.*—The origin and meaning of the word "Tamil". The place of Tamil in the Dravidian family of languages, its high antiquity, the geographical area where it was spoken in ancient times as referred to by old commentators, the twelve Sen-Tamil and the twelve Kodum-Tamil Countries. Very early cultivation of Tamil as a literary language; the three Sangams how far historical; Agastyar; his contribution to Tamil Tolkappiyam; its importance for the study of the language. The extent of Sanskrit influence on Tamil Grammar.

II. *The period of Tamil language.*—(1) The old or Sangam Tamil, (2) the mediaeval Tamil and (3) the modern Tamil. Illustrative literature of each period. Grammars of the different periods. Tolkappiyam Virasoliyam, and

Nannul. The difference between the language of the different periods in point of vocabulary and grammar.

III. *Language and Dialect.*—The standard of literary language and the spoken language. Their relation and mutual influence. The difference between the two. Sen Tamil, Kodum Tamil, Iyal, Isai, Natakam. Tamil Dialects: how formed. Different localities and different classes of people in the same locality have different dialects. Are dialects discernible in ancient literary works?

IV. *The Alphabet*—(*a*) *The Script*—Its gradual development. Vatteluttu, the grantha Tamil characters, their geographical distribution, origin and history. The relation of Vatteluttu and grantha Tamil characters to Brahmi. The form of Tamil characters how far determinable from Tolkappiyam and the other grammars and commentaries thereon. The dotted *e* and *o*. Gradual changes in Script. Changes credited to Beschi. (*b*) *The sound* values. How far the alphabet is phonetic. Its pronunciation, the spoken sounds, and the written symbols.

V. *Phonology.*—(*a*) Vowels and their relation to the primitive Dravidian vowel system. Classification of vowels according to the place of production. Diphthongs. Accent and emphasis, accent determining change, *eduttal* (rising accent), *paduttal* (falling accent), *nalital* (level or vanishing accent.) The influence of accent on word change and in prosody; alapedai. Mutation of vowels, Vowel harmony, Vowel sandhi—glides.

(*b*) Consonants and their relation to the primitive Dravidian consonants, classification of consonants according to the place of production. History of consonantal sounds palatalization, dentalisation, voicing, unvoicing, consonant length. Assimilation. Consonantal alapedai. Dialectal interchange of consonants. Consonantal sandhi. Laws of Tamil syllabation, the initial, the medial, the final letters in a word, the difference between Tolkappiyam and Nannul on this point. The light thrown by the reles of syllabation on the nature of loan words.

VI. *Accidence.*—(1) *Nouns*—Gender and number; how mutually expressive and interdependent. Are Dravidian nouns naturally neuter? Gender prefixes and suffixes; the epicene plural as distinguished from the Neuter plural, the neuter plural suffixes, double plurals, gender and number treatment, how they differ in old and modern Tamil. (2) *Case*, the number of cases and Sanskrit influence, the formation of the oblique case, the inflexional base, the inflexional increments or augments, their varied uses, the suffixes of the various cases, their probable origin and history, the uses of the various cases. Old Tamil, modern Tamil, how they differ in the formation of cases.

(2) *The Pronoun*—Their form in old and modern Tamil, the three persons and their plural forms, the oblique forms of the pronouns, the

phonetic relationship between the oblique and the substantive forms of the pronoun. The reflexive pronouns, the demonstrative and the interrogative cases, old and modern forms. Honorific pronouns.

(3) *The Verbs*—The structure of the verbs, the base, the tense infix and the pronominal suffix, classification of verbs into tan-vinai and pira-vinai. How far this classification is synonymous with 'transitive', and 'intransitive', the casuals, the modes of forming the casuals and the transitives. The various casual suffixes, reduplication. Appellative verbs. (2) The passive voice, the history of *padu*, the different modes of expressing the passive significance and of negative particles in old and modern Tamil. (3) The imperative form of the verb, how the infinite is formed, the various suffixes in old and modern Tamil. The subjunctive how expressed in old and modern Tamil. (4) The Tenses:—The tense infixes (*idainilai*, the present, the preterite, and the future). Is there no reference to the present, tense in the Tolkappiyam? The difference between the old and modern Tamil as regards the tense formation. *Kirukinru*, *t t*, *r*, and *in*; and p. and v. their history, phonetic relationship etc., and the principles of their use (5) the relative and the verbal principle, the suffixes forming them.

(4) *The Adjectives and the Adverbs uriccol.*—The adjectival and the adverbial participles, their origin and history. *The numerals.* The cardinals and the ordinals and the multiplicatives, the numeral bases mainly adjectival in nature, formation of substantive numerals from the case, the principles of formation. The double forms such as ir, and ir, mu and mu, etc. their uses and the laws governing them. The light thrown by the numerals on the antiquity of Tamil. *The particles* (idaiccol), their origin and significance (Interjections) and the conjunctive particles.

VII. *Vocabulary.*—(*a*) The general character of the Tamil Vocabulary at different periods, the so-called pure Tamil. Borrowing, its causes. Periods of borrowing, character, comparative extent of borrowing at each period. Doublets, Telugu and Kanarese element, causes of admixture, various periods of entry of Telugu and Kanarese words into Tamil. Loss of old words. Nature and extent.

(*b*) Sanskrit words; Tatsamas; Sanskritasamas and Prakritasamas. Laws of formation. Tadbhavas, Sanskritabhavas and Prakritabhavas. Laws of formation. Period of extensive Prakrita borrowing. Other borrowings, Hindi, Portuguese, English, etc., Manipravala style: Hybrids, tests for distinguishing loan words.

VIII. *Word building in Tamil*—(1) By composition, compound words like *Kadu vay*, etc. Several kinds of compounds or *tokai*:—*Ummai Uvamai*, etc. (2) by derivation, the various suffixes used to form nouns, verbs, adjectives and adverbs, etc. (3) Root-creation, bank formation, double bases like, *nai*, *nan*, etc.

Old and modern Tamil compared as regards the capacity to form new words and also the method of forming the words.

IX. *Semantics.*—Changes in the meaning and usage Elevation, degradation, specialisation and generalisation of native and foreign words.

X. *Syntax.*—Order of words in a sentence. The difference between Poetry any Prose as regards syntax. Deviations from the normal order of words in a sentence and their causes. Sanskritic constructions in Tamil.

10. History of Tamil Literature.

1. Introductory : Definition of Literature. Literature as reflection of a nation's life. Influence of political, religious and social conditions on literature. The Tamil people and their language.

The three divisions of ancient Tamil learning—Iyal, Isai and Natakam.

2. Pre-historical literature : The story of the submerged land and of the Mudal and Idai Sangams. Agastya, father of Tamil learning historicity of his personality-his disciples, and his works.

3. The Sangam Age : General

Different views regarding the date of the Sangam Age. Sen-Tamil and Kodum Tamil lands. The Cera, Sola and Pandyan kingdoms. Feudatory states-Political, social and religious conditions of the period—Aryan influences on the language and literature of the land.

Tolkappiyam : Its sources divisions—its place in the history of Tamil grammar—Porulaitkaram—a mirror of the culture and civilisation of the times.

Sangam works : Their division -chronology of Sangam works-selection of subject matter-Agam and Puram. Metres-absence of painam stories and tales in the works.

History of the Cera, Sola and Pandya kingdoms—the seven vallals.

4. The Sangam works—in their historical settings.

(a) *Pattupattu* or the Ten Idylls Nakkirar, Mangudi Marudanars, Mutumokkaniyar, Rudran Kannanar, Nattattanar, Perunkousikanar, Kapilar, Napputanar.

(b) *Ettutogai* or the Eight Anthologies-their compilers and their patrons-Narrinai, Kuruntogai, Ainkurunuru, Patirruppattu, Paripadal, Kalitogai, Agananuru, Purananuru

(c) *Patinen-kil-kanakku* or the Eighteen Minor works-Naladiyar, Nammanikadigai, Kurnarpatu, Kalavali-narpatu, Inia-narpatu, Inna-narpadu, Ainthinai, Thiru-kural, Tiru-Kadugam. Asara-kovai, Palamoli. Siru-panca-mulam, Mulumoli kanci, Elathi, Innilai-narpatu.

(d) Some Sangam poets-Kapilar, Paranar, Avvai, Nakkirar and Thiruvalluvar.

(e) Women in the Sangam age-Royal poets-Wandering ministrels.

5. *The age of Buddhists and Jains*: Their entry into the Tamil land-literary and traditional evidences—their first homes—archaeological remains-Jain caves and Buddhist monasteries—their doctrines. South Indian school of Jainism and Buddhism.

Jain and Buddhistic works:

(a) Among the major kavyas, Silappadhikaram, Manimekalai, Jivaka-Cintamani.

(b) Among the minor kavyas, Nilakesi, Sutammani, Utayanam katai.

(c) Perun-katai.

(d) Merumantira-Puranam.

(e) Lexicons. Divakaram and Pinkalantai.

(f) Vajranandi's Tamil Sangam—religious persecutions-contributions to Tamil language and literature-condition of the Tamil music and drama.

(g) Beginnings of Prose-Admixture of Sanskrit and Prakrit words-Manipravala style.

(h) Metrical changes-introduction of pa-ineams.

6. *The age of religious revival*: 6th to 10th century A.D.

(a) Tirumandiram by Tirumular—other early Nayanars and Alwars.

(b) The four Saiva-samaya-acharyas—their dates and their works-Tevaram, Tiruvacakam and Tirukovaiyar.

(c) The twelve Alwars-their dates and their works.

(d) Panniru-tirumurai and the four-thousand divine psalms, their compilation and their contents.

(e) Pattinathar.

(f) Kalladanar.

(g) Perundevanar's Bharatam.

7. *Grammarians*: Iraiyanar Ahapporul and its annotations-their dates-Purapporul Ventramalai by Aiyanar-idanar-Ahapporul Vilakkam by Narkaviraja Nambi-Yapparum-kalam and Karikai by Gunasagarar-Nannul by Pavanandy-Virasoliyum by Buddhamitrinar-Neminatham by Gunavirapandithar.

8. *Later Chola period literature—10th to 12th centuries*:

Kamban, his Ramayana and other works-his date-his contemporaries.

Ottakuthan-his date-his works.

Puhalenthi-Nalavenba.
Jayankondan-Kalingattupparani.
Dandiaseriyar-Dandiyalankaram.

Religious works and their authors: Nambiandar Nambi, Sekkilar, Kachiappa Sivacaryar.

Prabhanda works-Ulas, Paranis, Pallus.

Music and drama of the age.

9. Siddhanta works, 13th and 14th centuries. Santana kuravars and their works-Meikanda, Arulnandi, Umapathy and Marainanasambandar.

10. Commentators: Ilampurnar-Perariyar, Senavarayar, Naccinarkkiniyar, Adiyarkunallar, Parimelalagar' Sankaranamasivayar.

11. Mutts and their contributions to the growth of Tamil-literature. Tiruvavaduturai, Dharmapuram, Tirupanandal. Some authors-Swaminathadesikar, Sivananamunivar, Kumaraguruparar and their works.

12. 15th and 16th Centuries A.D.—Kalameghar, Irattayar-Niramba-Alagiya desikar-Ativira-rama-pandya-Varathunga Pandya and their works.

Villiputturar-Bharatam.

Arunagiri and his works.

Paranjoti-Thiruvilayadalpuranam.

Poyyalamolipulavar, Virakavirayar, Mandalapurusar, Thayumanavar.

13. 17th and 18th Centuries A.D.—Age of prabhandams and puranams.

Pillaiperumal Aiyangar, Padikkasupulavar, Nalla-pillai.

Muhammadan and European poets.

14. 19th Century A D.—Minakshisundaram Pillai, Ramalingaswamigal and other poets.

15. The modern age· Tendencies—modern prose-political writings-drama and novels-influence of western literature on Tamil-research-work of modern Universities-Tamil journalism-some modern personages.

Books for consultation.

1. Tamil Literature by M. S. Purnalingam Pillai.
2. Tamil Varalaru by K. Srinivasa Pillai.
3 Tamil Ilakkiya Varalaru by K. Subrahmanya Pillai.
4. Tamil of the Sangam Age and Later Times—Mahamahopadhyaya Dr. V. Swaminatha Ayyar.
5. Tamil 1,800 years ago—Kanagasabhai Pillai.
6. Pulavar Charitram—Kumaraswami Pulavar.

11. Early South Indian History.

(As a related subject to Telugu, Tamil or Kannada)

1. *The limits of the Andhra Country*—Early inhabitants and their civilisation—The Aryan expansion Southwards. The Mauryan rule and its influence.

2. *The Andhras*; their original home; their early history; Andhras in the Puranas; the latter Andhras; the extent of the empire and its division; religion, literature etc. under the Andhras; break up of the Andhra Empire. Contact with the outside world—commerce and colonisation

3. *The Andhra country after the break up of the Andhra Satavahana Empire.*—The Pallavas—The Chutus—The Abhiras—The Vishnukundins—The Salankayanas—The Vakatakar—Samudragupta's invasion—The Gangas of Kalinga.

4. *The Chalukyas.*—Their conquest of Vengi—The Eastern Chalukyan kingdom—Rajaraja—Relation with the Cholas. The Cholas in the Andhra country—Kulottunga and his successors—The Chola feudatories—The Velanate Chodas—The Telugu Chodas.

5. *The Kakatiyas.*—Foundation of the Kakatiya Power, Prola-Prataparudra transfer of capital to Warrangal—Mahadeva—Ganapati—Rudrama Prataparudra II—Muhammadan invasion in his reign—Krishna, his son, the last ruler of the dynasty.

The Reddis of Kondavidu—The Reddis of Rajahmundry.

6. *The Muhammadan invasions and the foundation of Vijayanagar.*—Muhammadan invasions of South India; their character, extent, and result; the empire of Muhammad Tughlak, Muhammadan possessions south of the Vindhyas; Hindu struggle—Vijayanagar and the Bhamani kingdoms.

7. *Vijayanagar under the first dynasty.*—The first dynasty, Harihara and Bukka; the wars of the latter; Harihara II, assumption of Imperial titles and responsibility; relations with the Bhamani kingdom under Harihara and his successors; the Bhamani wars and their character; Devaraya II, the greatest ruler of the first dynasty; the city and the empire under him; rise of Orissa; alliance between Orissa and Bhamani kingdom; Devaraya's successors; condition of the empire.

8. *Vijayanagar under the Saluvas and the Tuluvas.*—The rise of the Saluvas, their position in the empire; the Bhamani and Orissa invasions; Saluva Narasinga; his services to the empire, Narasa, *de facto* ruler; his son Narasimhaa II and general rebellion in the empire; accession of Krishna Devaraya; the condition of the Bhamani Kingdom during this period; wars against the

Bhamani kingdom and the Raichur; the condition of his later administration; rise of Achyuta's brothers-in-law, the elder empire; rebellions in the empire and last years of Krishna. Achyuta's restoration of order in the empire, character of his and the younger Tirumala; Sadasiva; the rule of the brothers Rama, Tirumala and Venkata.

9. *Vijayanagar under the de facto rule of the brothers.*—Sadasiva, the nominal ruler; relations with the Bhamani kingdom; condition of the distant south; "fishery coast" and Travancore; foundations of the Naykaship of Madura; the Portuguese; Talikota and its results; condition of the empire.

10. *The later Empire at Penukonda.*—The new empire at Penukonda; Tirumala; the successors of Tirumala; division of the empire; Sriranga empire; his struggle against the advance of Muhammadans; the empire reunited under Venkata; disaffection in the southern provinces; wars against the Muhammadans; end of the Viceroyalty of Seringapatam; foundation of Mysore; death of Venkata.

11. *The Decline and fall of the Vijayanagar Empire.*—War of succession; the weakened condition of Vijayanagar; the province of the empire; Gingi, Tanjore, Madura, Mysore, and Ikkeri, the advance of the Mughal in the Dekkhan; precarious condition of the Vijayanagar empire; the last emperor. Sriranga; his struggle for a united empire; end of the empire.

12. Early Indian History.

(As a related subject to Sanskrit or Pali.)

1. Physical configuration of India. Natural divisions—Mountains—Rivers—The Sea—Deserts—Production—Position in the rest of the world—Historical influence of these factors.

2. People of India—the aborigines—The civilization of the Indus Valley—The Dravidians — Aryans—Persians—Greeks—Sakas—Yuechi—Huns—Muslim invaders.

3. Age of the Rig Veda—geographical data and their significance—Tribes and Tribal warfare—Political organisation—Social customs and distinctions—occupations and groups—Vedic gods—Pantheism—Beginnings of Monotheism.

4. The Later Vedic Age—The later Vedas—The Brahmanas—The Aranyakas—The Upanishads—Extension of Aryan civilisation—Changes in social conditions—The system of Caste Government and the administration—Industry, Arts and Science—Religion and Philosophy—Chronology of the Vedic Literature.

5. The Sutras—Epics—Puranas—Social and Political conditions as reflected in them—The rise of new religions—Jainism and Mahavira—Buddhism and Gautama Buddha.

6. Political conditions in the Buddhist age—The rise of Magadha—The Saisunagas. The Nandas—Invasion of Darius—Invasion of Alexander the Great —Effects of these invasions.

7. The Mauryan Empire—Sources—Chandragupta—Kautilya—Bindusara—Asoka—His service to Buddhism—The Mauryan system of administration—Downfall of the Mauryan Empire.

8. The Period of many Kingdoms—The Sangas—The Kanvas—The Andhras—Indo-Greek and Indo-Parthian Kingdoms—The Kushans and Kanishka—His empire—Religion—Art. Alleged influence of Hellenism on Ancient Indian Culture.

9. The Gupta Empire—Samudragupta and his conquests—Chandragupta II. Vikramaditya—The Western Satraps—The later Guptas—The Huns—The decline of the Empire—The glories of the Gupta Age—Literature—Kalidasa—Art and Science—Trade—The Beginnings of Modern Hinduism—The Travels of Fahien.

10. The Empire of Harsha—His conquests—His religious Policy—The travels of Hiuen Tsang—Buddhism in its decline.

11. The History of the Deccan—The Andhras—The Chalukyas—Pulikesin II—The Rashtrakutas—The later Chalukyas—Jainism and Buddhism—Their decay—The Yadavas—The Kakatiyas—Hemadri.

12. The History of South India—Early Tamil Civilization—The Three kingdoms—The period of Pallava Supremacy—The Cholas and their Empire—The Pandyas—The Cheras—The Hoysalas—Intercourse with the West and the Far East.

13. Mediaeval Kingdoms of the North—The Rajputs—Their origin—Kashmir and its history—Rajatarangini—The Gurjara Pratihara Kingdom—Bhavabhuti and Rajasekhara—Delhi and Ajmere—Paramaras and Bhoja—The Palas and the Senas.

14. Religious and cultural movements—Decay of Buddhism—Bhagavatism—Puranic Hinduism—Siva and Vishnu Cults—Sankara and Ramanuja.

15. Indian History.

(As a related subject to Urdu).

N.B.—Each of the periods marks a stage in the growth and development of the Urdu language and literature.

First Period—1347—1707—Early Urdu.

1. *Preliminary.*—The early Muslim invasions from the North-West. The Sultanate of Delhi, particularly under Khilji and Tughlak dynasties. The early impact of Muslim civilization on India, and the evolution of the Urdu language in North India and in centres of Muslim Military camps in the Deccan. The fall of the Sultanate of Delhi before the Moghuls. The Early Moghul Kings—Sher Shah and his reforms—Akbar and his Policy—Persian as the court language—Literary and religious movements and their effect. The latter three Moghuls—Their policy—Causes of the decline of the Moghul Empire.

2. *The Muslim Kingdom of the Deccan.*—The rise of the Bhamani dynasty. The break-up of the Bhamani dominions into separate independent kingdoms—Imad Shahi dynasty of Berar: the Nizam Shahi of Ahmednagar; the Adil Shahi of Bijapur; the Barid Shahi of Bidar; and the Qutub Shahi of Golkonda. Their piecemeal annexation to the Moghul Empire. The fostering of the Urdu language at the courts of the Deccan and the patronage of the Early Urdu (Dekhani) literature in Bijapur, Ahmednagar and Golkonda.

Second Period—1708-1857—Development of Urdu.

The break-up of the Moghul Empire. Provincial centres of Indian Muslim culture; Hyderabad—Deccan, Lucknow, Murshidabad (Bengal) and Arcot. The growing power of the Sikhs, the Maharattas and the East India Company. The Third Battle of Panipat and its effects on the Maharatta ascendency. The battle of Buxar and the strengthening of the power of the East India Company. The annexation of the Carnatic. The fall of Tippu Sultan. The establishment of the British supremacy in 1818. The annexation of Oudh. The Mutiny, 1857. The death of the last Moghul emperor 1862.

Third Period—1858-1920—Modern Urdu.

The Queen's Proclamation. The Viceroys (Canning to Chelmsford). The material and moral advancement of the country. The influx of western ideals and their reaction on the thought and life of the people and on their literature. The foundation of the Universities. The Printing Press and the progress of Urdu literature. The use and development of journalism in India. Minto-Morley Reforms, 1900. Effects of the Great War on Indian thought and culture. Montford Reforms, 1919.

14. English.

The speaking apparatus of man and how it functions—the sounds of English—vowels and consonants—how produced and how they may be analysed—diphthongs and glides—syllable—accent and melody in speech—English spelling and its defects—phonetic alphabet and phonetic transcription—the problem of sound change—analogy—standard language and dialects.

English in relation to other languages of the Indo-European family as determined by comparison and reconstruction—the Germanic Branch and its principal features—the great consonant shiftings—Verner's Law.

The Old English period—sounds and spelling—The main qualitative and quantitative changes—Fracture, mutation and lengthening of vowels—the principal dialectal divisions—the language of Alfred the Great.

The Middle English period—Old English sounds in Middle English—new diphthongs—vowels in unstressed syllables—French influence in English spelling—the language of Chaucer—the dialect of London—the slow evolution of a standard language.

Modern English period—the great vowel shift—the language of Shakespeare—changes in consonant sounds—lengthening and shortening of vowels.

English inflections—their variety and richness in Old English—how they develop in Middle English and survive in living English—strong and weak verbs.

English vocabulary—extraordinary mixed—the various elements in it—native and foreign—Loans in old English and Latin—new influences in late old English and Middle English periods—Scandinavian and French loan words in Modern English—French, Greek, etc.—Changes of meaning.

Syntax of English—Evolution of it—Synthetic and analytic structure—word order.

15. Music.

In addition to the Intermediate syllabus, the course shall include the following:—

Theory.

1. Indian music and its place amongst the musical systems of the world. The distinctive features of Indian Music.

2. Acoustics. Production and transmission of sound waves. Reflection of sound waves and echoes. Resonance Sympathetic vibration. Scales of just intonation and equal temperament. Melody and harmony. Absolute pitch and relative pitch. Model shift of tonic. Acoustics of music halls. Gramophone and the radio.

3. Physiological acoustics. Larynx and the ear. Types of Sarira.

4. Detailed knowledge of the notation used in the South Indian music. An outline knowledge of the staff notation.

5. Art music and folk music. Musical forms and their classification. Lakshana of the principal musical forms. Musical forms figuring in the operas, dance music and sacred music. An outline of the knowledge of the older musical forms. Folk music and its characteristics.

6. Musical prosody.

7. A detailed knowledge of the talas used in South Indian music.

8. Systems of raga classification in vogue, Raga lakshana in general; Study of the trayodasa lakshanas mentioned for ragas in the Sanskrit works of music. Detailed knowledge of the 72 Melakarta scheme, the nomenclatures of Venkatamakhi and Govindacharya, for the 72 melas. Katapayadi formula and its application.

9. Detailed Lakshanas and sancharas of the following 25 ragas :—

Asaveri.	Kedaragaula.	Punnagavarali.
Yadukulakamboji.	Gaulipantu.	Hamsadhvani.
Bauli.	Kedaram.	Chakravakam.
Malayamarutam.	Nilambari.	Devagandhari.
Saurashtram.	Atana.	Ritigaula.
Varali.	Nata.	Kharaharapriya.
Purvakalyani.	Sriranjani.	Shanmukhapriya.
Huseni.	Saranga.	Natakuranji.
	Sunhendramadhyamam.	

10. Twenty two srutis and discussions relating thereto. Nomenclatures for 22 srutis. Gamakas and alankaras.

11. Manodharma sangita and its forms. Raga alapana paddhati and Kalpana swara rendering.

12. Musical appreciation. Styles in musical compositions. Critical study of two kritis each of Thyagaraja, Muthuswami Dikshitar and Syama Sastry, and one kriti each of any six of the other composers mentioned in para 15.

13. Musical instruments and their classification. Knowledge of the principal concert instruments including their construction. The tuning of Vina, Violin and Thambura.

14 Origin and development of scales. Systems of raga classification and their evolution, from the Grama-Murchana—Jati system to the modern classification of ragas. Musical forms and their evolution. History of musical instruments.

15. Biographies of the following composers and their contribution towards the development of South Indian music :—

Jayadeva, Talapakkam Chinnayya, Purandara Das, Tirtha Narayana Swami, Bhadrachala Ramadas, Kshetrayya, Sarangapani, Peddala, Gummaluri Sastri

Ramaswami Dikshitar, Thyagaraja, Muthuswami Dikshitar, Syama Sastri, Subbaraya Sastri, Swati Tirunal, Muvvalur Sabhapati Aiyar, Pachimiriam Adiyappiah, Pallavi Gopalayya, Vina Kuppayyer, Anayya, Subrahmanya Kavi, Gopalakrishna Bharati, Karur Dakshinamurthi Sastri, Pallavi Sesha Aiyer, Mysore Sadasiva Rao, Tiruvothiyur Thyagayyer, Patnam Subrahmanya Iyer, Dharmapuri Subba Rao, Ramnad Srinivasa Iyengar, Pattabhi Ramayya, and Thachur Singaracharlu.

16. An outline knowledge of the substance of the following works on music :—

Bharata's Natya Sastra (Musical Chapters only).
Sarangadeva's Sangeeta Ratnakara (Chaps. 1 and 2 only).
Ramamatya's Swaramelakalanidhi (Swara and Raga).
Venkatamakhi's Chaturdandi Prakasika.

17. Principal seats of musical learning in South India. The influences of exotic music on the development of S. I. Music.

18. Developments in contemporary music.

PRACTICAL.

6 ordinary gitas and 2 lakshana gitas.

2 Adi tala varnas, 1 Jhampa tala varna, 4 Ata tala varnas and 1 Pada varna.

25 Kirtanas in the ragas prescribed under Theory (paragraph 9 above).

2 Astapadis, 2 Tarangas, 2 Adhyatma Ramayana Kirtanas.

4 Padas, 2 Javalis, 1 Ragamalika and two Tillanas.

The compositions shall be representative of the composers mentioned in paragraph 15 above

Alapana of the 25 ragas prescribed.

Rendering of Kalpana svaras to compositions in the following 12 ragas :—

Todi, Bhairavi, Kambhoji, Mohana, Sankarabharana, Kalyani, Saveri, Madhyamavati, Bilahari, Pantuvarali, Kedaragaula and Atana, and in the following talas :—

Adi, Rupaka, Triputa, Chapu and Jhampa.

In the practical examination the candidates shall offer Vocal music or one of the following instruments :—

Vina, Violin, Flute.

Candidates excepting those who offer Vina, shall sing or play to the accompaniment of the Thambura.

Books for Reference.

Bharata's Natya Sastra.
Matanga's Brhaddesi.
Dattila's work on music.
Narada Siksha.
Narada's Sangitamakaranda.
Sarangadeva's Sangita Ratnakara.
Ramamatya's Svaramelakalanidhi.
Somanatha's Ragavibodha.
Ahobila's Sangita Parijata.
Raghunatha's Sangita Sudha.
Venkatamakhi's Chaturdandiprakasika.
Tulajaji's Sangita Saramruta.
Govinda's Sangraha Chudamani.
Sangita Sampradaya Pradarsini by Subbarama Dikshitar
Tachur Singaracharlu's works.
Pallavi Svarakalpavalli by Tiruvothiyur Tyagayyar.
Sankirtana Ratnavali by Tiruvothiyur Tyagayyar.
Sangita Svara Prastarasagara by Nadamuni Panditar.
Gana Bhaskara by K. V. Srinivasa Iyengar.
Tyagaraja Hrudayam by K. V. Srinivasa Iyengar.
Sangita Sudhambudhi by K. V. Srinivasa Iyengar.
Satakirtana Svaravali by C. S. Krishnaswami Iyer.
Helmholt's Sensations of Tone.
Sound by Richardson
Acoustics of Auditoria by Davis and Kaye.
Music of Hindustan by Fox-Strangways.
Music of India by H. A. Popley.
Musical Instruments in the Calcutta Museum by Dr. Meerwarth.
Madras Museum Bulletin on Musical Instruments.
South Indian Music I to III by P. Sambamurti.
Melakarta. Janyaraga scheme by P. Sambamurti.
Syama Sastri and other famous figures of South Indian Music by P. Sambamurti.
Indian Melodies in staff notation by P. Sambamurti.
Nowkacharitra of Tyagaraja edited by P. Sambamurti.
Tyagaraja by M. S. Ramaswami Iyer.
The Journal of the Music Academy, Madras.

CHAPTER XLI

B. A. (Hons.) DEGREE EXAMINATION

(Regulations.)

Conditions of Admission

1. Candidates for the Degree of Bachelor of Arts (Honours) shall be required—

(i) to have passed the Intermediate Examination in Arts and Science of this University or the Intermediate Examination of any other Statutory Indian University accepted by the Syndicate as equivalent thereto ;*

(ii) to have undergone subsequently a further course of study in the University College as prescribed hereunder extending over a period of three years, each consisting of three consecutive terms ; and

(iii) to have passed the Examination of the Degree hereinafter prescribed.

Courses of Study

2. The course for the B.A. (Honours) Degree shall comprise instruction in—

Part I :

(i) English during the first year.

(ii) A simple course in French or German, or Early South Indian History prescribed as a related subject for the B.A. (Pass) Degree Examination (under Part III—Branch VI) in the case of candidates offering Telugu Language and Literature under Branch VI, during the first year.

Part II :

One of the following branches of knowledge during the three years :—

I. Mathematics.
II. Philosophy.
III. History, Economics and Politics.
IV. English Language and Literature.
V. Sanskrit Language and Literature.
VI. Telugu Language and Literature.

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* *Vide* foot-note on the first page of Chapter XL.

Eligibility for the Degree

3. (a) No candidate shall be eligible for the B.A. (Honours) Degree until he has passed an examination in one of the branches of knowledge contained in the courses of study.

(b) No candidate, other than those hereinafter exempted, shall be admitted to Part II examination in Honours unless he has passed in Part I.

The Examination in Part I shall be the examination in English of (1) a three hours' paper based on two prescribed text-books one for detailed study and the other for non-detailed study, the books to be prescribed being of modern publication (the paper shall be the same as for B.Sc. Degree examination in Part (I), and (2) a two hours' paper on Translation from French or German into English and *vice versa* in the case of candidates other than those offering Branch VI of the Honours Course. Three alternative passages shall be set in different Arts subjects and a three hours' paper on Early South Indian History in the case of those offering Branch VI. This last paper shall be the same as that under Part III Group (vi) B.A. (Pass) Degree Examination.

A candidate for the B.A. Honours examination may present himself for Part I Examination (i.e. in English and Translation or Early South Indian History) at the end of the first year of the course and thereafter at his option present himself for English or Translation or Early South Indian History or English and Translation or Early South Indian History, provided that candidates who obtain qualifying marks for a Pass in either English or Translation or Early South Indian History need appear again in that subject in which they failed.

A candidate shall be declared to have passed in Part I if he obtains not less than 40 per cent in each of the papers on English, Translation and Early South Indian History. All other candidates shall be deemed to have failed in the examination. Successful candidates obtaining not less than 60 per cent of marks in each subject (i.e., English, Translation in French or German and Early South Indian History) shall be declared to have passed with distinction in that subject.

(c) No candidate shall be admitted to the Examination in Part I unless he has passed the Intermediate Examination in Arts and Science in this University or an examination in some other University recognised by the Syndicate as equivalent thereto.

Candidates who have passed in French or German under Part II in the Intermediate Examination shall not be required to undergo the course in French or German prescribed for the Honours Degree Examination or to sit for the examination in either language.

Eligibility of Graduates for the degree

4. Selected Pass Graduates of the University may be allowed to take the Honours Degree examination after a further period of study in the University extending over not less than two years, provided they have passed the B.A. Degree examination in the subjects for which they desire to appear. They shall be exempted from passing Part I provided they undergo one year's course in French or German or, in the case of those taking Branch VI—Telugu Language and Literature in Early South Indian History. Pass graduates of the University taking the Honours Degree Examination in Telugu Language and Literature shall be further exempted from undergoing the course in Early South Indian History if they had passed the corresponding examination in the B.A. Degree Examination.

Period during which Degree should be obtained

5. A candidate for the B.A. (Honours) Degree shall appear for Part II Examination in Honours (i) not later than the end of the fourth year after he has been admitted to the course *or* (ii) in the case of Bachelors of Arts proceeding to the Honours examination, not later than three years after commencing the Honours Course in the University College.

Appearance only once; withdrawal after notice

6. No candidate shall be permitted to undergo the examination in Part II in Honours more than once. A candidate for Part II examination shall be permitted to withdraw from the examination, provided he has not sat for the last paper in the examination and provided he has given notice of withdrawal to the Registrar within three clear days from the date of the last paper which he answered. He shall be permitted to appear again for the examination in Part II in the following year without producing any additional certificate of attendance.

For purposes of this Regulation, the examination in Part II shall be the examination in one of the branches of study (including practical examination if any) in Section 2 (iii).

When B.A. Degree is awarded

7. In the event of a candidate for the B.A. (Honours) Degree failing to satisfy the examiners he may be recommended by them for the B.A. Degree provided that he obtains not less than 33⅓ per cent of the total marks and not less than 25 per cent. in each division of the examination.

Failed candidates permitted to sit for B.A. Pass Degree Examination

8. A candidate not already eligible for the B.A. Degree, who having failed completely in the B.A. (Honours) Degree examination or after having completed the course becomes ineligible to appear for the examination in Part II desires to appear for the B.A. Degree examination, shall be allowed to do so without the production of a further certificate of attendance in the University College.

A candidate appearing under this Regulation for the B.A. Degree Examination shall appear for all the parts of the examination and shall take under Part III the same optional subject which he studied for the Honours course.

Subjects for Examination and duration of papers

9. The course in each branch of knowledge shall be as follows :—

BRANCH I—MATHEMATICS.

A candidate shall offer for the Honours examinations in Mathematics the following—

A.—*Pure Mathematics.*

(i) Pure Geometry including Projective Geometry.
(ii) Co-ordinate Geometry of two and three dimensions.
(iii) Algebra, Theory of Equations and Trigonometry.
(iv) Differential and Integral Calculus, including Fourier's series.
(v) Elementary Differential Equations.
(vi) Theory of Functions.

B.—*Applied Mathematics.*

(i) Dynamics.
(ii) Statics.
(iii) Elements of Vector Analysis.

C.—*Optional Group.*

Any two of the following subjects :—

(a) Gravitation and Electrostatics, (b) Statistics, (c) Astronomy, (d) Relativity, (e) Hydrostatics and Hydrodynamics, (f) Theory of vibrations and sound, (g) Thermodynamics, (h) Kinetic Theory of Gases, (i) Theory of Numbers and (j) Electromagnetism.

There shall be eight papers for the Honours Degree examination. All the papers except that on 'Theory of Numbers' shall be of three hours' duration and the paper on 'Theory of Numbers' shall be of four hours' duration. Each paper shall carry 150 marks. The first two papers shall be on (i) Pure Geometry, (ii) Co-ordinate Geometry, and (iii) Algebra, Theory of Equations and Trigonometry ; the third and fourth papers on (iv) Differential and Integral Calculus, (v) Differential Equations and (vi) Theory of Functions under A above ; the fifth paper on (i) Dynamics ; the sixth paper on (ii) Statics and (iii) Vector Analysis under B above ; and the seventh and eighth selected from—C optional group above.

The scope of the subjects shall be indicated by the syllabuses prepared for the purpose.

BRANCH II—PHILOSOPHY.

A candidate shall offer for the Honours examination in Philosophy the following groups :—

I. General Group and

II. Special Group.

I. The general group shall consist of the following subjects :—

(i) Logic and Theory of Knowledge.

(ii) Outlines of Indian Philosophy.

(iii) History of European Philosophy with special reference to the systems of Plato, Aristotle, Descartes, Spinoza, Leibnitz, Loke, Berkeley, Hume, and Kant.

(iv) General Psychology.

(v) Contemporary Philosophy with special reference to a prescribed work.

(vi) Essay.

II. The special group shall consist of any one of the following sub-groups, A, B or C :—

A. Any two of the following* :—

1. Experimental Psychology and Mental Measurements.
2. Child and Educational Psychology.
3. Abnormal Psychology.

B. Either

1. Special texts on Advaita Vedanta.
2. Development of the Advaita doctrine studied from Gaudapada's Karika, Sankara's Brahmasutra Bhashya and selections from Appayya Dikshita's Siddhanta-lesasangraha (Chapter I-Sections 1 to 5, Chapter III—Sections 9 to 12 and Chapter IV—Section 5).

Or

1. Special texts on Visistadvaita.
2. Development of the Visistadvaita doctrine.

C. 1. Ethics.

2. Social Philosophy or Political Philosophy or Philosophy of Religion.

There shall be eight papers for the B.A. (Hons.) examination, each of three hours' duration. There shall be six papers one on each of the subjects including essay in the General Group and two papers one on each of the subjects in the special sub-groups A, B or C. The paper on Experimental Psychology and Mental Measurements in the special sub-group A shall be a practical test which

*The following change will come into effect as from 1945 examinations.

In Chapter XLI (B.A. Hons. Degree Examination), Section 9, under sub-group A of the special group under Branch ii-Philosophy, after '3. Abnormal Psychology" *add* "4. Social Psychology."

shall comprise (i) practical examination and (ii) *viva voce* examination. At the practical examination candidates must submit to the examiners their class records duly certified by their professors or lecturers as a *bona-fide* record of work done by the candidates. The marks for the practical test shall be distributed as follows :—

Class records	40
Practical examination	40
Viva voce	20
	100

The scope of the subjects in the General and Special Sub-groups shall be indicated by the books recommended for study or by syllabuses where prescribed.

BRANCH III.—HISTORY, ECONOMICS AND POLITICS.

(1) A candidate shall offer for the Honours Examination in History, Economics and Politics the following Groups :—

(i) A General Group, and

(ii) A Special Group.

(i) The General group shall consist of the following subjects :—

(a) Indian History—any two consecutive periods from the following :—

(i) From the earliest times to 1200 A.D.

(ii) From 1200 A.D. to 1707 A.D.

(iii) From 1707 A.D. to the present day.

(b) History of Europe from 1450 A.D.*

(c) Economics, and

(d) Politics.

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*The following change will come into effect as from 1944 examinations :—

Substitute "History of Europe—1500 to 1919 A.D." *for* "History of Europe from 1450 A.D."

(ii) The Special group shall consist of the following sub-groups :—

(a) History sub-group.
(b) Economics sub-group.
(c) Politics sub-group.

The History sub-group shall consist of :—

(a) A special period or subject of Indian History.

(b) A special period or subject of History of Europe.

(c) A special period or subject of Oriental History other than Indian History (To be selected from time to time).

The Economics sub-group shall consist of :—

(a) Modern Economic History with special reference to England and India from 1700 A.D.

(b) Two subjects relating to different branches of Economics to be selected from time to time.

The Politics sub-group shall consist of :—

(a) History of English Constitution from 1603 and the Constitution of British India.

(b) Modern Political Thought (from the French Revolution).

(c) A special subject to be selected from time to time.

(2) A candidate for the B. A. Honours Degree shall undergo a course and be examined in—

(a) The subjects constituting the general group ; and

(b) The subjects constituting any one of three special sub-groups.

(3) There shall be eight papers for the B.A. (Honours) Examination, one paper on each of the subjects comprised in the general and the special sub-groups and an Essay. Each paper shall carry 100 marks.

(4) The scope of the subjects in the general and special groups shall be indicated by the books recommended for study or by syllabuses prepared for the purpose.

BRANCH VI.—TELUGU LANGUAGE AND LITERATURE.

(1) A candidate shall offer for the Honours Examination in Telugu Language and Literature the following :—

(a) A General part, and

(b) A Special part.

(*a*) The General part shall consist of (i) prescribed text-books bearing on the different periods of Telugu Literature ; (ii) the history of Telugu Literature or the history of the Telugu Language both of a less advanced character than those under the Special part—candidates taking the literary course under the Special part shall take the history of the Telugu Language and those taking the Linguistic course shall take the history of Telugu Literature under this head ; (iii) Telugu Grammar, Prosody and Poetics ; (iv) Elementry Sanskrit and Elementary Prakrit Grammar ; and (v) Essay.

(*b*) The Special part shall consist of either a distinctly literary course or distinctly linguistic course.

The course under the literary group shall consist of the following subjects :—

(i) History of Telugu Literature.

(ii) Principles of literary and textual criticism.

(iii) Intensive study of the literature of a prescribed period.

The course under the linguistic group shall consist of the following subjects :—

(i) History of Telugu Language.

(ii) Dravidian Grammar and Principles of Comparative Philology.

(iii) Phonetics and Dialectal study of a prescribed period or portion of the Telugu country.

(2) There shall be eight papers for the Honours Examination —five papers under the General part and three under the Special part. Each paper shall be of three hours' duration and shall carry 100 marks each. The subjects for the several papers shall be arranged as follows :—

General Part—

(i) Poetry and Drama.

(ii) Prose and History of Language or the History of Literature.

(iii) Telugu Grammar, Prosody and Poetics.

(iv) Elementary Sanskrit and Elementary Prakrit Grammar.

(v) Essay.

Special Part—

Literary Group :

(i) History of Telugu Literature.

(ii) Principles of literary and textual criticism.

(iii) Special period of Telugu Literature.

Linguistic Group :

(i) History of the Telugu Language.

(ii) Dravidian Grammar and Principles of Comparative Philology.

(iii) Phonetics and Dialectal study.

Marks qualifying for a pass

10. A candidate shall be declared to have taken Honours in one of the Branches of Knowledge for the B.A. Honours Degree if he obtains not less than 40 per cent of the total marks and not less than 30 per cent in each division of the examination, provided candidates taking Honours in Branch VI—Telugu Language and Literature—shall obtain not less than 35 per cent in each division and also a special minimum of 30 per cent for the two papers on Telugu Grammar, Prosody and Poetics and Elementary Sanskrit and Elementary Prakrit Grammar taken together under the

General part. The divisions in the several branches shall be as follows :—

BRANCH—I—MATHEMATICS.

(i) Pure Mathematics ; and

(ii) Applied Mathematics and the subjects under C—Optional group.

BRANCH II—PHILOSOPHY.

(i) The general group of subjects ; and

(ii) The special sub-group of subjects.

BRANCH III—HISTORY, ECONOMICS AND POLITICS.

(i) The general group of subjects ;

(ii) The special sub-group of subjects ; and

(iii) Essay.

BRANCH VI—TELUGU LANGUAGE AND LITERATURE.

(i) The general part ; and

(ii) The special part.

Classification of successful candidates

11. Candidates obtaining Honours shall be ranked in the order of proficiency as determined by the total marks obtained by each and shall be arranged in three classes :

The *first*, consisting of those who obtain not less than 60 per cent ; the *second*, of those who obtain not less than 50 per cent ; and the *third*, of those who obtain not less than 40 per cent of the total marks.

SYLLABUSES

PART I

French

First Term : The Alphabet and sounds. Pronunciation. Elementary Grammar. The articles, simple verbs and the more usual nouns and adjectives with their genders. Easy sentence and phrase drill.

Second Term : Exercises in Translation. The auxiliaries and the more frequent regular and irregular verbs (pouvior, fallior, vouloir etc.) The peculiarities of the four conjugations. The use of the Perfect, Imperfect and Preterite tenses. Idioms and *Groupes figes* taken exclusively from the text-books prescribed for a particular examination. Written Translations and Explanations of texts.

Third Term: Training in rapid translation at sight; graded exercises of unseen passages, preferably from works pertaining to their subject. Revision of the important elements of Grammar syntax. Peculiarities of the Subjunctive and other moods which entail difficulty in translation.

German

First Term: The Alphabet and sounds. Elementary Grammar; the articles, vocabulary of simple verbs, nouns and other words with due regard to their frequency; easy sentence and phrase drill.

Second Term: Exercises in translation from text; complex and compound sentences made up of gerundial and participle classes; familiarisation of more complicated forms of construction, regular, irregular, separable and inseparable verbs, idioms and set phrases taken exclusively from text-books prescribed for a particular examination, enlargement of vocabulary, use of dictionary.

Third Term: Training in visual mental translation, graded exercises of unseen passages: grouping of students according to subject and making them translate extracts from publications pertaining to their special subjects; revision of the most important elements

PART II

Mathematics

A—Pure Mathematics

1 *and* 2 *Pure and Analytical Geometry*

* (*a*) *Plane Geometry.*

The metrical properties of the point, the straight line, the circle the parabola, the ellipse and hyperbola treated by pure geometric methods, by means of Cartesian co-ordinates, polar co-ordinates and trilinear and areal co-ordinates.

Cross ratios, Harmonic ranges and pencils, Involution ranges and pencils. Perspective. Principle of duality. Reciprocation with respect to conics. Line co-ordinates, application of tangential equations to conics Projection Imaginary points and lines. Circular points and lines. Projective properties of conics. Invariants of conics and the corresponding geometric relations.

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*The following will come into effect as from the examinations of 1944: —

(1) In Chapter XLI [B.A. (Hons) Degree Examination] of the Code, Volume II, *add* the following as a fresh paragraph at the end of the existing syllabus on (*a*) Plane Geometry:—

(i) The treatment of Homogeneous co-ordinates with special reference to trilinear and areal co-ordinates, (ii) the P conic and the F conic.

(*b*) *Solid Geometry*:

The line, Plane and the regular solids treated by pure geometric methods.

Analytic Geometry of three dimensions with cartesian co-ordinates:

The straight line, the plane, the sphere, the cone, the quadrics, their plane sections and generating lines. Confocal quadrics. The reduction of the general equation of the second degree. (Standard as in Bell's Co-ordinate Geometry of three Dimensions.) Curvature and torsion of space curves, indicutrix of a surface principal sections and radii of curvature.

*3. *Algebra and Theory of Equations including Trigonometry.*

Inequalities and limits. Convergence and divergence of series and of infinite products. Binomial and Exponential Theorems. Logarithmic series. Summation of series. Theory of numbers. Elementary propositions in Probability. (Standard as in C. Smith's Algebra.)

†*Theory of Equations.* Relation between the roots and coefficients. Symmetric functions of the roots, transformation of equations, binomial and reciprocal equations, properties of derived function, Rolle's theorems. Location of the roots. Sturm's theorem. Solution of numerical equations by Horner's method. Graphical solution of equations. Determinants and Elimination (Standard as in Burnside and Panton's Theory of Equations.)

Plane Trigonometry:—Fuller treatment of the B.A. (Pass) course.

Properties of triangles and quadrilaterals. Complex numbers. De Moivre's Theorem and applications. Factorisation. Infinite series. Convergence of complex series. The power series. Trigonometrical expansions. Determination of ||Summation of series. Elementary properties of hyperbolic functions. Convergence of infinite products. Expressions for the Sine and Cosine as infinite products (Standard as in Loney's Trigonometry and treatment as in Hobson's Trigonometry.)

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* The following will come into effect as from 1944 examinations :—

Add the following as a fresh paragraph after the first paragraph under (3) Algebra and Theory of Equations including Trigonometry :—

(i) Simple and recurring continued fractions.
(ii) Indeterminate equations of the 1st and 2nd degrees.

† In the paragraph relating to "Theory of Equations," *add* the following after the comma after the words "reciprocal equations" in line 3 of the paragraph :—

"Algebraic solution (*a*) of the cubic, (*b*) of the biquadratic (Descarte's method), Fourier and Budan's Theorem on the location of roots.

4. *Differential and integral Calculus and Infiite Series and Integrals.*

Functions of one real variable. Derivatives, general theorems and rules for differentiation, repeated differentiation. Leibnitz's theorem. General theorems concerning derivatives. Rolle's theorem, mean value theorem. Geometrical applications of derivatives. Integration as the operation inverse to differentiation, standard forms and processess of integration. The general mean value theorem of the differential calculus, applications to maxima and minima, to evaluation of limits, and to contact of plane curves, Envelopes, Taylor's series, convergence of the standard Taylor series. Integration of bounder functions according to Riemann, integrability of continuous functions and monotonic functions, the fundamental theorem of the integral calculus. The first and second mean value theorems of the integral calculus. Functions, defined by the definite integrals, their continuity, differentiation and integration. Applications of definite integrals.

Functions of several real variables continuity. Implicit functions, idea of their existence (without proof), Partial derivatives, differentiation implicit functions and composite functions, Euler's theorem on homogeneous functions Taylor's theorem for functions of several variables, simple applications to maxima and minima, and to the finding of singular points and asymptotes, of algebraic curves. Double integrals, line integrals, surface integrals, and triple integrals—evaluation in simple cases. Green's theorem, Geometric applications of multiple integrals.

Infinite Series and Infinite Integrals:

Series of positive terms.

Simpler tests of convergence. Series of positive and negative terms, Abel's and Dirichtet's tests. Absolute convergence, effect of change of order of terms on sum. Absolutely convergent double series. Multiplication of absolutely convergent series.

Series of variable terms: Uniform convergence, Weierstrass's M-test, chief properties of uniformly convergent series as regards continuity, differentiation and integration. Fundamental properties of power series, standard power series. Fourier series of bounded functions with a finite number of maxima and minima and a finite number of discontinuities. Infinite products, the standard infinite products.

**Infinite integrals*: Functions defined by infinite integrals. Uniformly convergent integrals, their continuity, sufficient conditions for differentiating and integrating under the sign of integration, simple applications to the evaluation of infinite integrals.

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*The following change will come into effect as from the 1944 examinations:—

Add the words "Improper Integrals" at the end of the paragraph under Infinite integrals.

5. *Differential Equations.*

(a) Ordinary Differential Equations involving two variables :—

Formation of differential equations, character of solutions, geometrical meaning of differential equations.

Equations of first order.—Variables separable, linear equation, Bernoulli's equation, homogeneous equation, one variable absent, $Mdx+Ndy=0$. integrating factors and their discovery in simple cases. Equations of 'n'th degree that can be resolved into component equations of 1st degree, equations solvable for x or for y, Calairaut's form. Singular solutions, the t—and C—discriminants, geometric interpretation.

Linear equations with constant coefficients; Euler's linear equations. Exact equations.

The equation $\cdot y^{(n)}=f(x), y^{(n)}=f(y), y'^{(n)}=f\left\{y^{(n-1)}\right\}$.

$y^{(n)}=f\left\{y^{(n-2)}\right\}$. Depression of order when one variable is absent.

Equations of second order.—The complete solution in terms of known integral relation between integrals. Geometric applications, finding of curves with given properties, trajectories.

(b) Ordinary Differential Equations involving more than two Variables.—

Simultaneous linear differential equations, the equation $dx \mid P=dy \mid Q=dz \mid R$ and its geometrical interpretation. Total differential equations (with three variables), the condition of integribility, geometric interpretation of the equation and its solution.

(c) Partial Differential Equations.—

Their derivation, classification of integrals of partial differential equation $Hp+Qq=R$. Charpit's method. The standard forms.

$\psi(p, q)=o, \psi(z, p, q)=o, \phi(x. p)=\psi(y, q)$ *and* $z=px+qy+\phi(q.p)$

*6. *Theory of Functions.*

Preliminary.—Irrational numbers. Simple notions as to their genesis obtained from the intuitional properties of the straight line. The linear,

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*The following change will come into effect as from the examinations of 1944 :—

(5) *Substitute* the following *for* the matter beginning from Irrational numbers..... to continuum in lines 1 to 3 under the heading "Preliminary" under "6. Theory of Functions" :—

"Irrational numbers according to Dedekind, Real numbers, Sections of real numbers, the linear continuum."

continuum, infinite sequences, limiting points, upper and lower limits. General principle of convergence. General idea of a function of a real variable, the elementary functions and their graphical treatment. Limits of functions of a continuous variable, continuity of functions, properties of continuous functions. Inverse functions, proof of existence when original function is steadily increasing or decreasing.

* *Uniform Functions of a complex variable.*—

Complex numbers, their geometric representation. De Moivre's Theorem. Definition of a function of a complex variable, uniformity and multiformity of functions. Analytic functions, the Cauchy Riemann definition, the differential equations satisfied by the real and imaginary parts of an analytic function. Conformal representation of one plane on another, complete discussion of transformations.

$= \frac{az+b}{cz+b} \omega \frac{z}{n}$ (n a positive integer).

$\omega = \int_{e}^{z}$ (with simple variations).

Cauchy's Theorem for simple Contours and functions which are analytic inside and on the contour. The fundamental formula $f(x) = \frac{1}{2\pi i} \int \frac{f(z)}{z-x} dx$. Taylor's series, Liouville's rem Laurent's expansion. Point at infinity, development in its domain. Weierstrass's theorem on the asymptotic behaviour in the domain of an isolated essential singularity. Weierstrass's theorem on a series of analytic functions. Fundamental theorem on residues with simple applications, including evaluation of simple definite integrals.

Weierstrass's theorem on the infinite product expression for an integral function. Mittag Leffler's theorem on the expression of a function with isolated singularities as a series of rational functions.

Simple periodic functions, expansion of an integral simple periodic function. The impossibility of an uniform analytic function having three independent periods. Elliptic functions, their general properties about the sum of the residues, the number of zeroes and the number of poles, the difference

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* The following change will come into effect as from the examinations of 1944 :—

(6) *Add* the following at the end of the penultimate paragraph under the heading Uniform Functions of a complex variable " :—

"The addition Theorem for the P. Function and the algebraic relations between P (u) and P (p)."

between the sum of the zeroes and the sum of the poles in a parallelogram of periods, algebraic relation between elliptic functions of the same periods. The Weierstrassian function $P(\omega)$ and its fundamental properties.

The fundamental properties of power series of a complex variable, element of an analytic function, the process of analytic continuation. Weierstrass's conception of an analytic function. Singular points, their place in the Weierstrassian Theory. Functions with natural boundaries, simple examples.

B—Applied Mathematics.

(*i*) *Statics.*

Forces at a point.—Parallelogram of forces. Parallelopipoid of forces. Geometric and analytic reduction of forces acting at a point. Conditions of equilibrium of such forces. Friction. Equilibrium of a particle on smooth and rough curves and surfaces.

Forces in one plane.—Parallel forces. Theory of moments of forces and of couples, reduction of coplanar forces and conditions of equilibrium of such forces. Action at smooth and rough hinges and joints. Principal of virtual work as applied to coplanar forces. Astatic equilibrium.

Graphical Statics.—Centres of gravity of arc, plane area, surface and solid, Stable and unstable equilibrium. Machines with and without friction.

Forces in three dimensions acting on a rigid body.—Reduction of such forces to a force and a couple; general conditions of equilibrium, principle of work applied to any system of forces. Work or potential function. Stable and unstable equilibrium Poinsot's central axis; wrench, screw, resultant wrench of two given wrenches. The cylindroid. Reciprocal screws. Reduction of any system to the forces. Conjugate lines. Nul lines and nul planes.

Equilibrium of strings.—General conditions of equilibrium of an inextensible string. The common catenary, the parabola of suspension bridge, the catenary of uniform strength, strings on smooth surfaces and curves, strings on rough curves, strings under central forces, extensible string.

(*ii*) *Dynamics.*

(*A*) *Dynamics of Particle.*

Preliminary.

Velocity and acceleration, relative motion, angular velocity, laws of motion, impulsive forces, Units.

Rectilinear motion.

Equations of motion, simple harmonic motion, constant disturbing forces, periodic disturbing forces, damped and forced oscillations, various laws of resistance.

Motion in two dimensions.

(1) *Cartesian Co-ordinates.*—Composition of simple harmonic motions, motion of a projectile in vacuum, in a resisting medium, different laws of resistance. Equation of energy. Rotation of axes.

(2) *Polar Co-ordinates.*—Velocity and acceleration in polar co-ordinates. Central forces, differential equation of orbit; orbit for various laws of force. Disturbed circular orbit; apses, Law of the inverse square; construction of orbit, hodograph, time of describing an arc; Kepler's law, correction to 3rd law: perturbations.

(3) *Constrained Motion.*—Tangential and normal accelerations. Motion on a fixed smooth or rough curve. Motion on a smooth or rough cycloid, motion in a circle, time of describing an arc, series for time of oscillation, small oscillations of simple pendulum under resistance proportional to square of velocity. Motion on a revolving curve: motion of a particle in a revolving tube.

(4) *Motion of two or more particles.*—Principles of conservation of energy and of angular momentum. Two particles connected by a string passing over a pulley. Impulses, motion of a chain, motion of varying mass.

(B) Dynamics of a Rigid Body.

Moments and products of inertia, momental ellipsoid, momental pellise, equimomental systems. Principal axes. D'Alembert's principle; general equations of motion. Independence of translation and rotation. Impulsive forces.

Motion about a fixed axis.—Fundamental theorem. The compound pendulum, centre of oscillation. Torsional oscillations, bifilar suspension. Pressures on the fixed axis, bodies symmetrical and not symmetrical. The ballistic pendulum. Impulsive forces, centre of percussion.

Motion in two dimensions.—Finite forces. General principles of conservation of energy and of linear and angular momentum. System with one degree of freedom, oscillations about equilibrium Impulsive forces, impact of a rotating sphere on the ground. Systems of two degrees of freedom, double pendulum oscillations about equilibrium.

Generalised co-ordinates.—Lagrange's equations with applications, Hamilton's principle and the principle of least action. Hamiltonian equations. Contact transformations. Solution of the canonical equations by means of the Hamilton-Jacobi partial differential equation.

(iii) Elementary Vector Analysis.

Vectors, addition, scalar and vector multiplication. Laws of commutation and distribution. Expression of vectors as sums of three vectors and products

of such expressions. Differentiation of vectors. Gradient of a scalar field Transformation of vector components. Tensors of second order. Vector fields. Divergence and curl. Gauss' and Stokes' Theorems. Tensor fields and vector divergence. (Standard as in Haas' Introduction to theoretical Physics).

Vector Analysis should be taught along with its applications to Geometry, Dynamics and Statics, and that Vector methods should be used in general wherever found suitable.

C.—OPTIONAL GROUP.

(*a*) *Gravitation and Electrostatics.*

Gravitation.—Law of inverse square. Attraction and potential of simple bodies—spheres, rods, discs, cylinders etc. Potential at a distant point.

Electrostatics —Coulomb's law. Fundamental physical conceptions. conductors, insulators, induction. Intensity of electric force at a point, lines and tubes of force. Potential. Gauss' Theorem. Laplace's and Poisson's equations. Spherical harmonics. Equipotentials and lines of force—general properties. Fields of force due to special distributions of point-charges. Doublets Potential and capacity of simple conductor and condensers. Conductors in given fields. Electric screening System of conductors—energy and mechanical force. Dielectrics and inductive capacity. Applications of the method of images and inversion. Conjugate functions.

(*b*) *Statistics (including Probabilities and Errors of observation).*

Probabilities a priori:—

Mathematical definition, elementary theorems and examples. Addition and multiplication of probabilities, with examples. Binomial distribution and the most probable event. Mathematical expectation.

Apostericri or inverse.—Bayes's Rule and its criticisms.

Theory of variables.

(*i*) *Symmetrical Frequency distribution.*

Errors, different kinds, nature of accidental errors, Gauss's Law of Error, its proof based on the nature of accidental error. Error curve.

The law of least squares and deduction of the principles of arithmetical mean. The median and the law of error based on the median. Application to one unknown, measure of precision, mean square error, probable error. Observations of different weights. Adjustment of indirect observations involving one unknown and more than one unknown. Normal equations; their formation and solution. Probable error of an observation of unit weight. Probable errors of unknown and determination of their weight. Adjustment of conditioned observations. Rejection of observations.

*(*ii*) *Asymmetrical Frequency—distribution.*

The median, mode, standard deviation. Method of moments to derive a formula to fit a particular statistical experience. Curve fitting (Pearson's curves). Skewness. Theory of Dispersion.

(*iii*) *Frequency—Distribution of two variables.*

Correlation and contingency tables and their representation by surfaces. Correlation, regression, correlation coefficient and correlation ratio.

(*iv*) *Frequency distribution of several variables—Partial correlation*

Theory of sampling.—Normal correlation.

Theory of attributes—Classification, consistency, association, partial association.

General statistical methods with illustrations.

The Principles of Index—Number making and using.

(*c*) *Astronomy—General and Elementary spherical*

The celestial sphere, astronomical co-ordinates. The diurnal motion of the heavenly bodies and its explanation by rotation of the Earth. Arguments and proofs for the earth's rotation. Change of phenomena due to a change of the observer's place on the Earth. Form and side of the Earth. Simple problems connected with the diurnal motion solved by using spherical trigonometry.

The apparent motion of the Sun among stars. Variation in the length of the day at various places. Twilight. Explanation of the phenomena on the supposition of the annual motion of the Earth round the Sun and proofs for this hypothesis. The determination of the first point of Aries and the obliquity of the Ecliptic. The signs of the Zodiac. Effects of Precession and Nutation.

The Earth's orbit round the Sun. Kepler's laws and Newton's deductions therefrom. True anomaly, mean anomaly and the lengths of the different seasons.

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*The following will come into effect as from the examinations of 1944 :—

Insert the following matter between the words "(Pearson's curves)" and "Skewness" under the heading, (ii) Asymmetrical Frequency—distribution under (*b*) "Statistics-(including Probabilities and Errors of Observation)":—

"(i) Goodness of Fit-tables for P and X.

(ii) Calculation of the mean value of $\Sigma X^a Y^b$.

(iii) Probable errors of the mean, the standard deviation, and the coefficient of correlation."

Finding by observations the latitude and longitude of a place and the error of the clock. Different units of time and the conversion of one another. Sun dial, Equation of time. Different kinds of years. The Calendar.

Corrections of observations for astronomical refraction, parallax and aberration and the fundamental formulæ embodying these corrections. Determination of parallax of heavenly bodies and their distances.

The Moon—Its orbit round the Earth and the Sun. Its rotation and vibrations. Synodic and Sydereal months. Eclipses and their causes. Ecliptic limits. Number of Eclipses in a year. The Saros.

Members of the solar system. Elements of a planet's orbit. Direct and retrograde motions of the planets. Phases of the planets. Transits of planets across the Sun. Comets and Meteors.

Principal constellation and stars. Double and multiple stars. Binary Stars. Nebulæ.

The observatory. The principal instruments. The astronomical clock. Transit instrument. The transit Theodolite. Equatorial. Sextant. The principal errors of the Transit Instrument and their corrections.

(*d*) *Relativity*

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(*e*) *Hydrostatics and Hydrodynamics*

Hydrostatics.—Definitions of 'perfect fluid' and 'pressure' at a point in all directions, general conditions of equilibrium of a fluid and of a liquid in particular. Fluid at rest under the action of (1) gravity, (2) central forces. Rotating liquid. Resulting thrusts of fluid on plane areas. Centre of pressure. Thrusts of liquid on curved surfaces. General condition of equilibrium of a floating body. Surfaces of buoyancy and floatation. Positions of equilibrium. Potential energy stored up by the immersion of a solid.

Stable and unstable equilibrium of a floating body. Metacentre, expression for metacentric height. Experimental determination of metacentric height. Stability of equilibrium (1) of a hollow vessel containing a liquid floating in another liquid, (2) of bodies floating under constraint, (3) of bodies floating in heterogenous liquid (simple cases only), Theory of stability based on the principle of energy.

Hydrodynamics.

General theory and Equations of Motion.—Motion of a fluid element. Operator D and expansion ϕ Eulerian equations of motion, equation of

continuity. Boundary conditions. Equations of impulsive motion. Integration of the equations of motion. Steady motion, rotating liquid, irrotational motion, velocity potential, pressure—equation, efflux of liquids. Lagrangian form of the equations of motion.

Theory of irrotational motion of a liquid.—Flow and circulation. Stokes' theorem. Constancy of circulation in a moving circuit, permanence of irrotational motion. Velocity potential, physical meaning, and general properties, Green's theorem expression for the Kinetic energy, case of infinite boundary. Cyclic and acyclic motion.

Problems in irrotational motion of a liquid.—Sources and sinks. Stream function. Conjugate functions. Method of images. Moving spheres and cylinders in liquid. Rotating cylinders. Initial motion of liquid contained between concentric spheres or coaxial cylinders. Stokes' stream function.

Waves.—Wave motion, progressive and stationary waves. Sample cases of irrotational wave motion in liquid under gravity, long waves, surface waves.

(f) Theory of Vibrations and Sound

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(g) Thermodynamics

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(h) Kinetic Theory of Gases

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(i) Theory of Numbers

Unique factorization theorem; arithmetical functions; linear and quadratic congruencies: Pell's equation.

Elementary inequalities of the prime number theory; Dirichlet's theorem on the primes in an arithmetical progression (theory of characters and L—series).

Representation of a number as a sum of 2, 3 and 4 squares (Farey's series, Lagrange's theorem, Jacobi's theorem, on the number of representations of an integer as a sum of four squares).

The class-number of linary quadratic forms (finiteness of the class-number, calculation of the class-number).

The orders of the arithmetical functions d (n), ϕ (n), ω (n).

Text-Books :—

Landau, Vorlesungin uber Zahlentheoric, Band I, Parts 1—4; Landau, Primzahlen (selected topics); Mathews, Theory of Numbers, Chapters 1—3; Dickson. Introduction to the Theory of Numbers.

(f) *Electromagnetism*

Preliminary :—

Elementary theory of the Newtonian potential; the theorems of Gauss, Green and Stokes; the equations of Laplace and Poisson; uniqueness theorems and Green's function.

Electrostatics :—

Electric charge and Coulomb's law; density of charge; strength of field and potential; equipotentials and lines of force, Faraday's tubes of force; conductors and dielectrics; boundary conditions at the common surface of two dielectrics; Maxwell stresses and Maxwell's displacement theory, displacement ellipsoid; simple problems solved by the methods of images, inversion and conformal transformation.

Magnetostatics :—

Magnetic poles and doublets; potential of a uniformly magnetised body; Poisson's theorem; energy of a magnet in force field; induced magnetism.

Electrodynamics :—

Laws of electrodynamics; self inductance and mutual inductance; Maxwell's displacement currents, Maxwell's equations; Poynting's theorem; equations of motion of an electrically charged particle.

Electromagnetic waves :—

Propagation of electromagnetic waves in free space and dielectrics; simple theory of the optical behaviour of metals and Drude's equations; electromagnetic waves in anisotropic media and Fresnel's equation, uniaxial and biaxial crystals, equations of the wave surface; reflection of electromagnetic waves at the interface between two isotropic media: polarisation by reflection and Brewster's law.

Mathematical formulation of Huygens' principle; Kirchhoff's diffraction formula; simple cases of Fresnel and Fraunhofer diffraction phenomena.

Books for Study :—

Relevant portions in—

A. Hass	...	Theoretical Physics, Volume I.
L. Page	–	Theoretical Physics.
H. A. Wilson	...	Theoretical Physics.

Books for reference—

J. H. Jeans	...	Electricity and Magnetism.
R. Becker	...	Theorie der Elektrizitat, Volume I.

TELUGU

Outlines of the History of Telugu Literature

N. B.—*The Syllabus is the same as that prescribed for B.A. (Pass) Group VI*

History of Telugu Literature (Special Part)

I. *Introductory.*

Definition of Literature—literature as reflection of a nation's life—influence of political, religious, and social conditions on literature—the Andhra people and their language.

II. *Pre-Nannaya Period.*

Literature in the making—paucity of literary documents—importance of inscriptions—beginning of the differentiation between Marga and Desi types and their subsequent history.

III. *Age of Nannaya* 1000—1250.

Nannaya, the first great Telugu poet—the father of Telugu poetry—his contribution to Telugu literature—his method of translation—the characteristics of his style.

Other poets of the age—Nanne Choda—Panditharadhya, Somanatha and Buddharaju compared as Dwipada writers—The place of Somanatha in the Dwipada Literature.

Buddharaju—authorship of Ranganatha Ramayanam compared with Valmiki.

Siva poets—their religious outlook as reflected in their literature.

IV. *Age of Thikkana* 1250—1300.

Thikkana—political, religious, and literary condition of the period—the many-sided genius of Tikkana—his genius for harmonising conflicting elements in religion and literature—his method of translation compared with that of Nannaya—characteristics of his style—his Nirvachanottara Ramayanam—how it shows the maturity of his artist genius—the influence of his Bharatam on subsequent Telugu literature—Thikkana as an epoch maker.

Other poets of the age:—Ketana, Marana, Manchana.

V. *Age of Yerrana* 1300—1350.

His claim to be regarded as the maker of an age—his contribution to Bharatam—comparison with Nannaya and Thikkana—the development of the Prabanadha type.

Other poets: Bhaskara—authorship of Ramayana—comparison with Ranganatha Ramayanam—Nachana Somana—his poetry compared with that of

VI. *Age of Sreenadha* 1350—1500.

Age of Transition—some characteristics of the age—introduction of new elements into poetry—Sreenadha's methods of translation compared with those of his predecessors—his contribution to the growth of Prabandha—importance given by him to Sringara sara—the scholarly and the lay elements in his poetry—traditional account of his character—the evidence of his works—the influence of his life and character on his contemporaries and successors—authorship of Veedhi Natakam and the satirical element in it—his patriotism as seen in his ballads and other poems.

Pothana—Authorship of Bhagavatham—Pothana compared with Thikkana on the one hand and Sreenadha on the other in regard to literary equipment, temperament, and outlook—his lyrical gift—the influence of his devotion on his poetry—the influence of his Bhagavatham compared with that of Bharatham in the moulding of the Andhra character.

Other Poets:—Jakkana and Ananthamathya compared—Gaurana—and Dwipada writer—source of his Harischandra.

Pina Veerana—his Sakuntala and its sources—marks as advance in the evolution of the Prabandha.

Duggana, Narayana Kavi, Vennalakanti Surana, Nandi Mallayya, Ghanta Singaya.

VII. *Age of Krishnadevaraya* 1500—1600.

Political and social condition of the period—Greater Andhra—the dominating personality of Krishnadevaraya—authorship of Amukta Malyada—the golden age of Prabandha—characteristics of Prabandha.

Some great Prabandha poets:—Peddana, Thimmana, Dhurjati, Surana, Murti, Ramakrishna.

VIII. *Nayak Literature*—1600—1775.

Andhra conquest of Tamil Nadu—political, social and geographical conditions leading to freedom from the literary conventions of the Andhra Desa and the consequent growth of various types of literature, such as prose, song, Yakshagana—the emergence of women writers, a distinct characteristic—characteristics of the Tanjore and Madura schools.

Contemporary poets in the Andhra Desa: Thimma Kavi and others.

IX. *Age of Decadence* 1775—1875.

A century of darkness—causes of decadence—political and socia condituon—some bright stars like Paparaju.

X. *Modern age* 1875.

Signs of Renaissance—foreign influences—reaction of political and social conditions on literature—revolt against authority and convention—good and

evil effects of the same—growth of new forms of literature like the novel, essay, short-story, lyric—Veeresalingam, the father of modern prose—age of experiment rather than of achievement.

Special Period:—Candidates are expected to be familiar with the books which fall within this period and to have first-hand knowledge of the best portions of them, and to make a comparative study of the authors who have written on similar or same subjects, and to study the poets in relation to their times. A detailed study of the books is not expected.

Sanskrit and Prakrit

1. Prescribed Prose and Poetry.
2. Translation from Sanskrit into English—Inter. Part II standard.
3. Grammar.
   (1) Classification of sounds.
   (2) Sandhi.
   (3) Declension and conjugation of substantives and roots of general occurrence. Elementary knowledge of primary and secondary suffixes and a general outline of derivative verbs such as causal desiderative, frequentative, etc.
   (4) Compounds of general use.
   (5) Syntax—relating to nominal cases.
4. Prakrit: Chanda's Prakrit Grammar.

Principles of Literary Criticism

1. Fine arts and their fundamental affinity with one another—Definition of poetry—its place in the fine arts—Function of poetry in human activity—Didacticism in poetry—Poetry and metre—Poetry compared with science (physical and metaphysical)—Equipment of the poet—emotion, imagination, sense of beauty, culture.
2. Rasa—its varieties—Rasa as a subjective reality.
3. Poetry—subjective and objective.
   (a) Subjective poetry—love lyric—Nature poetry—Elegy—Devotional poetry—and patriotic poetry etc.
   (b) Objective poetry sub-divided into Dramatic and Narrative.
   Dramatic poetry: Comedy—Tragedy—Prakarana—Prahasana etc.
   Narrative poetry: Purana—Ithihasa—Kavya—Ballad—Story.
4. Novel and Drama compared.
5. Study of the short story.
6. Criticism as an art and as an impetus to creation.
7. Biography and its place in criticism.

CHAPTER XLII

B. COM. (PASS) DEGREE EXAMINATION

(Old Regulations)

Conditions of admission

1. Candidates for the Degree of Bachelor of Commerce shall be required—

(*i*) to have passed the Intermediate Examination in Arts and Science of this University or the Intermediate Examination of any other statutory Indian University accepted as equivalent thereto ;*

(*ii*) to have undergone subsequently a further course of study in the University college or in any college affiliated to the University for B. Com. (Pass) as prescribed hereunder, extending over a period of two years, each consisting of three consecutive terms ; and

(*iii*) to have passed the examination for the degree hereinafter prescribed.

Courses of Study

2. The course for the B. Com. Degree shall comprise instruction in—

Part I—(*a*) Commercial Correspondence and Precis-writing and (*b*) Translation (Hindi).

Part II (a) (1) General Commercial Knowledge and Commercial Arithmetic.

(2) Commercial Geography.

(3) Book-keeping and Accounts.

(4) Law and Practice of Banking in India.

Part II (b) (1) Business Organisation.

(2) Economics.

(3) Mercantile and Industrial Law.

**Vide* foot-note on the first page of Chap. XL.

(4) One of the following Special subjects :—

Advanced Accounting and Auditing

or

Advanced Banking and Currency

or

Recent Economic History of England, Germany, Russia, Italy, U.S.A., Japan each with special reference to India, and India.

3. The courses of study shall be as defined in the syllabuses.

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4. No candidate shall be eligible for the Degree of Bachelor of Commerce until he has passed the examination in Parts I, II-A and II-B.

5. A candidate for the B. Com. Degree Examination may present himself for Part I at the end of the first year of the course and thereafter at his option present himself for the whole of the examination, i.e. Part I, Part II-A and Part II-B or one or more of these, provided that candidates who obtain qualifying marks in any of the parts need appear again and pass only in the remaining part or parts in which they failed.

ıbjects for e Exa- nation

6. Candidates for the B. Com. Degree Examination shall be examined in—

Part I (a) : There shall be a three hours' paper on Commercial Correspondence and Precis Writing. This paper shall include an essay on some general Commercial subject.

Part I (b) : There shall be a two and a half hours' paper on Translation from Hindi into English and *vice versa*. This paper on Translation shall include a simple essay (on commercial subject) also.

Part II : There shall be nine papers, each of three hours' duration, one on each of the seven general subjects (including the essay) and two on the special subject.

Graduates in Economics shall be exempted from attending the classes in Economics but shall be required to take the examination in that subject.

Candidates who have passed in Hindi under Part II in the Intermediate examination shall not be required to undergo the course in Hindi prescribed for the examination or to pass in the examination under Part I-B.

Marks qualifying for a pass

7. A candidate shall be declared to have passed Part I of the examination if he obtains not less than 35 per cent of the total marks in each of the subjects.

A candidate shall be declared to have passed in Part II-A and Part II-B of the examination if he obtains not less than 35% of the total marks in the subjects comprising Part II-A and Part II-B respectively and not less than 30% in each of the subjects included therein.

There shall be separate lists of successful candidates in each part. Candidates obtaining not less than 60 per cent of the marks in each subject under Part I shall be declared to have passed in that subject with distinction.

Classification of successful Candidates

8. Successful candidates in Part II shall be arranged in three classes—the *first* consisting of those who obtain not less than 60 per cent ranked in the order of proficiency as determined by the total marks obtained by each ; the *second*, of those who obtain not less than 50 per cent ranked in the order of proficiency as determined by the total marks obtained by each, and the *third* of the remainder.

SYLLABUSES

Part II (a) General subjects

1. *Economics.*—General principles of Economic Theory, particularly regarding Production, Consumption, Value, Distribution, Money and Banking and International Trade, with special reference to India.

Production.—What is Production? Agents of Production, viz., Land, Labour, Capital and Organisation. The Laws of Returns ; the supply of Labour and theories of Population; the classification and functions of Capital, Business Organisation and forms of Industrial Organisation.

Consumption.—What is Consumption? Necessaries and luxuries, Wants; Utility and law of Diminishing Utility, Demand and Elasticity of Demand, Law of Demand. Principle of substitution, Doctrine of maximum satisfaction and Consumer's surplus.

Value.—Fundamental ideas. How value is determined, Market value and normal value, Value and the Laws of return, theories of value, Joint and composite Demand, Joint and composite supply, Value under Monopoly, Speculation, Markets.

Distribution.—The nature of Distribution, Rent and theories of Rent, Interest and theories of Interest, Wages and theories of Wages, and Profit and theories of Profit.

Money and Banking.—The nature and functions of money. The value of money, Quantity theory, Monetary standards. Credit and types of credit instruments, how credit is created, the role of Banking. Functions and principles of Commercial Banking. Importance of Bank Reserves, Clearing Houses, Central Banks and Note issue, Bank Rate and its influence on the Money Market, Bank of England, Imperial Bank of India and the Reserve Bank, and a study of the London Money Market and the Indian Money Market.

International Trade.—Theory of International Trade, Law of Comparative costs, Gain from International Trade, Protection *versus* Free Trade. Elements of Foreign Exchange. Trade cycles and causes thereof, theories of Trade cycle, World Trade Depression and remedies therefor, including Problems of stabilisation.

2. *Law and Practice of Banking.*—The legal relationship between banker and customer. Current accounts, Deposit accounts, Trust accounts, Loans, Overdrafts and cash credits. The Pass Book. Secrecy of the state of Customer's account. Cheques and documents analogous to cheques. Payment and collection of cheques. Payment of cheques by mistake. Forged cheques. Securities for advances in general. Pledges and mortgages of negotiable instruments, stocks and shares. Commercial credits. Realization of securities. Banker's guarantees. Miscellaneous securities, viz., Lands and Buildings, Life Policies, Book Debts and Ships. Subsidiary services of Banks and the Law relating thereto.

3. *Business Organisation—The nature and constitution of business houses.*—The sole Trader, Partnerships, Joint Stock Companies, Trusts, Cartels, Holding Companies, Municipal Organisations, Co-operative Institutions, Co-partnership, Profit-sharing, Nationalisation and Guild Socialism.

The financing of business.—Nature of saving, Investment, Fixed and working Capital, investment and the division of risk bearing. Types of investment, Competitive Demand for savings and function of the rate of interest: Financial institutions, their types, functions, and relation to other business. The promotion of companies and the raising of long-term capital. Relation of different classes of investors. Financial problems of depreciation and obsolescence—foreseen and unforeseen. Supply of short term capital—Bank advances, Bills of Exchange and Documentary Credits.

Control of responsibility, Office Routine and Scientific Management.—Internal relation of staff inside the business firms, the machinery for taking decisions involving different views and interests and the recruitment, training, promotion and retirement of personnel. The organisation for training Junior executives to become Managers and Administrators. The machinery of Co-operation of firms within groups, particularly that for enabling holding companies and their subsidiaries and other firms working together.

The external relation of firms and groups of firms with the outside world particularly trade associations, professional associations, scientific bodies, Government Departments and Governments.

Cost and marketing policy, Investment policy, the replacement, increase and withdrawal of Capital from fields of production in relation to costs and profits. Location, size and specialisation of plants determined by markets, raw materials labour supply, transport etc. The location of branch factories and assembly plants and the allocation of space within a plant location. The purchase of lease of factory premises. Organization and policy in the carrying of stocks and work in progress. Buying, storing and issuing materials, and the timing of manufacturing processes, Organization and policy in determining manufacturing processes. Planning and routine. Price Policy. Forms of pricing including tendering, open prices, discrimination between market prices, adjustment to demand and supply fluctuations, the condition of contracts. Influence of types of business in price policy. Price changes and discounts. Selling policy, including forms of selling organizations and relation with competitors and consumers. Marketing problems of distributors. Wholesale businesses. Organized and unorganized wholesale markets. Speculation and trading in future Hedging operations. Internal problems relating to departmental organization. Merchandise, control, buying and selling control. Selection, training, payment and control of 'Sales force.' Sales method, sales planning and budgeting. Relation of the sales department with other departments. Retail business. Types of consumers' demand. Organization of retail distribution. Department stores. Speciality stores. Chain stores. Retail Co-operative Societies. Buying policies, stock control and selling policies. Co-operation between retailers. Instalment Trading and Hire purchase.

Methods of Remuneration.—Degree of specialisation and automatism in relation to labour supply. Wage systems. Industrial efficiency.

Skilful advertisement.—Functions of specialist advertising firms, different forms of advertising and relation to types of goods sold. Trade marks and Brands.

4. *Book-keeping and Accounts* :—Principles of Double entry. Keeping of subsidiary books, posting to ledger, preparing Trial Balance, Trading and Profits and Loss accounts and Balance Sheets of sole traders, Partnerships and Joint Stock Companies. Bills of Exchange, Promissory Notes and Cheques. Accounts Current and Average Due Date. Depreciation, Reserves and Sinking

Funds. Capital and Revenue, Receipts and Payments and Income and Expenditure Accounts. Consignment Accounts. Joint ventures. Partnership accounts, Company accounts, including Reconstruction, Amalgamation and Absorption. Single Entry Book-keeping and conversion to Double Entry. Departmental and branch accounts. Hire purchase accounts, Royalty Accounts. Self-Balancing Ledgers.

5. *Mercantile and Industrial Law.*—Contracts (Sections 1 to 181 of the Contract Act), Agency, Sale of Goods, Partnership, Negotiable Instruments, Company Law, Societies Registration Act. Elements of law relating to Life Assurance and Provincial Insolvency. Elements of Industrial legislation, particularly regarding Factories, Workmen's compensation and Trade Unions.

6. *Commercial Geography.*—Physical Geography as the basis of various types of civilisation and a determining factor of natural and economic development. Chief commodities of Commerce—Agricultural and allied products, minerals and manufactures, conditions and regions of production, preparation for the market and chief processes. Trade routes by land and sea. Present day production and foreign trade of India, Great Britain and the leading commercial and industrial countries of the World.

7. *General Commercial Knowledge and Commercial Arithmetic.*

(i) GENERAL COMMERCIAL KNOWLEDGE

(1) Office records including filing, indexing and the use of mechanical devices.
(2) Importing and Exporting.
(3) Customs and excise.
(4) Port Trust Authority.
(5) Chambers of Commerce.
(6) Board of Trade.
(7) Elements of Insurance; Life, Fire and Marine.
(8) Advertising.
(9) Goodwill.
(10) Stock exchanges.
(11) Elements of money, exchange and banking, with special reference to India.
(12) Elements of public finance and taxation with special reference to India.

(ii) COMMERCIAL ARITHMETIC

(1) Short methods in addition, subtraction, multiplication and division.
(2) Decimals, including approximation.
(3) Decimalization and de-decimalization of money.
(4) Calculation of prices: practice, simple and compound.
(5) Ratio and proportion.

(6) Averages and percentages including—commission, brokerage, premium, cash discount, calculation of selling prices, given cost price and percentage of gain on cost price.

(7) Metric measures and decimal monetary systems.

(8) Indian money—rapid calculations.

(9) Square root and application of square root.

(10) Simple interest including short methods—Banker's interest—Formulae.

Part II (b) Special subjects

1 *Advanced Accounting and Auditing.*—(*a*) General Accounting as in Book-keeping and Accounts in greater detail and accounts of different commercial undertakings and Public utility companies Assurance Accounts. Bank Accounts, Bankruptcy Accounts. Outlines of Cost Accounts and Income-tax Accounts.

(*b*) Continuous and completed audit, detection of frauds, technical errors, (viz., of omission; commission and principle), Internal check, vouching, verification and valuation of Assets, different classes of audit, forms of accounts and balance sheets, certification of balance sheet, Auditor's reports and certificates. The appointment, duties, rights and liabilities of auditors, Investigations, certifying of average profits, etc. Legal decisions affecting Auditors, particularly regarding depreciation, profits available for dividend etc.

2. *Advanced Banking and Currency*—(*i*) *Banking.*—(*a*) General principles, cheque system, Development of Deposit Banking, Clearing Houses. Banking Investments. Short loan Fund. Regulation of Note issue. Reserves and Discount Rates Central Banking. Financial and Commercial crises. Modern Developments.

A short account of different kinds of Banks in Great Britain, France, Germany, U.S.A. and Japan.

(*b*) History and organization of Banking in India. The Imperial Bank, its constitution and relations with the Government and the other banks. The Exchange Banks and their place in the Indian credit system. Joint Stock Banks Indigenous bankers, shroffs, Mahajans, etc., and their place in the Money Market. Recent conditions. The Reserve Bank and its functions.

The co-operative credit movement in India, Provincial and District Banks, Unions and Credit societies and Land Mortgage Banks.

A short account of different kinds of Banks existing in India, viz. Savings Banks, Industrial Banks, Labour Banks, etc.

(*c*) Comparison between the systems of Banking in India and the leading countries of the world.

(*ii*) *Currency.*—(*a*) General principles and economic significance of Money. Money and its functions. Qualities of good money. Origin and Principles of Metallic currencies and Coinage. Mint Regulations and Coinage Laws in England, France, Germany, Japan, U.S.A. and India. Currency Deterioration, causes thereof and remedies therefor. Gresham's Law. Principles of Token coinage. Legal Tender and various systems thereof prevailing in the leading countries of the world. Monetary Standards, Paper Money, Decimal Coinage, Tabular Standards. The purchasing power of money and the Quantity Theory. Price variations and effect thereof. Inflation, deflation and reflation. The problem of stabilization of prices. Monetary Reform. The Gold Standard, its breakdown and its future. Various proposals for an international monetary standard. The world crisis, its explanation and remedies therefor.

(*b*) *Indian Currency Problems.*—Early history of demonetisation of gold. Fall in the value of Silver. Herschell Committee and closing of the Mints to Coinage of Silver on private account. Fowler Committee and its recommendations. India and the Gold Mint. The Gold Standard Reserve, its composition and location. Chamberlain Commission and its recommendations. Currency during the war and after. Babington-Smith Committee and its Report. Failure of the attempt to value the Rupee at 2 sh. Hilton-Young Committee and Gold Bullion Standard. Note-issue of the Presidency Banks. History of currency notes till 1914. Effects of war on the Note-issue. Changes proposed by the Babington-Smith Committee. Proposal to transfer Note-issue to a new institution. The Reserve Bank and its role in Currency.

(*c*) *Foreign Exchange*—What is Foreign Exchange? Importance of Foreign Exchange in modern economic development. Mint Par of Exchange Gold Points. Fluctuations in Exchanges, causes and effects thereof. Rates of exchange—Long and short rates and Sight rates. Silver and Paper exchanges. The purchasing power Parity Theory. Forward Exchange, Problem of stabilisation of Exchanges. Terminology of Exchanges and how to read a Foreign exchange article. Indian Exchanges, Pre-war and Post-war. Present conditions.

CHAPTER XLII-A

B. COM. (PASS) DEGREE EXAMINATION

(Current Regulations)

1. Candidates for the Degree of Bachelor of Commerce shall be required— Conditions of Admission

(i) to have passed the Intermediate Examination in Arts and Science of this University or the Intermediate Examination of any other statutory Indian University accepted as equivalent thereto ;*

(ii) to have undergone subsequently a further course of study in the University College or in any College affiliated to the University for B. Com. (Pass) as prescribed hereunder, extending over a period of two years, each consisting of three consecutive terms ; and

(iii) to have passed the examination for the degree hereinafter prescribed.

2. The course for the B. Com. Degree shall comprise instruction in :— Courses

Part I—English

Part II—Hindi

Part III—The following groups :—

Group (A) (Compulsory) :—

(1) Economics, including Money, Exchange and Banking.

(2) Accountancy.

(3) Business Organisation.

(4) Mercantile Law.

(5) Commercial Geography.

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* *Vide* foot-note on the first page of Chap. XXXIX.

Group (B) (Optional)—Any one of the following subjects :—

(1) Advanced Accounting and Auditing.

(2) Advanced Banking and Currency, including Law and Practice of Banking.

(3) Transport.

(4) Statistics and their application to Commerce.

(5) Recent Economic History of England, France, Germany, Italy, U.S.A., Japan and India.

Eligibility for the Degree

3. The courses of study shall be as defined in the syllabuses.

4. No candidate shall be eligible for the Degree of Bachelor of Commerce until he has passed the examination in Parts I, II and III.

Option to appear for whole or parts

5. A candidate for the B. Com. Degree examination may at his option present himself for the whole or for a part at any one time.

Subjects for the Examination

6. Candidates for the B. Com. Degree examination shall be examined in :—

Part I—English

There shall be three papers in English, each of three hours' duration.

The course shall be (*a*) Composition on matter supplied by books set for non-detailed study, (*b*) the study in detail of certain prescribed books and of the History of English Literature so far as it is represented by these books and (*c*) Commercial Correspondence and Precis-writing.

The books set under (*a*) shall consist of two books and may include works on fiction, literary criticism, biography, history, science, philosophy or sociology.

The books set under (*b*) shall consist of (*i*) Modern Prose : 2 set books : (*ii*) Modern Poetry : about 1,000 lines.

The paper on the books under (*a*) shall consist exclusively of subjects for short essays, and of these the paper shall contain a larger number than the candidate is required to attempt.

Under (*b*) the paper on Modern Prose and Poetry shall not contain any question on General English Literature.

Under (*c*) there shall be a three hours' paper on Commercial Correspondence and Precis-writing.

Part II—Hindi

There shall be one paper of three hours' duration. The course shall consist of—

(*a*) The study of certain prescribed text-books on Prose and Composition thereon. (Commercial Hindi will be laid stress upon).

(*b*) Translation from Hindi into English and *vice versa*. The main object of the course shall be the training of the students to employ the language as a vehicle of expression in the commercial world.

Part III—Subjects

There shall be seven papers of 3 hours' duration, one on each of the five compulsory subjects under Group A in section 2 above and two on the special (optional) subject, selected by the candidate from the subjects under Group B above set forth.

Bachelors of Arts shall be exempted from taking the examination in Part I.

Marks qualifying for a Pass

7. A candidate shall be declared to have passed Part I of the examination if he obtains not less than 30% of the marks in (*a*) and (*b*) combined (*i.e.* General English) and 30% in Commercial Correspondence and Precis-writing, and not less than 35% of the total number of marks. A candidate shall be declared to have passed Part II of the examination if he obtains not less

than 35% of the total number of marks. A candidate shall be declared to have passed Part III of the examination if he obtains not less than 30% of the marks in each of the subjects under Group A and B and 35% of the total number of marks.

Classification of successful candidates

8. There shall be separate lists of successful candidates in each part. Successful candidates in each part shall be arranged in three classes—the first consisting of those who obtain not less than 60 per cent and ranked in the order of proficiency as determined by the total marks obtained by each; the second, of those who obtain not less than 50 per cent and ranked in the order of proficiency as determined by the total marks obtained by each, and the third of the remainder.

Transitory Regulation

9. For the benefit of candidates who fail in Part I of the B. Com. (Pass) Degree examination held in 1940 or earlier, an examination in Part I under the regulations in force up to and including the examination of 1940 will be held in March and September 1941 under the then time-tables. Similarly for the benefit of candidates who fail in Part II-A or II-B or both of the B. Com. (Pass) Degree examination in 1941 or earlier, an examination in those parts under the Regulations in force up to and including the examinations of 1941 will be held in March and September 1942, 1943 and 1944 under the old time-tables. The text-books for Part I examination of 1941 and Parts II-A and II-B examinations of 1942, 1943 and 1944 shall be the same as those prescribed for 1940 and 1941 examinations respectively.

SYLLABUSES

PART I

1. Importing and exporting-Formalities and terms.
2. Customs and Excise.
3. Port Trust Authority.
4. Chambers of Commerce.
5. Elements of Insurance-Fire-Life Marine.
6. Stock exchange.
7. Elements of Banking and exchange with reference to India-Banking Documents-correspondence.

8. Terminology of Exchanges and how to read Foreign Exchange articles and money Market reports.

9. Duties of the Secretary to Company–regarding meetings–Notice convening meeting–Agenda–Statutory meeting–Annual General Meeting–Extraordinary meeting–Annual reports–proceedings of meeting–Meetings of Directors–Minutes–Reports of committees–Meetings resolutions–ordinary–special and extraordinary.

10. Business letters of requiring order–reference–execution of order–advice–collecting–sales–stock Exchange transactions–Ordinary and follow up letters.

11. Letters of credit–circular letter of credit–confirmed and unconfirmed letter of credit–documentary letter of credit–Letters of application and preferred services–Agency.

12 Inward correspondence – outward correspondence – filing – indexing–cross reference–mechanical devices in office.

13. Precis–writing.

14. Any Essay on a general topic of commercial importance.

PART III—GROUP A—COMPULSORY SUBJECTS.

(*1*) *Economics, including Money, Exchange and Banking.*

Economics—General Principles of Economic Theory, particularly regarding Production, Consumption, Value, Distribution, Money and Banking and International Trade, with special reference to India.

Production—What is Production? Agents of Production, *viz.* Land, Labour, Capital and Organisation. The laws of returns; the supply of Labour and theories of Population; the classification and functions of Capital; Business Organisation and forms of Industrial Organisation.

Consumption—What is Consumption? Necessaries and Luxuries, Wants, Utility and Law of Diminishing Utility, Demand and Elasticity of Demand, Law of Demand, Principle of substitution, Doctrine of Maximum Satisfaction and Consumer's Surplus.

Value—Fundamental ideas. How value is determined, Market value and normal value, Value and the Laws of return, theories of value, Joint and composite demand, Joint and composite supply, Value under Monopoly, Speculation, Markets.

Distribution—The nature of Distribution, Rent and Theories of Rent, Interest and theories of Interest, Wages and theories of Wages, and Profit and theories of Profit.

Money and Banking—The nature and functions of money, the value of money, Quantity theory, Monetary standards. Credit and types of credit instruments, how credit is created, the role of Banking. Functions and principles of Commercial Banking. Importance of Bank Reserves, Clearing Houses, Central Banks and Note-issue, Bank Rate and its influence on the Money Market, Bank of England, Imperial Bank of India and the Reserve Bank, and a study of the London Money Market and the Indian Money Market.

International Trade—Theory of International Trade, Law of comparative costs, Gain from International Trade, Protection *versus* Free Trade. Elements of Foreign Exchange. Trade cycles and causes thereof, theories of Trade cycle, World Trade, Depression and remedies therefor, including Problems of stabilisation.

(*z*) *Accountancy.*

1. The theory of Double-entry Book-keeping. Advantages of Double-entry over Single-entry Book-keeping.

2. Keeping of Books of Account. Distinction between Financial Books and Memorandum Books. Entering in Books transactions of the following nature.—Credit purchases and sales ; Cash receipts and payments ; banking transactions ; Cheques received and issued ; rent, salaries, trade charges and expenses, interest, commission, postage, etc. ; Bill transactions ; assets and liabilities ; returns of goods inwards and outwards · bills of exchange, promissory notes and cheques and transactions relating thereto.

3. The journal and its uses. Subsidiary journals of day-books and their uses, viz., the purchases book, sales book, returns books, bills receivable and bills payable books.

4. The cash book-simple and columnwar. Distinction between trade and cash discount. How to enter bank transactions in the cash book. Bank reconciliation statement. Petty cash book and the Imprest system.

5. The Ledger—different kinds of accounts and how to balance them. Preparation of the trial balance ; objects of the trial balance. Errors disclosed and not disclosed by the trial balance. How to correct errors by journal entries and to recast correctly a wrong trial balance given.

6. Final accounts of a sole trader—the trading and profit and loss account. Closing entries. Adjustments necessary for the ascertainment of net profit for a given period, viz , provision for unpaid and prepaid amounts, bad debts, discounts on debtors and creditors, etc. Ascertainment of closing stock and evaluation thereof. The manufacturing account and the working accounts.

7. The balance sheet, its definition and preparation. Significance of a balance sheet.

8. Accounts current and average due date.

9. Distinction between capital and revenue; receipts and payments account and income and expenditure account.

10. Consignment accounts. Consignments inwards and outwards. Distinction between a consignment and sale. Delcredere commission. Proforma invoice. Accounts sales. Joint venture accounts.

11. Depreciation and what is meant thereby; various methods adopted for providing same in accounts.

12. Sinking funds and reserves. Distinction between reserves and reserve funds. How to provide for these in the accounts.

13. Single entry—its meaning; conversion of single entry into double entry.

14. Partnership accounts; fixed capital and current accounts; taking in a new partner; revaluation of assets and liabilities on incoming and outgoing of a partner; purchase of a firm as a going concern; goodwill, its meaning and treatment in Partnership accounts under various circumstances.

Interest on capital and drawings, partner's salaries and loans.

Dissolution of partnership—application of Garner *versus* Murray decision in dissolution problems. Realisation of assets and distribution between the partners; interest calculations from the date of realisation of assets—distribution when assets are realised piecemeal.

Joint-survivorship; life assurance policy taken by a firm and its treatment in partnership accounts.

15. Company accounts—distinction between a partnership and a limited company. Formation of a company. Memorandum and articles of association. Principal subsidiary books of account required by companies. Statutory books. Preparation of statutory returns on prescribed forms. Share records. Different kinds of shares. Distinction between shares and stocks. Issue of shares, under-writing of shares. Application, allotment, calls—calls in arrear and calls in advance. Forfeiture of shares. Preliminary expenses. Debentures and register of mortgages. Different kinds of debentures. Application, allotment and calls. Reserves and sinking funds. What are divisible profits. Distribution of profits as dividends. Profits and loss appropriation account. Redemption of debentures and various methods thereof.

Reduction of capital reconstruction, absorption and amalgamation problems. Holding companies and their accounts.

Purchase of business by a limited company. Goodwill and its treatment in accounts.

Valuation of shares.

Preparation of final accounts for audit.

16. Department and branch accounts (retail and wholesale) inland and foreign branches.

17. Departmental ledgers, trade ledger, private ledger, etc., the principle or self-balancing ledgers.

18. The double-account system. Outlines of railway, electricity, gas and water works accounts.

19. Royalty accounts, Hire purchase, goods on sale or returns and sale by instalments accounts.

20. Outline of bank and insurance accounts.

(3) Business Organisation.

The nature and constitution of business houses—The sole Trader, Partnerships, Joint Stock Companies, Trusts, Cartels, Holding Companies, Municipal Organisations, Co-operative Institutions, Co-partnership, Profit sharing, Nationalisation and Guild Socialism.

The financing of business—Nature of saving, Investment, Fixed and Working Capital, investment and the division of risk bearing. Types of investment, Competitive Demand for savings and function of the rate of interest; Financial institutions, their types, functions and relation to other business. The promotion of companies and the raising of long-term capital. Relation of different classes of investors. Financial problems of depreciation and obsolescence—foreseen and unforeseen. Supply of short term capital—Bank advances, Bills of Exchange and Documentary Credits.

Control of responsibility, Office Routine and Scientific Management—Internal relation of staff inside the business firms. The machinery for taking decisions involving different views and interests and the recruitment, training, promotion and retirement of personnel. The organisation for training Junior executive to become Managers and Administrators. The machinery of Co-operation of firms within groups, particularly that for enabling holding companies and their subsidiaries and other firms working together.

The external relation of firms and groups of firms with the outside world particularly trade associations, professional associations, scientific bodies, Government Departments and Governments.

Cost and marketing policy, Investment policy, the replacement, increase and withdrawal of Capital from fields of production in relation to costs and profits. Location, size and specialisation of plants determined by markets, raw materials, labour supply, transport etc. The location of branch factories and assembly plants and the allocation of space within a plant location The purchase of lease of factory premises. Organisation and policy in the carrying of stocks and work-in-progress. Buying, storing and issuing materials, and the timing of manufacturing processes. Organisation and policy in determining manufacturing processes. Planning and routine. Price Policy. Forms of pricing including tendering, open prices, discrimination between market prices, adjustment to demand and supply fluctuations, the condition of contracts. Influence of types of business in the price policy. Price changes and discounts. Selling policy, including forms of selling organizations and relation with competitors and consumers. Marketing problems of distributors. Wholesale businesses. Organized and unorganized wholesale markets. Speculation and trading in future. Hedging operations. Internal problems relating to departmental organization. Merchandise control, buying and selling control. Selection training, payments and control of ' Sales force '. Sales method, sales planning and budgeting. Relation of the sale department with other departments. Retail business. Types of consumers' demand. Organization of retail distribution. Department stores. Speciality stores. Chain stores. Retail Co-operative Societies. Buying policies, stock control and selling policies. Co-operation between retailers. Instalment Trading and Hire purchase.

Methods of Remuneration—Degree of specialisation and automatism in relation to labour supply. Wage systems. Industrial efficiency.

Skilful advertisement—Functions of specialist advertising firms, different forms of advertising and relation to types of goods sold. Trade marks and Brands.

(*4*) *Mercantile Law*

Contracts (Sections 1 to 181 of the Contract Act), Agency, Sale of goods, Partnership, Negotiable Instruments, Company Law, Societies Registration Act, Elements of law relating to Life Assurance and Provincial Insolvency. Elements of Industrial legislation, particularly regarding Factories, Workmen's compensation and Trade Unions.

(*5*) *Commercial Geography.*

Physical Geography as the basis of various types of civilisation and a determining factor of natural and economic development. Chief commodities of Commerce—Agricultural and allied products, minerals and manufacturers, conditions and regions of production, preparation for the market and chief processes Trade routes by land and sea. Present-day production and foreign trade of India, Great Britain and the leading commercial and industrial countries of the World.

PART III—GROUP B—OPTIONAL SUBJECTS.

1. Advanced Accounting and Auditing.—

(*a*) General Accounting as in Book-keeping and Accounts, greater detail, and accounts of different commercial undertakings and Public Utility Companies. Assurance Accounts. Bank Accounts, Bankruptcy Accounts, Outlines of Cost Accounts and Income-tax Accounts.

(*b*) Continuous and completed audit, detection of frauds, technical errors, (*viz.* of omission, commission and principle), Internal check, vouching verification and valuation of Assets, different classes of audit, forms of accounts and balance sheets, certification of balance sheet, Auditor's reports and certificates. The appointments, duties, rights and liabilities of auditors. Investigations, certifying of average profits etc. Legal decisions affecting Auditors, particularly regarding depreciation, profits available for dividend etc.

2. Advanced Banking and Currency, including Law and Practice of Banking —

(i) *Banking.*—

(*a*) General principles, cheque system, Development of Deposit Banking, Clearing Houses. Banking Investments. Short loan Fund. Regulation of Note-issue. Reserves and Discount Rates. Central Banking. Financial and Commercial Crises. Modern Development.

(*b*) History and organization of Banking in India. The Imperial Bank, its constitution and relations with the Government and the other banks. The Exchange Banks and their place in the Indian credit systems. Joint Stock Banks. Indigenous bankers, shroffs, Mahajans etc. and their place in the Money Market. Recent conditions. The Reserve Bank and its functions.

The co-operative credit movement in India, Provincial and District Banks, Unions and Credit Societies and Land Mortgage Banks.

A short account of different kinds of Banks existing in India, *viz.* Savings Banks, Industrial Banks, Labour Banks, etc.

(*c*) Comparison between the systems of Banking in India and the leading countries of the world.

(*d*) Law and Practice of Banking—The legal relationship between banker and customer. Current accounts, deposit accounts, Trust accounts, Loans, Overdrafts and cash credits. The Pass Book. Secrecy of the state of customer's account. Cheques and documents

analogous to cheques. Payment and collection of cheques. Payment of cheques by mistake. Forged cheques. Securities for advances in general. Pledges and mortgages of negotiable instruments, stocks and shares. Commercial credits. Realization of securities. Banker's guarantees. Miscellaneous securities, *viz.*, Lands and Buildings, Life Policies, Book Debts and Ships. Subsidiary services of Banks and the Law relating thereto.

Note.—Law and Practice of Banking in India only need be studied.

(ii) *Currency.*—

(*a*) General principles and economic significance of money. Money and its functions. Qualities of good money. Origin and Principles of Metallic currencies and Coinage, Mint Regulations and Coinage Laws in England, France, Germany, Japan, U.S A. and India. Currency Deterioration, causes thereof and remedies therefor. Gresham's Law. Principles of Token coinage. Legal Tender and various systems thereof, prevailing in the leading countries of the world. Monetary Standards, Paper Money, Decimal Coinage, Tabular Standards. The purchasing power of money and the Quantity Theory. Price variations and effect thereof. Inflation, deflation and reflation. The problem of stabilization of prices, Monetary Reform. The Gold Standard, its breakdown and its future. Various proposals for an international monetary standard. The world crisis, its explanation and remedies thereof.

(*b*) *Indian Currency Problem.*—Early history of demonetisation of gold. Fall in the value of Silver. Herschell Committee and closing of the Mints to coinage of silver on private account. Fowler Committee and its recommendations. India and the Gold Mint. The Gold Standard Reserve, its Composition and Location. Chamberlain Commission and its recommendations. Currency during the war and after. Babington-Smith Committee and its Report. Failure of the attempt to value the Rupee at 2*sh.* Hilton-Young Committee and Gold Bullion Standard. Note-issue of the Presidency Banks. History of currency notes till 1914. Effects of war on the Note-issue. Changes proposed by the Babington-Smith Committee. Proposal to transfer Note-issue to a new institution. The Reserve Bank and its role in currency.

(*c*) *Foreign Exchange.*—What is Foreign Exchange? Importance of Foreign Exchange in modern economic development. Mint Par of Exchange, Gold Points. Fluctuations in Exchanges, causes and effects thereof. Rates of exchange—Long and short rates and Sight rates. Silver and Paper exchanges. The purchasing power Parity Theory. Forward Exchange, Problem of stabilisation of

Exchanges. Terminology of Exchange and how to read a Foreign exchange article. Indian Exchanges, Pre-war and Post war. Present conditions.

3. *Transport.*

(i) *Elements of Transport.*—Functions of Transport—The development of Transport—The essentials of a Transport System—Road, Rail, Sea, Inland, Water and Air Transport—Forms of Transport Undertakings—Monopoly and Competition—Co-ordination—State Control.

(ii) *Railway Transport.*—Construction and Maintenance Problems—Capital and Finance—Reserve and Expenditure—The Indian Railway Net—Its origin, development, and control—Rates, Fares and charges—Passenger and Freight Traffic Operation—The State and Railways—Private *vs.* State Ownership—The Road—Rail Question.

(iii) *Road Transport.*—Economics of Road construction and Maintenance—Fares and Rates—Motor Traffic, Freight and Passenger—Tramway Undertakings—Municipal Ownership—Road Transport in India—The State and Road Transport.

(iv) *Sea Transport.*—Types of Ocean Terminals and their administration—The Great Ports of India—Types of Ocean Traffic and their organisation—Principles of rate making—Economics of Marine Fuel—Competition—Conference, Pools, Rings—Marine Insurance—Reservation of Coastal Trade and the Indian Mercantile Marine—The State and Shipping.

(v) *Air Transport.*—Characteristics—Economic Factors in the operation of services—Passengers, Freight, and Mails—Ground organization—The State and Air Transport.

4. *Statistics and their application to Commerce*

Meaning and scope of Statistics.—Various definitions of statistics—Laws of Statistical Regularity and Inertia of large numbers.

Statistical Investigation.—General methods—Collection of primary and secondary data.

Tabulation.—Single, double and manifold.

Classification of data.

Frequency Distributions.

Accuracy and Approximation.

Averages.—Arithmetic, Geometric and Harmonic. The mode and the median—Weighted averages—Characteristics of the different averages.

Methods of Presentation.—Diagrams—Cartograms and Pictograms—Maps—Graphical representation—Simple, Logarithmic and semi-Logarithmic graphs.

Dispersion.—Meaning and Importance—Various measures of Dispersion and relation between them.

Skewness.—Meaning and various measures of skewness.

Serial Statistics.—Time series—seasonal, cyclical and Random fluctuations and methods of eliminating their influence—Secular trend.

Correlation (Linear only).—Meaning and measurement of correlation (with respect to ungrouped data only).

Interpolation.—Meaning and Importance of Interpolation—Interpolation by graphic method only.

Index Numbers.—Meaning and importance of Index numbers—Various types of and construction of some important index numbers, as simple and weighted Arithmetic, Geometric and Aggregative. The two reversal tests—Fisher's Ideal Index—Cost of Living Index—Index number of wholesale prices.

Government Published Statistics.—The nature of the Statistics publications of the various Provincial Governments and of the Government of India.

Study of the Indian Census.

Vital Statistics.—Birth rate, Death rate—Crude, corrected and standardised.

Methods of Economic Survey.—Preparation of schedules and questionaires.

(5) *Recent Economic History of England, France, Germany, Italy, United States of America, Japan and India (with special reference to England and India.)*

England:—Outlines of the Economic History in the pre-Industrial Revolution period—Mercantalism—The Industrial Revolution—Industrial and Commercial Policy—Agricultural and Commercial Revolutions—Economic Imperialism—Economic Legislation—Trade Unions, Factory Legislation, Poor Relief, Free Trade—Socialism and kindred movements—The Great War and its effects—Recent Economic problems—The growth of the philanthropic spirit.

France:—Outlines of Economic History during the Pre-Railway Age—Industrial conditions during 1815—1848—Money, Banking and Investment during 1815—1848—First Railway and Telegraph Act—Rural Finance from 1848—1914—Industry—Industrial policy and Labour during 1848—1914—Communications, Commerce and Commercial Organisation, Money Banking and Investment etc. during the Railway Age—The Great War and its effects—Recent economic developments

Germany:—Germany in the beginning of the 19th century—Agriculture, Industry, Commerce and Transport—Reorganisation after the Napoleonic Wars —The Zollverein—Progress of Agriculture, Industry, Commerce and Transport —Colonisation scheme—Industrial and commercial policy—Labour movements—The Great War and its effects—Recent economic developments.

Italy:—Outlines of the economic History from the middle of the 19th Century to 1903—The change in 1903—Economic Policy from 1903 to 1922—Growth of the Fascist Spirit—The Revolution in 1922 and victory of Fascism—Establishment of the "Corporate State" in 1926—"Labour Charter" of 1927—The "New Corporation Law" of 1934, establishing different corporations for different branches of economic activity—Colonisation schemes—Industrial and Commercial Policy under Fascism—Recent Developments.

The U.S.A:—Struggle for commercial and economic independence—The Industrial Revolution and the Westward Movement—Development of Transport —Economic effects of the Civil War—Main features and causes of the agricultural, industrial and commercial development—Immigration policy—Recent trend.

Japan:—The Economic reconstruction of Japan after the downfall of Feudalism—The change from the Domestic to Factory organisation—Main features and causes of recent economic progress in the country—The Great War and its effects—Recent developments.

India:—Economic conditions at the time of the downfall of the Moghul Empire—Period of economic disorder—Parliamentay control—Industrial decline—Preference to British interests—Early Land Settlements in various Provinces—Development of Transport—Industrial and Commercial Revolution —The Policy of the Government in regard to Commerce, Industry and Agriculture in the country—Transition period—Industrial development—Labour Legislation—Growth of the Co-operative Movement—Rise of Economic Nationalism—Change in the economic policy of the Government—Fiscal autonomy—Recent developments

CHAPTER XLIII

B. COM. (HONOURS) DEGREE EXAMINATION

(Regulations)

1. Candidates for the Degree of Bachelor of Commerce (Honours) shall be required—

(*i*) to have passed the Intermediate examination in Arts and Science of this University or the Intermediate examination of any other statutory Indian University accepted as equivalent thereto ;*

Note :—Admissions to Honours course shall ordinarily be restricted to those candidates who have taken one or more Commercial subjects as optionals under Part III in their Intermediate examination ;

(*ii*) to have subsequently undergone a further course of study in the University College, as prescribed hereunder extending over a period of three years, each consisting of three consecutive terms ; and

(*iii*) to have passed the examination for the degree hereinafter prescribed.

2. The course for the B. Com. (Honours) Degree shall comprise instruction in—

Part I—Preliminary Examination—(a) Commercial Correspondence and Precis Writing and (b) Translation (Hindi).

Part II—Final Examination.

A. 1. Commercial Knowledge and Commercial Arithmetic.

2. Commercial Geography.

3. Business Organisation.

4. Law and Practice of Banking in India.

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* *Vide* foot-note on the first page of Chapter XL.

B. 1. Economics.

2. Book-keeping and Accounts.

3. Mercantile and Industrial Law.

4. Statistical Method and Applied Staitstics.

5. & 6. Any two of the following special subjects one from each group.

Group (a)

1. Advanced Accounting and Auditing.
2. Advanced Banking and Currency.

Group (b)

1. Economics of Transport.
2. Actuarial Science.
3. International Trade and Foreign Exchanges.
4. World Trade and Organisation of Markets.
5. Insurance.
6. Recent Economic History of England, Germany, Russia, Italy, U. S. A., Japan (each with special reference to India) and India.

Eligibility for the Degree

3. (a) No candidate shall be eligible for the B. Com. (Honours) Degree until he has passed both the Part I and Part II Examinations.

(*b*) No candidate other than those hereinafter exempted, shall be admitted to the Part II examination in Honours unless he has passed the Part I examination.

4. The examination in Part I shall be the same as the examination in Part I—for the B. Com. Pass Degree examination.

A candidate for the Honours examination may present himself for the Part I examination at the end of the first year of the course and thereafter at his option present himself for either Commercial Correspondence and Precis Writing or Translation or both, provided that candidates who obtain qualifying marks for a

pass either in Commercial Correspondence and Precis Writing or Translation need appear again in the subject in which they failed.

Marks qualifying for a pass

A candidate shall be declared to have passed in Part I if he obtains not less than 40 per cent in each of the subjects. All other candidates shall be deemed to have failed in the examination. Successful candidates obtaining not less than 60 per cent of marks in each subject shall be declared to have passed with distinction in that subject.

Exemption

5. Selected graduates of the University (B. Com. Pass Degree holders and B.A. Pass Degree holders with Economics (Main) as their optionals) and such other graduates as may be recognised by the Syndicate as equivalent thereto may be allowed to take the Honours Degree examination after a further period of study in the University college extending over not less than two years. B. Com. Pass Graduates shall be exempted from passing the Part I examination ; they shall be required to attend the classes and appear and pass the Part II examination in the subjects under General and Special groups.

Candidates who have passed Hindi under Part II in the Intermediate examination shall not be required to undergo the course in Hindi prescribed for the examination or to pass in the examination under Part I-B.

Subjects for the Examination

6. The Part II examination shall be conducted in two parts, Part II-A and Part II-B respectively ; the subjects included in the above shall correspond to the subjects under the corresponding Parts mentioned in Section 2 above.

The papers set in each subject shall be as follows :—

Each of the special subjects—3 papers of 3 hours' duration each ;

Rest—one paper of 3 hours' duration each.

Candidates for the Honours examination are expected to have more detailed knowledge of the common subjects than is required in the case of candidates for the Pass Degree, a higher standard than B. Com. Pass course is required in passing the Examination.

Admission to Part II examination

7. Candidates may be permitted to appear for Part II-A at the end of the 2nd year of their Honours course. A candidate for the B. Com. Honours Degree examination shall appear for the Part II-B examination not later than the end of the 4th year after commencing the Honours degree course in the University College ; provided, however, graduates (*vide* Section 5 above) proceeding to the B. Com. Honours Degree shall appear not later than 3 years after commencing the B. Com. Honours Degree course in the University College.

Notice of withdrawal

8. No candidate shall be permitted to undergo the examination in Part II-B for the Honours more than once. A candidate for the Part II-B examination shall, however, be permitted to withdraw from the examination provided he has not sat for the last paper in the examination and provided he has given notice of withdrawal to the Registrar within three clear days from the date of the last paper which he answered. He shall be permitted to appear again for the Part II-B examination in the following year without producing any additional certificate of attendance.

9. In the event of a candidate for the B. Com. (Hons.) Degree failing to satisfy the examiners in Part II of the examination, he may be recommended by them for the B. Com. Pass Degree provided he has obtained not less than 30 per cent of the marks in Part II-A and 30 per cent of the marks in each of the divisions in Part II-B of the examinations, viz :—

(1) General Group, and (2) Special Group.

10. A candidate who is not already eligible for the B. Com. Pass Degree and has failed completely in the B. Com. (Hons.) Degree examination shall be permitted to appear for the B. Com. (Pass) Degree examination without the production of a further certificate of attendance in the University College.

Marks qualifying for a pass

11. A candidate shall be declared to have passed the Final examination if he has obtained the following minimum marks :—

Part II-A. 30 per cent in each subject and 40 per cent in the aggregate.

Part II-B. 33 per cent in both the special subjects taken together; 30 per cent in each of the remaining subjects; and 40 per cent in the aggregate.

Classification of successful candidates

12. Candidates obtaining Honours shall be ranked in the order of proficiency as determined by the total marks obtained by each and shall be arranged in three classes; the *first*, consisting of those who obtain not less than 60 per cent; the *second*, of those who obtain not less than 50 per cent; and the *third*, of those who obtain not less than 40 per cent of the total marks.

Transitory Regulation

13. For the benefit of candidates who failed in Part I-(a) English at the B. Com. (Hons.), Degree examination held in 1936 or earlier an examination in Part I-(a) under the Regulations in force up to and including the examination of 1936 will be held in March and September 1937 under the then time-tables. Similarly for the benefit of candidates who fail in Part II of the B. Com. (Hons.) examination in 1938 who are eligible to appear another time, the B. Com. (Hons.) examination in Part II under the regulations in force up to and including the examination of 1938 will be held in March—April of 1939 under the old time-tables. The text-books and syllabuses for Part I-(a) examination of 1937 and Part II examination of 1939 shall be the same as those prescribed for the examinations of 1936 and 1938 respectively.

SYLLABUSES

Part II—General Group

1. *Economics.*—Same as for B. Com. (Pass) Degree, but in greater detail plus Outlines of Public Finance and Taxation, Problems of Labour and Capital and Co-operation, with special reference to India.

2. *Law and Practice of Banking in India.*—Same as for B. Com (Pass) Degree plus important legal decisions affecting Bankers.

3. *Business Organization.*—Same as for B.Com. (Pass) Degree plus Export and Import Trade Organization and outlines of Transport.

4. *Book-keeping and Accounts.*—Same as for B. Com. (Pass) Degree plus Accounts of different commercial undertakings and Public utility companies,

Assurance Accounts, Bank Accounts, Bankruptcy Accounts, Outlines of Costs Accounts and Income-tax Accounts.

5. *Mercantile and Industrial Law*—Same as for B. Com. (Pass) Degree plus Rights and Duties of Liquidators, Trustees and Receivers Law of Arbitration and Award. Trade Disputes, Employers' liability.

6. *Commercial Geography.*—Same as for B. Com (Pass) Degree plus Regional and Commeicial Geography of India, Great Britain, France, Germany, Italy, Russia, U.S.A. and Japan.

7. *General Commercial Knowledge and Commercial Arithmetic.*

(i) GENERAL COMMERCIAL KNOWLEDGE.

Same as in the Pass course in greater detail plus criticism of a Company Prospectus. The Co-operative movement in India. and outlines of the Indian Constitution including the recent developments regarding Federation.

(ii) COMMERCIAL ARITHMETIC.

Same as in the Pass course in greater detail plus the following :—

(1) Mental calculation of prices including short methods.

(2) Mensuration of rectangles, parallelograms, circles and rectangular solids.

(3) Duodecimals.

(4) Builders' quantities and estimates.

(5) Business forms, such as invoices, debit and credit notes account sales and statements of account.

8. *Statistical Method and Applied Statistics*—Definition of statistics, collection, tabulation and presentation of data, graphs, averages, dispersion, skewness, correlation and index numbers. A brief study of British Indian statistics—official and non-official. Application of statistics to economic and commercial problems.

Part II—Special Group.

Sub-Group—A.

(1) *Advanced Accounting and Auditing*—(*a*) General Accounting as in Book-keeping and Accounts. Columnwar Book-keeping, Fire, Loss of Profits and Compensation Claims, Accounts of Professional Practices, Hotel accounts, Investment accounts. Cost accounts in greater detail, and Income-tax accounts, including law and procedure of Income-tax.

(*b*) *Auditing.*—Same as for B. Com. (Pass) Degree plus Audit Programme Share Transfer Audit, Miscellaneous Problems, Foreign Branches, Maintenance Contracts, Hire Purchase, Shares as consideration for sale, Vendor's guarantees,

"Family" companies, valuation of shares in private companies and underwriting agreements.

Investigation into and criticism of accounts, including—

(i) Classes of investigations, liability of the investigating accounts, investigation beyond the books, Examination of accounts with particular reference to Stock and Foreign investigations.

(ii) Criticism of balance sheet for prospective loan creditor or purchaser. Criticism of prospectus certificate. Special points regarding purchase of a business valuation of good-will.

(2) *Advanced Banking and Currency*—(*i*) *Banking*.—Same as for B. Com. (Pass) in greater detail plus outlines of practice of several kinds of banks in Great Britain, France, Germany, U.S.A. and Japan.

(*ii*) *Currency*.—Same as for B. Com. (Pass) in greater detail plus the various currency theories and their criticism.

(*iii*) *Foreign Exchange*.—Same as for B. Com. (Pass) in greater detail plus Arithmetic of Foreign Exchanges.

Sub-Group—B.

(1) *Economics and Transport*.—(*a*) General principles relating to Railway, Road, Inland Waterway, Sea and Aerial Transport. The place of Transport in Industry and Commerce. General organization of each means showing distribution of functions. Control exercised by the State at inauguration and overconstruction, operation and charges. Monopoly and Competition. Co-ordination of Transport. Relations with public.

Railway Transport.—Capital and Expenditure. Gross and Net receipts. Economics of Railway construction and maintenance. Growth of passenger traffic. Passenger fares. Influence on distribution of population. Freight rates and their theory. Rate making in practice. Influence of production, costs on rates. Classification of goods, Special rates, Discrimination. Control of rates by maxima, by commissions of tribunals, Competition. Traffic pools. Effects on rates and fares of State ownership and State guarantees of interest. Influence of railway rates on distribution of industries.

Road Transport.—Economics of road construction and maintenance. Theories of rates and fares. Variations caused by types of road transport Competition with railway transport, relation of road to railway transport. Municipal ownership. State control.

Inland Water Transport.—Capital Expenditure. State aid. Tolls. Rates. Economics of Haulage. Local nature of influence on industry.

Sea Transport.—Docks and Quays. Co-ordination of rail and water terminal facilities. Port dues. The ship economics of marine fuel. Charter party. Bill of lading. Seaworthiness. Freights on liners and tramps Agreements to control competition. Navigation Laws and State regulation. Freight making in coastwise transport. Marine Insurance. Average salvage. The ship canal.

Aerial Transport.—Growth and development. Principles of ratemaking.

(*b*) Rights and Duties of common carriers and their customers.

CHAPTER XLIII-A

B. COM. (HONOURS) DEGREE EXAMINATION

(New Regulations)

Conditions of Admission

1. Candidates for the Degree of Bachelor of Commerce (Honours) shall be required—

(i) to have passed the Intermediate examination in Arts and Science of this University or the Intermediate examination of any other statutory Indian University accepted as equivalent thereto ;*

Note :—Admission to Honours course shall ordinarily be restricted to those candidates who have taken one or more commercial subjects as optionals under Part III of the Intermediate examination.

(ii) to have subsequently undergone a further course of study, in the University College, as prescribed hereunder extending over a period of three years, each consisting of three consecutive terms ; and

(iii) to have passed the examination for the degree hereinafter prescribed.

Course of Study

2. The course for the B. Com. (Honours) Degree shall comprise instruction in—

Part I—Preliminary Examination—(at the end of the first year):

(*a*) English.

(*b*) Translation (Hindi).

Part II—Final Examination:

A. 1. General Economics.
2. Banking.
3. Accountancy.
4. Business Organisation.
5. Secretarial Practice.
6. Commercial Geography.
7. Mercantile Law.
8. Statistics and their application to Commerce.

* *Vide* foot-note on the first page of Chapter XL.

B. Any one of the following subjects :

1. Advanced Accounting and Auditing.
2. Transport.
3. International Trade.
4. Currency and Exchange.
5. Recent Economic History of England, Germany, U. S. A., Japan and India.

*6. Insurance.

Eligibility for the Degree

3. (*a*) No candidate shall be eligible for the B. Com. Honours Degree until he has passed both the Part I and Part II examinations.

(*b*) No candidate other than those hereinafter exempted, shall be admitted to the Part II examination in Honours unless he has passed the Part I Examination.

Subjects for Part I Exam.

4. The examination in Part I shall comprise (*a*) two papers of three hours' duration each—one based on two prescribed text-books of modern Prose for detailed study and the other on Composition based on two prescribed modern text-books for non-detailed study and (*b*) a three hours' paper on Translation from Hindi into English and *vice-versa*. (This paper on Translation shall include a simple essay on some commercial subject).

Admission to Part I Exam.

A candidate for the Honours examination may present himself for Part I of the examination at the end of the first year of the course and thereafter at his option present himself for either English or Translation or both, provided that candidates who obtain qualifying marks for a pass either in English or Translation need appear again in the subject in which they failed.

Marks qualifying for a pass in Part I Examination

A candidate shall be declared to have passed in Part I if he obtains not less than 35% in each of the subjects (*i.e.* English and Translation). All other candidates shall be deemed to have failed in the examination. Successful candidates obtaining not less than 60% of the marks in each subject (*i.e.* English or Translation) shall be deemed to have passed with distinction in that subject.

Bachelors of Arts shall be exempted from taking the examination in Part I-A.

* To come into effect as from the examination of 1944.

Exemption

5. Selected graduates in Commerce of this and other Universities may be allowed to take the Honours Degree examination after a further period of study in the University College extending over not less than two years. Pass graduates in Commerce shall be exempted from passing Part I of the Examination ; they shall be required to attend the classes and appear and pass Part II of the Examination in the subjects under compulsory and optional groups.

Candidates who have passed Hindi under Part II in the Intermediate examination shall not be required to undergo the course in Hindi prescribed for the examination or to pass in the examination under Part I (*b*).

Subjects for Part II examination

6. The Part II examination shall consist of one paper of 3 hours' duration in each of the compulsory subjects, and two papers of 3 hours' duration in the special (optional) subject.

Candidates for the Honours examination are expected to have more detailed knowledge of the common subjects than is required in the case of candidates for the Pass degree ; and a higher standard than B. Com. Pass course is required for passing the examination.

Admission to Part II examination

7. Candidates for the B. Com. (Hons.) degree examination shall appear for Part II of the examination in Honours not later than the end of the fourth year after commencing the Honours degree course in the University College, provided, however, graduates (*vide* section 5 above) proceeding to the B. Com. (Hons.) degree examination shall appear not later than three years after commencing the Honours degree course in the University College.

Notice of withdrawal

8. No candidate shall be permitted to undergo the examination in Part II for the Honours more than once. A candidate for Part II of the examination shall, however, be permitted to withdraw from the examination provided he has not sat for the last paper in the examination and provided he has given notice of withdrawal to the Registrar within three clear days from the date of the last paper which he answered. He shall be permitted to appear again for Part II of the examination in the following year without producing any additional certificate of attendance.

9. In the event of a candidate for the B. Com. (Honours) degree failing to satisfy the examiners in Part II of the examination, he may be recommended by them for the B. Com. Pass degree provided he has obtained not less than 30 per cent. of the marks in each of the divisions in Part II.

10. A candidate who is not already eligible for the B. Com. Pass degree and has failed completely in the B. Com. (Hons.) degree examination shall be permitted to appear for the B. Com. (Pass) degree examination without the production of a further certificate of attendance in University College.

Marks qualifying for a pass in Part II Exam.

11. A candidate shall be declared to have passed the Final examination (*i. e.* Part II) if he has obtained 30% in each subject of Group A (*i. e.* compulsory subjects) and 33% in the special subject selected by the candidate from Group B and 40% in the aggregate.

Classification of successful candidates

12. Candidates obtaining Honours shall be ranked in the order of proficiency as determined by the total marks obtained by each and shall be arranged in three classes ; the First consisting of those who obtain not less than 60 per cent ; the Second of those who obtain not less than 50 per cent ; and the Third of those who obtain not less than 40 per cent. of the total marks.

Transitory Regulation

13. For the benefit of candidates who fail in Part I of the B. Com. (Hons.) Degree examination held in 1940 or earlier an examination in Part I under the regulations in force up to and including the examination of 1940 will be held in March and September 1941 under the then time-tables. Similarly for the benefit of candidates who, withdraw from Part II-B of the B. Com. (Hons.) examination in 1942 and who are eligible to appear another time, the B. Com. (Hons.) examination in Parts II-A and II-B under the regulations in force up to and including the examination of 1942 will be held in March—April of 1943 under the old time-tables. The text books and syllabuses for Part I examination of 1941 and

Parts II-A and II-B examinations of 1943 shall be the same as those prescribed for the examinations of 1940 and 1942 respectively.

Note :—The candidates who fail completely in the B. Com. (Hons.) Degree examination of 1943 and who are not eligible for the B. Com. Pass degree, shall be permitted to appear for the B. Com. (Pass) Degree examination without the production of a further certificate of attendance in the University College up to and including the examinations of March and September 1944 under the old time-tables. The text-books and syllabuses for Parts II-A and II-B examinations of the B. Com. (Pass) degree held up to and inclusive of 1944 shall be the same as those prescribed for 1941 examinations.

SYLLABUSES

PART II

Group A. (Compulsory)

1. *General Economics*: Same as for B. Com. (Pass) degree, without the section on "Money, Exchange, and Banking," but including outlines of Public Finance and Taxation, Labour Problems and Co-operation, with special reference to India.

2. *Banking* :

(a) *Outlines of Currency*: The Functions and economic significance of money—various forms of money—metallic currencies and coinage—currency deterioration; its causes, measures and remedies—Legal Tender—Paper money—Monetary Standards—The purchasing power of money and quantity Theory—Indian Currency Problems.

(b) *Principles of Banking* : The nature and utility of Banking—the functions and economic significance of Banks—simple banking operations—Growth of the Deposit Banks and the Cheque System—The sources of bank's profit—Bank Investments—Banks and the money Market.

Central Banks—Regulation of note-issue—Reserves and Discount Rates—Clearing houses.

Financial and Commercial crises.

Branch Banking.

Outlines of the history and growth of Banking in England. The Bank of England and its relation to the Government, the Commercial and Banking

World and the general public. Indian Banking. Money-lenders and indigenous bankers—Their importance in Rural Finance—The Joint stock Banks—The Imperial Bank of India—The Exchange Banks—The Reserve Bank of India—Outlines of Co-operative Credit movement in India—Provincial and District Co-operative Banks, Unions and Credit Societies—Land Mortgage Banks.

(c) *Law and Practice of Banking in India*: The legal relationship between banker and customer. Current accounts, Deposit accounts, Trust accounts, Loans, Overdrafts and cash credits. The Pass Book. Secrecy of the state of Customer's account. Cheques and documents analogous to cheques. Payment and collection of cheques. Payment of cheques by mistake. Forged cheques. Securities for advances in general. Pledges and mortgages of negotiable instruments, stocks and share. Commercial credits. Realisation of securities. Banker's guarantees. Miscellaneous securities, *viz.*, Lands and Buildings, Life Policies, Book Debts and Ships. Subsidiary services of Banks and the Law relating thereto.

3. *Accountancy*:—Same as for the B. Com. (Pass) Degree plus Accounts of different commercial undertakings and Public Utility Companies, Life Assurance Accounts, Bank Accounts. Bankruptcy Accounts, Liquidation Accounts, Outlines of Cost Accounts and outlines of Income-Tax Accounts.

4. *Business Organisation*:—Same as for the B. Com. (Pass) degree plus export and import trade Organisation and outlines of Transport.

5. *Secretarial Practice*:

The Rights and Liabilities of a Company Secretary: Duties at time of incorporation of Company—Duties after, Incorporation—Qualifications—Appointment and Remuneration—Secretary's responsiblities and Liabilities—Position of Secretary on Liquidation or appointment of Receiver for Debenture Holders.

Incorporation and Formation of Companies:—Duties of person acting as Secretary protem in connection with arrangement and attendance at all meetings of promoters—Advice to promoters on matters incidental to registration of intended company—Different kinds of Limited Companies—Companies limited by shares. Companies limited by guarantee. Companies with unlimited liability.

Promotion—Functions of a promoter—His remuneration. High grade and low grade promotion—Preparation of Preliminary and underwriting Contracts—Different kinds of underwriting agreements—Underwriters' services—Their remuneration. Framing of prospectus—Documents to be filed on Incorporations—Memorandum and Articles of Association, List of Directors, etc. Miscellaneous Matters—Name of Company—Change of name, Seal and seal book.

Certificate of Incorporation and commencement of business.

Office Organisation and Business Methods.—The Business office and its Equipment—Departments—Division of Responsibility—Buying, Selling, Accounts and cash, General Administration, Secretarial Department. Appointment of staff—Staff management and records. Business methods—Handling Mails. Incoming and outgoing Mails—Orders outwards. Methods of filing Purchases, Invoices etc. Paying Accounts—Handling sale Orders—Recording payments by customers. Paying of wages—Internal checks—Office aids, Machinery and Appliances—Filing cabinets—Card indexes—Loose leaf books—Typewriters—Letter-copying machines—Duplicators—Photostat—Time recording clocks and devices—Cash Registers—Coin Issuing machines for change—Adding and Calculating machines—Tabulating machines for costing, statistical and sorting purposes-Dictating machines—Automatic Cash and document tube conveyors.

Correspondence, Filing and Indexing.—Composition of Business letters—Drafting of circulars—Filing systems—vertical, horizontal, card indexes, central filing etc.—Advantages and disadvantages of each.

Precis-writing, Drafting Reports, Circulars.—Precis; Definition, preparation length—uses, Reports: Statutory and Annual Reports to Directors—Committee Reports—Financial and Statistical Returns—Circulars—When issued—Need for careful drafting.

Application and allotment procedure.—Issues to Public-Different kinds of shares—Rights attached thereto—Procedure on allotment—Issuing allotment letters—Partial Allotments—Letters of Regret—Recording Allotment Moneys—Filing return of Allotments—Statutory and other books of the company—Register of members and share Register—Indexing, writing and balancing up of Register-Issue of share certificate-Procedure on issue of share certificates-Issue of Bonus shares—Procedure on allotment of Bonus shares—Other methods of giving shareholders a Bonus—Splitting allotment letters, Dealing with Renunciations, etc.

Calls and Forfeiture:—Procedure on making a call-Forfeiture of Shares-Reissue of Forfeited shares.

Transfer and Transmission.—Legal effect of a Transfer. Certification of Transfers-Duties attending certification procedure on Registration of Transfer-Transmission of shares—Formalities on Transmission—Miscellaneous matters in connection with Transfer and Transmission—Transfer and Transmission fees—Transfers executed under a Power of Attorney-Forged Transfers Closing of transfer books - Issue of duplicate share certificates etc.

Payment of Dividends:—Procedure on Payment of Dividends - Payment to shareholders' Bank Accounts—Income—Tax—Requirements—Unclaimed Dividends etc.

Alteration of Capital:—Procedure on Increase of Capital-Procedure on sub-division of shares-Procedure on consolidation—Procedure on conversion

of shares into stock and reconversion—Procedure on Reduction of Capital—Procedure on alteration of rights attaching to shares—Reorganisation of share capital.

Debentures:—Issue of Debentures—Registration and filing of charges, securing debentures—Transmission of Debentures—Payment of Interest—Redemption.

Secretarial Duties concerning meetings:—Notice convening the meeting—The agenda—Loophole agendum—The Statutory Meeting—The Statutory Report—Forwarding and Filing Statutory Report—Annual Meeting—Closing of Transfer books—The Annual Report—Proxies—Polling Preparations—Extraordinary meetings—Meetings of Directors—First meeting of Directors—Preparations for meetings of Directors (Immediate and at the meetings)—Committee meetings.

Resolutions:—Propositions—Motions—Ordinary, Special and Extraordinary Resolutions—Drafting—Filing of Resolutions with Registrar.

Minutes—Compilation—Main Essentials—Indexing of Minutes—Signing of Minutes—Alteration of Minutes—Minutes as Evidence—Failure to keep minutes—Inspection of Minute Books

Procedure on Reconstruction, Reorganisation and Amalgamation.

Private Companies:—Privileges and Restrictions. Conversion into Public Company.

Statutory Companies:—Formation and main differences between Statutory and limited companies from the point of view of Secretary.

6. *Commercial Geography*:—Same as for B. Com. (Pass) degree plus Regional and Commercial Geography of India, Great Britain, France, Germany, Italy, Russia, U.S.A. and Japan.

7. *Mercantile Law*:—Same as for B. Com. (Pass) degree, plus rights and duties of liquidators, trustees and receivers. Law of Arbitration and Award Trade Disputes and Employer's Liability.

8. *Statistics and their application to Commerce*:—

Meaning and Scope of Statistics:—Various definitions of statistics—Laws of Statistical regularity and of Inertia of Large numbers.

General methods of Statistical investigation:—Collection of data, primary and secondary.

Tabulation:—Single, double and manifold.

Classification and Frequency Distributions.

Accuracy and Approximation.

Averages:—Arithmetic average, Median, Mode, Geometric mean, Harmonic mean, Weighted average—characteristics of different averages.

Methods of Presentation :—Diagrams, cartograms, maps, etc. Graphs—Simple Logarithmic and semi-logarithmic—graphic methods of representing frequency distributions.

Dispersion :—Its meaning and importance—Various measures of dispersion—Relation between various measures.

Skewness :—Its meaning—Various measures of skewness.

Analysis of serial statistics :—Time series—Seasonal, cyclical, and random fluctuations and methods of eliminating their influence—Secular trend.

Correlation :—(Linear Correlation only)—Its meaning—Measurement of correlation (with respect of ungrouped data only).

Interpolation :—Its meaning and importance—Interpolation by graphic method only.

Index Numbers :—Their meaning—Various types of Index numbers—Construction of some of the important types such as simple and weighted, Arithmetic, Geometric and Aggregative—The two reversal tests—Fisher's Ideal Index—Cost of Living Index—and Index number of wholesale prices.

Government Published Statistics :—Nature of the Statistical publications of the various Provincial Governments and Government of India.

Study of Indian Census.

Vital Statistics :—Birth rate and Death rate—Crude, corrected and standardised.

Methods of Economic Survey :—Preparation of Schedules and questionaires.

Group B (Optional Subjects)

1. *Advanced Accounting and Auditing* :—

(*a*) General Accounting as in Book-keeping and Accounts. Columnwar Book-keeping. Fire, Loss of Profits and Compensation Claims. Accounts of Professional Practices, Hotel accounts, Investment accounts, Cost accounts in greater detail, and Income-tax accounts, including law and procedure of Income-tax.

(*b*) Auditing : Same as for B. Com. (Pass) Degree plus Audit Programme, Share Transfer Audit, Miscellaneous Problems, Foreign Branches, Maintenance, Contracts, Hire Purchase. Shares as consideration for sale, Vendor's guarantees 'Family' companies, valuation of shares in private companies and underwriting agreements.

Investigation into and criticism of accounts, including—

(i) Classes of investigations, liability of the investigating accounts, investigation beyond the books. Examination of accounts with particular reference to Stock and Foreign investigations.

(ii) Criticism of a balance sheet for prospective loan creditor or purchaser. Criticism of prospectus certificate. Special points regarding purchase of a business, valuation of good-will.

(*c*) Advanced Banking and Currency: (i) Banking—Same as for B. Com. (Pass) in greater detail plus outlines of practice of several kinds of banks in Great Britain, France, Germany, U.S.A. and Japan.

(ii) Currency: Same as for B. Com. (Pass) in greater detail plus the various currency theories and their criticism.

(iii) Foreign Exchange: Same as for B. Com. (Pass) in greater detail plus Arithmetic of Foreign exchanges.

2. *Transport*:—(*a*) General principles relating to Railway, Road, Inland Waterway, Sea and Aerial Transport. The place of Transport in Industry and Commerce. General organisation of each means showing distribution of functions. Control exercised by the State at inauguration and overconstruction, operation and charges. Monopoly and Competition. Co-ordination of Transport. Relations with public.

Railway Transport: Capital and Expenditure. Gross and net receipts. Economics of Railway construction and maintenance. Growth of passenger traffic. Passenger fares Influence on distribution of population. Freight rates and their theory. Rate making in practice. Influence of production, costs on rates. Classification of goods, Special rates. Discrimination. Control of rates by maxima, by commissions of tribunals. Competition, Traffic pools Effects on rates and fares of state ownership and State guarantees of interest, Influence of railway rates on distribution of industries.

Road Transport: Economics of road construction and maintenance Theories of rates and fares. Variations caused by types of road transport. Competition with railway transport, relation of road to Railway transport, Municipal ownership. State control.

Inland Waterway Transport: Capital Expenditure. State aid. Tolls. Rates, Economics of Haulage. Local nature of influence on industry.

Sea Transport: Docks and Quays. Co-ordination of rail and water terminal facilities. Port dues. The ship economics of marine fuel. Charter party. Bill of lading. Seaworthiness. Freights on liners and tramps. Agreements to control competition. Navigation Laws and State regulation. Freight making in coastwise transport. Marine Insurance. Average salvage. The ship canal.

Aerial Transport: Growth and development. Principles of rate making.

(*b*) Rights and Duties of common carriers and their customers.

3. *International Trade*:—General features of International Trade—History of the Theory of International Trade—The Theory of Comparative costs—The equation of International Indebtedness—Money in International Trade—

Outlines of Foreign Exchange—The influence of foreign trade on the internal distribution of wealth—Taxation for Revenue and its effects—Free Trade *versus* Production—Some controversial points in International Trade—Counter-theories of International Trade.

4. *Currency and Exchange*:

(i) *Currency*:

(*a*) *General principles*: Economics significance of Money. Money and its functions—Qualities of good Money—Origin and principles of metallic currency and coinage—Mint regulations and coinage Laws in England, France, Germany, the U.S.A. and Japan—Currency deterioration, causes thereof and remedies therefor—Gresham's Law—Token Coinage—Legal Tender and various systems thereof prevailing in the leading countries of the world—Monetary standards—Paper money—Various theories about the value of money and criticism thereof—Price variations and effects thereof—Inflation, Deflation and Reflation—The problems of stabilisation of prices—Monetary Reform—The Gold Standard, its breakdown and its future—Various proposals for an international Monetary Standard—The 1931 world crisis and its explanation—Recent developments.

(*b*) *Indian Currency Problems*—Early history of demonetisation of Gold. Fall in the value of Silver. Herschell Committee and closing of the Mints to Coinage of Silver on private account. Fowler Committee and its recommendations. India and the Gold Mint. The Gold Standard Reserve, its composition and location. Chamberlain Commission and its recommendations. Currency during the war and after. Babington-Smith Committee and its report. Failure of the attempt to value the Rupee at 2*sh*. Hilton-Young Committee and Gold Bullion Standard. Note issue of the Presidency Banks. History of currency notes till 1941. Effects of war on the Note issue. Changes proposed by the Babington-Smith Committee. Proposal to transfer Note-issue to a new institution. The Reserve Bank and its role in Currency.

(*c*) Foreign Exchange: What is Foreign Exchange? Importance of Foreign Exchange in modern economic development. Mint Par of Exchange, Gold points. Fluctuations in Exchanges, causes and effects thereof. Rates of Exchange, Long and short rates and Sight-rates. Silver and Paper exchanges. The purchasing power Parity Theory. Forward Exchange, Problem of stabilisation of Exchanges. Terminology of Exchanges and how to read a Foreign exchange article. Indian Exchanges, Pre-war and Post-war. Present conditions.

(ii) *Exchange*:

(*a*) *General Principles*: The meaning of Foreign Exchange. Importance of Foreign Exchange in modern Economic Development—Mint Par—

Gold Points—Fluctuation in Exchanges, causes and effects thereof—Rates of Exchange viz. long and short rates, sight rate, etc. Silver and paper exchanges. The Purchasing Power Parity Theory and Exchanges—Problem of Stabilisation of Exchanges—Terminology of Exchanges and how to read a Foreign Exchange article—Arithmetic of Exchanges.

(*b*) Indian Exchange—Pre-war and Post-war-Gold movements. The ratio controversy-Recent developments.

* 5. *Recent Economic History of England, Germany, U. S. A., Japan, and India* :—

England :—Same as for Pass course but in greater detail.

Germany :—Same as for Pass course but in geater detail.

U. S. A :—Same as for Pass course but in greater detail.

Japan :—Same as for Pass course, but in greater detail.

India :—Same as for Pass course, but in greater detail.

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* The following change will come into effect as from the examinations of 1944 :—

Add the following Syllabus after the syllabus under 5. Recent Economic History of England, & etc.

(6) *Insurance* :—

(*a*) Nature and the use of Life Assurance. The Science of Life Assurance. Special forms of Life Assurance. Investments of Life Assurance Companies' Funds. Outlines of the Law relating to Life Assurance.

(*b*) Fire Insurance, Marine Insurance, Motor Insurance, Personal accident Insurance, Employer's Liability. Insurance and unemployment Insurance (outlines only).

Books recommended :—

1. Life Assurance by J. H. Mages.
2. Life Assurance by Hubner.
3. Insurance Companies' Investments by H. E. Raynes.
4. Principles of Life Assurance by Maclear.
5. A Guide to Life Assurance by Leigh.
6. Marine Insurance—Its principles and practice by F. Templeman.
7. Principles and practice of fire Insurance by F. Godwin.
8. Motor Insurance by W. F. Todd.
9. Personal Accident, Disease and Sickness Insurance by J. W. Wilson.
10. Workmen's Compensation Insurance by G. E. Golding.
11. Indian Life Assurance Companies Act (latest).
12. India Workmen's Compensation Act (latest).

CHAPTER XLIV

DEGREE OF BACHELOR OF SCIENCE

(Regulations)

Conditions of Admission

1. Candidates for the Degree of Bachelor of Science shall be required

(1) to have passed the Intermediate examination in Arts and Science of this University or an examination of some other University accepted as equivalent thereto*;

(2) to have undergone subsequently a further course of study in an affiliated college as prescribed hereunder, extending over a period of two years, each consisting of three terms ordinarily consecutive ; and

(3) to have passed thereafter the examination for the Degree hereinafter prescribed.

Courses of study

2. The courses for the B. Sc. Degree shall comprise instruction in—

Part I—English ;

Part II—*Three* of the following branches of knowledge, of which one shall be the main subject (Part II-A) and the other the subsidiary (Part II-B)—

i. Mathematics

ii. Physics

iii. Chemistry

iv. Botany

v. Zoology

vi. Geology

vii. Physiology

Provided that (a) with Botany Main, Chemistry shall be taken as a compulsory subsidiary subject, and either Geology or Zoology as the second subsidiary, (b) with Zoology Main, Chemistry shall be

* foot-note on the first page of Chapter XL.

taken as a compulsory subsidiary subject, and either Botany or Geology as the second subsidiary and (c) with Geology Main, Chemistry shall be taken as a compulsory subsidiary subject, and either Physics or Botany or Zoology as the second subsidiary.

The course of study shall be as defined in the syllabuses.

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3. No candidate shall be eligible for the Degree of Bachelor of Science until he has passed the examination in Part I—English and in Part II viz., three of the optional branches of knowledge contained in the courses of study.

4. A candidate for the B. Sc. Degree Examination may present himself for Part I at the end of the first year of the course and thereafter at his option present himself for the whole of the examination (that is, Parts I and II), or for either part, or for Part II-A or Part II-B, or Part I together with either Part II-A or Part II-B; provided that candidates who obtain qualifying marks for a pass in either Part II-A or Part II-B need appear again only for the sub-division A or B in which they failed;

Provided also that candidates presenting themselves for any part of the examination at the end of the first year of the course shall take the examination with the text-books and syllabuses prescribed for that year no matter when they would be completing their course in the main subject.

5. Notwithstanding anything contained in Section 4, candidates who have passed in one subsidiary subject under Part II–B at the examination of 1931 shall be given credit for the pass in that subject and they need appear for and pass in the other subsidiary subject only to complete that Part. It shall also be permissible for candidates who commenced their B. Sc. Degree course of instruction in July 1931 to appear at the examination of April 1932 for one subsidiary subject under Part II-B and candidates who pass in that subsidiary subject in that year shall be given credit of the pass in that subject and they need appear for and pass the other subject only to complete that Part.

6. Candidates for the B. Sc. Degree examination shall be examined in

Subjects for Examination

Part I—English.

There shall be one paper in English of three hours' duration based on two prescribed text-books, one for detailed study and the other for non-detailed study.

Part II—Any three of the subjects mentioned under Part II in Section 2 above, of which one shall be main and the other two subsidiary.

The scope of the papers in the several subjects whether main or subsidiary shall be as stated below. Each paper shall carry 100 marks and shall be of three hours' duration except where otherwise stated.

MATHEMATICS (MAIN)

Six papers—

(i) Algebra and Trigonometry.
(ii) Pure Geometry.
(iii) Analytical Geometry.
(iv) Calculus.
(v) Statics and Dynamics.
(vi) Hydrostatics and Astronomy.

MATHEMATICS (SUBSIDIARY)

Two papers—

(i) Algebra, Trigonometry and Analytical Geometry.
(ii) Calculus and Differential Equations.

PHYSICS (MAIN)

Four papers in theory and two practical examinations—

(i) Dynamics and Hydrostatics.
(ii) Properties of Matter and Heat.
(iii) Light and Sound.
(iv) Electricity and Magnetism.

PHYSICS (SUBSIDIARY)

One paper in theory and one practical examination,

CHEMISTRY (MAIN)

Four papers in theory and two practical examinations as hereunder :—

(i) General Chemistry including History of Chemistry.
(ii) Inorganic Chemistry.
(iii) Physical Chemistry.
(iv) Organic Chemistry.

The practical examinations shall be of six hours' duration each.

CHEMISTRY (SUBSIDIARY)

One paper in theory and one practical examination.

BOTANY, ZOOLOGY OR GEOLOGY (MAIN)

Three papers in theory and three practical examinations as follows :—

Botany :

(i) Cryptograms.
(ii) External Morphology, Gymnosperms and Angiosperms.
(iii) Physiology and Histology.

Zoology :

(i) Invertebrata.
(ii) Vertebrata.
(iii) General Embryology and General Principles.

Geology :

(i) Physical Geology and Economic Geology.
(ii) Crystallography, Mineralogy, and Petrology.
(iii) Stratigraphy, Indian Geology and Palaeontology.

Practical under Geology.

(i) Crystallography and Mineralogy.
(ii) Petrology and Blow-Pipe analysis.
(iii) Structural Geology and Palaeontology.
Laboratory and Field Note-Books specimens.

BOTANY, ZOOLOGY OR GEOLOGY—(SUBSIDIARY)

Botany : No division of Papers.

Zoology: (i) Invertebrata.
(ii) Vertebrata.

Geology :

(i) General, Structural and Stratigraphical Geology and Palaeontology.

(ii) . Crystallography, Mineralogy and Petrology.

Practical under Geology :

(i) One on the above subjects.

Two papers in theory each of 2 hours' duration and one practical examination of three hours.

PHYSIOLOGY (MAIN)

Two papers in theory and three practical examinations.

PHYSIOLOGY (SUBSIDIARY)

One paper in theory and two practical examinations.

Exemptions to I M.B.B.S. candidates offering Physiology Main

7. A candidate who has passed the First M. B. B. S. Degree Examination of this University will be permitted to appear for the B. Sc. Degree Examination in Physiology as a main subject after he puts in a regular course of study in that subject for a period of one year in a college affiliated to the University for the purpose. The Syndicate shall have power to exempt him from taking any subsidiary subjects. He shall be required to appear for and pass Part I—English of the B. Sc. Degree Examination but the Syndicate shall have power to exempt him from the production of the required certificate of attendance in that subject at an affiliated college. The result of the candidate at the examination shall be determined by the marks he obtains in Part I—English and Part II—Physiology as a main subject without reference to the subsidiary subjects.

Marks qualifying for a pass

8. A candidate shall be declared to have passed Part I of the examination if he obtains not less than 35 per cent of the marks in that Part.

A candidate shall be declared to have passed Part II of the Examination if he obtains (a) in the main subject, not less than

35 per cent of the total marks and not less than 30 per cent in each division of the examination, and (b) in the subsidiary subjects, not less than 35 per cent of the total marks of the two subsidiary subjects and not less than 30 per cent, in each of the subsidiary subjects. All other candidates shall be deemed to have failed in the examination. The divisions in the following subjects when main shall be—

(i) *Mathematics.*

(a) Pure Mathematics, (b) Applied Mathematics.

(ii) *Physics*, (iii) *Chemistry*, (iv) *Botany*, (v) *Zoology*, (vi) *Geology*, or (vii) *Physiology*.

(a) The written examination in the main subjects.

(b) The practical examination in the main subjects.

There shall be no divisions in the above subjects taken as subsidiary.

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9. There shall be separate lists of successful candidates in each Part. Candidates obtaining not less than 60 per cent of the marks in Part I shall be declared to have passed with distinction in English.

ıssifica- n of cessful ıdidates

10. Successful candidates in Part II shall be arranged in three classes—The *first*, consisting of those who obtain not less than 60 per cent ranked in the order of proficiency as determined by the total marks obtained by each ; the *second*, of those who obtain not less than 50 per cent ranked in the order of proficiency as determined by the total marks obtained by each and the *third*, of the remainder, provided that first class and second class shall be given only to those candidates who pass Part II-A and Part II-B at one and the same examination.

mission B.As. to ear for Sc. mination

11. Candidates who have already passed the B.A. Degree examination with Physics, Chemistry or Botany as the main subject shall be eligible to appear for the B. Sc. Degree examination subject to the condition that they shall have undergone subsequently a further course of study in an affiliated college extending over a period of one year consisting of three terms ordinarily consecutive

in a subsidiary subject other than the one already taken for the B.A. Degree examination.

Such candidates shall be examined in—

(i) the main subject which shall be the same as that taken for the B. A. Degree examination, and

(ii) the new subsidiary subject.

They shall be exempt from sitting for an examination in Part I—English and in the subsidiary subject presented for the B. A. Degree Examination.

Classification of successful candidates shall be done as per Section 10 above, subject to the condition that the candidates shall have the benefit of the marks obtained in the subsidiary subject of the B. A. Degree examination in determining their class.

SYLLABUSES

Mathematics (Main)

The course will comprise Algebra, Plane Trigonometry, Geometry, Elements of the Calculus, Dynamics, Hydrostatics and Astronomy, the standard being that of B. A. (Group i) in such items of the syllabus as are common.

PURE MATHEMATICS.

Algebra.

Direct problems on the notion of algebraic inequality. The theorem on the Arithmetic and Geometric means and the allied results in maxima and minima.

The definition of a limit and deduction of the theorems on the limit of the sum, product and quotient of two functions. The limit of $\frac{x^n - a^n}{x - a}$ as x tends to a. Definition of a continuous function. Continuity of polynominals.

Definition of convergence. Absolute and conditional convergence. Statement (with graphical illustration) that a monotonic sequence tends to a limit or to infinity. Tests for series of positive terms by (i) Comparison of series, (2) discussion of series $\sum \frac{1}{n^p}$ (3) finding the limit of $\frac{Un+1}{Un}$ . . Test for the convergence of an alternating series.

The Binomial theorem for a rational index and the Exponential theorem (proved by assuming the theorem on the multiplication of two absolutely convergent series). *Series for log $(1+x)$.

Partial fractions.

Evaluation of (1) $\sum$ Un and $\sum \frac{1}{Un}$

Where $Un = \left\{a+\frac{b}{(n+1)}\right\} \left\{a+\frac{b}{(n+2)}\cdots\frac{b}{(a+n-r)}\right\}$

(2) $\sum \frac{a\,(a+x)\ldots(a+n-1x)}{b\,(b+x)\ldots(b+n-1x)}$

(3) $\sum f(n)\ {}_r n-1$ where f (n) is a rational integral function of n.

Elementary properties of simple continued fractions (excluding recurring continued fractions). Integral solutions of equations of the first degree. The theorems on the interchange of columns and rows, simplification, development and multiplication of determinants (proved for determinants of the third order). Elements of the theory of numbers. Fermat's and Wilson's theorems.

Typical graphs: $y=ax^n$, $y=\frac{a}{x}$, $y=ax+b+\frac{c}{x}$, $y=ax+b+\frac{c}{x^2}$

The equation of the *n*th degree. Statement of the theorem that an equation of the *n*th degree has *n* roots real or complex. Relations between its roots and co-efficients. Simple transformations of equations. Reciprocal equations. Sum of integral powers of the roots of an equation. Occurrence of imaginary roots in pairs. Descartes' rule of signs. Change of sign of a polynominal as an indication of a Zero The least number of the real roots of an equation The derived function. Multiple roots. Rolle's theorem for a polynominal. Horner's method for the numerical solution of an equation. Graphical solution of Cubic and biquadratic equations.

TRIGONOMETRY

Fuller treatment of the Intermediate course. Quadrilaterals inscribed in and circumscribed about circles. Regular polygons. Limits of $\frac{\sin x}{x}$ and $\frac{\tan x}{x}$ as x extends to zero. Inverse trigonometric functions. Complex numbers and their geometric representation. (Argand's diagram). De Moivre's theorem and its application to (1) expand Cos nx, Sin nx in powers of Cos x and Sin x. (2) expand Cos nx, Sin nx in terms of Cosines and Sines of multiples of x. (3) factorise $x^n \pm 1$, $x^{2n}-2x^n$ Cos n $\phi+1$. De Moivre's and Cote's properties of the circle. *Series for Cos x, Sin x, $\tan^{-1}x$ in terms of x.

*More stress is to be laid on applications than on formal proofs.

Summation of elementary trigonometric series; Splitting the general term (simple cases). Series of Sines and Cosines of angles in A. P Series whose summation by the use of De Moivre's theorem ultimately depends on geometric or binomial series.

Elementary transcendental functions of a complex variable; Exp. Z defined by series. The addition theorem. Periodicity of Exp. Z Hyperbolic functions. Log Z and its multiple—valuedness.

Definition of Sin Z. Cos Z. Tan Z and deduction of the ordinary properties of circular function. Separation of the above functions into real and imaginary parts.

GEOMETRY.

N.B—Questions in Geometry may be answered by methods of pure Geometry or Analytical Geometry.

Pure Geometry

Coaxal circles. Circles orthogonal to a coaxal system. Limiting points inverse to every circle. Common tangent to two circles subtends a right angle at a limiting point.

Cross-ratios. The different cross-ratios of a range of four points. The cross-ratio of a pencil; coplanar homographic ranges and pencils. Homographic axis. The harmonic property of the circle and complete quadrilateral and quadrangle. Orthogonal projection. Projections of parallel straight lines. Their ratio. Perpendicular lines which project into perpendicular lines. The area of the projection of a closed figure. Projection of a circle. The theorem on the projection of an ellipse into a circle.

Inversion. The inverse of a straight line and a circle. The intersection of the inverse of coplanar curves. The distance between the inverses of two given points. The inverses of a circle and a pair of points inverse to it. The inverse of a coaxal system. Proof by inversion of Feuerbach's theorem.

Reciprocation. Polar reciprocal of a circle with respect to a circle. The theorem on the reciprocation of a non-intersecting system of coaxal circles into confocal conics. Solid Geometry.

Geometrical conics. Such leading properties of conic sections as are specially suitable for treatment by elementary geometry.

Focus directrix definition of the conic. Shape axes of symmetry, centre, foci. The ellipse as orthogonal projection of a circle.

The following propositions and their immediate application:—

(i) If a chord PQ of a conic whose focus is S meets the corresponding directrix in R, SR is a bisector of angle PSQ.

(ii) The tangents from any point to a conic subtend or supplementary angles at a focus. Also the two tangents are equally inclined to the focal lines through the point.

(iii) The semi-latus-rectum is a harmonic mean between the segments of a focal chord.

(iv) The locus of midpoints of parallel chords of a conic is a diameter.

(v) The ratio of the rectangles under segments of two intersecting chords of a conic in two fixed directions is independent of the position of the chords.

(vi) The Sub-tangent of a parabola is bisected at the vertex; the sub-normal is constant.

(vii) The foot of the perpendicular from the focus on any tangent to a parabola lies on the tangent at the vertex.

(viii) The focal chord of a parabola parallel to the tangent at P is 4 SP.

(ix) $PV^2 = 4SK.\ KV$ where PV, is an ordinate to the diameter of the parabola through K.

(x) The sum of difference of the focal distances of any point on a central conic is constant.

(xi) The tangent and normal at P are bisectors of angle SPS in the case of a central conic and of the angle between SP and the parallel to the axis through P in the case of a parabola.

(xii) The feet of the prependiculars from the foci on any tangent to a central conic lie on the auxiliary circle and the rectangle under these perpendiculars is constant.

(xiii) The sum of the squares of conjugate diameters of an ellipse is constant.

(xiv) The locus of the meets of perpendicular tangents to a conic is a circle which reduces to a straight line when the conic is a parabola.

(xv) Any tangent to a hyperbola forms with the asymptotes a triangle of constant area.

(xvi) The portion of any tangent to a hyperbobla intercepted between the asymptotes is bisected at the point of contact.

(xvii) Every plane section of a right circular cone or cylinder is a conic.

Analytical Geometry.

Of two dimensions—Fuller treatment of the straight line and circle referred to rectangular axes. The parabola, ellipse and hyperbola referred to their principal axes and the rectangular hyperbola referred to its asymptotes.

Tracing of conics from the general equation of the second degree. The polar equations of the straight line, and the conic. Simple problems on the above.

Of three dimensions.—(referred to rectangular axes)—*The plane and the line.* Their equations. Distance of a point from a plane and a line. Planes bisecting angles between two given planes. Intersection of a plane and a line. Conditions that two lines be coplanar.

The shortest distance between two given straight lines.

The Sphere. Its equation. Tangent plane. Radical plane of two spheres. *The Ellipsoid referred to its principal axes.* Its equation. Tangent plane. Normal polar plane and polar lines. Equation of the plane of section with a given centre. Enveloping Cone and Cylinder. Conjugate diameters and diametrical planes.

Calculus.

Standard forms and fundamental processes of differentiation and integration. Simple applications of the derivative to geometry and mechanics. Successive differentiation. Leibnitz theorem. Maxima and minima values of a function of one variable. Rolle's theorem (without proof). Theorem of mean value. Taylor's and Maclaurin's theorems (without proof). Evaluation of the undetermined form.

Partial differentiation. Total derivative and its application to the differentiation of implicit functions. Total differential as the sum of a partial differentials. Approximations and small errors. Transformation of $\frac{\delta^2 \mu}{\partial x^2} + \frac{\partial^2 \mu}{\partial y^2}$ into polars.

A knowledge of the shape of the following curves is required :—

Cartesian : The Catenary, the Cycliod and the Cardigid.

Polar : $r = a \sin n\phi$. The limacon and the lemniscate of Bernoulli.

Curvature. Cartesian formula for the radius of curvature.

Integration by substitution. Integration by parts. Integration regarded as summation with simple applications to areas, volumes, and surfaces and to mechanics.

Differential equations of the first order and first degree of the types

Variables Separable.

Homogeneous equations.

Linear equations.

Exact equations.

Discovery of integrating factors with functions of one variable only Solution of the equation

$$\frac{d^2y}{dx^2} + a\frac{dy}{dx} + by = V.$$

where a and b are constants and V is a sum of functions of the type Exp. nx, Sin nx, Cos nx and polynominals in x.

Applied Mathematics.

Statistics and Dynamics.

Resolution and composition of displacements, velocities and accelerations.

Rectilinear motion of a particle under constant acceleration.

Motion of a projective under gravity range on a plane through the point of projection. Parabolic path and its construction for a given velocity of projection.

Circular motion : Normal acceleration. The conical pendulum.

Simple harmonic motion. Composition of simple harmonic motions of the same period.

Angular velocity, angular acceleration, moment of velocity.

Absolute units of force. Resolution and composition of forces. Dimensions of dynamical units.

Angular momentum. Moments of inertia in simple cases. The pendulum. Determination of g. Work, Energy, simple applications of the principles of energy and of linear and angular Momentum.

Impact of a smooth sphere on a fixed smooth plane and impact of two smooth balls. Loss of Kinetic energy. The theory of the ballistic pendulum.

Rectilinear motion in a resisting medium. The damped oscillation. Motion under constant force, the law of resistance being linear or quadratic, Central forces (Elementary course).

Constancy of areal velocity. Motion under (1) the law of direct distance (2) the law of gravitation. The velocity in the orbit. Kepler's Laws and the law of gravitation.

Conditions of equilibrium of a body acted on by *forces in one plane*. Moments and couples. Centre of mass of a tetrahedron and cone of arc and sector of a circle and of the volume and surface of a zone of a sphere Stability of equilibrium when surfaces in contact are spherical. Simple machines. Friction : its laws. Equilibrium on a rough inclined plane, and the manner of its disturbance (toppling or sliding.)

Easy problems in Graphical statics involving the method of Force and Link polygons.

The common Catenary.

Hydrostatics.

Thrust of fluid on plane and curved surfaces. Centre of pressure of a circle and of a parallelogram and a triangle with a side horizontal.

Floating bodies. Conditions of equilibrium. Stability in the case of spherical-bottomed bodies.

Problems on Boyle's law.

Determination of heights by barometer. Pumps.

Astronomy.

The apparent motion of heavens. Circumpolar stars. The principal constellations and the most conspicuous stars. (Diagrams not required).

The celestial sphere. Points and lines on it. Horizon, zenith, pole, meridian etc. The equinoxial points etc.

Celestial co-ordinates. Right ascension and declination. Latitude and longitude. Altitude and azimuth. Hour angle and declination.

The theory of the transit circle, the equatorial, transit theodolite and the Sextant. Collimation, level and deviation errors of the transit circle and their correction.

The use of the astronomical clock and chronometer. Determination, by observation, of clock error and rate and of right ascension and declination.

Phenomena depending on change of latitude and longitude of the observer, Magnitude of the Earth.

The apparent annual motion of the Sun. The constellations of the Zodiac. The ecliptic and its obliquity. The equinoxes and the solstices. The earth's motion round the sun. Seasons.

Sidereal time, apparent solar time, mean solar time. Equation of time.

Conversion of time. The use of the Nautical Almanac.

Standard time (India). The Calendar.

Explanation of astronomical refraction and parallax. The tangent formula for refraction. Twilight.

Determination of the latitudes of a station by meridian observation and of longitude by chronometer. Sumner's method.

The Solar system. Planetary motions (taking coplanar circular orbits), synodic and sidereal periods. Rough comparison of orbital dimensions. Stationary positions and periods of retrogression.

Kepler's laws.

Comets and meteors.

The motion of the Moon and her phases. The plan of her orbit. The Nodes and their motion. The Moon's sidereal and synodic periods. Her rotation, librations, diameter and distance.

Distances of planets from the sun by observation of a superior planet at opposition.

Causes of eclipses of Sun and Moon. Ecliptic limits. Number of eclipses in a year. Elementary problems on diurnal motion. (Use of the sine and cosine formulae for right angled spherical triangles).

Determination of the first point of Aries (Flamsted's method) and of the obliquity of the ecliptic. General description of the phenomena of Precession and Nutation.

Aberration: Annual aberration. Earth's way an apex. Correction for the position of a star. Representation on the celestial sphere. The relation between the coefficient of aberration, velocity of light and solar parallax.

Mathematics (Subsidiary).

Algebra and Trigonometry.

Determinants.—The theorems of the interchange of columns and rows, simplification, multiplication theorems (proved for determinants of the third order). Use in the solution of linear equations.

Convergency and Divergency of Infinite series.—Definition. Absolute and conditional convergence, tests for series of positive terms by (1) comparison of series, (2) discussion of the series $\sum \frac{1}{n^k}$ (3) finding the limit of $u_n \Big|_{n-1}^{\infty}$

Test for the convergence of an alternating series.

The exponential theorem.—(Proved by assuming the theorem on the multiplication of two absolutely convergent series).

The logarithmic series.—(More stress is to be laid on applications than on formal proof).

Partial Fractions.—

Complex numbers and their geometric representation. (Argand Diagram).

De Moivre's theorem: and its application to

(1) Expand cos n x, sin n x in powers of cos x and sin x.

(2) Expand $\cos^n x \sin^m x$ in terms of cosines and sines of mutiples of x.

(3) Solution of $x^n = y$ where n is a+ve integer and x and y are complex numbers.

CO-ORDINATE GEOMETRY.

Fuller treatment than in the Intermediate course.

Straight line and circle.—Orthogonal circles, length of the tangent from a point to a circle, radical axis, coaxal circles.

Parabola.—Equation with respect to axis and tangent at vertex. Transference of origin keeping axes parallel. Equations of tangent and normal. Parametric equation of chord and tangent. (Propositions and problems relating to the three normals to a parabola from a point are not required).

Ellipse.—Equation with respect to principal axes. Transference of origin, keeping axes parallel. Equations of tangent and normal. Parametric equations. Conjugate diameters. Geometrical properties of an ellipse. (Propositions and problems relating to the four normals to an ellipse from a point are not required).

Hyperbola.—Equation with respect to principal axes. Transference of origin, keeping axes parallel. Equations of tangent and normal. Conjugate diameters. Asymptotes. Geometrical properties of a hyperbola.

Rectangular Hyperbola—Equation with respect to asymptotes. Transference of origin, keeping axes parallel. Equations of tangent and normal. Parametric equations. Geometrical properties.

Pole and Polar.—Poles and polars with respect to circles and conics.

Polar Co-ordinates.—Change from Cartesian to Polar-co-ordinates; equation of a conic in the simplest form, with a focus as the pole (riders or general formula, not expected).

The standard in plane co-ordinate Geometry is lower than that of B.A. (Pass) Mathematics Main. The standard is that of Fine and Thompson's Co-ordinate Geometry.

CALCULUS AND DIFFERENTIAL EQUATIONS

Differentiation of rational integral functions. Differentiation of sums, products, quotients, direct and inverse trigonometric functions, and functions of a function. Differentiation of e^x and $\log x$. Application of the derivative to geometry and mechanics. Successive differentiation. Leibntis theorem: Maxima and Minima values of a function on one variable. Taylor's and Maclaurin's theorems (without proof.) Evaluation of the undetermined form $\frac{0}{0}$.

Partial differentiation. Total derivative and its application to the differentiation of the implicit functions. Total differential as the sum of partial differentials. Approximations and small errors Definition of hyperbolic functions.

Integration by substitution. Integration by parts. Definite integral regarded as the limit of a sum. Simple applications to area. Volume and surface and to mechanics.

Differential equations of the first order and first degree of the following types :—

1. Variables separable.
2. Homogeneous equations.
3. Linear equations.
4. Exact equations.

Solution of the linear differential equations

$$\frac{d^2y}{dx_2} + a\frac{dy}{dx^2} + by = V.$$

where a and b are constants and V is a sum of functions of the type sin n x and cos n x and e *nx*.

Book of reference:

G. A. Gibson—Elements of the Calculus.

Physics (Main).

Properties of Matter.

Balance. Circular motion. Centrifugal and centripetal force—their practical application. Centrifugal machines.

The compound pendulum: determination of 'g'. Elastic oscillations of springs and determination of 'g'.

Gravitation and gravity. Gravitation constant, mass and density of the earth. Experiments of Cavendish and Boys and determination of 'G'. Methods of comparing 'g' at various places. Effects of the latitude and the rotation of the earth on 'g'. Variation of 'g' (i) above and (ii) below the surface of the earth.

Mean, solar and sidereal time. Sun-dial, clocks, watches and chronometers and their principles of working. Time signals.

Hooke's Law, stress and strain. Modulus of elasticity. Strains due to simple longitudinal pull. Elastic limits. Poisson's ratio and its practical determination. Compressibility and rigidity of solids. Young's modulus and its determination. Expression for Young's modulus in terms of 'n' and 'k'.

Simple twisting of wires of circular section by a couple at right angles to its length. Torsional rigidity and its determination. Torsion balance. Uniform and non-uniform bending of rods of circular and rectangular section—Cantilevers. Relation between the bending moment at a point and curvature. Determination of ' Y '—' I ' form girders.

Compressibility and elasticity of gases. Boyle's law and deviations from it. Van der Waal's equation. Brownian motion Elements of Kinetic theory as applied to gases. Explanation of pressure viscosity, effusion, transpiration and diffusion. Molecular speed and absolute temperature of gases Atmospheric pressure variation with altitude. Isobars. Monsoons, cyclones and anticyclones.

Hydrostatics.

Fluid Thrust : Thrust of fluid on plane and curved surfaces.

Centre of pressure in simple cases (i) rectangular lamina with one side in the surface, (ii) triangular lamina with one side in the surface, (iii) triangular lamina with vertex in the surface and the base horizontal ; alteration in the centre of pressure as the body is lowered in the fluid.

Dispersive and resolving power of a grating. Resolving power of a telescope.

Spectrum analysis. Emission and absorption spectra. Ultra-violet and infra-red spectra.

Doppler's principle and its application.

Double refraction through calcite. Construction of wave-surfaces.

Production and detection of plane, circularly and elliptically polarised light. Quarter-wave plate, half-wave plate.

Rotation of plane of polarisation—Fresnel's explanation.

Polarimeters.

Interference of polarised light : rings and brushes in uniaxial crystals Scattering of light ; blue of the sky.

Magnetism.

Inverse-square law, Gauss's proof.

Magnetic potential : Equi-potential surfaces ; potential at any point due to a short magnet ; couple acting on a short magnet due to another magnet.

Mutual force between two small magnets with their axes in a straight line and their axes mutually perpendicular, one bisecting the other.

Magnetic shell. Potential due to a shell and its potential energy in a magnetic field,

Total normal induction and Gauss's theorem.

Molecular theory of magnetism. Elements of Para, dia and ferro-magnetism.

The magnetic field of the earth. Terrestrial magnetic elements: their variation and measurement. Magnetic charts.

The Kew Magnetometer and Dip circle. Mariners' compass and its uses.

Intensity of magnetisation and magnetic induction.

Magnetic susceptibility and permeability; their measurements. B-H and I-H curves: Magnetometer and ballistic methods.

Hysteresis and dissipation of energy.

Electrostatics.

Inverse-square law; Gauss's theorem.

Electrostatic potential and capacity.

Electric field due to a charged sphere, charged infinite cylinder and conducting plane. Cavendish's proof of inverse-square law.

Coluumb's law. Mechanical force on charged conductors.

Lines and tubes of force. Spherical and parallel plate condensers and their capacity. Dielectric constant. The attracted disc and quadrant electrometers.

Measurement of capacity and dielectric constant.

Energy of charged conductors and condensers. Dielectric and displacement currents.

Wimshurst machine. Distribution of charge and action of points. Lighting conductor.

Current Electricity.

Magnetic field due to a circular current and a solenoid. The Helmholtz' galvanometer. Kirchhoff's laws: application to the Wheatstones' net work. Callendar and Griffith's bridge.

Electrolysis: conductivity of electrolytes. Ionisation and velocity of ions.

Cells and accumulators—lead and Edison types.

The potentiometer: Measurement of E.M.F. current and resistance.

Thermo-electricity: Seebeck, Peltier and Thompson effects. Measurement of thermal E.M.F. Thermo-electric diagrams. Application of thermo-dynamics to a thermo-couple.

Energy of a circuit carrying current when placed in a Magnetic field.

Force exerted by a magnetic field on a coil carrying current.

Moving coil instruments : Voltmeter, ammeter and Wattmeter.

Ballistic galvanometer.

Electromagnetic induction : Lenz's Law. Coefficients of induction. Induction coils. Comparison of mutual inductances. Foucault's currents. Earth inductor. Measurement of H and V.

Dynamos and motors : shunt, series and compound wound machines and their characteristics : efficiency of a motor.

Technical applications of electricity to lighting and power transmission.

Elementary study of wireless. Thermionic valve. Simple receiving set. The microphone, loudspeaker and gramophone pick up.

Discharge of electricity through gases, Cathode rays ; X-rays—Collidge Tube.

Alpha, Beta and Gama rays.

General ideas of atomic structure.

Floating bodies and the conditions of stability. The common hydrometer and its graduation.

Barometers—mercury and aneroid. Determination of heights by barometer.

Meta-Centre and its practical determination.

Hydrostatic machines : Pumps—water pump, air pump, mercury pump. rotary pump and diffusion pump. Mcleod gauge.

Capillary phenomena : Surface tension of liquids and surface energy. Determination of surface tension by capillary rise. Torsion balance ; drop method. Variation of surface tension with temperature. Vapour pressure over curved surfaces and formation of liquid drops.

Compressibility of liquids—Regnault's experiment. Diffusion of liquids and gases ; analogy with conductivity ; Fick's law.

Osmosis and laws of osmotic pressure ; vapour pressure. Boiling and freezing points of solutions.

Viscosity—Cœfficient of viscosity of a liquid by capillary flow. Comparison of viscosities. Effect of temperature on viscosity.

Heat.

Thermometry : Liquid-in-glass. resistance, thermo-electric, vapour pressure and gas, thermometers. Pyrometry and low temperature thermometry.

Expansion : Solids, application to temperature compensation. Liquids, apparent and absolute. Gases.

Calorimetry: Specific heats of solids, liquids and gases. Ratio of the specific heats of a gas and its determination. Latent heats and latent heat calorimetry. Total heat of steam.

Vapour pressure: Static and dynamic methods. Vapour pressure of water at high and low temperatures, Effect of pressure on boiling and freezing points.

Isothermals: Critical temperature. Andrews' and Amagat's experiments.

Change of state: Equilibrium between different states. Triple Point.

Van der Waals' equation. Critical constants. Law of corresponding states.

Internal work in expanding gases: Joule's experiments, porous-plug experiment. Joule-Thomson effect. Liquefaction of gases.

Adiabatic transformation. Equation for the adiabatic of a perfect gas.

Conduction and diffusion of heat in solids. Searle's and Forbes' methods. Lees' method for bad conductors

Convection.

Radiation: Newton's and Stefan's laws of cooling and their experimental verification. Theory of exchanges. Emissive and absorptive powers. Kirchhoff's law. Measurement of radiation.

Solar constant and effective temperature of the Sun.

Laws of thermodynamics. Work done in isothermal and adiabatic expansions. Indicator diagram.

Carnot's theorem. Reversible cycle. Cycle of a refrigerating machine.

Steam engines and internal combustion engines. Steam turbine-general principles.

Applications of second law. Thermodynamic scale of temperature and ideal gas scale.

Entropy. Entropy diagram of a Carnot cycle. Entropy and available energy.

Light.

Reflection and refraction. Optical lever and sextant. Total internal reflection. Spherical mirrors. Thin lenses: combination of two thin lenses. Liquid lens; loss of power. Thick lenses. Principal points; revolving table.

Prisms: Minimum deviation and I-D curve

Dispersion and dispersive power; irrationality of dispersion.

Chromatic aberration; achromatic combination of prisms and lenses in contact. Direct-vision spectroscope and constant-deviation spectroscope.

Eye-pieces : Ramsden's and Huyghen's Telescopes. Compound microscope, Epidiascope. Intermittent illumination.

Photometry : Lummer-Brodhun photometer.

Velocity of light : Romer's Fizeau's and Foucault's methods.

Wave theory : Huyghen's principle. Rectilinear propagation of light, zone plate.

Explanation of reflection, refraction and total internal reflection.

Action of mirrors, lenses and prisms reviewed from wave theory.

Interference : Simple interference phenomena. Young's experiment.

Fresnel's bi-prism and bi-mirror. Rayleigh's interferometer.

Colours of thin films. Newton's rings.

Diffraction : Straight edge, narrow wire and narrow rectangular slit. Plane transmission gratings.

Sound.

The transmission of energy through material medium by wave motion.

Equation for a simple harmonic wave. Progressive and stationary waves.

Composition of simple harmonic motions. Lissajou's figures.

Characteristics of a musical note. Velocity of sound in a gas. Effect of temperature, pressure, humidity and wind on the velocity of sound.

Reflection and refraction of sound.

Interference and diffraction phenomena. Illustrations—beats.

Doppler's principle. Speed of transverse waves along a cord.

Laws of transverse vibrations of strings : Melde's experiment.

Velocity of longitudinal waves in a rod : Kundt's experiment.

Vibrations of air in pipes. Determination of frequency stroboscopic and other methods.

Free and forced vibrations, Resonance. Helmholtz's resonators.

Musical scales. Musical instruments. Gramophone.

Manometric flames, sensitive flames. Maintenance of vibrations : Concord and discord. Analysis of sound.

Practical Examination :—The practical examination will be held in parts and extends over three hours each, not on the same day.

Candidates must submit to the examiners before the hour of the first examination their laboratory note-books duly certified by their professors as a *bona fide* record of work done by them.

Physics (Subsidiary).

Properties of Matter.

Balance. Circular motion, Centrifugal and centripetal forces—their practical application. Centrifugal machines.

Determination of 'g'. Elastic oscillations of springs and determination of 'g'.

Gravitation and gravity. Gravitation constant, mass and density of the earth. Experiments of Cavendish and Boys and determination of 'G'. Methods of comparing 'g' at various places.

Mean, solar and sidereal time. Sun-dial, clocks, watches.

Hooke's law, stress and strain. Modulus of elasticity. Strains due to simple longitudinal pull. Elastic limits. Poisson's ratio. Compressibility and rigidity of solids. Young's modulus and its determination. Simple twisting of wires of circular section by a couple at right angles to its length. Torsional rigidity and its determination. Uniform and non-uniform bending of rods of circular and rectangular section—Cantilevers. Relation between the bending movement at a point and curvature. Determination of 'Y'.

Compressibility and elasticity of gases. Boyle's law and deviations from it. Van der Waals' equation. Brownian motion. Elements of kinetic theory as applied to gases. Explanation of pressure viscosity, effusion, transpiration and diffusion. Molecular speed and absolute temperature of gases. Atmospheric pressure—variation with altitude. Isobars.

Hydrostatics.

Barometers—mercury and aneroid. Determination of heights by barometer.

Hydrostatic machines: Pumps—water pump, air pump, mercury pump, rotary pump and high vac pumps. McLeod gauge.

Capillary phenomena; surface tension. Determination of surface tension by capillary rise and torsion balance.

Compressibility of liquids—Diffusion of liquids and gases; analogy with conductivity: Fick's Law.

Osmosis and laws of osmotic pressure.

Viscosity—Coefficient of viscosity of a liquid by capillary flow.

Heat.

Thermometry: Liquid-in-glass, resistance, thermo-electric vapour-pressure and gas thermometers, Pyrometry and low-temperature thermometry.

Expansion: Solids, application to temperature compensation. Liquids, apparent and absolute. Gases.

Calorimetry: Specific heats of solids, liquids and gases. Ratio of the specific heats of a gas and its determination. Latent heats and latent heat calorimetry. Total heat of steam.

Vapour pressure: Static and dynamic methods. Vapour pressure of water at high and low temperatures. Effect of pressure on boiling and freezing points.

Isothermals: Critical temperature. Andrews and Amagat's experiments.

Change of state:—Equilibrium between different states. Triple Point.

Van der Waals' equation. Critical constants. Law of corresponding states.

Internal work in expanding gases Joule's experiments, porous-plug experiment. Joule-Thomson effect. Liquefaction of gases.

Adiabatic transformation. Equation for the adiabatic of a perfect gas.

Conduction and diffusion of heat in solids. Searle's method. Lees' method for bad conductors.

Radiation: Newton's and Stefan's laws of cooling and their experimental verification. Theory of exchanges. Emissive and absorptive powers. Kirchchoff's law. Measurement of radiation.

Laws of thermodynamics. Work done in isothermal and adiabatic expansions. Indicator diagram. Carnot's theorem. Reversible cycle. Cycle of a refrigerating machine.

Steam engines and internal combustion engines.

Light.

Reflection and refraction. Optical lever and sextant. Total internal reflection. Spherical mirrors. Thin lenses.

Prisms: Minimum deviation and I-D curve.

Dispersion and dispersive power; irrationality of dispersion.

Chromatic aberration; achromatic combination of prisms and lenses in contact. Direct-vision spectroscope and constant-deviation spectroscope.

Photometry: Lummer-Brodhun photometer.

Velocity of light: Fizeau's and Foucault's methods.

Wave theory: Huyghens' principle. Rectilinear propagation of light.

Explanation of reflection, refraction and total internal reflection.

Interference; Simple interference phenomena. Young's experiment.

Fresnel's bi-prism.

Colours of thin films. Newton's rings.

Diffraction: Straight edge, narrow wire and narrow rectangular slit. Plane transmission gratings.

Spectrum analysis. Emission and absorption spectra. Ultra-violet and infra red spectra.

Double refraction through calcite.

Production and detection of plane, circularly and elliptically polarized light. Quarter-wave plate, half-wave plate.

Rotation of plane of polarization—Fresnel's explanation.

Polarimeters.

Magnetism.

Molecular theory of magnetism. Elements of Para, dia and ferro-magnetism.

The magnetic field of the earth. Terrestrial magnetic elements: their variation and measurement. Magnetic charts.

Dip circle. Mariners' compass and its uses.

Current Electricity.

Magnetic field due to a circular current and solenoid.

Electrolysis; conductivity of electrolytes. Ionisation and velocity of ions.

Cells and accumulators—lead and Edison types.

The potentiometer, Measurement of E. M. F., current and resistance.

Energy of a circuit carrying current when placed in a magnetic field.

Forces exerted by a magnetic field on a coil carrying current.

Moving coil instruments: Voltmeter, Ammeter and Wattmeter.

Electromagnetic induction: Lenz's Law. Coefficients of induction. Induction coils.

Dynamos and motors: shunt series and compound wound machines and their characteristics. Efficiency of a motor.

Technical applications of electricity to lighting and power transmission.

Elementary study of wireless. Thermionic value. Simple receiving set. The microphone, and loudspeaker.

Candidates shall submit to the Examiners before the hour of the practical examination their laboratory note-books duly certified by their Professors as a *bona fide* record of work done by them.

Chemistry (Main).

Physical Chemistry.

Only elementary treatment is expected.

The atomic concept of matter:—Laws of chemical combination; the law of conservation of matter; Avogadro's hypothesis; Dulong and Petit's law; isomorphism; Prout's hypothesis; the periodic classification and its defects; atomic number; isotopes; electron; valance and electron arrangement.

Energy in chemical system:—The definition of energy; force; the unit of energy; dyne and atmospheric pressure; the law of conservation of energy; the heat content of a system; the heat capacity of a system; heat of chemical reaction; heat of reaction at constant pressure and constant volume; Hess's law of constant heat summation; heat of formation; heat of combustion; heat of solution; heat of dilution; heat of neutralisation; heat of ionisation; calorimetric methods; variation of heat of reaction with temperature.

The state of aggregation:—The fundamental gas law; kinetic theory of gases; Dalton's law of gas mixtures, specific heats of gases; heat capacity of gases at constant pressure; thermal conductivity of gases: expansion of gases; Joule—Thomson effect; deviation from the ideal gas law; Vander Waal's equation; energy changes accompanying expansion and compression of gases; Critical temperature; critical pressure; critical volume; isothermal P. V. curves: Vander Waal's equation and P. V. isothermals; the law of corresponding state; vapour pressure; Ramsay and Young's rule; vapour pressure and external pressure; surface tension; molecular association; viscosity of liquids; crystal form; classification of crystals, crystal structure; elementary notation regarding X-rays and crystal structure: liquid crystals; melting point of a solid.

Relation between chemical constitution and physical properties:—Relation of chemical constitution with atomic and molecular volume, specific refraction, rotation of the plane of polarisation, emission and absorption spectra.

Velocity and mechanism of gaseous reactions.—Homogeneous and heterogenous reactions; the mass law; monomolecular and bimolecular reactions; the time of half change; the influence of temperature on the velocity of reaction; opposing reactions; consecutive reactions; concurrent reactions; the order of a reaction: heterogeneous reactions involving gases; catalysis.

The direction of chemical change:—The state of equilibrium; the ideal chemical equilibrium; spontaneous process; reversibility and irreversibility; maximum work; cyclic processess and Gibs Helmholtz equation; the nature of the free energy change; the sign of the free energy change; free energy and equilibrium.

Solution:—Gaseous solution; composition of solution; ideal solutions; vapour pressure lowering; the raising of the boiling point; the lowering of the

freezing point; steam distillation; osmotic pressure and its experimental determination; the determination of molecular-weight in solution; thermo-dynamic consideration of the laws of dilute solution; relation between osmotic pressure and vapour pressure lowering of solution; Raoult's equation for vapour pressure lowering; relation between osmotic pressure and boiling point-elevation; osmotic pressure and freezing point lowering; mechanism of osmotic pressure.

Homogeneous and heterogeneous equilibria—Chemical equilibrium from the stand-point of kinetics; chemical equilibrium from the stand-point of thermo-dynamics; relationship between Kp and Kc; the formation of equilibrium conditions with temperature, pressure and concentration; Le-chatelier-Braun principle; effect of pressure upon chemical equilibrium; reactions without change in the number of molecules; the water gas equilibrium; reactions in which the number of molecules changes; dissociation of carbon-dioxide and water vapour; dissociation of nitrogen tetroxide; phase rule; phases; components; degrees of freedom; system of one and two components.

Electric conductance and ionisation :—Classes of conductors; uni polar conduction; theory of metallic conduction; effect of temperature on resistance of metals; laws of electrolysis; electrolysis of fused salts; theory of electrolytic dissociation; specific, equivalent and molecular conductance; experimental determination of electric conductivity; equivalent conductance at infinite dilution; migration of ions and transport number; determination of transport number · indicators, hydrogen ion concentration (PH *value.*)

Ionic Equilibria :—Law of mass action and ionic equilibrium; range of applicability of mass action law; ionisation and chemical constitution; isohydric solution; ionisation of water; inversion of cane-sugar; hydrolysis of esters; solubility product; amphoteric electrolytes.

Photo-Chemistry · —Photo-chemical absorption law; Beer's law; actinometry law of photo-chemical equivalence.

Colloid state :—Formation of colloid particles; method of obtaining colloidal solutions; sols and gels: kinetic theory and colloid particle; osmotic pressure of colloidal solution; diffusion of colloid particles; properties of the colloid system: absorption; absorption of gases by solids; absorption from solution; absorption and surface tension; electro endosmosis and cataphoresis; coagulation.

General and Inorganic Chemistry.

Historical development :—The prehistoric period; the period of alchemy; period of iatro chemistry; period of sceptical chemistry; phlogiston period; quantitative period.

Hydrogen :—Laboratory and industrial methods of preparation; technical application of hydrogen · properties; hydrides; place of hydrogen in the periodic classification.

Oxygen :—Laboratory and industrial methods of preparation, properties ; theory of rusting of iron ; oxides ; oxidation ; reduction ; oxidising and reducing agents ; autoxidation.

Ozone : Preparation, properties and constitution.

Water :—Hydrates ; phase rule ; composition of water (volumetric and gravimetric) ; hard and soft water.

Hydrogen peroxide :—Preparation, properties and characteristic reactions ; composition and constitution ; thermo-chemical consideration ; peroxides ; peracids ; per-salts.

Halogens :—A comparative study—preparation and properties of fluorine, hydrofluoric acid and fluorides ; laboratory and technical methods of preparing chlorine and hydrochloric acid ; period of induction ; chlorides ; Werner's co-ordination theory ; oxides, oxyacids and oxysalts of chlorine ; preparation and properties of bromine, hydrobromic acids, iodine, hydroidic, iodic, and periodic acids, iodate and periodates.

Sulphur :—Extraction and properties ; allotropy of sulphur ; triple point ; consideration of phases ; transition point ; hydrides of sulphur ; sulphides and per sulphides ; halogen compounds of sulphur ; oxides and oxyacids of sulphur ; sulphurous, sulphuric per and thiosulphuric acids and their salts ; constitution of sulphuric and sulphurous acids, thionyl chloride ; sulphuryl chloride ; thionic and their salts.

The gases of the atmosphere.

Nitrogen :—Allotropy, preparation and properties ; hydrides—ammonia ; hydrazine and hydrazoic acid, oxides and oxyacids ; fixation of nitrogen ; hydroxylamine and hyponitrous acid.

Phosphorus :—Preparation and properties, allotropy ; phosphine and phosphonium compounds ; halides ; oxides and oxyacids of phosphorus.

Arsenic, Antimony and Bismuth :—Their more important compounds and reactions ; a comparative study of elements of the fifth group.

Carbon :—Allotropic forms ; oxides and oxyacids ; water gas reactions ; photo-synthesis.

Silicon :—Hydrides, halides ; oxides ; silicic acid and silicates ; ceramic and glass industries.

Boron :—Boric acid and borates ; borax and its industrial uses.

The following metals studied in detail with particular reference to their metallurgy and their more important compounds and with special reference to their industrial modes of preparation and technical applications. Alloys.

Sodium, potassium, ammonium, copper, silver, gold, magnesium, barium, stronsum, calcium, zinc, cadmium, mercury, radium, aluminium, tin, lead, chromium, Manganese, iron, nickel, cobalt and platinum.

ORGANIC CHEMISTRY

Purification and analysis of organic compounds; empirical, molecular and constitutional formulae, isomerism.

Hydro carbons of Methane, Ethylene and Acetylene series and their derivatives, Alcohols; Ethers; Aldehydes and ketones; Alkyl esters of inorganic acids; fatty acids and their derivatives, esters; Glycerol nitro-glycerine, Allyalcohol; Acrolein; fats; soaps.

Aliphatic amines; cyanogen compounds; organo-metallic compounds of zinc and magnesium; urea; urethanes; glycols; dibasic acids and their derivatives.

The hydroxy mono and poly basic acids and their derivatives; stereo-isomerism; unsaturated acids; ketonic acids and esters; B diketone; amino acids; mono-saccharides and dissaccharides; starch, cellulose; nitro-cellulose; Glucosides.

Phenols, aromatic Alcohols, Aldehydes, Ketones, Acids and their derivatives; constitution of Benzene, aromatic halogen, nitro and sulpho derivatives; reduction products of nitro bodies, Diazo compounds and their transformations; Azo compounds and Azo-dyes; Hydrazines.

Phenols, aromatic Alcohols, Aldehydes, Ketones, Acids and their derivatives; Quinones, aromatic Hydroxyl; Aldehydes and Acids.

Diphenyl; Diphenyl methane; Triphenyl methane; Malachite green; Rosanilines; Aurines; Phthaleins and Indigo.

Naphthalene, Anthracene and their important derivatives and reactions; Alizarine.

Pyridine; Quinoline; Iso Quinoline, Nicotine and Quinine.

Simple proteins:—

Practical Examination in Chemistry shall include the following:—

1. Qualitative analysis of inorganic mixture containing not more than four radicles (acids or bases).

2. Volumetric analysis.—Preparation of standard solutions; Acidimetry; Alkalimetry; Oxidation and Reduction methods involving the use of potassium permanganate, potassium dichromate, Iodometry; precipitation methods.

3. Gravimetric analysis of aluminium, iron, calcium, magnesium, copper, silver, lead, zinc, manganese, sulphuric, hydrochloric, phosphoric and carbonic acids, silver coin, gravimetric separation of copper from zinc: gravimetric separation of iron from manganese.

4. Preparation of some common inorganic substances so as to ensure the candidate's acquaintance with ordinary chemical operations.

5. Physico chemical determinations of boiling point, melting point, molecular weight by vapour density, cryoscopic and ebullioscopic methods, transition point hydrolysis of an ester and partition co-efficient.

6. Identification by physical and chemical tests of the following organic compounds given singly :—

Methyl alcohol; Ethyl alcohol: acetone; chloroform; formic, acetic, oxalic, tartaric, citric acids; glycerine; urea; glucose; cane-sugar; starch, benzene; aniline; phenol; resorcinol; pyrogallol; benzal-dehyde; benzoic, salicyclic acids; alpha-naphthol; beta-naphthol.

7. Preparation of the specimens of any six of the following organic compounds :—

Ethyl acetate; chloroform; ether; acetic anhydride; nitro-benzene; aniline; phenol.

Benzoic acid from toluene; chloro benzene-(by Sandmeyer's reactions).

At the practical examination candidates must submit to the examiner or examiners their laboratory note books duly certified by their professors or lecturers as a *bona fide* record of work done by the candidates.

Candidates shall be permitted to consult text-books on Practical Chemistry during the period of their practical examinations in Chemistry (Main).

Chemistry (Subsidiary)

General Theoretical Chemistry and Physical Chemistry—Methods of determining Equivalent; Atomic and Molecular weights; Theory of Electrolytic Dissociation, Law of Mass Action, Valency, Kinetic Theory; Osmotic pressure, Colloids; Mono-molecular reactions; Elements of thermo-chemistry.

The elements (excluding the rare metals) and their important compounds studied in detail.

Chemistry of carbon compounds from an elementary stand-point.

Purification and analysis of organic compounds. Constitutional formulae, isomerism. Preparation and properties of the following substances :—

Methane, Ethane, Ethylene, Acetylene, Methyl and Ethyl Alcohols, Formaldehyde, Acetaldehyde, Ether, Acetone, Formic and Acetic acids, Ethyl Acetate, Oxalic and Tartaric acids, Urea, Glucose, Cane-sugar, Starch, Coal-tar and its fractionation products, Benzene, Nitro-benzene, Aniline, Phenol, Benzoic acid.

Practical examination in Chemistry (Subsidiary) shall include the following :—

(1) Qualitative analysis of inorganic substances containing not more than two radicals (acids or bases).

(ii) Volumetric analysis :—

(*a*) The following syllabus will be current for the examinations of 1943 only :—

Preparation of standard solutions; Acidimetry; Alkalimetry; Oxidation and Reduction methods involving the use of Potassium Permanganate, Potassium dichromate, Iodine and Sodium Thio-sulphate.

(*b*) The following revised syllabus will come into effect as from the examinations of 1944 :—

I. *Acidimetry.*	1. Estimation of caustic soda and sodium carbonate in a mixture. Two indicators method (Warder's method).
	2. Estimation of sodium carbonate and bicarbonate in a mixture (Warder's method).
	3. Estimation of ammonium salts (Indirect method).
	4. Estimation of copper sulphate (Back titration).
	5. Estimation of Barium Chloride $Ba\,Cl_2\,2H_2O$.
II. *Permanganametry.*	6. Estimation of Ferrous Iron in Mohr's salt.
	7. Estimation of Ferric Iron in ferric salts.
	8. Estimation of Ferrous and Ferric salts in a mixture of both. (Zn method of reduction to be employed.)
	9. Estimation of Calcium in a calcium salt using the precipitate.
III. *Dichrometry.*	10. Determination of ferrous iron (External indicator).
	11. Determination of ferrous and ferric iron in a mixture (Sn Cl reduction).
	12. Determination of potassium chlorate.

IV. *Iodometry.*

13 Standardisation of thiosulphate using dichromate and permanganate.

14. Determination of copper.

15. Determination of arsenic trioxide.

V. *Precipitation Method.*

16. Estimation of chloride using standard silver nitrate using chromate as indicator.

At the practical examination candidates must, if required, submit to the examiner or examiners their laboratory note books duly certified by their professors or lecturers as a *bona fide* records of work done by the candidates.

Botany (Main)

1. The main points of structure, life-history, development and taxanomic relationship of the following groups in general and the Genera in particular.

Myxomycetes.

Bacteria.

Cyanophyceæ . Oscillaria Nostoc, Rivularia and Scytonema.

Diatomaæ.

Chlorophyceæ Chlamydomonas, Pandorina, Eudorina, Volvox, Ulothrix, Oedogonium, Ulva, Enteromorpha, Coleochaete, Protococcus, Scendesmus, Hydrodictyon, Cladophora, Vaucheria, Bryopsis, Caulerpa, Botrydium, Spirogyra, Zygnema, and Desmids.

Characdeæ : Chara, Nitella.

Phaeophyceæ : Ectocarpus, Fucus, Sargassum, Dictyota.

Rhodophyceæ : Liagora (Nemalionanceæ), Batrachospermum, Polysiphonia, Gracilloria, Corillina.

Fungi.

Phycomyoetes : Phytophthora, Mucor or Rhizopus, Pilobolus, Saprolegnia Cystopus.

Ascomycetes : Saccharomyces, Eurotium, Pencillium, Erysiphe, Pexiza, Xylaria.

Basidiomycetes : Ustilago, Puccinia, Agaricus, Lycoperdon, Polyporus, Phallus.

Lichens.

Bryophtes : Riccia, Marchantia Anthoceros, Funaria, Polytrichum.

Pteridophytes : Lycopodium, Selaginella, Isoetes, Equisteum, Ophioglosum, Gleichenia, Osmunda, Angiopteris Trichomanes, Pleopeltis, Adiantum, Marsilia.

Gymnosperms ; Pinus, Cycas.

2. The morphology and development of the reproductive organs of Angiosperms.

3. The external morphology of Angiosperms, the general principles of classification and the distinguishing characteristics of the following families as used in the Flora of British India :—

Magnoliaceae, Anonaceae, Nymphaeaceae, Cruciferae, Capparidae, veceae, Sterculiaceae, Tiliaceae, Geraniaceae, Rutaceae, Meliaceae, mnae, Sapindaceae, Anacardiaceae, Leguminoseae, Rosaceae, Comaceae, Myrtaceae, Lythraceae, Cucurbitaceae, Umbelliferae, iaceae, Compositae, Sapotaceae, Oleaceae, Apocynaceae, Asclepiaceae, Boraginaceae, Convolvulaceae, Solanceae, Scrophularineae, ...thaceae, Verbenaceae, Labiateae, Amarantaceae, Loranthaceae, Euphorbiaceae, Urticaceae, Hydracharidae, Orchidae, Scitaminae, Amaryllidae, Liliaceae, Commelinacae, Palmae, Aroidae, Cyperaceae, Graminae.

4. Physiology :

The chemical composition of the plant ; materials of plant food and their sources ; the nature of soil and importance of its constituents and micro-organisms ; movements of water and gases ; assimilation of carbon and nitrogen; transpiration and translocation of the assimilated products ; parasitism and other modes of nutrition ; metabolism ; respiration ; the influence of light, heat and gravity ; growth ; movements and irritability in plants ; sexual reproduction and its significance ; vegetative reproduction ; the phenomena of cross-fertilisation ; variation, heredity and mendelism ; theories of evolution and origin of species.

5. Histology :

The structure and modes of division of the cell ; the nature of cell contents, the nature and mode of origin of plastids ; cell-sap and other cell contents ; the physical and chemical properties of protoplasm and cell wall ; the origin, nature and development of plant tissues; primary and secondary tissues and their distribution in the plant body.

6. Ecology :

Structural adaptations to environment ; plant communities.

*7. Economic Botany.

A general account of the economically important plants of South India like those yielding cereals, pulses, oil seeds, fibres, timbers, spices, drugs, fruits and vegetables.

A general knowledge relating to the cultivation of the Agricultural crop plants like paddy, sugarcane, cholam, cotton and groundnut; their diseases and the methods of control.

Methods of plant propagation as practical in Horticulture.

8. Practical work:

Candidates are expected to be able to make preparations illustrating the form and structure of any plant of the groups mentioned in the syllabus and describe them with sketches sufficient for the identification: to make dissections with the simple microscope of the floral of phanerogams, to make drawings, to construct floral diagrams and refer them to their families; to describe in technical language plants belonging to any of the groups in the syllabus and to set up and explain simple experiments in plant physiology.

At the practical examination, each candidate must submit his laboratory note book, a collection of named plants collected and preserved by himself and a record of field work showing a thorough acquaintance with the local flora.

Botany (Subsidiary)

1. Structure and life-history of the following:—

Bacteria, Oscillaria, Chlamydomonas, Pandorina, Eudorina, Volvex, Ulothrix, Oedogonium, Spirogyra, Eetocarpus, Polysiphonia, Chara or Nitella, Rhizopus or Mucor, Peziza, Puccinia, Agaricus, Lichen (Ramalina) Marchantia, Mosses, Selaginella, Pleopeltis or Adiantum, Marsilia, Cycas, Pine.

2. External Morphology of Flowering plants.

3. The general principles of classification and the characteristics of the following families:—

Anonaceæ, Nyhpheaceæ, Cruciferæ, Nalvaceæ, Rutaceae, Rhamnæ, Leguminoseæ, Myrtaceæ, Cucurbitaceæ, Umbelliferaæ, Rubiaceæ, Compositæ, Apocynaceæ, Asclepiadaceæ, Convolvulaceæ, Solnaceæ, Acauthaceæ, Verbenaceæ, Libiaatæ, Amarantaceæ, Euphorbiaceæ, Urticaceæ, Hydrocharidæ, Orchidæ, Scitamineæ, Amaryllidæ, Palmæ and Graminæ.

* Comes into effect as from the examinations of 1944.

4. Plant Physiology.—

Chemical composition of the plant: soil and its properties; photosynthesis; transpiration; respiration; metabolism; heterotropic plants; growth; movements; irritability; reaction to external stimuli; adaptations; reproduction, sexual and asexual, cross and self-pollination and fertilisation; variation, heredity and Mendelism; theories of evolution and origin of species.

5. Histology.—

Cell structure and cell division; plastids, cell sap and other cell contents, the origin, nature and development of plant tissues; primary and secondary tissues and their distribution in the plant body; the relation of structure to function.

6. Practical work.—

Candidates are expected to be able to make preparations illustrating the form and structures of any plant belonging to the groups mentioned in the syllabus and to describe with sketches sufficient for their identification; to make dissections with simple microscope of the floral parts of Phanerogams: to make drawings, construct floral diagrams and refer them to their families; to describe in technical language plants belonging to any of the groups specified in the syllabus.

Candidates shall submit to the examiners, before the hour of the practical examination, their laboratory note books duly certified by their professors as a *bona fide* record of work done by him.

Zoology (Main)

The scope of Zoology. The leading features in the structure, the important points concerning the development, and affinities and general classification of the forms included in the following groups:—

Protozoa, Porifera, Cœlenterata, Platyhelmia, Nemertini Nematoda, Acanthocephala, Chætognatha, Rotifera; Brachiopoda, Annelida, Phoronidea, Polyzoa, Arthropoda, Mollusca, Echinodermata and Chordata.

A comparative study of the Physiological activities of the animals such as locomotion, feeding, respiration, excretion and reproduction of the groups mentioned above.

A general acquaintance with the Vertebrate Fauna of South India.

The geographical and geological distribution of the Chordata treated in an elementary manner.

Outlines of the theories of Organic evolution, Heredity and Adaptation.

An elementary knowledge of the Cell and Cell-phenomena.

Practical work :—Candidates will be required to examine, describe, identify or otherwise deal with specimens and preparations illustrating points of zoological interest in connection with any of the preceding groups. They will, in addition, be expected to have a full practical knowledge of the structure and will be required to make dissections and simple microscopical preparations of any of the following types :—

Amœba, Vorticella, Hydra, Obelia, Jelly-fish (Chrysora Rhizostoma), Sea-anemone, Neries or Eunice, Earthworm, Leech, Prawn and Crab (external characters), Scorpion, Centipede (external characters), Cock-roach, Fresh-water Mussel, Ampullaria, Sepia, Amphxus : (preparations and sections:) Dog-fish, frog, Pigeon and Rabbit.

Candidates may also be examined by *viva voce* questions.

Candidates shall submit to the examiners before the hour of the practical examination, their laboratory note-books duly certified by their professors as a *bona fide* record of work done by them.

Zoology (Subsidiary)

The scope of Zoology. The leading features in the structure the most important points concerning the development and affinities of the forms included in the following Phyla in general and of the following types in particular. (Students will not be expected to be familiar with characters of orders or other sub-groups not mentioned in the following scheme. The animals are to be studied with special reference to their habits and environment.)

Protozoa :—Rhzopoda—(Lobosa, Foramnifera, Heliozzoa, and Radiolaria.)

Mastigophora. (Flagellata.)

Infusoria. (Ciliata.)

Sporozoa.

Types.—Amoeba, Euglena, Volvox, Paramoecium, Vorticella, Monocystis and Malarial Parasite.

Coelenterata :—Hydromedusae (and all its orders).

Scyphomedusae (and all its orders).

Anthozoa (Zoantharia and Alcyonaria).

Ctenophora.

Types :—Hydra, Obelia, Aurelia, Sea-Anemone and Hormiphora.

Platyhelminthes :—Types : Taenia and Liver-Fluke.

Nemathelminthes :—Types : Ascaris.

Annelida :—Archiannelida.
Chaetopoda (Polychæta and Oligochaeta).
Hirudinea.
Echiurodia.

Types :—Neries, Earth-worm and Leech.

Arthropoda :—Crustacea (Entomastraca and Malacostraca).

Types :—Streptocephalus, Lepas, Sacculina, Prawn and Crab.

Onycophora :—Peripatus.

Myriopoda :—(Centipede and Millipede).

Insesta :—(Aptera Orthoptera, Coleoptera, Neuroptera, Hymenoptera, Hemiptera, Diptera, and Lepidoptera).

Types :—Cockroach.

Arachnida :—Scorpion, Spider and Limulus.

Type : Scorpion.

Mollusca :—Pelycypoda.

Gastropoda.

Cephalopoda.

Types :—Mussel, Chiton, Pila (Ampullaria), (Ahpullaria) and Sepia.

Echinodermata :—Asteriodea.

Ophiuroidea,

Echinoidea,

Holothuroidea.

Crinoidea.

Types :—Starfish, Brittlestar, Seaurchin, Sea Cucumber, and Feather star.

Chordata :—
Prochordates :—Balanoglossus, Ascidia and Amphioxus.

Vertebrata :

Pisces : Elasmobranchif,

Teleostei,

Dipnoi.

Amphibia : Anura,

Urodela,

Gymnophiona.

Reptilia : Lacertilia,

Ophidia,

Chelonia and Crocodilia.

Aves : Archaeornithes,

Neornithes (Ratitae and Carinatae).

Mammalia : Prototheria,

Metatheria (Diprotodontia and Poly-protodontia.)

Eutheria (Edentata, Sirenia, Proboscidea, Ungulata,

Cetacea, Carnivora, Rodentia, Insectivora, Chiroptera,

Prosimiae and Primates.

Types :—Balanglossus, Ascidia, Amphioxus, Dog-fish, Bony Fish, Frog, Caloter, Pigeon, and Rabbit.

A general knowledge of the theories of Evolution, Heredity and Adaptation.

Practical Work:—Candidates will be expected to have a practical knowledge of the structure and shall be required to make dissections and simple microscopical preparations of any of the following types :—Earthworm, Neries (external features), Leech, Crab (external features), Scorpion, Cockroach, Fresh-water Mussel, Ampullaria, Sepia, (external characters), Frog, Pigeon, (nerves excepted) and Rabbit (nerves excepted).

Candidates shall submit to the examiners before the hour of the practical examination, their laboratory note books duly certified by their professors as a *bona fide* record of work done by them.

Geology (Main)

A course of lectures on the following :—

1. Physical and Dynamical Geology—

The aims, methods and applications of Geology as a science ; its sub-divisions.

The Earth : brief review of its origin and its relations to the members of the solar system, its evolution ; movements and their effects ; its shape, size, density ; main principles of determination of the age of earth.

The atmosphere : its nature, extent and movements ; climate ; weather, seasons ; elements of meteorology.

The Hydrosphere : extent, composition and movements ; effects on climate.

The lithosphere: constituents of the crust; probable nature of the interior; rate of downward increment of internal heat; main divisions of rocks and their mode of occurrence.

Geological Agents: Hypogeny—igneous activity; volcanoes, their form and structure; their action, cause, results and products. Earthquakes—nature, origin and effects; relationship to volcanoes.

Epigene: Heat and cold, water, wind, ice and organic agents.

Erosion, transportation and deposition considered with each of the agents. Characters of deposits, terrestrial fluviatile, marine lacustrine, glacial, and organic. Earth sculpture.

2. Crystallography and Mineralogy—

Distinction between crystalline and morphous substances.

Crystals: lines, planes, axes and centre of symmetry. Laws of crystallography. Crystal systems; crystal notation; important holohedral and hemihedral forms and their combinations; contact goniometer; principles of reflecting goniometer; the important types of twinning and twinned crystals, elements of crystal drawing.

Physical characters of crystals; isomorphism, dimorphism, isodimorphism, paramorphism, pseudomorphism.

Simple, dry and wet tests for identifying minerals.

Main principles of optics leading to the recognition of minerals; pleochroism and absorption; extinction angles; interference phenomena;

Study of the more important rock-forming and economic minerals.

3. Petrology—

Aqueous, igneous and metamorphic rocks; their origin, mode of occurrence, composition, structure and texture Study of the leading types in each of these groups. Alteration and metamorphism (including contact and regional of rocks).

Construction and use of the petrological microscope; its use in the identification of minerals and rocks by means of ordinary and place polarized light.

4. Structural and Field Geology—

Structural features of the different classes of rocks; lamination, bedding, joints, overlap, unconformity, strike, dip, faults, folds—their effect on topography. Relation between geological structure and surface features.

Construction and interpretation of geological maps and sections. Simple problems in structural geology.

5. Economic Geology—

Forms and origin of Ore deposits; important characters of the main types—magmatic, pneumatolytic, hydrothermal, metasomatic, metamorphic and detital.

General knowledge of the chief economic ores and minerals of India and their main uses—Coal, petroleum, water, building stones, salt, mica, magnesite; gold, silver, manganese, and iron ore, tungsten, chromite, etc.

Elementary principles of prospecting.

6. Palæontology and Stratigraphy—

Fossils; their nature and mode of preservation and uses. Distribution of the main groups in time; recognition and drawing of the more important types. Correlation of strata; Homotaxis and contemporaneity. Importance of the study of fossils in problems of evolution.

Standard European geological formations; their lithological and palæontological characters; Indian stratigraphy studied likewise; physiographic and climatic conditions of the different epochs and systems.

Practical Work—

Physical properties of minerals—density, hardness, fusibility.

Examination of important rock-forming minerals and rocks in hand specimens and under the microscope—Dry and wet tests for the identification of important minerals.

Reading of geological maps and construction of sections. General acquaintance with field work, including the maintenance of field notes and specimens collected in excursions. Study and drawing of a representative collection of fossils. Laboratory note-books. *Viva voce* questions may be asked.

Geology (Subsidiary)

General Geology.—The aims, methods and applications of geology. The earth, its movements and their effects. The nature and characters of the atmosphere, hydrosphere, and lithosphere. Work of the Geological Agents—hypogene such as volcanoes and earthquakes, and epigene such as air, water and organisms.

Crystallography and Mineralogy.—Six systems of crystals and their symmetry characters; Weiss and Miller notation. The holohedral and the more important hemihedral forms. Simple twins.

Study of the most important rock-forming and economic minerals: their crystallographic and physical characters and chemical compositions.

Native gold, silver, copper, nickel-iron, diamond, graphite, sulphur; corundum, quartz, chalcedony and opal, cuprite, hematite, megnetite, spinel, chromite, ilmenite, cassiterite, bauxite limonite, pyrolusite and psilomelane; pyrite, pyrrho-tite, chalcocite, chalcooyrite, bornite, stibnite, zinc blende, argentite, realgarg orpment, galena, cinnabar, pentlandite; fluoritè, halite, sylvite, kieserite, carnallite, borax; calcite, dolomite, magnesite, siderite, malachite, azurite, cerussite; the feldspars, nepheline, sodalite, garnet, beryl, amphibles and pyrovenes (tremolite-actinolite, hornblende, hypersthene, diopside, augite), epidote, dlivine, muscovite, biotite, chlorite, kaolin, talc, serpentine, gypsum, barite, apatite.

Petrology.—Nature of rocks and their classification. Study of the chief types of sedimentary, igneous and metamorphic rocks in hand specimens.

Structural Geology.—Structure of rock masses—bedding, joints, striks, dip, folds and faults. Outcrops of simple structures in relation to topography. Study of topographical maps and simple geological maps and construction of sections across them.

Historical Geology.—Fossils, their mode of preservation and uses. The stratigraphical record. The standard European stratigraphical scale; correlation of strata; important rocks and fossils of the chief periods; elementary knowledge of Indian Geology.

Practical work.—Description and identification of important crystal forms, minerals, rocks and fossils; easy exercises on geological maps.

Physiology (Main)

(A) *Physiology.*

General:—

History and scope of Physiology. Characteristic features of living substance. Conditions of life. Structure and Chemistry of Protoplasm, Surface tension, Osmosis, Hydrogen-ion concentration. Colloids and their behaviour. Cell protoplasm. Nucleus. Reproduction of cells.

Circulatory System:—

Origin, composition and properties of blood. General character and formation of Lymph. Blood and Lymph as protective mechanisms. Circulation of blood, Physiological characteristics of the heart. Work of the heart, Cardiac cycle. Nature of cardiac contraction. Sounds of the heart. Nervous control

of the heart. Circulation through various organs. Physiology of capillary circulation treated in an elementary manner. Blood pressure, methods of measurement of blood pressure. Effect of the heart beat on blood pressure. Pressures in capillaries, veins and lymphatic vessels. Features of blood flow. Influence of posture and gravity on circulation. Shock and its general causes

Respiratory system :—

Organs of respiration. Internal and External respiration. Mechanism of external respiration. Movements of respiration. Amount of air respired. Interchange of air by diffusion. Respiratory sounds. Respiratory Rhythm. Nervous regulation of respiration. Interaction of circulation and respiration. Influence of the heart on respiration. Internal respiration. Effects of respiration on the air breathed. Effects of respiration on the blood. Causes of respiratory exchange. Blood as carrier of oxygen and carbondioxide. Ventilation. Asphyxia.

Digestive system :—

Nature of food. Proximate principles of food. Sources of the proximate principles. Dietetics. Digestion of the food stuffs. Secretion and properties of the digestive juices and bile. Movements of the stomach and intestine. Mode and channels of absorption of food. Storage of surplus food. Functions of the Liver and Pancreas.

Metabolism :—

Factors influencing metabolism, age, climate, nature of work, etc. Basal metabolism during starvation. Metabolism of proteins, Carbohydrates and fats treated in an elementary manner. Insulin and carbohydrate metabolism. Regulation of temperature.

Muscle nerve physiology :—

Functions of the muscular tissue. Muscular movement. The graphic registration of muscular contractions. Methods of stimulation of muscle and nerve. Character of contraction of muscles. Chemistry of muscle. Heat production in muscle. The neuron and its conducting paths. Phenomenon of conduction in nerve. Reaction of nerve and muscle and constant and interrupted electrical currents.

Excretory system :

The secretion of urine. Expulsion of urine. Micturition. Composition of urine. Functions of the skin and its appendages.

Nervous system :—

Significance of the nervous system. Functional arrangement of the nervous system. Reflex action. Functions of the spinal cord. Functions of the autonomic system. Sympathetic and parasympathetic nervous system. Functions

of the medulla oblongata, and associated nerves. General functions of the cerebrum. Cerebral localization. Functions of the cerebellum. Formation and properties of conditioned reflexes. Cerebro-spinal fluid, its formation, composition and functions.

Sense Organs :—

Classification of sense organs. General features of Receptors. Physiology of the ear and eye and other sensory organs treated in an elementary manner.

Endocrinology :—

The thyroid, Parathyroid, thymus, adrenal bodies, Hypophysis, pineal body. Testes and ovaries. Haemolymph glands.

Reproductive System :—

Growth, regeneration and reproduction ; Physiology of the male and female reproductive organs treated in an elementary manner. Functions of the foetal membranes. Nutrition of the embryo. Foetal circulation.

(B) *Histology*

[Lectures are to be correlated with practical work and students will be expected to be familiar with the standing methods.]

Cell :—

Structure of the cell. Cell-division. Connective tissues. Pigment cells, Adipose tissue. Wharton's Jelly. Elastic. Ferrous and hyaline cartilage. Ossification and bone. Contractile tissues. Skeletal muscle, smooth muscle and heart muscle. Nerve cell. Structure of the spinal cord at various levels, cortex and cerebellum. Nerve fibres, Nerve endings. Ganglion cells.

Blood vessels :—

Aorta, smaller artery, bronchial artery and vein. Lymphatic vessels and tissues, lymphoid tissue, lymph gland, spleen and tonsil.

Alimentary tract :—

Tongue, oesophagus, stomach, intestine, salivary gland, Pancreas and liver.

Respiratory system :—

Larynx, trachea, bronchi and lungs.

Urinary tract—Kidney, ureter.

Ductless glands—Thyroid, parathyroid, thymus, pineal body, pituitary body, pancreas, adrenal body. Reproductive system—Testes, ovaries, vas defences, uterus etc.

(C) *Experimental Physiology*

A working knowledge of the electrical apparatus in common use in physiological experiments. Cells, electrodes, key, Commutator. Rheochord and Induction coil.

Certain simple experiments illustrating the use of the above apparatus.

The muscle-nerve preparation. The recording of muscular contractions. Superposition. Tetanus.

Action of Veratrine and Curari. Effect of fatigue on muscle.

Polar excitation of nerve, electrotonus, Galvanism and Faradism.

The Frog's heart. Stannius' experiments. Peculiarities of Cardiac contraction, Cardiac nerves of frog.

The capillary circulation in the frog's web and mesentery.

Sheep's heart, action of valves, the use of the Dudgeon Sphygmograph.

Arterial pressure in man. Sphygmomanometer.

The respiratory movement in man. Stethography.

Vital capacity. Artificial respiration.

Reflex action in frog. De-cerebrated frog.

The enumeration of blood corpuscles. Estimation of Haemoglobin.

(D) *Bio-Chemistry*

Students will be expected to have a fuller knowledge of the portions specified in the syllabus as a subsidiary subject in addition to the following :—

Theory :—

Vitamins, Chemistry of bile. Vanden Bergh's reaction. Bacterial decomposition in the intestine Physiological detoxications, glycol and ornithin derivatives. Glycourates. Ethereal sulphates. Methylation. Oxidation and reduction and acetylation. Chemistry of internal secretions.

Practical :—

The preparation and estimation of amino-acids. Hydrolysis of fats. Quantitative estimation of carbohydrates. Indirect calorimetry. Basat metabolism. Estimation of PH. Quantitative estimation of important constitutions. Alkali reserve. Blood gases Analysis of air. Quantitative analysis of urine. Liver and kidney efficiency tests. Analysis of gastric contents.

Physiology (Subsidiary).

(A) *Physiology*

Chemical composition of the animal body ; physiology of the cell. Histology of animal tissues. General physiology of muscle and nerve. Food and

dietetics. Digestion, absorption and nutrition. Blood, lymph and tissue fluids. Physiology of the heart and blood vessels. Respiration, Excretion, Metabolism and regulation of temperature. Skin and its appendages. Central nervous system Autonomic system. Special sense organs. Endocrinology. Reproduction. Elementary facts of general physiology as indicated below :—

Protoplasm, its structure and properties, surface action, surface tension, absorption etc. Properties of colloids. Permeability of membranes. Osmotic pressure. Electrolytes. Functions of water. Catalysis. Enzymes.

(B) *Bio-Chemistry*

The Chemistry and metabolism of food stuffs. Enzyme action. The chemical constituents of blood, their origin and physiological conduct, Acidosis and alkalesis. The Chemistry of urine and faeces: Urinary pigments, reactions of proteins, rats and carbohydrates. Quantitative estimation of sugar. Digestive enzymes and bile. Qualitative analysis of some common food stuffs. Derivatives of Haemoglobin. Spectroscopic examination of Haemoglobin and its derivatives. Coagulation of blood. Haemoglysis chemical tests for blood. Preparation of Haemin and Haemoglobin crystals.

Quantitative estimation of sugar and urea in blood. Use of the calorimeter. Estimation of PH of urine. Testing for the various constituents. Urinary sediments Quantitative estimation of Chlorides, phosphates and urea. Identification of substances of Physiological importance.

(C)

Candidates will be expected to have undergone a course of practical instruction in Practical Physiology, Histology and Elementary Bio-Chemistry, and certificates of such attendance should be produced from the Professors concerned.

CHAPTER XLV

B Sc. (HONOURS) DEGREE EXAMINATION

(Regulations)

A—With Physics or Chemistry as Main subject

Conditions of Admission

1. Candidates for the Degree of Bachelor of Science (Honours) shall be required—

(i) to have passed the Intermediate Examination in Arts and Science of this University or the Intermediate examination of any other Statutory Indian University accepted as equivalent thereto* ;

(ii) to have undergone subsequently a further course of study in the University College as prescribed hereunder, extending over a period of three years, each consisting of three consecutive terms ; and

(iii) to have passed the examination for the Degree hereinafter prescribed.

Courses of Study

2. The courses for the B.Sc. (Hons.) Degree shall comprise instruction in—

Part I—(a) English and (b) a simple course in French or German.

Part II—Any one of the following branches of knowledge :—

(i) Physics as the Main subject with Chemistry and Mathematics as Subsidiary subjects.

(ii) Chemistry as the Main subject with Physics and Mathematics as Subsidiary subjects.

Part I (a) English Part I (b) French or German

3. The examination in Part I–(a) English shall be a paper of three hours' duration based on two prescibed text-books, one for detailed study and the other for non-detailed study : (this paper shall be the same as that for B.Sc. Pass Degree Examination) ; and in Part I-(b) a two-hour paper in Translation from French or

German into English and *vice versa*, similar to that of the B.A. (Honours) Part I, but alternative passages for translation shall be set in the different subjects. Candidates who have passed in French or German under Part II in the Intermediate Examination shall not be required to undergo the course or sit for the examination prescribed for Part I-(b).

Part II

4. The courses of study in the Main and the Subsidiary subjects under Part II shall be as detailed below :—

Physics (Main)

Physics (Main)

A candidate shall be required to have a sound knowledge, experimental and theoretical of :—

(i) Properties of Matter and Dynamic Theory of Sound.

(ii) Sound and Heat.

(iii) Light.

(iv) Electricity and Magnetism.

(v) Modern Physics.

Each candidate shall submit his laboratory note books containing the record of all his practical work performed during the period of study for the examination. The record shall be countersigned by the Professor or Professors under whom the candidate has worked and shall be certified as a *bona fide* record of work performed by the candidate. It shall be submitted on the first day of the practical examination to the Examiners engaged in conducting the examination.

There shall be six papers in theory, two on Modern Physics and one on each of the remaining four subjects. Each paper shall be of three hours' duration and shall carry 100 marks.

There shall be four papers in Practical Physics as detailed below :—

(i) One paper in Properties of Matter, Sound and Heat—3 hours.

(ii) One paper in Light—3 hours.

(iii) One paper in Electricity and Magnetism—3 hours.

(iv) One paper covering the whole syllabus—6 hours.

Each paper in Practical shall carry 100 marks and the Practical record submitted shall carry 100 marks.

The scope of the several subjects shall be as defined in the syllabus.

Chemistry (Main)

A candidate shall be required to have a sound knowledge, experimental and theoretical of :— Chemistry (Main)

(1) General and Historical Chemistry.

(2) Physical Chemistry.

(3) Inorganic Chemistry.

(4) Organic Chemistry.

(5) Any one of the following special subjects :—

(i) Electro Chemistry.
(ii) Technical Gas Reactions.
(iii) Analytical Chemistry.
(iv) Chemistry of rarer elements and their industrial uses.
(v) Tinctorial Chemistry.
(vi) Bio-Chemistry.
(vii) Chemistry of Sugars and Carbohydrates.
(viii) Chemistry of Colloids.
(ix) Chemistry of Foods and Drugs.

There shall be five papers in theory, each of three hours' duration on each of the above five subjects. Each paper shall carry 100 marks. There shall be four papers in practical, one on the special subject and the rest on the general subjects, viz., Inorganic, Organic and Physical Chemistry. The practical examination in the special subject and Physical Chemistry shall be of 6½ hours' duration each and that in Inorganic Chemistry and Organic Chemistry shall be each of 12 hours' duration (6 hours per day). The practical examination in each subject shall carry 100 marks and the practical record submitted shall carry 100 marks.

Each candidate shall submit his laboratory note books containing the record of his practical work performed during the period of study for the examination. The record shall be countersigned by the Professor or Professors under whom the candidate has worked and shall be certified as a *bona fide* record of work performed by the candidate. It shall be submitted on the first day of the practical examination to the Examiners engaged in conducting the examination.

The scope of the several subjects shall be as defined in the syllabus.

Mathematics (Subsidiary to Physics Main)

There shall be two papers each of three hours' duration. Each paper shall carry 100 marks.

The examination and syllabus shall be the same as that for the candidates taking the course in Mathematics as a Subsidiary subject for the B.Sc. (Pass) Degree examination.

Mathematics (Subsidiary to Chemistry Main)

There shall be one paper of three hours' duration carrying 100 marks.

The examination and syllabus shall be common with Part I (*a*) Mathematics for the B.Sc. (Hons.) Examination with Chemical Technology as Main subject.

Physics (Subsidiary)

There shall be one paper in theory and one in practical, each of three hours' duration. Each paper shall carry 100 marks. The examination and syllabus shall be the same as that for the candidates taking the course in Physics as a Subsidiary subject for the B.Sc. (Pass) Degree examination.

Chemistry (Subsidiary)

There shall be one paper in theory and one in practical, each of three hours' duration. Each paper shall carry 100 marks.

The syllabus shall be the same as that prescribed for the candidates taking the course in Chemistry as a Subsidiary subject for the B.Sc. (Pass) Degree Examination.

The scope of the subject shall be as defined in the syllabus.

Eligibility for the Degree

5. No candidate shall be eligible for the B.Sc. (Honours) Degree until he has passed the examination in Part I and in one of the branches of knowledge in Part II detailed in the courses of study.

6. A candidate with Physics as his Main subject shall be permitted, at the end of the first year, to appear for the examination in Part I (a) English and (b) French or German and at the end of the second year in the Subsidiary subjects. A candidate with Chemistry as his Main subject shall, however, be permitted at the end of the first year, to appear for the examination in Part I (a) English (b) French or German and also in Mathematics (Subsidiary) under Part II and at the end of the second year in the remaining Subsidiary subject.

Marks qualifying for a pass in Part I

7. The examination in Part I shall be (a) a three hours' paper on English Composition and (b) a two hours' paper on Translation. A candidate may present himself for the examination in Part I (i e. English and Translation) at the end of the first year of the course and thereafter at his option present himself for either English or Translation or both provided that candidates who obtain qualifying marks for a pass either in English or Translation need appear again in that subject in which they failed.

A candidate shall be declared to have passed the Part I examination if he obtains not less than 40 per cent in each of the papers on English and Translation. All other candidates shall be deemed to have failed in the examination. Successful candidates obtaining not less than 60 per cent shall be declared to have passed with distinction in that subject.

Qualification for admission to the Examination

8. No candidate shall be admitted to the examination in Part I unless he has passed the Intermediate examination in Arts and Science of this University or an examination of any other

statutory Indian University accepted as equivalent thereto and has undergone the prescribed course.

Admission to the final examination

9. No candidate, other than those hereinafter exempted, shall be permitted to appear for the examination in the Main subject in the case of candidates offering Physics or Chemistry as the main subject unless he has passed the Part I examination.

B. Sc. Pass candidates to appear for Honours Examination

10. A candidate for the B.Sc. (Honours) Degree who has passed the B.Sc. (Pass) Degree Examination shall be permitted to appear for the B.Sc. (Hons.) Degree Examination after a further two years' course in the University College, provided he has passed the B.Sc. Degree examination in the subjects in which he desires to appear for the Honours examination. He shall be exempted from passing the examination in Part I and from the examination in the Subsidiary subjects, provided he undergoes one year's course in simple French or German.

B.A. pass candidates to appear for Hons. Examination with Physics or Chemistry as main subject

10-A. A candidate for the B.Sc. (Hons.) Degree Examination with Physics or Chemistry as the Main subject, who has passed the B.A. Pass Degree Examination shall be permitted to appear for the B.Sc. (Hons.) Degree Examination after a further course of three years in the University College. He shall be exempted from passing the Examination in Part I provided he undergoes one year's course in simple German and from the Examination in the Subsidiary subjects, provided he passed the B.A. Degree Examination with these subjects.

11. A candidate for the B.Sc. (Honours) Degree shall appear for the examination in Part II not later than the end of the fourth year after commencing the Honours Degree course in the University Colleges, provided however Bachelors of Science proceeding to the B.Sc. (Honours) Degree examination (*vide* section 10 supra) shall appear not later than three years after commencing the B.Sc. (Honours) Degree course in the University College.

For purposes of this regulation, the Part II examination shall mean the examination in the Main subject in the case of Physics and Chemistry main groups.

12. No candidate shall be permitted to undergo the examination in Part II more than once. A candidate for the final examination shall however be permitted to withdraw from the examination provided he has not sat for the last paper in the written examination or the last practical examination in the subject; and provided also he has given notice of withdrawal to the Registrar within three clear days after the date of the last paper (theory or practical) which he answered. He shall be permitted to appear again for the examination in the Main subject in the following year without producing any additional certificate of attendance. Nothing in this regulation shall apply to the examination in the Subsidiary subjects.

Candidates for Honours recommended for B. Sc. pass degree

13. In the event of a candidate for the B.Sc. (Hons.) Degree failing to satisfy the Examiners in Part II of the examination, he may be recommended by them for the B.Sc. (Pass) Degree provided he has passed the examination in Part I and has obtained not less than 30 per cent of the marks in each subject, both Main and Subsidiary, in Part II.

Candidates failing in B. Sc. Honours may appear for B. Sc. privately

14. A candidate who is not already eligible for the B.Sc. (Pass) Degree, and has failed completely in the B.Sc. (Hons.) Degree examination, shall be permitted to appear for the B.Sc. Degree examination in the subjects in which he has already appeared without the production of a further certificate of attendance in an Affiliated College.

Marks qualifying for a pass

15. A candidate shall be declared to have passed the B.Sc. (Hons.) Degree Examination if he has obtained not less than 40 per cent of the total marks in the Main subject and 40 per cent of the total marks in each of the Subsidiary subjects under Part II, provided however no candidate shall be deemed to have passed in the Main subject under Part II unless he gets not less than 33 per cent of the total marks in each of the two divisions of the Main subject, viz., (i) Theory of the Main subject; (ii) practicals of the Main subject, including the practical records submitted,

Classification of successful candidates: in the subsidiary subjects

16. Candidates declared to have passed the examinations in the Subsidiary subjects shall be classed in each of the Subsidiary subjects as noted below provided the candidates pass in all the subjects at the first appearance :—

The first consisting of those who obtain not less than 60 per cent, the second of those who obtain not less than 50 per cent, and the third of those who obtain not less than 40 per cent of the total marks.

in the main subjects

Candidates declared to have passed the Honours Examination shall be ranked in the order of proficiency as determined by the total marks obtained by each in the Main subject and shall be arranged in three classes as noted in paragraph 2 above.

B—With Chemical Technology as Main Subject

Conditions of Admission

17. A candidate for the B.Sc. (Hons.) Degree in Chemical Technology shall be required—

(i) to have passed the Intermediate examination (with Physics, Chemistry and Mathematics as optionals) of this University or any other examination accepted as equivalent thereto ;*

(ii) to have undergone subsequently a further course of study in the University College, as prescribed hereunder, extending over a period of three years, each consisting of three consecutive terms ;

(iii) to have passed the examination for the degree hereinafter prescribed ; and

(iv) to have undergone at least 2 months of practical training in any approved factory or workshop either during the course or immediately after its completion and before the Degree is awarded.

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* Vide foot-note on the first page of Chapter XL.

Courses of Study

18. The courses shall comprise instruction in—

Part I—(*a*) Mathematics, (*b*) Physics, (*c*) Chemistry, (*d*) General Engineering including Machine Drawing and Workshop Practice and (*e*) Pharmaceutical Botany in the case of candidates offering Pharmaceuticals and Fine Chemicals as Special subject under Part II.

Part II—Chemical Technology, Chemical Engineering and any one of the following special subjects for the study of which provision may be made by the University :—

(i) Sugar ;
(ii) Pharmaceuticals and fine chemicals ;
(iii) Oils and Fats (including essential oils) ; and
(iv) Ceramics.

Scope of subjects

19. The scope of each subject shall be as defined in the syllabus prescribed.

Part I: Mathematics Physics, Chemistry and General Engineering

20. The examination in the several subjects in Parts I and II shall be as detailed below :—

PART I.

Mathematics :—There shall be one paper of three hours' duration, carrying 100 marks. This paper shall be common with Mathematics Subsidiary to Chemistry Main B.Sc. (Hons.)

Physics.—There shall be two papers, one written, of three hours' duration and one practical, of three hours' duration. Each paper shall carry 100 marks.

Chemistry.—There shall be three papers in theory and three practicals, one each in Inorganic Chemistry, Physical Chemistry and Organic Chemistry, respectively. Each paper in theory shall be of three hours' duration and shall carry 100 marks. Each practical examination shall be of six hours' duration. Besides the above, there shall be an oral examination. The marks for the practical and oral examinations shall be allotted as below :—

Inorganic and Physical Chemistry	200	marks.
Organic Chemistry	100	,,
Practical records	50	,,
Oral	50	,,

General Engineering.—There shall be one paper in theory carrying 100 marks and one in practical (workshop practice) each of three hours' duration. The practical examination shall carry 50 marks and drawing records 50 marks.

Pharmaceutical Botany.—There shall be two papers, one written of two hours' duration and one practical of three hours' duration. Each paper shall carry 50 marks.

PART II

Part II: General Chemical Technology, Chemical Engineering and one Special subject

General Chemical Technology.—There shall be two papers in theory of three hours' duration each and two practical examinations of 6½ hours' duration each. Each paper shall carry 100 marks and the records 50 marks.

Chemical Engineering.—There shall be one paper in theory of three hours' duration and one practical of six and half hours' duration. Each paper shall carry 100 marks and the records 50 marks.

Special Subject.—There shall be one paper in theory of three hours' duration and one practical examination of 6½ hours' duration. Each paper shall carry 100 marks and the records 50 marks.

Marks qualifying for a pass

21. A candidate shall be considered to have passed the examination in the several subjects detailed above if he obtains marks as hereunder :—

Subjects.	Written	Practical (including records and oral if any).	Aggregate.
Mathematics	40 per cent	...	40 per cent
Physics	25 ,,	35 per cent	,,
Chemistry	35 ,,	,,	,,
General Engineering	35 ,,	,,	,,
Pharmaceutical Botany	35 ,,	,,	,,
General Chemical Technology	35 ,,	,,	,,
Chemical Engineering	35 ,,	,,	,,
Special Subject	35 ,,	,,	,,

Admission to the Examination

22. A candidate shall be permitted, at the end of the first year, to appear for the examination in Mathematics and at the end of the second year in the remaining subjects in Part I.

23. No candidate shall be permitted to appear for the examination in Part II unless he has passed the examination in Part I.

B.Sc. or B.A. pass candidates to appear for Honours Examination in Chemical Technology

24. (*a*) A candidate for the B.Sc. (Hons.) Degree Examination in Chemical Technology who has passed B.Sc. (Pass) Examination in first or second class with Chemistry as the Main subject, provided he had Mathematics, Physics and Chemistry as optionals in the Intermediate, shall be permitted to appear for the examination after a further course of two years in the University College and he shall be exempted from passing the examination in the Subsidiary subjects that he has already passed in the B.Sc. He shall sit for the examination in Chemistry and General Engineering in Part I at the end of the first year's course and in Part II at the end of the second year.

(*b*) A candidate who has passed the B.Sc. (Pass) Degree Examination except with Chemistry as Main subject or B.Sc. (Pass) Degree Examination in third class with Chemistry as Main subject or B.A. (Pass) Degree Examination. provided he had Mathematics, Physics and Chemistry as his optionals in his Intermediate Examination, can appear for the B.Sc. (Hons.) Degree Examination in Chemical Technology after a further course of three years in the University College. He shall be, however, exempted from those subsidiary subjects in which he has already secured a pass.

Restriction in respect of appearance

25. A candidate for the B. Sc. (Hons.) Degree shall appear for the examination in Part II not later than the end of the fourth year after commencing the Honours Degree course in the University College.

Permitted to appear only twice

26. A candidate who appears for the examination in Part II at the end of the third year after commencing the Honours Degree Course in the University College of Science and Technology and fails, may appear again for the examination in Part II in the following year provided the candidate undergoes the final year's Honours Course again and produces the additional certificate of attendance for the fourth year.

Classification of successful candidates in the subjects under Part I

27. Candidates declared to have passed the examinations in the subjects under Part I shall be classed in each of the subjects as noted below provided the candidates pass in all the subjects at the first appearance :—

The first consisting of those who obtain not less than 60 per cent, the second of those who obtain not less then 50 per cent, and the third of those who obtain not less than 40 per cent of the total marks.

Classification of successful candidates in Part II Examination

Candidates declared to have passed the Part II Examination shall be ranked in the order of proficiency as determined by the total marks obtained by each in that part and shall be arranged in three classes as noted in paragraph 2 above.

C—With Botany or Zoology or Geology as Main Subject

Conditions of admission

28. A candidate for the Degree of Bachelor of Science (Honours) in Natural Sciences shall be required—

(i) to have passed the Intermediate Examination in Arts and Science of this University or any other examination accepted as equivalent thereto ;*

(ii) to have undergone subsequently a further course of study in the University College, as prescribed hereunder extending over a period of three years, each consisting of three consecutive terms ; and

(iii) to have passed the examination for the Degree hereinafter prescribed.

Courses of study

29. The course shall comprise instruction in—

Part I— (*a*) English and (*b*) a simple course in French or German.

Part II – Any one of the following branches of knowledge:—

(i) Botany as the Main subject with Chemistry or Zoology or Geology as Subsidiary subject ;

(ii) Zoology as the Main subject with Chemistry or Botany or Geology as Subsidiary subject ;

* Vide foot-note on the first page of Chapter XL.

(iii) Geology as the Main subject with Physics or Chemistry or Zoology or Botany as Subsidiary subject.

Part I (*a*) English, Part I (*b*) French or German

30. The examination in Part I (*a*) English shall be a paper of three hours' duration based on two prescribed text-books, one for detailed study and the other for non-detailed study : (This paper shall be the same as that for B.Sc. Pass Degree examination) ; and in Part I (*b*) a two-hour paper in Translation from French or German into English and *vice versa* similar to that of the B.A. (Honours), Part I but alternative passages for translation shall be set in the different subjects. Candidates who have passed in French or German under Part II in the Intermediate Examination shall not be required to undergo the course or sit for the Examination prescribed for Part I (*b*).

31. The courses of study in the Main and the Subsidiary subjects under Part II shall be as detailed below :—

Botany (*Main*)

Botany (Main)

A candidate shall be required to have a sound knowledge, experimental and theoretical, of :—

(1) Morphology and Taxonomo of (*a*) Thallophytes, (*b*) Bryophytes, (*c*) Pteridophytes, (*d*) Gymnosperms and (*e*) Angiosperms.

(2) Ecological and Geographical distribution of Phanerogams with special reference to South India.

(3) Fungi, specially with reference to their economic importance.

(4) Plant Physiology.

(5) Plant Histology.

(6) Physiological Anatomy.

(7) Palseobotany.

(8) Cytology and Genetics.

(9) Principles of Evolution and Heredity.

(10) The Chief Economic Plant Products.

Each candidate shall be required to present as a special subject a topic chosen from one of the sections mentioned above.

A candidate, during the three years' course of study, shall put in at least six weeks of field work for studying the various representative floristic regions of South India.

There shall be five papers in theory, each of three hours' duration on each of the following five subjects :—

(1) Algae Fungi and Bryophytes.

(2) Pteridophytes, Gymnosperms and Morphology of Angiosperms.

(3) Histology, Physiology, Ecology and Distribution.

(4) Systematic Botany, Economic Botany and General Principles.

(5) Special subject.

Each paper shall carry 150 marks. There shall be four papers in practical each of three hours' duration. The practical examination may include (1) the identification of Indian plants with the help of a flora or any other books allowed by the examiners ; (2) the preparation and correct interpretation of microscopic sections of plant ; (3) the examination of a diseased or abnormal plant and (4) practical Physiology and *viva voce* questions.

Each candidate shall submit a collection of named flowering plants, collected and preserved by himself. There may be also plants of any of other main divisions of the vegetable kingdom. The record shall be countersigned by the Professor or Professors under whom the candidate has worked and shall be certified as a *bona fide* record of work performed by the candidate. It shall be submitted on the first day of the practical examination to the Examiners engaged in conducting the examination.

Zoology (*Main*)

Zoology (Main)

A candidate shall be required to have a sound knowledge, experimental and theoretical, of—

(1) Invertebrata, including Invertebrate Embryology.

(2) Chordata including Vertebrate Embryology.

(3) Minor groups, Palaeontology and South Indian Fauna.

(4) Genetics, Cytology and General Principles.

(5) Any one of the following special subjects.

(i) General and Comparative Physiology.
(ii) General Entomology.
(iii) Parasitology,
(iv) Marine Ecology.
(v) Agricultural Zoology.
(vi) Forest Zoology.
(vii) Genetics in relation to animal breeding.

There shall be five papers in theory, each of three hours' duration on each of the above five subjects. Each paper shall carry 150 marks. There shall be four papers in practical, each of three hours' duration and one of the practicals may include questions bearing on the special subject. The practical examination in each subject shall carry 100 marks and the practical record submitted shall carry 100 marks.

Candidates may also be examined by *viva voce* and this may form part of any one of the four practicals.

Each candidate shall submit his laboratory note books containing the record of his practical work ; also preparation of serial sections (not less than 24 slides) made during the period of study for the examination. The record shall be countersigned by the Professor or Professors under whom the candidate has worked and shall be certified as a bona fide record of work performed by the candidate. It shall be submitted on the first day of the practical examination to the examiners engaged in conducting the examination.

The scope of the several subjects shall be as defined in the syllabus.

Geology (Main)

Geology (Main)

A candidate shall be required to have a sound knowledge, experimental and theoretical, of—

(1) General Geology—Physical, Dynamical and Structural Geology.
(2) Crystallography and Mineralogy.

(3) Petrology.

(4) Indian Geology, Stratigraphy and Palaeontology.

(5) Economic Geology with special reference to India (Special subject).

There shall be five papers in theory, each of three hours' duration on each of the above five subjects. Each paper shall carry 150 marks. There shall be four papers in practical each of three hours' duration on all the above subjects. Each practical Examination shall carry 100 marks and the Field and Laboratory Record and *viva voce* shall carry 100 marks.

Each candidate shall submit his field and laboratory note books containing the record of his practical work performed during the period of study for the examination. The records shall be countersigned by the Professor or Professors under whom the candidate has worked and shall be certified as a *bona fide* record of work performed by the candidate. They shall be submitted on the first day of the practical examination to the Examiners engaged in conducting the examination.

The scope of the several subjects shall be as defined in the syllabus.

Physics (Subsidiary)

Physics (Subsidiary)

There shall be one paper in theory and one in practical, each of three hours' duration. Each paper shall carry 100 marks. The examination and syllabus shall be the same as that for the candidates taking the course in Physics as a Subsidiary subject for the B.Sc. (Pass) Degree examination.

Chemistry (Subsidiary).

Chemistry (Subsidiary)

There shall be one paper in theory and one in practical, each of three hours' duration. Each paper shall carry 100 marks.

The examination and syllabus shall be the same as that prescribed for the candidates taking the course in Chemistry as a Subsidiary subject for the B.Sc. (Pass) Degree examination.

Botany (Subsidiary)

Botany (Subsidiary)

There shall be two papers in theory carrying 50 marks each and one practical paper carrying 100 marks. The written papers shall be of two and a half hours' duration each and the practical paper of three hours' duration.

The examination and syllabus shall be the same as that for the candidates taking the course in Botany as a Subsidiary subject for the B.Sc. (Pass) Degree examination.

Zoology (Subsidiary)

Zoology (Subsidiary)

There shall be two papers in theory carrying 50 marks each and one practical paper carrying 100 marks. The written papers shall be of two and a half hours' duration each and the practical paper of three hours' duration.

The examination and syllabus shall be the same as that prescribed for the candidates taking the course in Zoology as a Subsidiary subject for the B.Sc. (Pass) Degree examination.

Geology (Subsidiary)

Geology (Subsidiary)

There shall be two papers in theory carrying 50 marks each and one practical paper carrying 100 marks. The written papers shall be of two and a half hours' duration each and the practical paper of three hours' duration.

The examination and syllabus shall be the same as that prescribed for the candidates taking the course in Geology as a Subsidiary subject for the B.Sc. (Pass) Degree examination.

Eligibility for the Degree

32. No candidate shall be eligible for the B.Sc. (Honours) Degree until he has passed the examination in Part I (unless otherwise exempted) and in one of the branches of knowledge in Part II detailed in the courses of study.

33. A candidate shall be permitted, at the end of the first year, to appear for the examination in Part I (*a*) English Composition and (*b*) French or German and in the Subsidiary subject under Part II.

Marks qualifying for a pass in Part I

34. The examination in Part I shall be (*a*) a three hours' paper on English Composition and (*b*) two hours' paper on Translation. A candidate may present himself for the examination in Part I (i.e., English and Translation) at the end of the first year of the course and thereafter at his option present himself for either English or Translation or both provided that candidates who obtained qualifying marks for a pass either in English or Translation need appear again in that subject in which they failed.

A candidate shall be declared to have passed the Part I examination if he obtains not less than 40 per cent in each of the papers in English and Translation. All other candidates shall be deemed to have failed in the examination. Successful candidates obtaining not less than 60 per cent shall be declared to have passed with distinction in that subject.

Qualification for admission to the Examination

35. No candidate shall be admitted to the examination in Part I unless he has passed the Intermediate examination in Arts and Science of this University or an examination of any other statutory Indian University accepted as equivalent thereto and has undergone the prescribed course.

Admission to the Final Examination

36. No candidate, other than those hereinafter exempted, shall be permitted to appear for the examination in the Main subject unless he has passed the Part I examination.

B.Sc. pass candidates to appear for Honours Examination

37. A candidate for the B.Sc. (Honours) Degree who has passed the B.Sc. (Pass) Degree examination shall be permitted to appear for the B.Sc. (Honours) Degree examination after a further two years' course in the University College, provided he has passed the B.Sc. Degree examination in the subjects in which he desires to appear for the Honours examination. He shall be exempted from passing the examination in Part I and from the examination in the Subsidiary subject, provided he undergoes one year's course in simple French or German.

38. A candidate for the B.Sc. (Honours) Degree shall appear for the examination in Part II not later than the end of the fourth year after commencing the Honours Degree course in the

University Colleges, provided however Bachelors of Science proceeding to the B.Sc. (Honours) Degree examination (vide Section 37 supra) shall appear not later than three years after commencing the B.Sc. (Honours) Degree course in the University College.

For purposes of this regulation, the Part II examination shall mean the examination in the Main subject.

39. No candidate shall be permitted to undego the examination in Part II more than once. A candidate for the final examination shall however be permitted to withdraw from the examination provided he has not sat for the last paper in the written examination or the last practical examination in the subject; and provided also he has given notice of withdrawal to the Registrar within three clear days from the date of the last paper (theory or practical) which he answered. He shall be permitted to appear again for the examination in the Main subject in the following year without producing any additional certificate of attendance. Nothing in the regulation shall apply to the examination in the Subsidiary subject.

Candidates of Honours recommended for B.Sc. Pass Degree

40. In the event of a candidate for the B.Sc. (Honours) Degree failing to satisfy the Examiners in Part II of the examination, he may be recommended by them for the B.Sc. (Pass) Degree provided he has passed the examination in Part I and has obtained not less than 30 per cent of the marks in each subject, both Main and Subsidiary, in Part II.

Candidates failing in Honours may appear for B. Sc. privately

41. A candidate who is not already eligible for the B.Sc. (Pass) Degree, and has failed in the B.Sc. (Honours) Degree examination, shall be permitted to appear for the B.Sc. Degree examination in the subjects in which he has already appeared without the production of a further certificate of attendance in an affiliated college provided that he shall undergo the prescribed course and examination in the second subsidiary subject and obtain qualifying marks in that examination also.

Marks qualifying for a pass

42. A candidate shall be declared to have passed the B.Sc. (Honours) Degree examination if he has obtained not less than

40 per cent of the total marks in the Main subject and 40 per cent of the total marks in the Subsidiary subject under Part II, provided however no candidate shall be deemed to have passed in the Main subject under Part II unless he gets not less than 33 per cent of the total marks in each of the two divisions of the Main subject, viz., (i) Theory of the Main subject, (ii) practicals of the Main subject, including the practical records submitted and *viva voce*.

Classification of successful candidates

*43. Candidates obtaining Honours shall be ranked in the order of proficiency as determined by the total marks obtained by each in the Main Subject and shall be arranged in three classes.

The First consisting of those who obtain not less than 60 per cent; the Second of those who obtain not less than 50 per cent and the Third of those who obtain not less than 40 per cent of the total marks.

SYLLABUSES

Part I, French and German (Same as for B. A. Hons. Part I)

A—Physics (Main)

Properties of Matter.—

Units and dimensions, dimensional formulae, homogeneity of dimensions in a physical equation, dynamical similarity, simple applications.

The balance, sensibility, stability, faults, Hydrometers—graduation.

Uniform circular motion, centrifugal force, conical pendulum.

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* *Substitute* the following as from 1945 examinations :—

Classification of successful candidates in the subsidiary subject

Candidates declared to have passed the examination in the Subsidiary subject shall be classed in the subject as noted below provided the candidates pass in the subject at the first appearance :—

The first consisting of those who obtain not less than 60 per cent, the second of those who obtain not less than 50 per cent, and the third of those who obtain not less than 40 per cent of the total marks.

Classification of successful candidates in the main subject

Candidates declared to have passed the Honours Examination shall be ranked in the order of proficiency as determined by the total marks obtained by each in the Main Subject, and shall be arranged in three classes as noted in paragraph 2 above.

Rotational motion; moments of inertia; torque. Energy of rotation, angular momentum.

Simple harmonic motion; superposition of two Simple Harmonic Motions in the same direction and in directions at right angles to each other. The simple pendulum, the compound pendulum. Kater's pendulum; corrections due to (a) finite arc of swing, (b) air effect, (c) curvature of knife edges, (d) yielding of support. Determination of 'g'; variation of 'g' on the surface of the earth—gravity survey.

Vertical oscillations of a loaded spring; bifilar pendulum; the ballistic pendulum.

Gravitation.—Two-dimensional motion, radial and transverse velocities and accelerations; central orbits, areal velocity. Keplar's Laws of Planetary motion: Newton's Law of gravitation; gravitational attraction and potential—calculation of simple cases. Methods of measuring constant of gravitation; qualities of gravitation.

Elasticity.—Solids -Hook's Law; behaviour of a loaded wire under different conditions; effect of loading on structure. Moduli of elasticity Y, k, n, expression Y and $\sum$ (sigma) in terms of k and n; torsion of a cylinder: application to shafts; torsion of bars of non-circular cross section, St. Venant's results and their application to galvanometer suspensions; torsional pendulum. Bending of beams, I—section of beams; vibration of loaded bars; stability of a loaded pillar; flat spiral spring; determination of n and Y. Experimental methods of determining elastic moduli—optical methods—Searle—Ferguson and Andrews. Testing of materials—elements.

Liquids—measurement of k.

Kinetic Theory of Gases; Calculation of pressure, gaseous laws; mean free path; probability of path of given length, collisions with a solid boundary; the co-efficient of viscosity; viscosity gauge; thermal conductivity; calculation of molecular diameter and a mean free path.

Diffusion: Fick's law of diffusion, Co-efficient of diffusion; diffusion and osmotic pressure; diffusion of electrolytes. Diffusion in gases. Production and measurements of high vacua.

Virial theorem, Vander Waal's equation, size of molecules, Brownian motion in liquids. Perrin's determination of Avogadro's number, Brownian motion in gases.

Surface Tension:—Surface tension and surface energy. Liquid drop in contact with air and resting on a solid or on another liquid; angle of contact; pressure and curvature of a surface, general case of a curved soap bubble; stability of cylindrical films. Methods of measuring surface tension (a) capillary elevation, (b) Quincke's method, (c) ripple method, (d) Joger's method,

(e) Rayleigh's jet method, (f) Method of drops—Rayleigh, Worthington, Iredale, Horkins and Brown, (g) Soap film method. Interfacial surface tension between two liquids. The capillary curve. Force to pull a plate from liquid surface. Surface tension of solutions. Vapour pressure over curved surfaces and the formation of clouds. Theories of capillarit.

Viscosity—Flow of liquid through a narrow tube; corrections to Poiseuille's formula. Dynamical similarity, Reynold's number, Turbulence. Methods of measuring viscosity of liquids (a) oscillating disc method, (b) rotating cylinder method, (c) Stoke's method. Variation of viscosity with temperature and pressure. Lubrication and viscosity—general principles.

Flow of gas through a narrow tube and measurement of viscosity of a gas—Rankine's method—Variation of viscosity of a gas with temperature and pressure.

Hydro-Dynamics.—Equation of continuity; Euler's equations of motion; velocity potential; Bernoulli's Torricelli's theorem.

SOUND

A. Dynamical.—Harmonic waves, longitudinal progressive waves; plane waves in a gas. Speed of sound in a gas and along a solid rod. Speed of transverse waves along a cord. Reflection in a fixed and open end. Energy of progressive waves.

Damped S.H.M, forced S.H.M.; energy of forced vibrations and sharpness of resonance; coupled oscillations—without damping, multiple resonance. Theory of combinational tones.

d'Alembert's equation and its solution, vibration of strings—plucked string, struck string and bowed string. torsional vibrations of rods; transverse vibrations of bars. Application to tuning fork; vibrations of stretched membranche—rectangular; Chladni's figures.

Vortex formation and Aeolian tones; vibrations of air in wide tubes; open-end corrections; conical tube; edge tones; organ pipe.

B. Physical.

Resonators—Helmholtz's resonator, theory and application; resonator with variable neck and multiple openings. Rayleigh's disc and phonometer, hot-wire microphone, striæ in Kundt's Tube; pressure of sound waves; sound radiometers; piezi-electric quartz resonator. Electrical analogy, acoustic impedance, inertance; and capacitance; acoustic filters; double resonators, applications to sound intensity measurements and measurement of absorption co-efficients by stationary wave method; absolute pressure measurements.

Velocity of sound in solids; liquids and gases and its determination quency of sound and its determination; reflection and refraction of sound; ppler's principle. Sound-wave photography, acoustics of buildings, spark ripple-tank methods, reverberation.

The ear, limits of audition, minimum amplitude audible and its measure- it, theories of audition, mechanism of nerve conduction. Consonance and sonance, the musical scales, temperament.

Quality of sound, its analysis in various musical instruments, acoustic ctra. Miller's-Phonodeik, oscillographs; the voice: analysis of speech nds, harmonic and inharmonic theories, Paget's experiments, Miller and ndall's work. Speech power, sensation unit-decibel; noise and its asurement.

Gramophones and loud speakers; the photophone and phonofilms.

HEAT.

Thermometry.—Mercury-in-glass thermometry: special types of liquid rmometers, compensated air-thermometer; standard gas-thermometers; stant pressure and constant volume types; reduction of actual observation reading to scales to the perfect gas scale. Platinum thermometry; thermo- ctric thermometry.

Calorimetry:—Specific heat of solids—method of mixtures; Nernst lorimeter E. H. and E. Griffith's experiments, liquid air and liquid hydrogen lorimeters. Experiments at high temperatures.

Specific heat of liquids—method of mixtures. Callendar's continuous xture method; method of cooling. Specific heat of water—experiments of ule. Rowland, Griffiths, Callendar and Barnes Laby and Hercus. First Law Thermodynamics

Specific heat of gases (i) at constant volume—Joly's steam calorimeter. er's explosion method. Eucken's experiments on hydrogen at low tempera- res; (ii) at constant pressure—experiments of Regnault, Holborn and enning, Swam, Scheel and Heuse. Ratio of specific heats—experiments of ement and Desormes, Lummer and Pringsheim, Kundt, Partington and illing, Dixon

Fusion.—Latent heat of fusion; Bunsene's Ice Calorimeter; Measurement latent heat of fusion of metals.

Evaporation:—Latent heat of vaporisation—experiments of Hennings, mon and Lange, Berthelot, Awbery and Griffiths; Trouton's rule.

Thermal Expansion:—Linear expansion of solids, of crystals. Fizeau's terference method, Rober's optical lever method, Grunaisen's law.

Expansion of liquids.—Hydrostatic method, Callendar and Moss' apparatus.

Continuity of State:—Compressibility of gases at high pressures, Andrew's experiments, properties of Vander Waal's equation, comparison with experiments; law of corresponding states; Berthelot equation of state. Critical phenomena, properties of a substance near the critical point. Liquefaction of gases; principle of cascades; Joule-Thompson effect, the porus-plug experiment—Hoxton's apparatus; air liquefiers; liquefaction and solidification of hydrogen and helium; use of liquid air and other liquefied gases. Measurement of very low temperatures.

Thermal Conductivity:—Rectilinear flow of heat in an isotropic body. Fourier's linear diffusion law, diffusivity; steady state. Ingen-Hausz's experiment; Forbe's method, Angstrom's method; conductivity of earth's crust. Electrical methods—Kohlrausch, experiments by Jager and Diesselhorst. Conductivity of poorly conducting materials. Wiedemann- Farn law, simple theory—Drude, difficulties of the theory. Super-conductivity. Euicken's determination of conductivity of crystals.

Conductivity of liquids—film method.

Conductivity of Gases—Hot-wire method, cooling, thermometer method, film method; variation of conductivity with temperature and pressure, relation between thermal conductivity and viscosity: dererminatiom of molecular dimensions.

Thermo-dynamics.—First law, application to specific heats, work done in isothermal and adiabatic expansion.

Heat engines, the Carnot engine, efficiency, Carnot's theorem; Rankine's cycle, performance of an actual team engine, the indicator, the I. H. P and B. H. P, mechanical efficiency, thermal efficiency. Internal combustion engines—the Otto cycle, the Diesel cycle, refrigerating machines, co-efficient of performance, Second law of thermodynamics, absolute scale of temperature; entropy, reversible and irreversible processes, principle of increase of entropy.

Maxwell's thermodynamical relations, application to specific heats, Joule-Thompson effect, correction of gas thermometer; thermo-dynamic potential at constant volume—Gibbs-Helmholtz equation, thermodynamic potential at constant pressure—application to change of state, equations of Clapeyron and Clausius; specific heat of saturated vapour, triple point

Radiation.—Theory of exchanges; Kirchhoff's law—applications and quantitative proof; temperature radiation, black body—realisation of; pressure of radiation—experimental proof, energy, density and pressure of diffused radiation; Boltzmann's proof of Stefan's law, experimental verification and determination

f Stefan's constant—Coblentz. Radiometers; radiation pyrometers—Fery, ptical pyrometers, Solar constant— pyrolieliometers, affective temperature of ie Sun—total radiation method. Wien's distribution law method.

Adiabatic expansion of radiation. Wien's displacement law, experimental erification.

Number of independent vibrations of a continuous medium, Rayleigh's adiation formula, Planck's radiation formula, experimental verification of 'lanck's law—the isothermal chromatic methods, determination of h, Planck's onstant.

Specific Heats and Quantum Theory—Solids—Dulong and Petit's law—its ailure. Einstein's theory and Debye's theory of specific heat of isotropic olids, comparison with experimental results

Gases.—Degrees of freedom, the equi-partition of energy—specific heats, omparison with experimental values; specific heat of hydrogen at low tempera-ures. Application of quantum theory to di-atomic gases.

Light.

Geometrical Optics.—Reflection and refraction at plane and spherical sur-aces; principles foci and focal planes, linear and longitudinal magnification, hin lenses, combination of two thin lenses, cardinal points, equivalent lens; hick lenses, cardinal points, linear magnification.

Dispersion and achromatism—dispersive power, irrationality of dispersion; hromatic aberration, achromatic combination of prisms, of thin lenses; object gla-ses and eye-pieces.

Spherical aberration, caustics, circle of least confusion, focal lines formed by refraction, aplantic surfaces, aplantic points and microscope objectives: nvestigation of and remedy for spherical aberration; coma, astigmatism, urvature, distortion Figuring of a spherical surface—Foucault's test.

Optical instrument · Spectroscope, constant deviation type and direct ision type; telescope, microscopes; sextant; binocular; stereoscope; photogra-hic camera: telephotography and microphotography.

Spectrometry: Experimental; Calibration; Hartmann's dispersion formula. Production of spectra · types of spectra Doppler's principles—applications. Spectrometry of infra red rays, of visible rays, and ultra-violet rays.

The Rainbow:—Spurious bows, Airy's explanation, Miller's experiments.

Velocity of Light:—Fizeau's method, Foucault's method. Newcomb's experiments, Michelson and Pearson's experiments The astronomical methods.

Wave Theory:—Huyghen's principle reflection and refraction at plane and spherical surfaces; optical length and optical distances; Fermat's principle and its application. Rectilinear propagation of light; zone plate.

Interference:—Conditions necessary for interference; Fresnel's mirrors; bi-prism; Lloyd's mirror; bi-plate; split-lens. The plane parallel plate, colours of thin films; thick plate; Newton's rings; Haidinger fringes.

Refractometers; variation of refractive index with density. Gladstone and Dale's Law, Lorentz—Mossoti formula, Michelson's interferometer, determination of refractive index and dispersion, determination of the length of standard meter, measurement of the diameter of stars, the echelon grating: Fabry and Perot' interferometer; Lummer and Gehrcke's interferometer. Stationary light waves, colour photography. Testing glass plates for flatness and plane-parallelism.

Diffraction:—Elementary theory of diffraction at a straight edge, narrow wire, narrow rectangular aperture, circular aperture, circular disc. Babinet's principle; halos. Young's Eriometer.

Plane diffraction grating, dispersive power, resolving power, purity of spectrum, absent spectra; concave grating, Rowland mounting, Eagle-mounting; measurement of wave length.

The graphical method of investigating the intensity of diffraction patterns in the cases considered above. Diffraction at a straight edge. Fresnel's theory, Cornu's spiral. Franhaufer diffraction phenomena, determination of maxima and minima in the case of a narrow rectangular aperture, two equal rectilinear apertures and the diffracrion grating.

Resolving power of a prism, of a telescope, of a microscope.

Polarisation:—Polarisation by reflection and refraction; Norrenberg's polariscope; law of Malus; pile of plates.

Polarisation by double refraction, the Nicol's prism.

Huyghen's construction of wave surfaces in uni-axial crystals; experimental verification. Fresnel's theory of double refraction; the normal velocity surface; the wave surface; Axes of single wave velocity; internal conical refraction; axes of single ray velocity, external conical refraction.

Interference of polarised light—colours of thin crystalline plates (i) parallel plane polarised light, (ii) convergent or divergent plane-polarised light; isochromatic and achromatic lines in uni-axial and bi-axial crystals.

Production and detection of (1) plane polarised light, (2) circularly polarised light—Fresnel's Rhomb, (3) elliptically polarised light—Babinet's compensator,

determination of the constants of elliptical polarisation. Elliptical polarisation by reflection.

Rotation of plane of polarisation; Fresnel's explanation of rotation; Fresnel's experiments; Cornu's prism; Babinet's experiments; rotation of plane of polarisation by liquids; polarimeters. Rotatory dispersion. Experimental study of the Faraday Effect.

Electro-magnetic Theory of light:—Derivation of Maxwell's equation, displacement currents, equation for an electro-magnetic wave velocity of the wave; deduction of the laws of reflection and refraction for transparent media; perpendicular incidence; explanation of total reflection; explanation of metallic reflection.

The theory of dispersion—Cauchy, Sellmeier, Helmholtz, Electron theory of dispersion; normal dispersion, anomalous dispersion. Selective reflection—Rest-Strahlen—residual rays from powders.

ELECTRICITY AND MAGNETISM

Magnetism:

Inverse square law, magnetic field due to a magent; Magnetic potential couples and forces between magnets.

Terrestrial Magnetism.

Magnetic elements and their determination. The Kew Magnetometer, the dip circle, variation in magnetic elements, recording instruments, magnetic maps. Ships compass—deviations produced by the magnetisation of a ship.

Electro-statics.

Inverse square law, dielectric medium; electrostatic potential; equipotential surfaces; electro-static charge—capacity of a conductor, laws of energy on sharing charge. Total normal induction, Gauss's theorem, electric intensity in simple cases; tubes of induction and lines of force, energy in medium; stress in tubes of induction; Maxwell's theory—its limitations.

Distribution of charge on conductor; force on an uncharged body; boundary conditions; uncharged sphere in an electric field; electrical images—conducting plane and sphere.

Capacity of a condenser—spherical, cylindrical and parallel plate, effect of dielectric on capacity; condensers, construction, different types. Electrometers, absolute and quadrant types. Practical uses of Dolezalek Electrometer; sensitive electroscopes and their use. Comparison of capacities and determination of di-electric constants.

Electro-magnetism—Theoretical.

Magnetic shell, Ampere's theorem; strength of the magnetic shell, magnetic field due to an uniformly magnetised sphere. Circular current; Helmholtz galvanometer; solenoidal current.

Work done in carrying a magnetic pole round a current line integral of magnetic field, magnetic field due to a straight current and a solenoid. Magnetic permeability, magnetic induction—boundary conditions; force on magnetic body in uniform field, force on current in magnetic field; suspended coil and ballistic galvanometers; effect of current on current, co-axial coils, Kelvin's ampere-balance. Simen's electro-dynamometer, Grassot fluxmeter.

Theories of magnetisation—Weber, Ewing, Magnetic induction, intensity of magnetisation. Study of magnetic properties in iron and other materials, the magnetometer mothod, the ballistic method. Hysteresis, hysteresis tester Weak and strong magnetic fields. Variation of susceptibility with temperature. The magnetic circuit, Bar and Yoke tests.

Electro-magnetic induction. Lenz's law, self-inductance and mutual inductance. Growth and decay of current; units of inductance. Charge and discharge of a condenser, current and charge in the secondary circuit, the induction coil, methods of measuring inductances Growth of current in a circuit with inductance, capacity and resistance when a steady E.M F. is applied, frequency of oscillation, discharge of the condenser when the applied E.M.F. is removed.

Alternating Currents.

Circuit with inductance and resistance, representation by a vector diagram, measuring instruments. Virtual current and E. M. F Measurement of inductance and power in alternating current circuit; Wattmeters. Circuit containing capacity inductance and resistance Choking coil, oscillographs, transformers. Resistance and inductance of wires for currents of high frequency; shielding effect of a mass of metal; repulsion between conductor and circuit carrying alternating current, rotating magnetic field; single phase and polyphase motor, imaginary quantities, rotating vectors; application to circuit containing inductance capacity and resistance, different inductance bridges; Maxwells Anderson's Vibration galvanometer. Units.

Electro magnetic and electrostatic system of units; their relation and practical determination of the ratio, determination of the ohm.

Electrolysis.

Electrolytic dissociation, osmotic pressure. Migration of ions. Ionic velocities, theory; experimental determination. Conductivity and its determination; theory of reversible cells, concentration cells, capillary electrometers. Accumulators.

Thermo-electricity.—Seebeck, Peltier and Thomson Effects. Thermoelectric power, thermo-dynamics of a thermo-couple, the thermo-electric diagram applications.

Electric Instruments.

Ammeter, Voltmeters; Galvanometers—string galvanometers, ballistic galvanometers; dynamometers, Wattmeters, potentiometers, bridge; measurement of current, resistance and voltage

Applications of Electricity

D.C. and A.C generators and motors. Characteristic curves and efficiency Induction motors, transformers and transmission of power.

Electro-magnetic radiation

Plane-waves. Oscillatory discharge. Hortz's experiments; determination of wave-length by stationary oscillation, oscillators and detectors. The triode valve Elements of wireless telegraphy and telephony.

Discharge of Electricity through Gases.

Discharge at low pressures, Cathode rays and their properties; Determination of velocities and the ratio m/e of electrons, different methods of determination of e. C.T.R. Wilson's experiments, Millikan's modification.

MODERN PHYSICS

I. Dielectrics.

Dielectric polarization. Clausius-Mossotti Law. Relation between index of refraction and dielectric constant. Lorenz-Lorentz Law. Polarization in certain dielectrics. Failure of Clausius-Mossotti Law, Debye's theory of dipole molecule. Langavin Debye formula for electric polarization.

Determination of dielectric constant using high frequency volve oscillators. Different methods of determining the electric moments of molecules. Electric moments and molecular structure

II. Magnetism.

Electron Orbit theory Effect of electric and magnetic field on moving charges. Larmor's theorem. Diamagnetism. Langevin-Pauli formula for the diamagnetic susceptibility. Atoms and molecules. Comparison with experiment Pascal's additive law.

Paramagnetism. Langavin's theory. Curis Law. Application to solids. Internal molecular fields. Curie-Weiss Law. Experimental results. The Weiss Magneton and the p-values. Anomalous paramagnetism.

Ferromagnetism. Internal molecular fields and spontaneous magnetisation. Laws of spontaneous magnetisation. Curie point. Behaviour of ferromagnetics above Curie point. Specific heats of ferromagnetic substances. Magnetocaloric effect. Production of low temperatures by the method of adiabatic demagnetisation.

Methods of determining the susceptibilities of weakly magnetic substance—gases, liquids and solids.

Quantum theory. Orbital and spin angular moments and the corresponding magnetic moments. Space quantisation Electronic and atomic quantum numbers. Pauli exclusion principle. Spectroscopic states and magnetic moments of atoms. Relation between the angular momentum and the magnetic moment. Lande splitting factor. The gyromagnetic effect. Experiments of Stern and Gerlach. Zeeman effect-Normal and anomalous. Paschen-Back effect.

III. Radio Activity. Nuclear Physics.

Phenomena of radio-activity; radio-active substances; Characteristics of radio-active radiations. Nature and properties of α, β and γ rays. Methods of measurement—the α ray and the β and γ ray electroscopes, electrometers. Counting of γ β particles. Scintillation method, electrical method—from the amount of helium collected.

Radio-active decay—radio-active constant. Mathematical theory of decay and of successive transformations by disintegration. Transformation series of radio-active substances. Radio-active evidence of the age of the Earth.

Radio-active gases or emanations, discovery, nature and properties; methods of finding the half value period—Rutherford, Curie.

Range of α particles, range and velocity, ionisation at different parts of range—the Bragg curve. Relation between range and radio-active constant.

Scattering of α rays—explanations, Thomson's model of the atom. Rutherford's model. Mathematical theory of scattering and experimental verification. Size and charge of nucleus from scattering experiments. Theory of impact of α parcticle with the nucleus of a light element. Rupture of the nucleus by α *ray* bombardment.

Theories of radio-active phenomena—elementary exposition.

Thomson's work; discovery of Isotopes; improved focussing methods of Aston and Dempster in obtaining mass spectra.

Packing effect. Theory of the constitution of the atomic nucleii.

IV. Optical Spectra.

Arc and spark spectra; series in line spectra; series relationships, laws of Rydberg-Schuster and Runge; spectral terms.

Hydrogen spectrum—Lyman, Balmer, Paschen, and Brackett series. Rydberg and Ritz formulae for spectra of the general atom; Ritz combination principle.

Quantum theory of spectra, Bohr's fundamental postulates. Theory of Hydrogen spectrum; effect of nucleus, Bohr's correspondence principle. Elliptic orbits—Sommerfeld, total quantum number, azimuthal quantum number, radial quantum number. Relativity, change of mass, fine structure of hydrogen lines, results of Sommerfeld theory.

Elements of molecular spectra.

V. X-Rays.

Production of X-rays. The gas tube, the Collidge tube; the absorption of X-rays, nature and properties of X-rays, practical applications and uses of E-rays, elements of E-ray technology.

Measurement of X-ray wave lengths, X-ray spectrometry.

X-rays and crystal structure with reference to Kcl, Nacl, Zns and C.

The continuous X-ray spectrum: determination of Planck's constant; total intensity and distribution; experiments of Wagner and Kulenkampff.

Quantum theory of X-rays; K.L.M. and N. series. Mosley's law.

Scattering of X-rays; Compton Effect.

VI Ionisation and Radiation Potentials.

Methods of determining ionisation and radiation potentials, electrical and spectroscopic methods—electrical (i) Lenard (ii) Franck and Hertz (iii) Davies and Goucher—distinguishing radiation potential from ionisation potential. (iv) Franck and Einsporn, (v) Partial current method. (vi) Hertz methods. Spectroscopic—Franck and Hertz.

Elastic and inelastic collisions.

VII. Scattering of Light.

(*a*) *Classical Scattering.*—Theory of molecular scattering. Rayleigh. Scattering by gases and vapours, experimental. The blue of the sky. Scattering by liquids. Intensity and polarisation measurements. Theory of Einstein and Smoluchowski and of Raman-Ramanathan. The colour of the sea. Comparison of the depolarisation in the gaseous and liquid states. Optical anisotrophy of atoms and molecules.

(*b*) *Raman Scattering.*—Discovery of the Raman Effect. Experimental method of investigating the Raman Effect. Intensity and polarisation of Raman lines and their qualitative explanation. Relation between Raman Effect and infra red absorption. Raman Effect in the three states of aggregation. Relation between Stoke's and Antistoke's lines. Raman Effect and chemical constitution.

Physics (Subsidiary).

Same as that prescribed for Physics (Subsidiary) for the B.Sc. (Pass) Degree Examination.

A—Chemistry (Main).

GENERAL SUBJECTS.

1. General and Historical Chemistry.

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2. Physical Chemistry.

In addition to a ***fuller treatment*** of the subjects prescribed for the B.Sc. Pass, a study of the following should be made :—

Reaction isochore; velocity of trimolecular reaction; determination of the order of reaction; theory of indicators.

Theory of galvanic cells; single electrode potentials; decomposition potentials; concentration and gass cells; hydrogen ion concentration and elementary knowledge of ionic activity; determination of "e."

Determination of Avogadro's number.

Arrangement of atoms and molecules in crystals, and in unimolecular films.

The practical examination shall include Physico-Chemical experiments on the following subjects :—

Setting up of a thermostat.
Molecular weight determination.
Viscocity.
Surface tension.
Velocity of typical reactions.
Determination of the order of reaction.
Heat of neutralisation, solution, dilution, ionisation and of combustion.
Determination of refractivity.
Polarimetry.
Spectroscopy.
Conductivity.
Transport numbers.
Ionic Velocity.
Concentration cells.
Electro analysis.
Transition point.
Partition co-efficient.

3. Inorganic Chemistry.

In addition to a fuller treatment of the subjects prescribed for the B.Sc. Pass, a study of the following should be made :—

History of Chemistry since the earliest period up to the recent developments.

Atomic structure; atomic number; periodic law; theories of valency, determination of equivalent, atomic and molecular weights; radio-activity, isotopes; chemical crystallography, isomorphism; double and complex salts.

A comprehensive study of the Chemistry of all the commoner elements and their compounds. A short study of the rarer elements, radio-elements and their compounds.

Metallography and Metallurgy.

Practical Course

Qualitative :—Analysis of mixtures containing not more than six radicals, positive and negative, excluding rare elements.

Preparation of typical compounds like —Ferrous Ammonium sulphate, chrome alum, anhydrous aluminium chloride, sulphuryl chloride, phosphorous trichloride, hydrazine sulphate, chloropentammine, cobaltic chloride.

Quantitative :—Gravimetric estimation of the individual positive and negative ions excluding the rare metals. Separation of iron from aluminium iron or aluminium from zinc manganese, nickel and magnesium; lead from antimony; copper from zinc, iron or nickel; calcium from magnesium.

Acidimetry; alkalimetry; oxidation and reduction methods; iodometry; precipitation methods.

Analysis of typical alloys like :—brass, bronze, German silver.

Analysis of minerals :—hæmatite, pyrolusite, dolomite, limestone, pyrites, chromite.

Analysis of bleaching powder, red lead, water reagents etc.

Analysis of air and coal gas.

4. Organic Chemistry

A fuller treatment of the subject given in the B.Sc. Pass course with special reference to recent developments.

Cyanogen Compounds and their Oxy and Thio-derivatives. Their isomerism, ketonic acids and Di-ketones. Polypeptides. Proteins. Configuration of monosaccharides. Chemistry of starch and cellulose.

Cyclo-paraffins and Cyclo-olefines. Benzenoid. Hydrocarbons and their important derivatives, Phenanthrenes. Triphenylmethane and Anthracene dyestuffs. Furane. Thiophene. Pyrones. Coumarins. Chromones and Flavones. Xanthones. Natural colouring matters of the Flavone and Xanthone series. Anthocyanins. Diazoles and Triazoles; Pyrroles; Indoles; Indigo, Carbazole. Pyridines. Quinolines. Isoquinolines. Acridines.

Monocyclic, dicyclic and olefinic. Terpenes, Camphors. Pinene, Camphene, Bronylene. Fenche.

Pyrimidines and Puriness. Alkaloids.

Special types of condensations. Fuller treatment of Geometrical isomerism, automerism, and stereo-isomerism of Carbon and Nitrogen compounds. Bæyer's Strain Theory and modern developments. Relation between Chemical constitution and Physical properties.

N.B.—The course may and should be varied from time to time to admit of references to questions more immediately engaging the attention of Chemists.

Practical Organic Chemistry.

Texts for the recognition of the important classes of Organic compounds. Identification by Physical and Chemical tests and the preparation of derivatives of about 16 pure Organic substances. Separation of about 6 mixtures containing not more than 3 different compounds. Estimation of the more important groups occurring in Carbon compounds e.g., Nitro, amino, hydroxy, carbonyl, methoxy etc. groups. Ultimate analysis by combustion of carbon, hydrogen, and nitrogen in organic compounds. Estimation of halogens and sulphur by Carius method.

Preparation of at least a dozen organic compounds of an advanced type involving the application of important typical reactions.

Special Subjects

1. *Electro-Chemistry*

The scope of the syllabus is indicated by the books recommended.

2. *Technical Gas reactions*

The scope of the syllabus is indicated by the books recommended.

3. *Analytical Chemistry*

The scope of the syllabus is indicated by the books recommended.

4. *Chemistry of rarer elements and their industrial uses*

The scope of the syllabus is indicated by the books recommended.

PRACTICAL COURSE.

Qualitative:—Analysis of mixture containing rarer elements; spectral analysis; micro-analysis.

Quantitative:—Analysis of more complicated minerals, ores and alloys which may contain rarer elements; analysis of ordinary and special steels; electro-analysis; conducto-metric and potentio-metric titrations; assaying.

Special students are required to consult original papers on the subject.

5. *Tinctorial Chemistry*

The scope of the syllabus is indiacted by the books recommended.

6. *Bio-Chemistry*

Definition and scope; Reactions in the living cell; application of Physico-Chemical principles to their study; Chemistry of the colloid state; Enzymes and the mode of their action; Fermentation of sugar into alcohol; Yeast and its properties; theories of alcoholic fermentation; Chemistry of fats, sterols and lipins and their metabolism in the plant and animal cells; Proteins and Carbohydrates and their metabolism; Drugs; natural and synthetic action of drugs and their relation to Chemical constitution; Chemo-theraphy, Chemistry of food; dietetics; isodynamic value of food; Calorific requirement and surface law; normal diet; the energy equivalent of growth, nitrogenous bases forming the active principles of internal secretion; their Physiological action; effect on sex metabolism: blood and its Chemical composition; plasma, serum, fibrinogen etc., mechanism of coagulation of blood; Chemistry of Haemoglobin; Specific oxygen capacity of blood; bosal metabolism; action of light on biological processes; effect of light energy; photo-synthesis in plants; Chlorophyll, Vitamins.

N.B.—A course of dozen lectures on human Physiology should be given to the students to supplement their course in Bio-Chemistry.

PRACTICAL BIO-CHEMISTRY

A. Bacteriology.

Making of sterile water and storage.

Making and storing of media: Nutrient broth, Nutrient agar.

Preparation of sterile tubes and plates of agar and gelatine.

Preparation and examination of cultures. Staining of cultures by (a) dry and (b) wet staining process.

Cultivation of anaerobic bacteria by two distinct methods.

Isolation of bacteria from (a) soil and (b) air, and preparation of a pure culture.

Counting of Colonies on Petri Dishes

Photo-micrography.

Preparation of a pure culture of yeast and determination of its efficiency; Analysis of water: Chemical and bacteriological.

Preparation of indicators and buffer solutions. Determination of Ph.values of (a) urine and (b) a plant sop by electrical and indicator methods.

Tests for proteins. Determination of iso-electric point of Casein.

Preparation of the following amino-acids from natural sources:—

(a) Glycine ester hydrochloride from gelatine.

(b) Histidine from animal blood.

(c) Cystine from hair.

(d) Tyrosine and Leucine from horn shavings.

Determination of nitrogen in amino-acids by Van Slyke's method.

Mono-Saccharides: Common tests. Estimation of sugar by (a) Bertrand's method (b) Polarimetric method. Experiments with starch.

Yeast: Preparation of a pure culture. Determination of fermenting power. Deduction of Chloral to tri-chloro-Ethyl-alcohol by Yeast and Sugar.

Enzymes: Preparation of Lipase from castor, beans, determination of its splitting action. Preparation of malted barley and diastase. Estimation of diastatic power of malt.

7. *Chemistry of Sugars and Carbo-hydrates*

Syllabus for Applied Chemistry of Cane Sugar and other Important Carbo-hydrates

Lecture Course:

Detailed study of the properties and constitutions of the mono and disaccharoses, starch and cellulose. Elements of soil and plant chemistry with special reference to the sugarcane crop. Cane sugar manufacture in detail. Sugar refining. By-products of cane sugar industry and their utilization. Other sources of sugar in India. Elements of the manufacture of starch, paper and artificial silk.

Laboratory Course:

Identification of the more common carbohydrates. Graduation and manipulation of the scientific instruments and apparatus used in sugar analysis. Preparation of reagents required in sugar analysis. Detailed

analysis of sugar-cane, sugars and sugar products. Detailed analysis of all factory products and wastes required for the proper chemical control of white sugar manufacture., Estimation of starch maltose and dextrin.

8. Colloid Chemistry

Theoretical:

The Colloidal state, methods of preparing colloidal solutions, suspensoids and emulsoids, lyophobe and lyophile colloids.

Physical properties of colloidal solutions :—

(1) Diffusion of Colloidal particles, Perrin's work.

(2) Osmotic pressure.

(3) Tyndall's phenomena, light scattering by colloidal particles, the ultra-microscope, size and shape of the colloidal particles.

(4) Surface tension and viscosity of colloids.

(5) Cataphoresis and electrical endosmose.

(6) Dialysis and ultrafiltration.

(7) Coagulation by electrolytes, (a) the electric charge of the colloid particles, (b) absorption, (c) hydration of colloid particles.

Elementary treatment of Kinetics of coagulation. Electro-chemistry of colloids. Protective action. Gold number. Peptisation. Sensitisation. Proteins and their colloidal behaviour. Membrane Potential. Donan Equilibrium. Gel and Gel structure. Liesegaug Phenomenon Emulsions and their technical treatment. Elementary account of the above. Importance of colloids in Biology; Medicine and Industry.

Practical work:

Preparation of solutions of gold, silver and sulphur, sols, of ferric hydroxide, aluminium hydroxide. Vanadium pentoxide and chromium hydroxide, sols of sulphides of arsenic and antimony.

Coagulation of colloids.

Cataphoresis

9. *CHEMISTRY OF FOODS AND DRUGS*

Lecture Course:	Chemistry of the following:
1. Carbohydrates	Occurrence, preparation and constitute of mono and dissaccharoses, starch, glycogen pectins, glycosides.
2. Proteins	Their composition and hydrolysis, classification, structure and reactions. Amino-acids and polypeptidos.
3. Oils and Fats	Characterisation of fats and oils. Their main components, sterols, lecithin.
4. Vitamins	Nature and properties of Vitamins, A.B.C.D. and E.
5. Enzymes and their action	Occurrence and Chemical nature of enzymes. The main characteristics of enzyme action.
6. Alkaloids	Medicinally important alkaloids, their characteristic properties, uses and chemical constitution.
7. Synthetic Drugs	Including organometallic compounds and the relation between chemical constitution and physiological properties.
8. Hormones	Adrenaline, thyroxin, insulin.

Laboratory Course:

Proximate analysis of Food stuffs.
Analysis of sugar products.
Examination of fats and oils for their physical and chemical properties. Typical prepartions of drugs from natural sources and by synthetic methods.
A few examples of assay of drugs.

50 Lectures and about 180 hours of practical work.

Chemistry (Subsidiary)

Same as that prescribed for Chemistry Subsidiary for B.Sc. (Pass) Degree Examination.

Mathematics (Subsidiary to Physics Main)

Same as that prescribed for Mathematics Subsidiary for B. Sc. (Pass) Degree Examinations.

Mathematics (Subsidiary to Chemistry Main.)

For text-books, *vide Annual Register.*

B—CHEMICAL TECHNOLOGY AS THE MAIN SUBJECT

PART I

(a) Mathematics

Same as that prescribed for Mathematics Subsidiary to Chemistry Main for B.Sc. Hons. Degree Examination.

(b) Physics.

The examination, the syllabus and the papers shall be the same as those for the B.Sc. (Hons.) Chemistry Main students.

(c) Chemistry.

[The syllabus shall be taught with emphasis on the industrial aspects so that it will form a good introduction to the Chemical Technology course.]

Lectures.

Inorganic Chemistry :—The periodic Law as the basis for the classification of the elements and its interpretation in the light of modern advances Chemistry of the non-metals. The manufacture of industrially important non-metallic elements and compounds. More detailed treatment of the Chemistry of Boron, Nitrogen, Phosphorus, Arsenic, Antimony, Bismuth, Sulphur, the halogens and their compounds.

Systematic study of the metals and their compounds including the more important rare earths and inert gases. The industrial preparations of the more important of these Alloys and industrial gases.

Organic Chemistry :—The scope of Organic Chemistry. Analysis of organic compounds. Molecular and constitutional formulae

A study of the important compounds of the aliphatic and aromatic series with emphasis on commercial preparation and uses, the important condensation and reactions involved, the different kinds of isomerism, the methods of establishing constitution and the principles governing substitution and reaction.

Elementary treatment of the following :—Pyridine, quinoline and isoquinoline, pyrrol, indol and indigo, simple alkaloids, terpenes and synthetic dyestuffs.

Physical Chemistry :—General properties of solids, liquids, gases and solutions. Determination of molecular weight. Refractivity, Spectroscopy and Optical activity Ionic theory and its application, hydrolysis of salts. Electromotive force, theory of indicators and hydrogen ion concentration. Thermo-Chemistry Chemical equilibrium, velocity of reactions, catalysis. Liquefaction of gases. The phase rule and its applications. Some applications of thermo-dynamics in Chemistry. Colloidal state, absorption and surface chemistry.

Practical Course.

Inorganic Chemistry :—Qualitative analysis of inorganic mixtures containing not more than 4 radicals.

Preparation of about a dozen substances involving typical methods.

Volumetric analysis including acidimetry, alkalimetry, oxidation and reduction methods involving the use of permanganate, dichromate and iodine and precipitation methods.

Gravimetric analysis of calcium, copper, lead, aluminium chloride, sulphate, phosphate and carbonate.

Organic Chemistry:—About 15 preparations involving important reactions.

Qualitative analysis: Identification of compounds by means of reactions for functional groups and preparation of derivatives

Physical Chemistry:—Simple exercises on the following:—Molecular weight determination, velocity of reaction, solubility, partition co-efficient, Colloids and absorption. Simple exercises in electrochemistry

Density, viscosity, surface tension, refractivity, spectroscopy and polarimetry will be done under Physics.

(d) General Engineering

Lecture Course

1. *Principles of General Engineering (Descriptive)*—

Mechanical properties and uses of Engineering materials, Stress and strain. Modulus of elasticity, elastic limit, Ultimate strength, Factor of safety and Working stress.

2. *Elementary Building Construction*—

Building materials, foundations, etc., Elementary study of beams, bending moments and shearing forces. Sections of wrought iron, steel and wood.

3. (*a*) *Elementary Surveying.*

(*b*) *Dynamics of Fluids.*

(1) *Heat Engines*—

Raising of steam, various types of boilers, steam engines, Internal combustion engines Transmission of power.

(2) *Electrical Engineering*—

Direct current. Alternating current. Machines and apparatus of different types. Changing of batteries. Power transmission.

Practical

1. *Drawing Office*—

(*a*) Geometrical Drawing—Use of scales and instruments. Plane figures. Solid geometry—Principles of projection—Projection of solids placed in simple positions. Plans and elevations of solids. Simple cases of intersection and development of surfaces.

(*b*) Freehand sketching of Machine details from Models and from Machine parts.

At least three exercises of Machine-parts-drawing to scale.

II. *Workshop*—

Use of hand and machine tools : Fitting, chipping, filing, scraping, screwing and tapping. Use of scribing block, gauges and squares.

Soldering, brazing, machinery, drilling, boring, turning and milling. Smithy work.

Carpentry, planing, joining, turning and making simple models in wood.

III. *Testing Laboratory*—

1. Tension, compression, bending, hear, etc.
2. Steam engine trials.
3. Electrical Laboratory.
4. Surveying.

(e) Pharmaceutical Botany

A. Living and non-living things and their main feature
The differences between Plants and animals.
Protoplasm, Cell, Cell structure, Cell division and gametogenesis.
Cojugation and fertilization.

B. 1. A general survey of the leading sub-divisions of plant kingdom as indicated below :—

Thallophytes, Bryophytes, Pteridophytes, Gymnosperms and Angiosperms—their general characteristics with the help of an elementary study of the types suggested below :—

Euglema, Ghlamydomonas, Spirogyra, Sargassum, (external features and gross structure), Bacteria, Yeast, Mucor, Agaricus, Lichen, Machantia, Moss, Form, Pinus, (external features and broad outline of life-history), Argomone Mexicana, Sesbania Grandiflora, Helianthus annus and Crinum Latifolium.

2. Cell : Cell structure, cell contents (such as Sugar, Starches, Tannins, Inorganic crystals, mucilages, gums, resins, oils, glucosides, alkaloids, Latex, pigments) and their behaviour to microchemical reagents.

Cell Walls : Their formation and composition, various kinds of cell walls and the behaviour of each with microchemical reagents.

Tissues : Different kinds of tissues, their occurrences and indentification in situ and when isolated.

The elements of Plant morphology of Angiosperms embracing (a) the structure Macroscopic and microscopic) of root, stem and leaf, (b) the structure of a typical flower and principal modifications of the type, (c) the Inflorescence and the principal types, (d) the principal types of fruits, (e) the structure and development of the seed. The functions of the various plant organs.

Practical

Microscopic examination and identification of cell contents and of different tissues of the different parts of a type plant.

Making temporary mounts of sections of Root, Stem and leaf of Angiospermic plants.

Description in technical terms of Angiospermic plants.

Books recommended

Pharmaceutical Botany by Yengken, H. W.

Biology for Pharmaceutical students and others by Mangham, S. & Hooley, A.R.

Part II

(A) General Chemical Technology

(*Lecture course. about* 100 *lectures.*)

Inorganic.—Metallurgy of iron, copper, lead, nickel, zinc, tin, aluminium, silver, gold and platinum.

Manufacture of acids.—Nitric, hydrochloric, hydrofluoric and sulphuric acids.

Manufacture of alkali and salts.—Sodium hydroxide, soda ash and allied industries, sodium and potassium sulphate, hypochlorities, perchlorates, persulphates, permanganates, phosphates and superphosphates, nitrates and nitrites.

Manufacture of silica glass, bricks, potteries, cements, plasters, bricks, lime, carbides, alundum, graphite, magnesium and rare earths.

Manufacture of industrial gases. Fixation of nitrogen.

Organic.—Distillation of coal and wood. Petroleum and coal tar products. Dyestuffs, Textile fibres, cellulose and paper. Sugars, starch, dextrin, acetic acid, alcohol, glycerol, explosives, resins and plastics. Tannins and leather tanning, fats, waxes, essential oils and drying oils. Paints and varnishes. Drugs and some synthetic products.

Text-books—

1. Industrial Chemistry by Riegel.
2. Industrial Chemistry, two volumes, by Allen Rogers.

Reference books—

1. Industrial Electro-Chemistry by C. J. Mantell.
2. Applied Electro-Chemistry by A. J. Allmand.

(*Laboratory course about* 250 *hours.*)

Analysis of water, fuel, lubricants, alloys, fertilizers, fats and oils, paints, pigments and varnishes. Estimation of cellulose and tanning materials.

Preparations. Nitration, sulphonation, halogenation, acetylation, esterification and diazotisation. Reduction and hydroxylation (caustic fusion).

DISTILLATION OF COAL TAR

Etectrolysis and electrodeposition. Preparation and purification of some simple inorganic salts.

(B) Chemical Engineering

(*Lecture course about* 100 *lectures.*)

1. *Transportation of solids, liquids and gases* —Transportation of solids ; Conveyors, elevators, cranes. Railway transportation Transportation by road and water. Flow of fluids : Streamline and turbulent flow, fluid films, flow of viscous fluids, friction factors, friction loss in pipe , different type of pumps and compressors, long distance transportation. Transportation of corrosive liquids.

2. *Heat transmission.*—Transference of heat by radiation, convection and conduction, coefficient of heat transmission of various solids Different types of heaters and heat exchangers.

Evaporators.—Different types of evaporators ; their working, principles and designs ; evaporation of different liquids from various types of surfaces.

Distillation.—Distillation under different pressures—various types of stills and rectification columns.

Drying.—Different types of dryers, their principles of working and design. Humidification, dehumidification, air conditioning, water cooling, use of humidity chart.

Temperature measurement —Thermometers, thermocouples, optical pyrometers.

Refrigeration.

3. *Furnaces and kilns.*—Combustion of fuels in furnaces. Different types of furnaces. Flow of the products of combustion, heat efficiency, stacks and chimneys.

4. *Processes—Crushing and grinding.*—Various types of crushers, their principle of working and design. Power consumption, efficiency, etc.

Mechanical separations.—Screening, shifting, floatation, sedimentation, ltration, different types of filters, centrifuges, supercentrifuges.

Mixing.—Different types of mixers and stirrers, colloid mills, paint ills, etc.

Extraction, etc.—Extraction, leaching, absorption, adsorption, crystalliza-on.

5. *Materials of construction.*—Special reference to chemical and electro-emical industries.

Metals.—Iron, ferrous alloys, nickel, copper, lead, zinc, aluminium, silver, n, platinum, brass, bronze.

Non-metals.—Porcelain, silica, earthenware, bricks, cement, wood, ebonite, bber, etc.

Text-book—

Elements of Chemical Engineering by Badger and Mccabe.

Reference books—

1. Handbook of Chemical Engineering, Volumes I and II by D. M Liddell.
2. Handbook of Chemical Engineering by Harold Tongue.
3. Principles of Chemical Engineering by W. H. Walker, W. K. Lewis and W. H. McAdams.

(*Laboratory course about 200 hours.*)

Crushing and grinding, screening. Temperature measurement, calorific lue of solid, liquid and gaseous fuels, flow of the fluids. Friction loss in pes, flow of heat, determination of coefficient of heat transfer. Evaporation, stillation and rectification, plate efficiency, leaching and crystallization.

(C) Special Subjects

(i) Sugar Technology

(*Lecture course · about 50 hours.*)

General outline of the modern plant and machinery for the manufacture, ntation, white sugar manufacture, manufacture of jaggery and raw sugar inery.

Extraction of juice from cane, milling and diffusion, composition of the ce, juice clarification, by sulphition, carbonitation and defeaction processes; ling of juice to syrup and the syrup to massecuit, curing of massecuit sugar.

Manufacture of jaggery, manufacture of white sugar from raw sugar and gery.

Chemistry of glucose as sucrose Laboratory routine work and chemical control of a cane sugar factory.

(*Laboratory course: about 150 hours*)

Graduation of sugar apparatus, polariscope, refractometer, ionometer, estimation of sugars, volumetric and gravimetric analysis of raw materials, chemicals, products and by-products of a cane sugar factory.

Text-books—

1. The Handbook for Cane Sugar Manufacture and their Chemistry by Spencer and Meads.
2. Cane Sugar and its Manufacture by H. C. P. Geerligs.

* (ii) PHARMACEUTICS

(*Lecture course: about 50 lectures.*)

Crude drugs, their important constituents and uses. Isolation of the active principles of natural drugs. Chemistry of inorganic and organic substances in common use in pharmacy. Synthetic drugs.

Pharmaceutical operations The preparation of the official galenicals. Physical and chemical examination of pharmaceutical substances and their standardization.

Text books—

1 Bentley and Driver's Text-book of Pharmaceutical Chemistry.
2. Science and Practice of Pharamacy by Bennet and Cocking (Volumes I and II).

Reference books—

1. The British Pharmacopoeia, Text-book of Pharmaceutics by Bentley.
2 A Treatise on Pharmacy by C. Caspari.

(*Laboratory course: about 150 hours.*)

Small-scale preparations of tinctures, fluid extracts of, and other pharmacopoeial substances.

Examination and standardization of drugs according to the Pharmacopoeia.

Preparation of some active principles.

Botanical and chemical identification of crude drugs and fine chemicals.

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*For the revised course to come into effect as from 1944 examinations *vide* next page.

Reference books—

1. Practical Pharmaceutical Chemistry by Coper and Appleyard.
2. The British Pharmacopoeia.
3. Drugs and Galenicals by D. G Garret.
4. British Pharmaceutical Codex, 1934.

The following will come into effect as from the examinations of 1944 :—

(ii) PHARMACEUTICS AND FINE CHEMICALS

(*Lecture Course : about 100 lectures*).

Chemistry, commercial preparation, standardization and uses of inorganic and organic substances listed in the British Pharmacopœia.

Official definition, source and distribution, important constituents, official methods of standardization and uses of vegetable and animal drugs listed in the British Pharmacopœia.

Pharmaceutical operations. The preparation of the official galenicals and their standardization.

(*Laboratory Course : about 250 hours*).

Preparation of galenicals and other pharmacopœial substances.

Examination and standardization of drugs according to the Pharmacopœia.

Identification of crude drugs and fine chemicals.

(iii) TECHNOLOGY OF OILS AND FATS

(*Lecture course : about* 50 *lectures.*)

Fats.—Chemical nature of the fats and fatty oils, statistics, recovery, refining and hardening of oils, hydrolysis, manufacture of soaps, candles, polymerisation of oils for paints and varnishes.

Different types of waxes; their occurrences and chemical nature. Uses.

Essential oils.—Statistics, recovery of essential oils, chemical nature and utilization.

(*Laboratory course : about* 150 *hours.*)

Recovery of fats by expression and solvent extraction. Physical and Chemical test for oils, fats and waxes. Hydrolysis of fats, analysis of fatty foods. Assaying of essential oils and the raw materials. Boiling of hard and soft soaps. Analysis of soap. Analysis of paints, pigments and varnish.

Text-books—

(1) Oils, Fats and Fatty Foods by E. R. Bolton.
(2) The Industrial Chemistry of the Fats and Waxes by T. P. Pilditch.
(3) The Utilization of Fats by Dean.

C—BOTANY OR ZOOLOGY OR GEOLOGY AS MAIN SUBJECT

PART I.

French and German [same as for B.A. (Honours), Part I].

PART II.

Botany (Main)

No detailed syllabuses have been prescribed.

Botany (Subsidiary)

Same as that prescribed for Botany (Subsidiary) for the B.Sc. (Pass) Degree examination.

Zoology (Main)

Subjects as set out for the B.Sc. (Pass) will have a more detailed treatment. In addition candidates will be expected to have a knowledge of the following :—

1. Minor groups, Mycetozoa, aborrant ctenophores (e.g., ctenoplana, coeloplana), Dicyemidae and Orthonectidae, worms of uncertain position, and Myzostomidae, Tardigrada, Pentastomida
2. Paleontology, Nature and mode of preservation of fossils, Evolutionary Palaeontology dealing with the fossil representatives of the more important groups of animal life, both Vertebrate and Invertebrate.
3. Vertebrate Embryology and comparative study of
   (*a*) the development of the embryo as far as the formation of the main organ-systems,
   (*b*) the later development with special reference to nutrition, metamorphosis and protection.
   (*c*) Elements of Experimental embryology.
4. Genetics—Mendelism, the mechanism of heredity. The Chromosome theory of heredity, linkage, sex-linked inheritance, crossing over, non-disjunction, mapping of the chromosomes, sex-determination.
5. Cytology Constituents of a cell; origin, structure and function of Golgi bodies and mitochondria, cell-division, germ-cells—their origin, structure and maturation.

Any one of the following special subjects : -

(*a*) *General and Comparative Physiology.*—Elementary Physics and Chemistry as applied to biological systems. General physiology of the cell. Action of physical and chemical influences on the cell.

Comparative physiology of digestion, respiration, excretion, circulation of body fluids. Animal behaviour—sense organs, effectors, nervous and endocrine co-ordination.

(*b*) *General Entomology.*—A general study of the external and internal anatomy, post-embryonic development and biology of insects; Natural orders; origin and phylogeny of insects; origin and development of the wings in insects, aquatic life in insects, social life in insects; insect nutrition, physiology of respiration in insects.

(*c*) *Parasitology.*—Symbiosis and Parasitism. Effect of parasitism on structure and life-history of the parasite and host. A detailed study of parasitism as exhibited by (*a*) Protozoa, (*b*) Platyhelminthes and Nematholminthes.

(*d*) *Marine Ecology*:—The life of the seas. The work of the great oceanographical expeditions. The Physical and chemical environment and its seasonal changes. Littoral communities, and the Benthon, Necton and Plankton. Methods of Plankton research. The basis of the food supplies of the sea. Puttor's theory. The place of the plankton in the economy of marine life; the principal types of plankton; their distribution, seasonal change, vertical migrations and patchiness. The relation of animal and plant planktons. Adaptations of animals to pelagic and deep-sea life, including bio-luminescence. Studies of the natural history of important food fishes such as the sardine, and the flat fish. Practical work on the ecology of the marine plankton, involving a consideration of the physical and chemical factors and accompanied by a grounding in taxonomy.

(*e*) *Agricultural Zoology.*—The course covers; the Structure, biology, and classification of insects and related arthropods, with particular reference to families of agricultural importance, the life-histories and control of some of the principal pests of field and garden crops, stock, and stored produce, insecticides and fumigation methods, biological control; ecological relation of pests to their environment; other invertebrates, birds, and mammals in relation to agriculture; methods of collecting and preserving specimens.

(*f*) *Forest Zoology.*—The course covers; the Structure, biology, and classification of insects and related arthropods, with particular reference to families of importance in Forestry, the life-histories and control of some of the principle forest pests of the world; insecticides, biological control, ecological relation of pests to environment; other invertebrates, birds, and mammals in relation to Forestry; methods of collecting and preserving specimens.

(*g*) *Genetics in relation to Animal Breeding.*—The following subjects are discussed, The chromosome theory of heredity, linkage; sex-linked inheritance, crossing over, non-disjunction; mapping of the chromosomes; the inheritance of anatomical and physiological characters in the domestic animals; sex determination; sex-differentiation, hermaphroditism; heredity and disease; in breeding and out-breeding; telegony and other disputed beliefs; methods of breeding and of conducting breeding investigations.

Practical work.—The practical work will not be confined to the types enumerated. The candidates may be required to dissect any of the more common types of animals included in the classes they study, to identify specimens with the aid of manuals, to report upon Zoological collections, to make microscopical preparation, to cut sections with the microtome and to show their practical acquaintance with the methods employed in studying the embryology of the chick

Candidates may also be examined by *viva voce* questions.

Zoology (Subsidiary)

Same as that prescribed for Zoology (Subsidiary) for the B.Sc (Pass) Degree examination.

Geology (Main)

The syllabus of the Pass course treated more fully and with the addition of the following:—

General Geology.—History and development of the Science of Geology and its different branches. Theories of the origin and evolution of the earth. Earth's interior. Radioactivity and Geology. Age of the earth. Igneous action and its manifestations. Seismology-principles, instruments and records. Earthquake and volcanic belts. Mountains, their origin and structure. Isostasy. Glaciers, rivers and lakes. Evolution of Continent and Oceanic basins.

Crystallography and Mineralogy.—Thirty-two types of crystal symmetry. Structure of crystals as exemplified in groups of minerals. Mathematical relations of crystals. Twinned crystals and crystal aggregates. Projection and crystal drawing.

The reflecting goniometer Measurement of crystal angles and calculation of crystallographic elements.

Optical characters of crystals. Interference, phenomena uniaxial and biaxial character; determination of positive and negative character of minerals. Determination of refractive indices, birefringence, optic axial angle. The petrographic microscope and accessories used in optical mineralogy.

Detailed study of rock-forming and economic minerals, their physical, optical and chemical characters, occurrence, origin, association, alteration, products and uses. A knowledge of micro-chemical tests.

Petrology

Igneous rocks.—Classification; theories of igneous action; origin and evolution of rock types, structures and textures of rocks and their interpretation; petrographic provinces.

Sedimentary rocks—Classification and character. methods of study of sedimentary rocks, sands and heavy residues.

Metamorphic rocks.—Types of metamorphism; metamorphic grades and mineral association; characters and classification.

Meteorites.—Nature and origin, characters and classification.

Structural and Field Geology

Structural Geology.—Relationship of structure to topography and landscape evolution. Advanced geological maps. Sections, and structural problems.

Field Geology.—Field methods and geological mapping. Field notes, geological illustration and preparation of technical reports; collection and preparation of minerals, rocks and fossils for study

Topographical Surveying.—Methods and scale. Contours in relation to topography. Working knowledge of methods of survey and the use of compass, Clinometer, Aneroid, plane-table, level, tacheometer and theodolite.

Palaeontology and Stratigraphy

Palaeontology—Study of important genera of the fossil invertebrata and the most important vertebra and fossil plants of India. Stratigraphical palaeontology.

Stratigraphy.—A fairly detailed study of geological formations as developed in India and Burma—their structural, lithological and palæontological characters. General knowledge of the foreign equivalents of Indian formations.

Practical work.—A course of laboratory work in accordance with the above syllabus. Use of the petrological microscope for advanced studies in mineralogy and petrology. Essays of ores, minerals, Quantitative analyses of rocks, their interpretation and graphical representation; Microscopic preparations and photomicrography. The candidates are expected to maintain records of laboratory work, field notes of excursions and to prepare geological maps of limited areas and reports thereon under the guidance of the staff. Their theoretical and practical knowledge will be tested by the examiners in the *viva voce* examination.

Special Subject

Economic Geology with special reference to India:

A. General principles of Ore deposition, mineral paragenesis and structural relations. A study of the following in regard to their origin, occurrence, distribution and uses:—

(i) *Metallic ores*—Gold, silver, platinum group, copper, lead, zinc, aluminium, magnesium, iron, manganese, chromium, titanium, lithium, tungsten, tin.

(ii) *Fuels.*—Coal, petroleum, natural gas and oil shale.

(iii) *Non-Metallic or Industrial Minerals* including Refractories, Insulating Media, abrasives, ceramic and glass-making materials, fertilisers, paints and pigments Mica, asbestos, graphite, kyanite, sillimanite, corundum, emery, magnesite, garnet, quartz, phosphates, glass sands, kaolin and other clays, felspar, fluorspar, barytes, ochre, gypsum, sodium, potassium and magnesium salts.

(iv) *Rare Minerals*—Monazite, zircon, columbite, tantelite, beryl, chrysoberyl, radioactive minerals.

(v) *Building and ornamental stones and road materials* including lime, cement and plasters.

(vi) *Precious and semi-precious stones*—Diamond, ruby, sapphire, emerald, topax, garnet, spinel, quartz, etc., and their varieties.

B. Geology of water supply—underground water, dams, reservoirs, wells and springs.

C. General principles of study of mineral deposits including prospecting, sampling, estimation and valuation of deposits; economics of mine and quarry management aided by visits to mines and quarries.

D. Knowledge of the elements of ore microscopy; preparation and examination of thin sections of local and polished sections of ores.

E. Elementary principles of geophysical prospecting, the chief methods, their limitations and applicability to particular problems.

Geology (Subsidiary)

Same as that prescribed for Geology (Subsidiary) for the B.Sc. (Pass) Degree Examination.

CHAPTER XLVI

POST GRADUATE AND RESEARCH DEGREES

(Regulations)

I. MASTER OF ARTS (M.A.)

1. A candidate who has qualified for the B.A. (Honours) Degree of the University by passing the prescribed Examination under the Regulations may, without further examination but upon payment of the prescribed fee, proceed to take the M A. Degree of the University at any Convocation subsequent to his taking the B.A. (Honours) Degree.

II. DEGREE OF DOCTOR OF PHILOSOPHY (Ph.D.)

2. The Degree of Doctor of Philosophy (Ph.D.) is conferred on persons who have passed the B.A. (Honours) Degree examination or B. Com. (Honours) Degree examination with Advanced Banking and Currency as special subject under the Old Regulations and with Currency and Exchange as special subject under the New Regulations of the University or an examination of any other University recognized as equivalent * to the above, and who have satisfied the conditions laid down in the following paragraphs.

3. All candidates for the Degree of (Ph.D.) are required to pursue in the University for at least three academic years—the period shall be four academic years in the case of a third class Honours Graduate—an approved full-time course of research under the direction of the Head of the Department concerned or of a member of the University staff appointed by the Vice-Chancellor on his recommendation ;

Provided however that in the case of B.Com. Honours graduates with Advanced Banking and Currency as special subject under the Old Regulations and with Currency and Exchange as special subject under the New Regulations, the subject of research shall be chosen from one of the branches of Economics and that the Head of the

* The following examination have been recognised as equivalent. —
B.A. Hons. of the Travancore University.

Department of Economics or a member of the staff of the Department appointed by the Vice-Chancellor, shall direct their research ;

Provided that, after completion of the first year of the course, a candidate may be permitted to devote such periods as may be deemed advisable by the Vice-Chancellor to full-time research in other approved Universities or institutions, or at a place and under conditions approved by the University, while remaining under the direction of the University or of persons nominated by the University.

It shall be competent for the Vice-Chancellor to reduce the period by one year on the recommendation of the Director of Studies in the case of those who have some research work to their credit and who are teachers of the University or are members of the teaching staff in any of the colleges affiliated to the Andhra University or a recognised University for the preceding 5 years.

4. Before entering on the course of research, candidates are required—

(*a*) to submit to the Vice-Chancellor for his approval through the Head of the Department, the general line of research proposed to be undertaken by them ;

(*b*) to register as students of the University and to pay the prescribed tuition fees.

5. Each candidate shall submit, through the Director of his Studies and the Head of the Department concerned, not less than 3 terms in advance of the date of the examination, the subject of his research.

6. On completing the course of research candidates are required to present a thesis on the subject of their research and to satisfy the examiners that it contains original work worthy of publication.

7. Every candidate shall state in his application the special subject within the purview of the Regulations for the B.A. (Honours) or B. Com. (Hons.) (subject to the condition specified in sections 2

and 3 supra in respect of the latter Degree) Degree of the University upon a knowledge of which he rests his qualification for the Doctorate, and shall, with the application, transmit three copies, printed or typewritten, of a thesis on some special portion of the subject so stated, embodying the result of research or showing evidence of his own work, whether based on the discovery of new facts observed by himself, or of new relation of facts observed by others, whether constituting an exhaustive study and criticism of the published work of others or otherwise forming a valuable contribution to the literature of the subject dealt with or tending generally to the advancement of knowledge. The applicant, in submitting a thesis, shall state generally in a preface and specifically in notes, the sources from which his information is derived, the extent to which he has availed himself of the work of others and the portions of his thesis which he claims as his original. He shall also be required to declare that the thesis submitted is not substantially the same as the one which has already been submitted to any other University.

A candidate who has passed the B.A. (Honours) or B. Com. (Hons.). or an examination recognized as equivalent thereto in the third class shall be required to pass a written examination consisting of three papers of the Honours Degree Examination at the end of the first year of his research in such subjects as the Director of Studies may prescribe. No one who does not obtain at least 60 per cent of the marks prescribed for these shall be permitted to continue for the Ph.D. course.

8. The candidate may also forward, with his application, three printed copies of any original contribution or contributions to the advancement of the special subject professed by him or of any cognate subject, which may have been published by him independently or conjointly and upon which he relies in support of his candidature.

9. The thesis and the original contributions shall be referred by the Syndicate to a Board of three examiners ordinarily drawn from outside India.

10. The Board shall report to the Syndicate the result of the examination of the thesis and if the Syndicate, upon the report, considers the candidate worthy of the Doctorate Degree, it shall declare that the candidate shall be awarded the Degree and cause his name to be published with the subject of his thesis and the titles of his published contribution if any, to the advancement of knowledge.

11. If the Examiners do not approve of the thesis once submitted, the candidate may with the previous approval of the Syndicate submit after an interval of not less then six months from the date of intimation of the non-approval of the thesis to the candidate a revised thesis.

III. DEGREE OF MASTER OF SCIENCE (M.Sc.)

12. The Degree of Master of Science (M.Sc.) is conferred on persons who have passed the B.Sc. (Honours) Degree Examination or B. A. (Hons.) Degree Examination with Mathematics of the University * or an examination of any other University, recognized as equivalent to the above, and who have satisfied the conditions laid down in the following paragraphs.

13. All candidates for the Degree of M.Sc. are required to pursue in the University for at least one academic year, the period being two academic years in the case of a third class Honours or first and second class B.Sc. Pass Graduates, an approved full-time course of advanced study and research under the direction of the Head of the Department concerned or of a member of the University staff appointed by the Vice-Chancellor on his recommendation.

14. Before entering on the course of research, candidates are required—

(*a*) to submit to the Vice-Chancellor for his approval, through the Head of the Department, the general line of research proposed to be undertaken by them, and

(*b*) to register as students of the University and to pay the prescribed tuition fee.

* The following examination has been recognised as equivalent:—
B.Sc (Hons.) in Mathematics of the Mysore University.

They shall submit to the University through the Director of their Studies and the Head of the Department and the Principal the subject of their research not later than 1st October preceding the date of the Examination.

15. On completing the course of research, every candidate for the Degree of Master of Science shall—

(*a*) submit three copies of a thesis, printed or type-written embodying the results of the research carried out by him together with the report of the person who supervised his work. He shall state in a preface to the thesis, the sources from which he has derived information or guidance for his work, the extent to which he has availed himself of the work of others and the portions of the thesis which he claims as original. The thesis should give clear indication of the candidate's ability to conduct research under direction and some knowledge of the technique involved ;

(*b*) appear for a written examination of three hours' duration, in the special branch to which the subject of research belongs ;

(*c*) submit a record of the practical work done as a preliminary to the Research work :

Provided that candidates whose subject of research relates to Mathematical Physics shall take a second paper of 3 hours' duration in lieu of the practical record.

Note.—(i) This paper shall be on New Quantum Theory and Wave Mechanics the scope of the subject being as defined in Wave Mechanics, Vol. II by Prof. A. Sommerfield.

(ii) For purposes of sections 16 and 17 infra this paper shall be taken as a substitute for the practical record, and

(*d*) undergo a *viva voce* test at the discretion of the Examiners.

A candidate who has passed the B.Sc. Honours examination or an examination recognized as equivalent thereto in the third class

or the B.Sc. Pass examination in the first and second class shall be required in addition, at the end of the first year of research, to appear for the following examination.

A candidate who has passed the B. Sc. (Pass) Degree Examination in the first or the second class shall be required to undergo the prescribed course in theory and practice along with the B. Sc. (Hons.) students before he is allowed to sit for the examination at the end of the first year.

(In the case of Physics candidates, two papers on Modern Physics and in the case of Chemistry candidates, one paper in the appropriate subject of the Honours examination.)

Practical Examination (all those prescribed for Honours in the case of Physics and the general subjects in the case of Chemistry),

and secure at least 50 per cent of the marks prescribed in the theory and practical examinations respectively.

16. The Syndicate shall refer the thesis, practical record and the written paper to a Board of two examiners for report and valuation. The practical record and the written paper shall carry 100 marks each and no candidate shall be qualified to receive the M.Sc. Degree unless he obtains at least 50 per cent of the total marks in the practical record and the written paper put together. On receipt of the marks in respect of the practical record and the written paper and the report on the thesis, the Syndicate shall decide whether the candidate may be awarded the Degree.

17. (1) If the examiners do not approve of the thesis once submitted, and if the candidate secures at least 50 per cent of the prescribed marks in the practical record and written paper put together, the candidate may re-submit the thesis after revision, taking into account the criticisms of the examiners, after an interval of not less than six months and not more than one year from the date of intimation of the non-approval of the thesis to the candidate.

(2) If the candidate fails to secure 50 per cent of the prescribed marks at the first appearance and if the thesis has been approved, he may appear for the examination a second time after an interval of not less than six months from the date of the first appearance and submit a fresh record.

(3) If the candidate fails to secure 50 per cent of the marks in practical and theory and if the thesis is rejected, he may appear for the whole examination a second time after an interval of not less than twelve months from the date of the first appearance.

(4) If the candidate is disqualified at the second appearance, he shall not be permitted to present himself again for the examination.

The Board of Examiners who will also set the paper for the written examination, shall consist of one external and one internal examiner. The internal examiner shall ordinarily be the Director of Studies. The valuation of the practical record and the written paper shall be independent whereas the report on the thesis shall be a joint one. The Registrar shall, in consultation with the Principal of the University Colleges, indicate the scope of the examination to the Board of Examiners and the paper shall ordinarily be set so as to give a wide choice to the candidate.

IV. DEGREE OF MASTER OF SCIENCE IN APPLIED PHYSICS

18. A candidate for the Degree of Master of Science in Applied Physics shall be required—

(*a*) to have passed the B.Sc. Pass or B.Sc. (Hons.) Degree Examination of this University with Physics as the Main subject or an examination of any other University accepted by the Syndicate as equivalent thereto ;

(*b*) to have undergone subsequently a further course of study in the University College, extending over a period of one academic year consisting of three consecutive terms in the case of Honours

Graduates and two academic years each consisting of three consecutive terms in the case of Pass Graduates ; and

(*c*) to have passed the prescribed examinations.

19. The course and scope of instructions shall be as defined in the syllabus prescribed.

20. The examination for the B.Sc. Pass Graduates at the end of first year shall consist of three papers in theory each of three hours' duration except in the case of Properties of Matter which shall be of two hours' duration. Besides, there shall be two papers in practical each of three hours' duration.

The theory papers shall be as follows and be commom with the Physics Hons. Part II Main :—

1.	Properties of Matter	... 2 hours— 60 marks.
2.	Light	... 3 hours—100 marks.
3.	Electricity and Magneitsm	... 3 hours— 100 marks.

The practical examinations will be conducted along with those for the Physics Hons. Part II Main candidates and the practical examination carries 200 marks.

The candidates have to submit record of practical work done and the record shall carry 40 marks.

A candidate shall be declared to have passed the Degree examination at the end of the first year if he obtains on the aggregate not less than 40 per cent of the total marks and not less than 30 per cent in each of the parts (*a*) written and (*b*) practical including records.

21. The examinations at the end of the first year for Honours Graduates and at the end of the second year for Pass Graduates shall consist of three papers in theory, and three practicals each of three hours' duration one on each of the subjects, viz. (1) Applied Mechanics, (2) Optical Instruments, and (3) Applied Electricity.

In addition there shall be an examination in drawing. The marks shall be allotted as below :—

Written	...	Three papers each carrying 100 marks	300
Practical	...	Three practicals each carrying 100 ,,	300
Drawing	...	,,	100
Practical records	...	,,	100

22. A candidate shall be declared to have passed the M.Sc. Degree examination if he obtains on the aggregate not less than 40 per cent of the total marks and not less than 35 per cent in each of the parts (*a*) written and (*b*) practical including drawing and records.

23. Candidates declared to have passed the M.Sc. Degree examination shall be ranked in the order of proficiency as determined by the total number of marks obtained by each and shall be arranged in two class :—

Class I—Those obtaining 60 per cent and above.

Class II—The rest.

V. DEGREE OF MASTER OF SCIENCE IN CHEMICAL TECHNOLOGY (M.Sc. CHEM. TECH.)

24. A candidate for the Degree of Master of Science in Chemical Technology shall be required—

(*a*) to have passed the B.Sc. (Honours) Examination in the University with Chemical Technology as the Main subject ;

(*b*) to have undergone subsequently the prescribed course of study in the University for a period of one academic year ; and

(*c*) to have passed the prescribed examination.

25. Each student for the Degree of Master of Science in Chemical Technology shall be required to undergo practical training for at least two months in an approved chemical factory and under the directoin of a competent person and shall submit through his Director at the factory report of the work done to the head of the department.

26. Select students who have taken the B.Sc. Pass Degree in Chemistry of this University or any other Degree accepted by the Syndicate as equivalent thereto may be admitted for the M.Sc. Course in Chemical Technology. They shall undergo a prescribed course of training in Chemical Technology for two years before appearing for the examination and in addition undergo factory training in an approved chemical works or factory for at least four months.

27. The examination shall be written, practical and oral.

28. The examination for the M.Sc. Degree in Chemical Technology shall be as below :—

		Marks.
1. Scientific German Translation. ...	1½ hours' paper	50
2. General economics and factory management...	2 hours' paper	50
3. (*a*) Sugar Technology (*b*) Pharmaceutics (*c*) Oils and Fats (*d*) Ceramics		
(i) Written examinations.	3 papers of 3 hours' each	300
(ii) Practical examinations.	3 practicals of 6½ hours' each	300
4. Home Paper (work corresponding to the requirement of the Home Paper of the I—Chem. E. Examinations)		100
5. Oral		100
6. Records		100

The examination shall be held in June.

29. A candidate shall be declared to have passed the examination if he obtains not less than 40 per cent of the total marks and not less than 35 per cent in each (a) written (b) practical, including oral and records examinations.

30. Candidates declared to have passed the examination shall be ranked in the order of proficiency as determined by the total marks obtained by each and shall be arranged in two classes :—

Class I—Those obtaining 60 per cent and above.

Class II—The rest.

VI. DEGREE OF MASTER OF SCIENCE IN CHEMISTRY WITH THE SPECIAL SUBJECT CHEMISTRY (INCLUDING MICROSCOPY) OF FOODS, DRUGS, AND WATER.

31. A candidate for the M.Sc. Degree in Chemistry with the special subject 'Chemistry (including Microscopy of Foods, Drugs and Water' [M.Sc Chemistry (special subject) Foods, Drugs and Water] shall be required :—

(*a*) to have passed the B.Sc. (Hons.) or the B.Sc. Pass Degree examination (with Chemistry as the Main subject) of this University or any other examination accepted by the Syndicate as equivalent thereto ; and two other science subjects as subsidiary subjects ;

(*b*) to have undergone subsequently a further course of study in the University College, extending over a period of one academic year consisting of three consecutive terms, provided however that the period shall be two academic years in the case of Pass graduates ; and

(*c*) to have passed the prescribed examination.

32. The course and scope of instruction shall be as defined in the syllabus prescribed.

33. The examination shall be written, practical and oral.

34. The Examination for the B.Sc. (Pass) Graduates at the end of first year shall consist of two papers in theory each of three hours' duration. Besides, there shall be two papers in practical. The theory and the practical papers shall be common with those for the B.Sc. (Hons.) Degree examination in Chemistry Main.

The theory papers shall be as follows :—

(i)	Organic Chemistry	3 hours	100 marks.
(ii)	Chemistry of Foods and Drugs	3 hours	100 marks.

The practical examination shall be as follows and be conducted along with those for the Chemistry (Hons.) Part II.—Main candidates :—

1st paper- Organic Chemistry 12 hours (6 hours per day)	100 marks.
2nd paper—Chemistry of Foods and Drugs ($6\frac{1}{2}$ hours per day)	100 marks.

The candidates have to submit record of practical work done and the record shall carry 40 marks.

A candidate shall be declared to have passed the examination at the end of the first year if he obtains on the aggregate not less than 40 per cent of the total marks and not less than 30 per cent in each of the parts (a) written and (b) practical including records.

35. The Examinations at the end of the first year for Honours graduates and at the end of the second year for Pass graduates shall consist of two papers in theory each of three hours' duration and three practicals of six and a half hours' duration each. Besides these, there shall be an oral examination. The marks shall be allotted as below :—

Written Examination :	2 papers each carrying 100 marks	200
Practical ,,	3 papers each carrying 100 marks	300
Oral and Records		100

36. A candidate shall be declared to have passed the M.Sc. Degree examination if he obtains not less than 40 per cent of the total marks and not less than 35 per cent in each : (a) written, (b) practical (including oral and records) examinations.

37. Candidates declared to have passed the examination shall be classed as below :—

Class I—Those obtaining 60 per cent and above,

Class II—The rest.

Where the names of successful candidates are published in the Gazette they shall be arranged in the order of merit according to the total number of marks obtained.

VII. DEGREE OF DOCTOR OF SCIENCE (D.Sc.)

38. The Degree of Doctor of Science (D.Sc.) is conferred on persons who have passed the Master of Science Degree examination or the M.B.B.S. Degree Examination of the University or an examination of any other University, recognized* as equivalent to the above and who have satisfied the conditions laid down in the following paragraphs.

39. All candidates for the Degree of D.Sc. are required to pursue in the University for at least three academic years an approved full-time course of research under the direction of the head of the department concerned or of a member of the University staff appointed by the Vice-Chancellor on his recommendation:

Provided that, after completion of the first year of the course a candidate may be permitted to devote such periods as may be deemed advisable by the Vice-Chancellor to full-time research in other approved Universities or institutions, or at a place and under conditions approved by the University, while remaining under the direction of the University or of persons nominated by the University.

40. Before entering on the course of research, candidates are required—

(*a*) to submit to the Vice-Chancellor for his approval, through the head of the department and the principal, the general line of research proposed to be undertaken by them ;

(*b*) to register as students of the University and to pay the prescribed tuition fees ;

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*The following examinations have been recognised as equivalent to the corresponding examinations of this University :—

University.	*Examinations.*	*Condition if any.*
B.H.U., Benares.	M.Sc. in Chemistry. M.Sc. in Physics.	Subject to the condition that the candidates seeking such recognition obtained 50%.

Provided however that (i) candidates who submit their theses for the award of M.Sc. Degree of the Andhra University in June of any year may be provisionally registered in July of that year and in case they are awarded in due course the M.Sc. Degree on the first submission of their theses their registration shall be confirmed and that the prescribed period of research shall be calculated from the date of their provisional registration ; and (ii) if the candidates thus provisionally registered fail to qualify for the M.Sc. Degree on the first submission of their theses, their registration shall be cancelled automatically and in case they are permitted to resubmit their theses after revision, the prescribed period of research for the D.Sc. Degree shall be calculated only from the date of communication of having obtained the qualification for the M.Sc. Degree.

41. Each candidate shall submit, through the Director of his Studies and the head of the department concerned, not less than three terms in advance of the date of the examination, the subject of his research.

42. On completing the course of research, candidates are required to present a thesis on the subject of their research and to satisfy the examiners that it contains original work worthy of publication.

43. Every candidate shall state in his application the special subject within the purview of the Regulations for the Master of Science Degree or the M.B.B.S. Degree of the University upon a knowledge of which he rests his qualification for the doctorate, and shall, with the application, transmit three copies printed or typewritten, of a thesis on some special portion of the subject so stated embodying the result of research or showing evidence of his own work, whether based on the discovery of new facts observed by himself, or of new relation of facts observed by others, whether constituting an exhaustive study and criticism of the published work of others or otherwise forming a valuable contribution to the literature of the subject dealt with, or tending generally to the advancement of knowledge. The applicant, in submitting a thesis, shall state generally in a preface and specifically in notes, the

sources from which his information is derived, the extent to which he has availed himself of the work of others and the portions of his thesis which he claims as his original. He shall also be required to declare that the thesis submitted is not substantially the same as one which has already been submitted to any other University.

44. The candidate may also forward, with his application, three printed copies of any original contribution or contributions to the advancement of the special subject professed by him or of any cognate subject, which may have been published by him independently or conjointly and upon which he relies in support of his candidature.

45. The thesis mentioned and the original contributions, if any, shall be referred by the Syndicate to a Board of three examiners ordinarily drawn from outside India.

46. The Board shall report to the Syndicate the result of the examination of the thesis and if the Syndicate, upon the report, considers the candidate worthy of the Doctorate Degree, it shall declare that the candidate shall be awarded the Degree and cause his name to be published with the subject of his thesis and the titles of his published contributions, if any, to the advancement of knowledge.

47. If the Examiners do not approve of the thesis once submitted the candidate may with the previous approval of the Syndicate submit after an interval of not less than six months from the date of intimation of the non-approval of the thesis to the candidate a revised thesis.

GENERAL

48. Particulars regarding dates for submitting applications etc., in respect of M.Sc. Degree examination by research will be found in Chapter LVII. Each candidate shall submit through the Director of Research and the Head of the Department, to the Principal, University Colleges, three copies of his thesis and one copy of the practical record certified as bona fide by the Director of Research between the 15th and 30th of June or between the 15th and 30th of December.

Candidates for the Ph.D. and D.Sc. Degrees shall submit their theses, after the prescribed period of research, to the Registrar so as to reach him between the 16th and 30th June or between 1st and 15th December each year.

A candidate for a research degree whose thesis is rejected on the first occasion may be permitted by the Syndicate to submit the same a second time after revision taking into account the criticisms made by the Examiners appointed in the first instance along with the prescribed fee, but he shall not be eligible to re-submit it on a subsequent occasion should it be rejected a second time.

Transitory Regulations

49. Notwithstanding anything contained above, candidates registered prior to 1st December 1937 for submitting theses in respect of M.A. (Hons.), M.Sc. (Hons.) and M.A. and M.Sc. Degrees examinations in accordance with the Old Regulations shall be permitted to continue their work, submit their theses and undergo the examination prescribed not later than the end of 1939.

50. Notwithstanding anything contained above, candidates registered prior to 1st December 1937 for submitting theses for the Ph. D. Degree Examination in accordance with the Old Regulations shall be permitted to continue their work, submit their theses and undergo the prescribed examination not later than the end of 1942.

51. Candidates registered by the Syndicate prior to 1st December 1937 for submitting theses for the M.A. (Hons.) Degree examination may be permitted to appear for the Ph. D. Degree Examination under the New Regulations subject to the following conditions :—

That they shall satisfy all the conditions prescribed in Sections 2—11 above, provided, however, that the Syndicate may permit the period spent in research under a recognised Director since July 1937 to be counted in reckoning the period of research prescribed in Section 3 above.

Candidates desirous of availing themselves of this exemption shall apply through the Director of Studies to the Registrar so as to reach him not later than 1st July 1938.

52. Candidates registered by the Syndicate prior to 1st December 1937 as persons doing research with a view to appearing for the Ph. D. Degree examination (in the Faculties of Science and Medicine) under the Old Regulations may be permitted to appear for the D. Sc. Degree Examination subject to the condition that they shall satisfy all the conditions prescribed in Sections 38 to 47, provided, however, that the Syndicate may permit the period already spent under approved directed research in the Jeypore Vikrama Deo College of Science and Technology or the Andhra Medical College, Vizagapatam, to be counted in reckoning the period of research prescribed in Section 39.

Candidates desirous of availing themselves of this exemption shall apply through the Director of Studies to the Registrar so as to reach him not later than 1st July 1938.

N.B.—Students who have taken up their course for M.Sc. Tech. in July 1938 or earlier shall take the M.Sc. (Hons.) in Tech. by research under the Old Regulations.

SYLLABUSES

Degree of Master of Science in Applied Physics.

A. *Applied Mechanics*: (*a*) Course of lectures: Strength of materials as in Chapters I to IV, X and XV of A. Morley's book on 'Strength of Materials' omitting ellipse of stress—circular diagram of stress—Principal planes and stresses—Principal strains in Chapter I and retaining theory of bending and simple and other bending only in Chapter IV. Function of the Scientific instrument. Instrument design. Tolerance. Degrees of freedom and constraint. Back lash and its prevention. Friction and lubrication Turning, sliding and difficulties of precise construction. Commercial instruments including the design of jigs and gauges. Different methods of aiding, checking and testing manufacture.

(*b*) Practical training. (i) Drawing and (ii) Workshop practice. Use of machines tools. Grinding and lapping. Polishing and finishing. Pattern making and casting. Fitting and testing.

B. *Optical Instruments*: (*a*) Course of lectures: The telescope. The microscope. Binocular instruments. Photographic lens. Photometry. Micro-photometers. Interferometric methods of testing. Refractometers. Polarimeters.

(*b*) Practical training: Using, testing and fitting the above instruments.

C. *Applied Electricity*: (*a*) Course of lectures. Theory of alternating currents. Measuring instruments. Illumination and heating. Theory and construction of both D. C. and A. C. generators and motors, transformers, converters and rectifiers. Theory of starting, controlling and protecting appliances. Power House and Power distribution. Theory and design of D. C. and A. C transmission and distribution systems including Switch gear of low-tension power.

Different kinds of thermionic valves and their characteristics, Detection, amplification and modulation. Wireless circuits and aerial systems for transmission and reception. Propagation of wireless waves. Directional wireless

NOTE.—'Electrical Technology' by Cotton and 'Fundamentals of Radio' by Terman with the last two chapters omitted indicate respectively the standards that the candidates are expected to attain under Electrical Engineering and Wireless.

(*b*) Practical training: Working of the different machines, their test, and defects, in addition to laboratory work for an understanding of the lecture course.

Degree of Master of Science in Chemistry (including Microscopy) of Foods, Drugs and Water

Lecture Course.

Part I—

1. Chemistry, origin, composition, commercial preparation and preservation of foods.
2. Nutritive requirements of the human body. The Chemistry of digestion and growth
3. Water-supplies and effluents.
4. Elements of bacteriology and bacteriology of water-supplies and milk.
5. Alcohol, alcoholic beverages, enzapnes and enzymeactions.
6. Condiments and spices flavouring substances and essences.

Part II—

1. Chemistry, origin, composition, commercial preparation, Pharmacological action and therapeutic value of drugs.
2. Poisons, their effects and examination.

3. Antiseptics and disinfectants.

4. The Chemistry of urine and blood.

5. Indian and Foreign Governments' regulations regarding foods, adulteration and preservatives in food-stuffs and the adulteration of drugs

Legal and pharmacopocial standards of purity.

6. Vegetable morphology and microscopy of drugs.

N. B.—This syllabus is a continuation of the preliminary treatment of the subject for the B Sc (Honours) students in Chemistry under the special subject "Chemistry of Foods and Drugs."

Practical Course.

Chemical analysis of—

Water and effluents.

Carbohydrates and their products.

Milk and its derivatives.

Oils, fats, waxes and waps

Spices, condiments and flavouring substances.

Cereals and their products.

Coffee, tea and cocoa.

Chemical examination of drugs and chemicals used in Pharmacopocial preparations and presumptions.

Antiseptics and disinfectants.

Preservatives.

Alcoholimetry

Recognition of commercial drugs.

Microscopy of drugs—starches and fibres.

Chemiqal examination of urine and blood.

Detection of poisons and quantative determination of Arsenic and lead.

Bacteriology (a brief course covering the general technique of bacteriology and bacteriology of foods and water).

Degree of Master of Science in Chemical Technology.

Scientific German Translation.—The examination in German will be a test of the capacity of the student to carry out free translation into English of German literature relating to Industrial Chemistry. Consultation of dictionaries will be allowed during the examination.

General Economics and Factory Management.—(25 *lectures.*)

Elements of Economics.—Elementary notions regarding economic concepts. Production value and price—capital and income. Exchange. Distribution. Money and credit—currency—Exchange rates. An outline of the economic organization of India with special reference to Industries.

Business Organization and Finance.—Business units, Partnerships and joint stock companies. Balance sheets. Loans. Managing agency system.

Industrial Organization.—Planning of work and control of production. Combines and trusts. Works organization and management. Departmental and functional organization. Standardization—Selection of employees. Training. Planning. Graphical and statistical control. Purchasing. Marketing. Policy of discriminating protection for industrial progress in India.

Outlines of Industrial Legislation.—Factory legislation. Inspection of factories. Housing and welfare work. Accident prevention. Dust hazard. Industrial diseases. "Safety First" movement. Trade Unions and Employers' Association. Schemes of joint consultation. Strikes and lock-outs. Settlement of disputes. Basic features of wages—Primary pay systems—Incentives. Time-keeping and wage payment. Pay-roll compilation.

Principles of cost accounting.—Analysis of problem of investment. Capital charges Depreciation. Interest. Amortisation. Costing of land and buildings. Cost of raw materials and labour of various kinds. Services · gas, water, power and steam. Repairs and maintenance. Rates, taxes and insurance. Value of by-products. General overhead charges. Practical analysis of first cost. Packing, transport and selling charges. Margin of profit on the capital outlay. Preparation of flow sheets (material, energy and time).

Principles of Plant Location.—Plant layout and design.

Home Paper.—This refers to home work done by the M. Sc. students on any problem in the special subject set by the teacher concerned. An essay or paper will be submitted by the candidate to the examiners who will value it and award marks.

SPECIAL SUBJECTS.

1. Sugar Technology.

Lecture Course.

General.—Chemistry of sugar, starch, dextrose, cellulose and their products. Agriculture of sugarcane, harvesting and transport of cane. History of the development of sugar industry, special reference to India. Economics of sugarcane agriculture and sugar factory economics. Accounts and tariff duty with reference to sugar, utilization and disposal of the by-products and waste materials of sugar factory.

Manufacture.—Extraction of juice from cane, diffusion of beet. Recovery of sugar from other materials containing sugar, clarification of juice, by different processes, physical and chemical properties of juice. Different constituents of juice. Boiling of sugar. Curing, storage and transport of sugar, manufacture of glucose, dextrose and other sugars.

Control.—Chemical control of milling house, boiling house. Control of panboiling, scientific control of sugar factory and raw sugar refinery, calculation of sugar factory data and preparation of working report, specification and installation of a sugar factory.

Sugar machinery.—Cane mills, rollers, mill housing, machinery for preparation of cane, knives, shredders, etc. Drive for cane mills, diffusion batteries. Bagasse fired boilers, evaporation, pans, sugar dryers, defecation plant. Vacuum pump, condensers, etc. Power station. Machinery used for the utilization of the by-products of sugar factories, paper, alcohol, etc.

Laboratory Course.

Clarification of cane juice, concentration, boiling of syrup in vacuum pans. Assaying of cane and raw sugar. Complete analysis of sugar house products. Evaporator and pan scale, boiler scale, molasses, press cake, bagasse. Boiler ash. Heat balance of cane sugar factory, problem allotted to the students separately.

II. PHARMACEUTICS AND FINE CHEMICALS

(1) *Pharmacy*:—Chemical and Mechanical control in a manufacturing Pharmacy. Prescription reading and a study of incompatibilities. Manufacture of pharmaceuticals including toilet preparations, medicinal foods and dressings. History of pharmacy.

Foreign and Indian state regulations for the control and test of drugs.

(2) *Pharmacognosy*:—An advanced study of the important vegetable and animal drugs listed in the pharmacuetical codex and their substitutes available in India.

(3) *Chemistry and analysis of foods and general principles of dietetics*:

Chemistry and analysis of Carbohydrates, liquids, proteins, vitamins and harmones, condiments and flavouring substances; general principles of dietetics.

Foreign and Indian state regulations for the control and tests of foods.

(4) *Physiology, Pharmacology and Bioassay*:—A general knowledge of physiology of alimentary, respiratory, circulatory nervous and genito-urinary systems. The pharmacology of drugs affecting the above systems and of other drugs of importance. Methods of biological assay.

(5) General principles of bacteriology and preparation of biological products. The structure, composition and development of bacteria, methods of their study, effects of physical and chemical agents on them and the effects of bacterial growth. Bacteria and disease in animal organism, immunity and body resistance to disease.

The Bacteriology of water and Milk. The classification of biologicals and the preparation of biological products used for passive immunization, active immunization and for diagnostic purposes.

Practical.

Preparations of galenicals, toilet preparations and fine chemicals, medicinal foods and biological products. Prescription, filling and incompatibilities.

Analysis of water, milk, butter, condiments. Cereals and flavouring substances. Simple exercises in Bacteriology.

Macroscopic and microscopic study of starches, Fibres and the following important crude drugs of vegetable and animal origin :—

Aconitum.
Amylum.
Auran tii Cortex.
Belladonnae Folium.
Buchu.
Calumba.
Cantharidis.
Cardamomum.
Caryophylum.
Cascara Sagrada.
Cinchona.
Cinnánomum.
Coriandrum.
Digitalis Folium.
Ephedra.
Ergota.
Foeniculum.
Glycyrrhiza.
Hyostyamus.
Ipecacuanna.
Jalapa.
Linum.
Nux Vomica.
Podophyllum Indicum.
Quassia.
Quillaia.
Rheum.
Scilla.
Sennae Folium.
Stramonium.
Zingiber.

III. Oils and Fats.

Lecture Course.

Fats and Waxes—Properties of the higher saturated and unsaturated fatty acids. Fats metabolism in vegetable and animal tissues. Refining of fats and waxes.

Fat hardening. Continuous and batch process.

Composition and constitution of the fatty acids of fats, fats of various industries. Study of the other constituent of fats and waxes.

Polymerisation and boiling of oils for paints and varnish industry ; resins ; natural and synthetic conversion of fats to hydro-carbons and vice versa.

2. *Essential oils.*—Composition of essential oils. Properties and constitution of terpenes and camphors. Synthetic perfumes. Use of essential oil in industry. Study of some typical essential oil. Blending.

3. *Soap and detergents.*—Various types of soaps, mechanism of saponification and its physio-chemical principles. Manufacture of different types of soaps. Disinfectants, etc.

Chemical nature of other detergents, saponins, sapogenins, sulphonates of higher aliphatic alcohols Conversion of fatty acids to alcohols.

4. *Paints, pigments and varnish.*—Raw materials for the manufacture of paints and pigments Manufacture of paints. Pigments and varnish, catalytic oxidation of fatty oils, metallic soaps of fatty acids and resin. Chemical and physical properties of various fibres, paints and varnish. Prevention of corrosion in industry by coating of fibres.

5. Statistics and economics of fats and waxes. Industry. Historical development of fats, soap and varnish industry.

6. Machinery used for the recovery, refining and hardening of oils, manufacture of essential oils, soaps, paints and varnish. Resins and plastics. Specification and installation of plants.

7. Recovery of petroleum, utilization of paraffin, gas and petroleum and products ; refining and distillation of petroleum.

Laboratory Course.

Extraction of fats and waxes, refining and hardening. Complete study of typical sample one each of vegetable oils, animal oils, essential oils and wax. Non-saponifiable materials or oils. Analysis of technical and edible oils and detection of adulteration. Polymerisation of oils with different catalysts. Testing of soaps, boiling of different types of soaps. Preparation of paints and varnish. Tests and analysis of paints, varnish and resins. Physical and chemical properties of paints and varnishes. Manufacture of higher aliphatic alcohols. Preparation of sulphonates. Some special problem allotted to the student. Three months training in a factory.

CHAPTER XLVII

DEGREE OF BACHELOR OF EDUCATION

(Regulations)

Qualification for degree

1. No candidate shall be eligible for the Degree of Bachelor of Education unless he has taken a Degree in this University or a Degree in some other University accepted by the Syndicate and has also passed the prescribed examination.

Qualification of candidates for Examination

2. Candidates for the B.Ed. Degree Examination shall have taken, or have qualified for, a Degree in this University or have taken a Degree in some other University accepted by the Syndicate as equivalent thereto* and shall have thereafter undergone the prescribed course in an affiliated college for three terms.

3. The examination shall consist of (*a*) a practical examination in teaching conducted by a Board of two examiners for each lesson, who shall as a rule be members of the staff of the college presenting the candidates for examination and (*b*) a written examination conducted by means of printed papers.

4. Candidates shall undergo a course and be examined in :—

(i) The Theory and Practice of Education.

(ii) History of Education and Comparative Study of Educational systems.

(iii) Methods appropriate to the teaching of English.

(iv) Methods appropriate to the teaching of *one* of the following groups of subjects :—

(a) All subjects to young children.
(b) Mathematics.
(c) Physical Science.
(d) Natural Science.

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*The following examinations have been recognised by the Academic Council in accordance with section 33 (1) of the Act as equivalent to the B.A. Degree Examination of this University :—

The B.A. and B.Sc. Degree Examinations of all other Statutory Indian Universities and Mysore University.

The B. Com. Degree Examination of all other Statutory Indian Universities.

(e) History.
(f) Geography.
(g) One language other than English.

Candidates shall also undergo a course in practical training, including instruction in school management and practice in teaching.

Subjects for Examination

5. Candidates for the written part of B.Ed. Degree Examination shall answer the following papers :—

(i) The Theory and Practice of Education, Part I.
(ii) The Theory and Practice of Education, Part II.
(iii) History of Education and the Comparative Study of Educational Systems.
(iv) Methods appropriate to the teaching of English.
(v) Methods appropriate to the teaching of one of the subjects mentioned in section 4 (iv) above.

At the practical examination each candidate shall be tested by means of two lessons of his choice, one in English and the other in special subject. The duration of each lesson shall ordinarily be half an hour or half a school period. Candidates shall submit full teaching notes of their lessons to the examiners before commencing their lessons. The practical test in teaching shall carry 200 marks, 100 marks for English and 100 marks for the special subject, 40 per cent of the marks in each case being allotted to practical work done by the candidates during the course of their training. In addition to actual teaching work, this practical work shall include the writing of notes of lessons, reports of lessons observed, and records of other practical work, if any, done during the course (1) English and (2) the special subject. A statement of the marks awarded shall be forwarded by the Principal of the College to the Registrar of the University along with the progress certificates of the candidates, about the middle of March each year.

Candidates applying for the examination for the first time shall apply for both parts of the examination ; but a candidate failing in

one part of the examination shall be permitted to reappear at a subsequent examination for that part, and shall, if he passes in it, be declared to have passed the B.Ed. Degree Examination.

For the benefit of candidates who fail in the practical examination a further practical examination shall be held during the first term of the academic year following the previous examination held in March–April.

Marks qualifying for a pass

6. Candidates who secure 40 per cent of the aggregate marks in English and in the special subject in the practical work done at college and in the practical examination in teaching, taken together shall be declared to have passed in the practical test.

Candidates who obtain not less than 35 per cent of the aggregate marks in papers (i), (ii) and (iii) of the written examination, taken together, and not less than 35 per cent of the marks in each of the papers (iv) and (v), but not less than 40 per cent of the aggregate marks in papers (iv) and (v) taken together, shall be declared to have passed the written examination.

Of the candidates who pass both the practical and written examinations in the same year, those who obtain not less than 60 per cent of the total number of marks in both parts of the examination taken together shall be placed in the first class, those who obtain not less than 50 per cent of the marks in the second, and the rest in the third class.

Successful candidates obtaining not less than 60 per cent of the total marks (in theory and in practical test) in English or the special subject shall be declared to have obtained distinction in that subject.

In the pass lists the names of candidates passing in the first and second classes shall be given in the order of merit ; the names of those passing in the third class shall be given in the order of the register numbers.

Candidates successfully completing the written and practical examinations in parts in different years shall be declared to have passed the examination in the third class.

SYLLABUSES

(1) Theory and Practice of Education

PART I

A. GENERAL.—

The need of a theory of education—relation of theory to practice.

The meaning of education—education as the process of adjustment between the individual and the environment—other concepts (preparation, unfoldment and formal discipline).

The aim of education—the nature of an aim—general and specific aims.

The agencies of education—the family, the social community, the church, the state and the school—the evolution and function of the school—the nature of the school environment.

Other agencies operating at the present day—libraries, museums, cinemas and broadcasting.

The function of the teacher—bi-polar and tri-polar relation. The modern views regarding the influence of the personality of the teacher—the scientific and cultural presuppositions of the teacher's work.

B. PSYCHOLOGY IN RELATION TO THE CHILD'S DEVELOPMENT.—

1. *Heredity and Environment and the Significance of Infancy—*

Heredity as a condition of development—the inheritance of physical and mental traits.

Environment (social heredity) as the other condition as an originating and selecting agent—the possibilities of estimating the relative influences of heredity and environment.

The theory of the inheritance of acquired characters and its bearing on education.

The prolongation of human infancy and its sociological and educational significance.

2. *The Physiological basis of Mental Processes—*

The constitution of the nervous system—the localisation of brain functions—the action of the nervous system.

3. *The Mental Processes—*

(*a*) *The Affective and Conative Processes—*

Pleasantness—unpleasantness—aspects of consciousness. Definition of Instinct and Emotion.

Instincts of pugnacity, flight, curiosity, disgust, sex, self-assertion, submission and appeal and constructive, acquisitive and parental instincts.

Imitation and suggestion.

Play ; differences between play and work, make-believe, the play spirit in education.

Distinction between instinct and habit—nature and importance of habit—principles of habit-formation.

Volition inhibition and direction.

Primary and Secondary emotions.

Sentiment—temperament—mood.

The Unconscious : libido, repression, sublimation, complexes, etc.

The growth of group and moral consciousness.

Attention—factors involved, classification, difference between adults and children, pedagogical application

Relation of attention to interest—nature and kinds of interests—development of interests—classification of interests.

Fatigue—its causes, symptoms, effects and remedial measures.

(*b*) *The Cognitive Processes*—

Sense—perception and its development—Perception of quality, space and time—training in sense perception—preperception and apperception—the doctrine of apperception.

Memory—classification and favourable conditions—reminiscence and oblivescence—difference between adults and children—economical methods of memorisation.

Learning methods—learning curves—plateau stages.

Transfer of training—the traditional view—experimental result—interference—the limits of transfer.

Imagination—factors involved—individual differences in imagery—growth of imagination—differences between adults and children—training in imagination.

Thinking and reasoning—types of thinking—steps in thinking—concrete and abstract thinking—training to think

General intelligence—its measurement—The uses of intelligence tests—Principles of test construction.

PART II

A. SCHOOL HYGIENE—

General conditions of healthy life and growth—characteristics of successive stages of physical development.

School hygiene—school site and buildings—lighting and ventilation—playground—furniture.

Common ailments of children and how to detect them—infectious diseases.

Detection and avoidance of fatigue and overpressure.

Physical training, gymnastics, drill, games and free-play.

B. SCHOOL ORGANISATION—

The school and its divisions—school departments—size of departments—co-education *vs.* separation—special classes—one teacher schools—the class as a working unit—size of classes—the staff—qualifications and adequacy, etc.—classification of pupils—time-tables for different grades of schools—examinations, external and internal—promotion and its different bases—school records and their proper maintenance.

C. INSTRUCTION—

(*a*) *Material.*

Criteria for selecting material of instruction.

The elements of the environment and the needs of the various stages of development as determining the curricula for infant, primary and secondary grades of education.

Theories of recapitulation—the psycho-physiological theory and the culture epoch theory.

The scope and sequence of school studies.

Co-ordination, Correlation and Concentration.

(*b*) *General Principles of Method.*

The nature and general principles of method—teaching and learning processes—logical and psychological methods—the maxims of methodological procedure—the formal steps—types of lessons—inductive, deductive, drill, review, appreciation and how to study lessons.

Forms of instruction suited to different ages of pupils and in different subjects—devices of teaching—exposition, illustration, questioning, etc.—the use of black-board and of other class room apparatus. Lesson plans—Modern individualistic tendencies as exemplified in supervised study, the Gary system, the Project method and the Dalton plan.

D. DISCIPLINE—

Moral instruction and training. The aim of moral training. The chief factors in moral training—(*i*) corporate life of the school, (*ii*) personal influence and (*iii*) non-personal influence.

The corporate life of the school—School community—mutual rights and obligations—schools, societies and other organized groups—school government—school laws, their character and enforcement—juvenile delinquency—rewards and punishments, their nature and kind—pupil self-government and its forms.

Influence—government—discipline—personal influence of the teacher and "the leaders of the groups". Non-personal influence of the curriculum and other school activities.

Day and Boarding schools and leisure time of pupils.

The relation of the school to other communities with kindred interests.

(2) History of Education and Comparative Study of Educational Systems

A INDIAN EDUCATION—

Education during the Company period early activities in Madras and Calcutta. The part played by the Missionaries and Government. The decision of 1835 and its results. The despatch of Sir Charles Wood in 1854 and the foundation of the modern system. The rise of the Universities.

Education under the Crown: the Education Commission of 1882 and the development of education till 1900. The Indian Universities Commission of 1902. The Calcutta University Commission The creation of new Universities. Montford reforms and education. Compulsory Education Acts and Educational Control A general review of the present system of education.

B. EUROPEAN EDUCATION.

The educational aims and ideals of Rousseau, Pestalozzi, Froebel and Herbart—their influence on modern educational theory and practice.

C. A COMPARATIVE STUDY OF EDUCATIONAL SYSTEMS.

The 19th Century and the movement for national education.

A national system, an expression of the national genius. Influence of historical, geographical, ethnological, political and economic factors. The aim of a national system of education.

The national systems of education in England, United States of America, Germany and Japan, with reference to the administrative arrangements—Local and central control—organisation of education and types of Schools, elementary, secondary, continuation, vocational and special schools for boys and girls. Provision for the training of teachers for elementary and secondary schools. Child welfare movements, such as medical inspection, feeding of necessitous children, movement for playgrounds, open-air schools, sanitoria etc.

Tendencies of post-war education.

(*a*) *Text-Books*—

(1) Comparative Education by Kandel.

(2) History of Indian Education by B Somasundararao.

(*b*) *Book for reference*—

The Principles of Educational Policy by Nicholas A. Hans.

(3) Methods Appropriate to the Teaching of English.

I. LANGUAGE.—Thought and language; Language an analyis of experience and the product of speech; not strictly logical, evocative and symbolic. Language and speech. The word, the unit of language; the sentence, the unit of speech. The active and passive aspects of language study. First and second languages; the extent to which the first hinders and helps acquisition of the latter.

II. ENGLISH.—The position of English in India. The bilingual problem, English a medium (1) of instruction and (2) of expression. The practical and cultural value of English. Colloquial and literary English.

III. METHODS OF TEACHING.—(1) The translation or grammatical methods, aiming at a comparative study of grammatical structure, through reading without providing occasions for the natural use of language, repetition rather than translation the most effective means for the learning of idiom, the translation method, with its appeal to reason, the adult's rather than schoolboy's approach to the study of language.

(2) The "reform" or realistic methods: the natural, the oral, the active, and the direct method, the direct method and its many modifications, its aims and main principles, and its psychological basis the inhibition of the mother-tongue as a check to cross-association, the direct method, right in principle, wrong in emphasis.

(3) The "compromise" method, aiming at the development of all aspects of language learning, with a view to achieving practical results, the rational use of the mother-tongue as a means of explanation, adequate provision for progress in reading to the extent possible at each stage;

progressive practice in speech, though not always in advance of reading, the suitable grading of written work, and the practical teaching of grammar therewith

IV ORAL WORK.—Its prominence in the initial stages, the vitalizing force of reading throughout the course, though gradually outstripped by it.

The place and value of phonetics in all oral work to teacher and pupil. Ear training and phonetic drill. The speech sounds of English, a detailed study of their production, and comparison with Indian speech sounds.

The use of phonetic symbols and apparatus The value of phonetic texts for teacher and pupil An elementary study of intonation Rhyme, rhythm, quantity and metre.

Conversation: conventional and natural; to precede reading. The importance of repetition Subjects for conversation: objects, persons, actions, pictures, stories, dialogues Picture or object talks as a device for preventing the undue intervention of the mother-tongue, for promoting fluency, and for covering much ground in a shorter space of time The place and value of substitution tables

V. THE TEXT.—(*a*) *Oral Reading.*—The initial stages the alphabetic, the phonic, the look-and-say, the sentence and electric method Devices for directing attention to the content of reading. Reading in its elocutionary aspect: pronunciation, phrasing, intonation, stress, speed.

(*b*) *Silent Reading.*—Its place and importance, an aid to language acquisition. How to develop skill in rapid reading.

(*c*) *The Content of Reading*—Methods of explanation; use of objects, actions, gestures and pictures, the apperceptive principle and the mother-tongue in explanation. *Realien* (customs, society, institutions, etc); how gradually to introduce.

(*d*) *Prose*—(1) *The text for intensive Study*: The centre of instruction in intelligent reading and the study and the use of language, the extension of vocabulary; drill in word and phrase, the extent to which digression is desirable. Sentence and paragraph study. Purpose and tone in writing. Diction and the choice and use of words: style; common literary forms. Types of exercises for oral and written work at all stages of school work.

(2) *The text for Extensive Study*: Mainly for comprehension; the chief aim, the creation of interest in books by rapid silent reading developed from oral reading, interest and vocabulary control, complexity of sentence structure no great hindrance to comprehension. Exercises in oral and written to test comprehension primarily. The formation and use of class libraries.

(*e*) *Poetry.*—Virtually another language; new word order and diction (including figurative usage) rhyme and rhythm, and more often than not a foreign background. Types of verse. Mood more important than meaning. Visualization an aid to appreciation. Annotation and paraphrase. Types of oral and written work.

(*f*) *Recitation.*—Of prose and verse; dramatic work.

VI. GRAMMAR.—Views regarding the function of grammar. How far grammar aids the learning of a language. The linguistic and the critical sense. Formal and functional grammar. The place of grammar in "reform" methods of language teaching.

The bias of English grammar in the past; the present tendency. The need for uniformity in grammatical terminology. The real need for the teaching of grammar evident when written work is attempted.

The teaching of grammar largely the teaching of terminology. The most realistic method, the inductive, Grammatical summaries and the framing of rules. Drill exercises. The teaching of grammar in the early and later stages The structure of the sentence as an aid to punctuation, balance, concord, order, ellipses and emphasis The function and form of words, word order. The framing of syllabuses.

VII. COMPOSITION.—Oral and written. Progress from reproduction to free composition. The text the centre of instruction. Fluency exercises. Picture and object composition: story reproduction; the descriptive essay—oral and written, preparation essential. The more formal types of written work, epitome, expansion and paraphrase. The preparation of syllabuses. Correction and valuation of written exercise.

VIII. HANDWRITING.—Cursive and print writing. The importance of blackboard demonstration. The use of copy books. Capitalization, syllabification, indentation, the punctuation of abbreviations, underlining; purpose and grading of transcription and dictation Attention to handwriting and arrangement of all kinds of written work; spelling.

IX. TRANSLATION.—Mainly for purposes of explanation as a remedial exercise to impress differences in grammatical structure. Translation as an art possible only in the highest class to a limited extent. Systematic exercises in translation correlated with the teaching of grammar.

X LANGUAGE TESTS.—Purpose of tests. Tests for measurement of achievement and for diagnosis of individual defects. The applicability of the new examining technique (covering the mechanical aspects of language instruction). Tests of reading—speed, pronunciation, comprehension. Tests of vocabulary and grammar. Handwriting scales. Composition scales.

XI. THE ORGANIZATION OF ENGLISH TEACHING IN SCHOOLS.—Time-tables and schemes of work. Syllabuses. Notes of lessons. Pictures and class libraries. Literary and debating societies. Library reading and the use of works of reference. The running of school magazines and other forms of team work.

(4) Methods appropriate to the Teaching of Optional Subjects.*

(a) ALL SUBJECTS TO YOUNG CHILDREN.

I. Principles and methods of Child Study.

History of Child Education with special reference to Rousseau, Pestalozzi, Froebel and Montessori.

Experimental observations; Physiological consideration, the child's instincts.

Stages of child development—study of exceptional children and methods of dealing with them.

Pre-School Tests of Intelligence.

II. A survey of recent experiments in methods of child education.

Theories of play and play methods; importance of play in the development of the child; free and organised play. Consideration of the choice of child's play-things and occupation materials.

III. Self-activity, continuity, connectedness and creativeness as guiding principles in early education.

IV Sense training, its importance in the teaching of—

(a) Language, number and space.
(b) Plant and Animal Life.
(c) Class singing with special emphasis on rhythm, simple eurhythmics.
(d) Drawing and handwork.
(e) Story and dramatisation.

V. Correlation in the teaching of the various subjects, in the framing of syllabuses and time-tables and in the application of the project method.

Books for Consultation:

Foster and Matteson: Nursery School Procedure.
Gessel: Pre-school Tests of Intelligence.
Ballard: Practical Infant Teacher.

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* *Note*:—The question papers on the special subjects shall contain one compulsory question of Notes of lessons with enough choice of subject-matter.

(b) MATHEMATICS.

I. NATURE OF MATHEMATICS—

Subject-matter and methods.

The relation of Mathematics to the applied sciences, logic and economics.

Stages in the development of Mathematics, the experimental, the intuitional, the systematic and the philosophical.

The fundamental concepts of Elementary Mathematics.

II. THE AIMS OF MATHEMATICAL EDUCATION—

Practical, disciplinary, and cultural.

III. HISTORY OF MATHEMATICS—

The value of the history of Mathematics. The history of the decimal system, negative, complex and irrational numbers, the function concept and the parallel postulate.

Contribution to the pedagogy of Mathematics by eminent educationists Pestalozzi, Froebel, Herbert and Montessori.

Modern tendencies in methods of teaching.

IV. PSYCHOLOGY OF SCHOOL MATHEMATICS—

The psychology of drill, the equation and problem solving.

V. METHODS OF TEACHING MATHEMATICS—

The heuristic, laboratory, analytic and synthetic, inductive and deductive and genetic methods.

Logical and psychological methods of development.

Means of securing speed and accuracy.

Oral and written work.

Graphical methods and illustrations

VI. THE MATHEMATICS CURRICULUM AND THE ORGANIZATION OF SCHOOL MATHEMATICS—

Principles governing the construction of syllabuses and assignments.

The logical and the psychological sequence.

The Concentric and Continuous Systems.

The primary, lower and upper secondary stages.

Specialization and the specialized course.

The teaching of Arithmetic, Algebra and Geometry dealt with separately and in detail with regard to aim, matter and method.

Correlation of Mathematical subjects and of those with the other school subjects.

The Dalton Plan and the Project Method.

Tests and Examinations.

VII. EQUIPMENT FOR THE TEACHING OF MATHEMATICS—

Collection of data for problems
Notes of lessons
Vocational Mathematics with reference to local conditions.
Text-books, their place and value.
Mathematical libraries and laboratories.

The elements of statistical methods. General acquaintance with frequency distributions, histogram and frequency polygon, measures of central tendency, measures of dispersion, standard score and co-efficient to correlation.

Books for Consultation:—

1. The Technique of Teaching Secondary School Mathematics: Earnst R. Breslich (The University of Chicago Press).
2. The Teaching of Elementary Methematics · J. W. A. Young (Longman's Green & Co).
3 The Teaching of Arithmetic : Lennes (Macmillan & Co).
4. The Teaching of Algebra · T. P. Nunn (Longman's Green & Co).
5. The Teaching of Geometry · D. E. Smith (Macmillan & Co).
6. The History of Mathematics, Vols. I and II D E. Smith (Ginn & Co).
7. The Psychology of Arithmetic Thorndike (Macmillan & Co).
8. The Psychology of Algebra · Thorndike (Macmillan & Co)
9. Fundamental Concepts of Algebra and Geometry · J. W. A. Young (Macmillan & Co)

(c) PHYSICAL SCIENCE.

A. Introductory—

Meaning and genesis of Science, utilitarian and cultural values of the Sciences, aims of teaching Science in the school three stages in the growth of a Science—observational, heuristic and systematic and their characteristics.

B. Elementary Science—

Place of elementary Science in the high school curriculum ; different stages of teaching Elementary Science with subject-matter, aims, and methods appropriate to each stage in relation to the mental equipment and development of the pupils in the various stages of school life.

Object or observation lessons of the primary classes. Nature study lessons of Forms I to III, experimental science course of Form IV, information-lessons of Forms V and VI, object and mode of conduct of alternative courses.

Qualifications of the Elementary Science teacher; principles of organisation of Elementary Science teaching with a view to secure co-ordination and correlation; importance of maintaining Nature. Calendar, school gardens and museums; planning and conducting excursions.

C. Optional Physics and Chemistry.—

Specialisation in Forms V and VI a sequence to Elementary Science teaching; principles of selection of subject-matter and organisation of teaching.

Methods of instruction in the class-room: lectures with demonstrations, verification method, heuristic method and its limitations, logical and psychological orders of development, historical method, projects and team work, individual work and supervised study, class-room teaching as class conferences; judging quality of work in the class-room, equipment of the class-room, home-work for pupils, provision for individual difference; methods of securing co-ordination and correlating with laboratory practice, means of creating and sustaining interest. Importance of laboratory course in high school science, size of laboratory classes and their supervision, systems of laboratory work, nature and number of exercise in a course, quantitative work and treatment of the results.

Laboratory manual, laboratory note books and their correction, provision for backward pupils.

Planning and equipment of a physical and chemical laboratory, design and size of the demonstration table and work benches, light and ventilation, fume cupboards, and utilisation of wall space.

Laboratory arts—work-shop practice, including wood and metal work, glass blowing, photography, making of lantern slides.

Laboratory management, selection of laboratory and demonstration appliances, preparation of indents, care of apparatus, chemical and store-room laboratory registers.

D. General.—

Scientific method, inference, analogy, deduction and induction, synthesis, and analysis—their application in the teaching of Science, imagination, hypothesis, requisites of a good hypothesis, theory and law as applied to natural sciences, didacticism and scientific method, testimony and appreciation of authority.

Framing of syllabuses and time-tables, place of text-books, and reference books in high school science, class libraries.

Medium of instruction, oral questioning, written and practical examinations as tests of proficiency, nature of questions and valuation, award of school marks.

(d) NATURAL SCIENCE.

1. *General.*

(a) Scope of Natural Science, its relation to other Sciences, aims of teaching Natural Science, acquisition of knowledge by discovery methods not merely verification of known facts but finding out by means of experiments, the scientific habit of thinking, the place of deductive reasoning in Science. Values of teaching Natural Science, mental, ethical, emotional and practical.

(b) Nature Study of Elementary Natural Science, aims of teaching plant and animal life in the lower forms, training powers of observation, comparison and reasoning, discovery of characteristics of life. In higher forms training of the mind by discovery of laws governing the activities of life, the organism and its environment, recognition of order in nature and understanding of the principles of evolution, acquisition of useful knowledge.

2. *Methods.*

Observation and heuristic methods of teaching, the value of comparison, conducting experiments, individual work and demonstration, record of work, observations and inferences, hypotheses and verification. The Project and Dalton methods. Value of drawing and description. Choice of material, value of living specimens.

3. *Aids to teaching.*

(a) The school garden : how to maintain ; value in teaching, study of life-histories and other advantages.

(b) School museum and herbarium ; their value in teaching, fitting and maintenance, selection of specimens, collection by teacher and by the pupils.

(c) Charts, diagrams and lantern slides : preparation and value in teaching.

(d) Excursions, their educational value, how to conduct excursions.

(e) Text-books : their use and abuse.

4. *Preparation of courses of study.*

The concentric system, general principles underlying schemes of lessons, choice of topics and material, more for training the mind than for information, importance of using objects in the immediate surrounding of the school, imparting of useful information in Human Physiology and Hygiene.

5. *Botany in the S.S.L.C. Course.*

Aims ; preparatory to the study of plants as a Science, acquisition of knowledge of the external features and functions of the parts of flowering plants, adaptation to external conditions, the principles of classification.

(a) Study of external features ; importance of the study of actual specimens, personal observation of the pupils necessary, use of diagrams and description and observation to be guided by the needs for classification.

(b) Study of principles of classification ; individuals and species, recognition of species and general to preceds study of families, grouping of species into genera and genera into families, relationship determined more by floral structure.

(c) Study of functions : by observations and experiments, experiments to be carried by pupils, demonstration experiments, how to make pupils carry out experiments, scope of instructions to pupils successful and unsuccessful experiments, observations and inferences, record of experiments.

(d) Adaptations : to be studied in relation to environment, importance of field study, correlation of structure and function, similarity in form as a result of similar conditions.

(e) History.

I. The Meaning of History—

What History is. What is meant by the philosophy of History.

II. The Scope of History—

Economic, social, political and constitutional history The economic background of history. A plea for a unified social science course. The relation of history to other subjects.

III. The Educational Value of History—

(*i*) *Content* : Comprehension of ethical and cultural idea .

(*ii*) *Mental Discipline* : Cultivation of memory, imagination, reason, and judgment.

IV. The Aims of Teaching History—

(*i*) *General* : to make the pupils realize the progressive growth and development of civilization, to create in them the historic and civic sense, and to inculcate a proper use of books and other sources of information.

(*ii*) *Special* : (1) *In the Lower Classes*—to awaken interest, kindle imagination and foster memory. (2) *In the Higher Classes*—to stimulate the critical faculty and train the pupils in individual and community work.

V. The Subject-matter of History—

(*i*) *Its Selection* : Local, Indian, European, and World History ; Ancient, Mediaeval, Modern, and Recent History.

(*ii*) *Organisation* : Outlines and periods.

VI. THE METHODS OF TEACHING HISTORY—

(*i*) *The Early Stage*—The oral lesson—the Culture Epoch theory—chronological treatment—the biographical approach—the Great man theory—the Narrative method—vitalising the past by means of verbal illustrations and pictures—dramatization—drill.

(*ii*) *The Latter Stage.*—(1) *The Text-book lesson*—the Continuous *vs.* the Concentric system—topical treatment—concrete illustrations—correlation with Civics, Geography and Literature (epic, ballad, poetry, romance and novel)—the Inductive method—the operation of cause and effect—the Spiral plan—special lectures—teaching History backwards. (2) *Individual Work*—Learning by doing—home lessons—historical exercises—library work—collateral reading—the study of documents and other sources—the Dalton Plan—the solution of problems—the Townsend Warner method—the "Research" method—note making—essay writing—the preparation of maps, plans and sketches—the construction of graphs, time-lines and charts. (3) *Community Work*—Civics taught through school organizations—undertaking excursions—the execution of projects—the conduct of debates.

VII. THE EQUIPMENT OF THE HISTORY LABORATORY—

Furniture, library and museum—maps, pictures and charts—the camera, magic lantern, stereopticon, stereoscope, epidiascope, cinema, gramophone and radio.

VIII. THE ORGANIZATION OF TEACHING WORK IN HISTORY—

The basis and construction of a syllabus—teaching notes and notes of lessons—supervision by the senior assistant—New Type and Standardised Tests—the examination system—Teacher's Conferences for the consideration of syllabuses and methods.

The vernacular as the medium of instruction.

Books for Consultation:—

1. The Teaching of History (issued by the English Board of Education.)
2. The Teaching of History and Civics by Bourne (Longmans).
3. The Teaching of History (issued by the Cambridge University Press).
4. Memorandum on the Teaching of History (issued by the Cambridge University Press).
5. History and its Place in Education by Findlay (University of London Press).

6. The Learning of History by Fifth (Kegau Paul).
7. The Teaching of History by Hasluck (Cambridge University Press).
8. How to Study and Teach History by Hinsdale (Appleton).
9. The Teaching of History by Jarvis (Clarendon Press)
10. Studies in the Teaching of History by Keatinge (Black).
11. The Teaching of History by Klapper (Appleton).
12. The Teaching of History (New Educator's Library).

(f) GEOGRAPHY.

1. *The Nature of Modern Geography.*—

A brief historical sketch of its growth and of its pedagogy.

2. *The subject-matter of Geography.*—

Its scope regarded as a school subject. The value and place in the course of mathematical, physical, economic, historical and regional (including home) geography. The necessity for selection and the principles on which this should be based with special reference to the type of school (elementary or secondary) and the area in which it is situated (rural or urban).

The possibilities of correlation with other subjects.

3. *The Value of Geographical Study.*—

(a) *Practical*—As preparation for everyday life—individual and civic.

(b) *Educational* (i.e. in the school):—As an 'approach' subject in the early stages, and as a 'correlating' and 'outlook' subject in the later stages.

(c) *Disciplinary*:—Mental training—processes involved in the scientific method of study: observation, classification, generalization, comparison.

(d) *Culture*:—Breadth of outlook, depth of insight, and sympathy with lives of distant peoples, the world's workers.

4. *The aims of Teaching.*—

(a) To develop a geographic outlook, and create an intelligent interest in the modern world.

(b) To secure a dexterity in the use of geographical material—maps, blue-books, etc.

5. *Methods of Teaching.*—

(a) The value of oral work, pictures, handwork and dramatization in the early stages.

(b) The value and methods of teaching the following subjects:—Maps and map-reading with special reference to methods of showing relief, drainage, climate, communications, human occupations, and distribution of population.

Map-making: The use of chain, prismatic compass and plane-table in school surveying.

The use of a simple form of level in practical contouring.

The methods of recording temperature, pressure and rainfall data obtainable in school.

The possibilities of collecting local data with regard to climate and crop statistics.

The sources of information regarding industries, trade, crops, population, etc.

The method and value of teaching graphical representation of such information in maps, curves and diagrams.

(c) The value and possibilities of out-door work in the different stages of school. Excursions, Laboratory methods.

(d) Class Work:—Oral teaching: its importance and limitation—types of lessons—causal relation, and place and value of geographical explanation—questioning to test memory and provoke thought—illustrations, maps, graphs, charts, pictures and models.

(e) Individual work:

(i) Use of text-books—characteristics of good text-books.

(ii) Collateral reading—its purpose—assignments and guidance—sources of geographical information.

(iii) Maintenance of note-books etc.

(iv) Problems and exercise—The project method.

(f) Team work: Its value and possibilities.

6. *Organisation of Courses of Study.*—

Construction of syllabuses, schemes of lessons, formal notes of lessons, teaching notes and lesson plans. Preparation of assignment.

7. *The Medium of Instruction in Indian Schools.*—

Initial difficulties in the use of the mother-tongue, and how to surmount them; technical words, text-books, maps, and atlases.

8. *Examination.*—

Oral and written. Their aims and values, criticism of present methods; recent methods of testing.

9. *Geography Room.*—

Necessity for a separate room, its plan, geographical equipment and its use; minimum essentials.

10. *Bibliography.*—

Standard and recent books, maps, atlases etc.

N.B.—Candidates will be expected to give satisfactory evidence that they have had experience in teaching the subject, and to this end compulsory questions on lesson notes, syllabuses and practical work will be set.

(g) One Language other than English

(i) Sanskrit:

(a) *General: Preliminary.*—

Objects of teaching Sanskrit. The standard to be aimed at in Secondary Schools and Pre-collegiate Sanskrit Schools The position of Sanskrit in India; its cultural and practical value. The inter-relations of Sanskrit and Indian Vernaculars. Comparison of Sanskrit and English, with particular reference to their grammar and structure. Practical and theoretical study of Sanskrit.

(b) *Methods of Teaching.*—

The translation method and the direct method as applied to Sanskrit study; traditional methods of Sanskrit study, the merits and defects, the external and internal difficulties of the Sanskrit Language and how best to overcome them.

(c) *The Early Stages of Sanskrit Teaching.*—

The sound of Sanskrit, detailed study of their production, the organic and acoustic methods of study. Sanskrit sounds. The means of teaching them to pupils. The teaching of Sanskrit hand-writing; place of dictation and transcription; translation. Reading and recitation. The Sanskrit text as the centre of instruction; manner of exposition, means of extending the Sanskrit vocabulary. Inductive methods of Sanskrit teaching, Sanskrit grammar. The use of Sanskrit Kosas.

(d) *The Later Stages.*—

The choice of Sanskrit texts. Lines of development in teaching the various aspects of Indian life. Correlation with the geography of Indian civilization and culture. Study of diction in Sanskrit texts; types of Sanskrit composition. Sentence structure in Sanskrit. Paraphrase and translation with reference to Sanskrit. The Historical and Comparative Method of studying the

Sanskrit language and literature. Study of Organization of Sanskrit teaching in English Schools ; consideration of time-tables ; formation of class libraries and general libraries.

(ii) TELUGU :

I. *General.*—

(1) The importance of the mother-tongue ; position of the vernacular in a scheme of general education ; vernacular as the medium of instruction ; relative importance of the mother-tongue and English as media of instruction, use of the mother-tongue in the various stages of education.

(2) History of vernacular education in India ; the village-school of the old type—intensive as opposed to the extensive study of the mother-tongue ; study of the mother-tongue in schools under the control of the Educational Department, present position of the vernaculars in the various stages of education.

(3) Methods of teaching the mother-tongue ; the effect of teaching English side by side with the vernacular, influence of English on the pronunciation, dictation and expression of the morther-tongue.

(4) Grammar—Its place in the reformed methods of teaching modern languages ; the inductive method of teaching grammar ; correlation with text-books ; formal and practical grammar, function and form of words, word-order, sentence structure, analysis of sentences ; framing of grammatical rules by the inductive method, grammar drill, syllabuses of grammar for general guidance, place of formal grammar in the early stages, relative importance of instruction in grammar and drill in expression in the use of the mother-tongue.

II. *Telugu in the Primary stage.*—

(1) Rural and urban schools, boys' and girls' schools, question of differentiation of courses of study.

(3) Story-telling and reproduction, nursery fable, fairy tales, puranic stories and their importance in the successive years of the primary course.

(2) Songs, verses, nursery rhymes ; comical ballads ; memorization of easy verses.

(4) Writing—Circles as the basis of the Telugu alphabet ; methods of teaching the Telugu alphabet, the traditional method : modern methods of teaching the alphabet ; the 'gudinthamu' and the method of teaching it : phonetics of the Telugu language ; defects of the Telugu alphabet and the 'gudinthamu' and methods of reform.

(5) Reading Knowledge of phonetics essential for correct pronunciation; defects of children—acoustic and organic methods of rectifying them; ordinary inability of children to pronounce the aspirates, distinction between s, sh: and s'; k pronounced as t; r as l; distinction between c and ts, r and r' and so on.

(6) Individual and group recitations.

(7) Text books—At what stage to be introduced; text-books as the books of instruction in general knowledge and as a means of enriching the pupils' vocabulary; literary standard of the text-book; nature of text-books for rural and urban areas and for boys' and girls' schools.

(8) Picture-reading and composition; word and phrase books, composition exercises and team work in composition.

III. *Telugu in the Secondary stage.*—

(*i*) PRE-HIGH SCHOOL.

(1) Story-telling and reproduction, puranic and historical wonder tales of adventure and heroism; stories of invention and discovery, lives of great men.

(2) Songs and verses memorisation of easy portions of Telugu literature, individual and group recitation.

(3) Reading and writing—reading aloud; copy-writing; transcription.

(4) Text-books—Prose and poetry; their varieties; correlation of text-books with the other subjects of school instruction.

(5) Methods appropriate to the teaching of prose and poetry, detailed and non-detailed.

(6) Picture-reading; composition - oral and written, nature of subjects for composition; methods of correcting composition exercises.

(*ii*) HIGH SCHOOL.

(1) Text-books: nature of material; methods of teaching; memorisation and recitations; dramatization.

(2) Precis-writing and expansion of ideas; composition—oral and written; appreciation of literature; training to speak on prescribed subjects.

CHAPTER XLVIII.

DEGREE OF MASTER OF EDUCATION

(Regulations)

1. The Degree of Master of Education may be conferred upon :— On who conferr

(1) persons who have passed the B. Ed. Degree Examination of this University and who are of not less than two years' standing ;

(2) persons who are residents of or domiciled in the University area and who have passed an examination accepted by the Syndicate as equivalent* to the B. Ed. Degree Examination of this University and who are of not less than two years' standing.

If any question arises as to whether a person coming under clause (2) above, is a resident of or domiciled in the University area or not, the question shall be decided by the Syndicate and its decision shall be final, provided that a candidate will not be considered as domiciled unless he has lived continuously within the University area for a period of not less than 2 years immediately preceding the date of submission of the thesis.

2. The M. Ed. Degree shall only be awarded to candidates who have submitted as a thesis work forming a distinct contribution to the advancement of learning. Each candidate shall state in his application the subject or subjects within the purview of the Regulations for the Degree of Bachelor of Education, upon a special knowledge of which he rests his application for M. Ed. Degree, and shall with the application transmit three copies, printed or typewritten, of the thesis.

The application and thesis should be forwarded so as to reach the Registrar between 1st June and 1st July of any year.

3. The thesis must comply with the following conditions :—

(1) it must be satisfactory in respect of literary representation as well as in other respects and should be in a form suitable for publication ;

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* The following examination has been recognised :—

L. T. Degree Examination of the Travancore University.

(2) the candidate shall indicate generally in his preface to his thesis and specialy in notes, the sources from which his information is taken, the extent to which he has availed himself of the work of others and the portions of the thesis which he claims as his original work ;

(3) he shall further state whether his research has been conducted independently, under advice or in co-operation and in what respects his investigations or researches appear to him to tend to the advancement of learning.

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4. The thesis shall be referred to three independent judges appointed by the Syndicate who shall examine the thesis, who may examine the candidate orally if they so desire and who shall report individually whether the candidate's work is of sufficient merit to deserve the Degree.

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If the Syndicate, upon the independent reports of the judges, consider the candidate worthy of the Degree of Master of Education, it shall cause his name to be published with the subject of his thesis.

5. Every candidate shall be at liberty to publish his thesis. The thesis of any successful candidate may be published by the University with the inscription—" Thesis approved for the Degree of Master of Education in the Andhra University ".

CHAPTER XLIX

DEGREE OF BACHELOR OF MEDICINE AND SURGERY

(*Regulations.*)

1. Candidates for the Degree of Bachelor of Medicine and Surgery shall be required :—

Age-limit for admission to college

(i) to have completed the age of seventeen years on or before the date of admission to a College of Medicine for registraaion as medical students, unless specially exempted by the Syndicate from the operation of this rule ;

Preliminary qualifications

(ii) to have passed the Intermediate Examination in Arts and Science of this University, taking Physics and Chemistry, as two of the three optional subjects under Part III of the Intermediate examination or an examination accepted by the Syndicate as equivalent thereto* ; provided however that students who commenced their Intermediate courses of study prior to July 1930 may be permitted to undergo the M.B.B.S. Degree course subject to the condition that they have passed the Intermediate examination in any three of the following subjects under Part III—Physics, Chemistry, Mathematics, Botany and Zoology ;

Pre-Registration Examination

(iii) to have subsequently studied for a period of six months in a college affiliated to or recognized by the University, the subjects of Inorganic Chemistry, Physics and Biology and passed the Pre-Registration examination of this University or an examination recognized by the General Medical Council of Great Britain and Ireland and accepted by the Syndicate as equivalent thereto ;

Five years' study at college

(iv) to have, subsequent to passing the Pre-Registration examination, been engaged for not less than five years in professional study in a College of Medicine affiliated to or recognized by the University, provided that not less than two academic years or six terms of medical study, immediately preceding the Final M.B. & B.S. examination, be spent in attendance at the Andhra University on courses of instruction in the subjects of the curriculum.

Vide foot-note on the first page of Chapter XL.

Terms

(v) The academic year shall consist of three terms, spring, autumn and winter. The spring term will extend from 1st January to 31st March, the autumn term from 1st July to 30th September, and the winter term from 1st October to 31st December.

Certificate of further study

(vi) In the case of the examinations, other than the Final, candidates who fail at the examination or having applied for admission do not appear for the examination or having obtained the prescribed certificate do not apply for admission to the examination although qualified to do so, shall be required to produce a certificate of further study for at least one term before appearing for the next succeeding examination. No candidate who failed in any one of the clinical subjects of the Final M.B.B.S. shall be permitted to appear again for the examination unless he puts in a further course of hospital practice in the subject, for at lest one term.

Examinations twice a year.

(vii) The examination shall be held twice a year in the months of April and December.

Pre-Registration Examination.

Courses of study and examination

2. A candidate for the examination shall undergo a course of study extending over a period of six months, and shall be examined in—

(*a*) Inorganic Chemistry (according to a syllabus),

(*b*) Physics (according to a syllabus), and

(*c*) Biology (according to a syllabus).

The examination in each subject shalll be written, practical and oral.

Preliminary qualifications

3. No candidate shall be admitted to the examination unless he has produced satisfactory evidence of having complied with the provisions contained in clause (ii) of Regulation 1 of this Chapter, and has produced the prescribed certificate.

Candidates with B.A., B.Sc. etc., passing in Science group eligible for exemption

4. Candidates who have passed the Physical or Natural Science group of the B.A., B.Sc., B.Sc. (Honours) Degree examination of this University or of any other Indian University (where practical courses and examinations are held), accepted by the Syndicate as equivalent thereto, shall not, however, be required to produce the prescribed certificates for, or to pass in any of the subjects in which they have passed at the Degree examination. Such candidates shall, however, be required to pay the prescribed fee for the whole examination. Candidates who have passed the examination with either Botany or Zoology as one of the optional subjects shall not be exempted from examination in Biology.

Marks qualifying for a pass

5. A candidate for the examination shall be declared to have passed the examination if he obtains not less than 35 per cent of the marks in the practical and not less than 35 per cent of the marks in the written and oral taken together in each of the subjects, Inorganic Chemistry, Physics and Biology. All other candidates shall be deemed to have failed in the examination.

Exemption from re-examination in subjects

6. Candidates for the examination who fail but obtain 40 per cent in each of the (i) practical and (ii) written and oral in any subject shall be exempted from re-examination in that subject.

Failure

7. A candidate who after qualifying for admission to the examination applies therefor and fails four times shall not be permitted to take the Pre-Registration examination again. If a candidate, whose name has been registered for the examination, absents himself therefrom, he shall be deemed to have failed in the examination.

Classification of successful candidates

8. Candidates who pass the whole examination on the first occasion of appearing therefor shall be ranked in the order of proficiency as determined by the total number of marks obtained by each and shall be arranged in two classes ; the first consisting of those who have obtained not less than fifty per cent of the aggregate number of marks, the second consisting of all the others.

Candidates who pass in the first class and who obtain not less than sixty per cent of the marks in any subject shall be declared to have passed with distinction in that subject.

Candidates who pass the whole examination at a subsequent appearance shall be ranked only in the second class.

All candidates who pass the examination subject by subject shall be ranked in the second class separately.

First M. B. B. S. Examination.

Courses of study and examinations

9. A candidate for the examination shall undergo a course of study extending over a period of two academic years after passing the Pre-Registration examination and consisting of—

(1) Anatomy including the elements of human embryology and dissection of the entire body.

(2) Physiology including Histology, Bio-Chemistry and Bio-Physics and experimental Physiology.

(3) Organic Chemistry, extending over a period of one academic year.

(4) Elements of normal psychology.

(5) The normal reaction of the body to injury and infection as an introduction to general Pathology and Bacteriology.

(6) An introduction to Pharmacology, the last three not to occupy more than a third of the available time during the second year of study, and

(7) Elements of the methods of clinical examination including the use of common instruments and examination of body fluids, with demonstrations on both normal and abnormal living subject.

A candidate for the examination shall be examined in—

(*a*) Organic Chemistry (according to a syllabus).

(*b*) Anatomy including elements of human embryology, and

(*c*) Physiology including Bio-Chemistry and Bio-Physics (according to a syllabus).

The examination in each subject shall be written, practical and oral.

Conditions of admission to examination

10. No candidate shall be admitted to the examination unless he has passed the Pre-Registration examination of this University or an examination accepted by the Syndicate as equivalent thereto* and has produced the prescribed certificates.

Candidates who have passed the B.A. (Honours) or B.Sc. (Honours) or M.A., or M.Sc. Degree examination with Chemistry as the main subject or Organic Chemistry as the special subject in the case of degrees obtained by research, shall not, however, be required to produce the prescribed certificates of attendance for or to pass in Organic Chemistry. A similar concession shall be shown in the case of those who have passed the B.A., or B.Sc. Degree examination with Chemistry as the main subject provided they have obtained not less than 50 per cent of the marks prescribed for Organic Chemistry. Applications for exemptions shall be made in each case.

Marks qualifying for a pass

11. A candidate for the examination shall be declared to have passed if he obtains not less than one-half of the marks in the practical and not less than one-half of the marks in the written and oral taken together in each subject. All other candidates shall be deemed to have failed in the examination.

Exemption in subjects passed

12. Candidates for the examination who fail but obtain passing marks in any subject shall be exempted from re-examination in that subject.

Classification of successful candidates

13. Candidates who pass in all the subjects on the first occasion of appearing therefor shall be ranked in the order of proficiency as determined by the total number of marks obtained by each and shall be arranged in two classes ; the first consisting of those who have obtained not less than seventy per cent of the aggregate number of marks ; the second consisting of all the others.

Candidates who pass in the first class and who obtain not less than seventy-five per cent of the marks in any subject shall be declared to have passed with distinction in that subject.

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* The following examination has been recognised by the Academic Council in accordance with Sec. 33 (1) of the Act, as equivalent to the Pre-Registration Examination of the Andhra University :—

Pre-Registration Examination of the Sheffield University.

Candidates who pass the whole examination at a subsequent appearance shall be ranked only in the second class.

All candidates who pass the examination subject by subject shall be ranked in the second class separately.

Second M. B. B. S. Examination.

Courses of study and examination

14. A candidate for the examination shall undergo a course of study extending over a period of one academic year in Pharmacology, Hygiene and Public Health and Forensic Medicine, taken concurrently and subsequent to passing the First M. B. B. S. examination.

The course in Pharmacology and Materia Medica shall include elementary Pharmacological Chemistry and Practical Pharmacy. The course including practical work should be taken concurrently with courses of clinical instructions.

The course of instruction in Forensic Medicine, Hygiene and Public Health shall include instruction in the duties which devolve upon practitioners in their relation to the State and on the generally recognized rules of medical ethics.

Admission to examination

15. No candidate shall be admitted to the Second M.B.B.S. examination unless he has passed the First M.B.B.S. examination of this University or an examination recognized as equivalent thereto* and has been engaged in medical studies at a Medical College recognized by the University for a period of two years after passing that examination.

Before admission to the Second M.B.B.S. examination candidates shall present certificates of having completely attended the following courses to the satisfaction of the Head of the College.

In Pharmacology including Elementary Pharmacological Chemistry and Materia Medica—a course of lectures and demonstration extending over three terms or one academic year.

In Practical Pharmacy—a course of demonstrations and practical work extending over one term.

* The First M.B.B.S. Examination of the Punjab University.

In Hygiene—a course of lectures and demonstrations and practical work extending over three terms or one academic year.

In Forensic Medicine—a course of lectures and demonstrations extending over three terms or one academic year.

Candidates shall be examined in the following subjects :—

(1) Pharmacology—Materia Medica and Practical Pharmacy and Pharmacological Therapeutics.

The examination shall consist of—

One written paper of three hours' duration.

Practical examination in Pharmacy as well as practical and oral test in Pharmacology.

(2) Hygiene—

The examination shall consist of—

One written paper of three hours' duration.

Practical and Oral examination.

(3) Forensic Medicine—

The examination shall consist of—

One written paper of three hours' duration.

Oral examination.

Marks qualifying for a pass

16. A candidate for the examination shall be declared to have passed the examination if he obtains not less than one-half of the marks in the practical and not less than one-half of the marks in the written and oral taken together in each subject. All the other candidates shall be deemed to have failed in the examination.

Exemption in subjects passed

17. Candidates for the examination who fail but obtain passing marks in a subject shall be exempted from re-examination in that subject.

Classification of successful candidates

18. Candidates who pass the whole examination on the first occasion of appearing therefor shall be ranked in the order of proficiency as determined by the total number of marks obtained by each and shall be arranged in two classes ; the first consisting of

those who have obtained not less than seventy per cent of the aggregate number of marks, the second consisting of all others.

Candidates who pass in the first class and who obtain not less than seventy-five per cent of the marks in any subject shall be declared to have passed with distinction in that subject.

Candidates who pass the whole examination at a subsequent appearance shall be ranked only in the second class.

All candidates who pass subject by subject shall be ranked in the second class separately.

Final M.B.B.S. Examination

19. A candidate for the examination shall undergo a course of study extending over nine terms or three academic years in Medicine, Surgery and Pathology and a course of study extending over a period of three terms or one academic year in Ophthalmology and Obstetrics and Gynæcology taken concurrently and subsequent to passing the First M.B.B.S. Examination, and shall be examined in—

(*a*) Medicine.

(*b*) Surgery.

(*c*) Obstetrics and Gynæcology.

(*d*) Ophthalmology.

(*e*) Pathology and Bacteriology.

Medicine: Course of study and Examination

20. The course in Medicine shall include—

(*a*) A course of systematic instruction in the principles and practice of Medicine.

(*b*) Appointment for nine months as clinical clerk in the medical wards of a recognized hospital, of which at least two months shall be in the final year.

(*c*) Appointment for three months as clinical clerk in the medical out-patient department of a recognized hospital.

(*d*) Clinical clerkship for not less than one month in a children's out-patient department.

Note.—Each student during his period of clinical clerkship in the wards shall have continuously in his sole charge as clerk not less than five beds and during the period of medical ward clerking a continuous period of one month as an intern clerk during which period each student is in residence in hospital or close by.

(*e*) Lectures or demonstrations in clinical medicine and attendance at general in-patient or out-patient practice during at least two years which may run concurrently with the surgical practice.

(*f*) Instruction in Therapeutics and prescribing including

(1) Pharmacological Therapeutics.

(2) Methods of treatment by vaccine and sera.

(3) Physio-therapy.

(4) Dietetics.

(5) Principles of nursing.

(*g*) Instruction in Applied Anatomy and Physiology throughout the period of clinical study.

(*h*) Instruction throughout the period of medical clerkship in Clinical Pathology.

21. Every candidate for the M.B.B.S. Degree shall also attend recognized courses of instruction in the following subjects :—

(1) Infectious diseases with attendance as clinical clerk of a recognized hospital on two days in the week for a period of three months.

(2) Diseases of Infancy and Childhood.

(3) Tuberculosis with attendance as clinical clerk in a tuberculosis hospital or ward on one day in the week for a period of three months.

(4) Psycho-pathology and mental diseases with attendance as clinical clerk at a recognized hospital for mental diseases on one day in the week for a period of three months.

(5) Diseases of the skin including leprosy with attendance at the special department on two days in the week for a period of three months.

(6) Theory and practice of vaccination by a qualified Health Officer.

(7) Radiology and Electro-therapeutics in their application to Medicine.

Throughout the whole period of study the attention of the student should be directed by the teachers of this subject to the importance of its preventive aspects.

22. The examination in Medicine may include questions on the above-mentioned subjects but separate examinations in these subjects will not be held.

Surgery: Course of study and examination

23. The course in Surgery shall include—

(1) appointment for nine months as surgical dresser in the surgical wards of a recognized hospital of which at least two months shall be in the final year;

(2) appointment for three months as surgical dresser in the out-patient department of a recognized hospital.

Note :—Each student during his period of surgical dressership in the wards should have continuously in his sole charge as dresser not less than five beds, and during the period of surgical ward dressing a continuous period of one month as intern clerk during which the student is in residence in hospital or close by.

24. Every candidate for the Final M.B.B.S. Degree shall also attend recognized courses of instruction in the following subjects :—

(1) A course of systematic instruction in the principles and practice of Surgery.

(2) Lectures and demonstrations in clinical surgery and attendance at general in-patient and out-patient practice during at least two years which may run concurrently with the medical practice.

(3) Practical instruction in surgical methods including Physiotherapy.

(4) Practical instruction in minor surgery on the living.

(5) Instruction in the administration of Anæsthetics.

(6) A course of instruction in Operative Surgery.

(7) Instructions in Applied Anatomy and Physiology throughout the period of clinical studies.

(8) Instruction throughout the period of surgical dressership in Clinical Pathology.

(9) Instruction in diseases of the Ear, Nose and Throat including the use of otoscope, laryngoscope and rhinoscope with attendance as clinical clerk at a recognized clinic on three days in the week for a period of three months.

(10) Radiology and Electro-therapeutics in their application to Surgery.

(11) Venereal diseases with attendance at a venereal clinic for two days in the week for a period of two months.

(12) Orthopedics with attendance at a recognized clinic on two days in the week for a period of three months.

(13) Dental diseases.

(14) Surgical diseases of infancy and childhood.

25. The examination in Surgery may include questions on the above-mentioned subjects but separate examinations in these subjects will not be held.

Throughout the whole period of study the attention of the student should be directed by the teachers of this subject to the importance of its preventive aspect.

26. The course of study in Obstetrics and Gynæcology shall include—

Obstetrics and Gynæcology: Course of study and examination

(1) A course of systematic instruction in the principles and practice of Midwifery and Gynæcology and Infant Hygiene including Applied Anatomy and Physiology of pregnancy and labour.

(2) Lectures and demonstrations in Clinical Midwifery, Gynæcology and Infant Hygiene and attendance on the practice of maternity hospital or the maternity wards of a general hospital including (i) antenatal care, (ii) management of the puerperium and on in-patient and out-patient gynæcological practice for a period of at least three months.

N.B.—This period shall be devoted exclusively to instruction in these subjects and should be subsequent to the medical clinical clerkship and the surgical dressership. Not less than two-thirds hours of the clinical instruction should be given to Midwifery including antenatal care and Infant Hygiene.

(3) Of this period of clinical instruction not less than one month should be spent as a resident pupil either in a maternity hospital or in a hospital attached to a maternity hospital or to the maternity ward of a general hospital. The candidate should during this month attend at least 20 cases of labour under adequate supervision. Should the number of cases attended during this month be less than 20, the remainder should be attended as soon as possible thereafter.

27. A certificate showing the number of cases attended by the candidate in the maternity hospital or in the patients' homes respectively should be signed by a responsible medical officer on the staff of the hospital and should state (1) that the candidate has personally attended each case during the course of labour making the necessary abdominal and other examinations under the supervision of the certifying officer and (2) that satisfactorily written histories of the cases attended by the candidates were presented to the supervising officer and countersigned by him.

28. The course of study in Ophthalmology shall include—Systematic lectures in Ophthalmology with attendance at an

Ophthalmic hospital or Ophthalmic wards of a general hospital on three days in the week for a period of three months and shall include refraction and the use of Ophthalmoscope.

29. The course of instruction in Pathology and Bacteriology shall be given throughout the period of clinical study and shall include—

(1) General and Special Pathology and Morbid Anatomy.

(2) Clinical and Chemical Pathology.

(3) Elementary General Bacteriology and Parasitology.

(4) Clinical Bacteriology and Parasitology.

(5) Immunology and Immunization.

Admission to examination

30. No candidate shall be admitted to Final M.B.B.S. Examination unless—

(1) he has passed the First M.B.B.S. Examination or an examination accepted by the Syndicate as equivalent thereto, not less than three academic years previously ;

(2) he has passed the Second M.B.B.S. Examination or an examination accepted by the Syndicate as equivalent thereto, not less than one academic term previously ;

(3) he has been engaged in Medical Studies at the Andhra University for not less than two academic years immediately preceding the examination ; and

(4) he has produced the prescribed certificates.

31. Before admission to the Final M.B.B.S. Examination, candidates shall present certificates of having satisfactorily attended the courses to the satisfaction of the head of the college.

32. The subjects in which the candidates will be examined are as follows :—

(1) *Medicine*

The examination shall consist of—

Two written papers, each of two hours' duration,

Clinical examination consisting of the following :—

(i) Examination of a patient and a report (written) thereon extending to at least one hour.

(ii) Short examination of two patients extending to at least half-an-hour.

Practical and Oral examinations.

(2) *Surgery*

The examination shall consist of—

Two written papers, each of two hours' duration.

Clinical examination consisting of—

(i) Examination of a patient and a report (written) thereon extending to at least one hour.

(ii) Short examination of not less than two cases.

Practical and Oral examinations bearing on Surgical Anatomy and Pathology.

Use of surgical appliances.

Operations on the cadavar.

(3) *Obstetrics and Gynaecology*

The examination shall consist of—

One written paper of three hours' duration.

Clinical, Practical and Oral examinations.

(4) *Ophthalmology*

The examination shall consist of—

One written paper of three hours' duration.

Clinical, Practical and Oral examinations.

(5) *Pathology and Bacteriology*

The examination shall consist of—

One written paper of three hours' duration.

Practical examination and Oral examination.

Marks qualifying for a pass

33. A candidate shall be declared to have passed the Pathology and Bacteriology Examination if he obtains not less than 40 per cent of the marks in the written part, not less than 50 per cent in practical and oral taken together, and not less than 50 per cent marks in the written, practical and oral examinations taken together.

In Medicine, Surgery, Ophthalmology and Midwifery no candidate shall be allowed to pass in any subject who fails to obtain 50 per cent of the marks assigned to the Clinical examination or who fails to obtain 40 per cent of the marks assigned to the written examination or who fails to obtain 50 per cent of the aggregate assigned to the written, practical and oral examinations.

They shall not be declared to have passed the whole examination until they have passed in all the subjects of the examination.

Exemption from re-examination

34. Candidates who have appeared for the Final M.B.B.S. examination either in part or whole shall be exempted from appearing in the subject or subjects in which they have passed and they may complete the said examination at a subsequent session or sessions by appearing in the subject or subjects in which they have failed, provided however that they pass in all the subjects within a period of two calendar years or in four consecutive examinations including the first appearance.

Candidates who do not avail themselves of any exemption must also complete the examination within a period of two years from the date of first appearance.

Candidates who fail to complete the whole examination within the above limit of two years or four consecutive examinations shall be required to appear again for all the subjects of the Final M.B.B.S. Examination.

At the expiry of each period of two years or four successive examinations another period of the same duration will be applicable as regards the exemption in passing the examinations.

Non-appearance at the examination during the period of two years shall be deemed as a failure to pass the examination for purpose of this regulation.

Classification of successful candidates

35. Candidates who pass the whole examination on the first occasion of appearing therefor shall be ranked in the order of proficiency, as determined by the total number of marks obtained by each in all subjects and shall be arranged in two classes : the first consisting of those who have obtained not less than seventy per cent of the aggregate number of marks, the second consisting of all the others.

Candidates who pass in the first class and who obtain not less than seventy-five per cent of the marks in any subject shall be deemed to have passed with distinction in that subject.

Candidates who pass the examination at a subsequent appearance shall be ranked only in the second class.

All candidates who pass the examination subject by subject shall be ranked in the second class separately.

Transitory Regulations

36. Candidates who commenced their third year of medical studies in January 1939 shall appear for Pharmacology in December 1939 under Old Regulations and they shall proceed with their further studies under New Regulations and shall take the rest of the examinations under New Regulations.

Candidates who commenced their third year of medical studies in July 1939 shall proceed with their further studies under New Regulations and shall take the Second and Final M.B. & B.S. Examinations under New Regulations.

Candidates who commenced their fourth or fifth year of medical studies in January or July 1939 shall proceed with their further studies under Old Regulations and shall take the rest of the examinations under Old Regulations.

The following are the examinations to be held during the Transitory period between December 1939 to December 1941 to implement the new curriculum of studies :—

December ... All the examinations under Old Regulations.

March-May 1940 ...	All the examinations under Old Regulations.
	Examination in Organic Chemistry and Pharmacology to be held only for the benefit of referred candidates.
December 1940 :	
First M.B. & B.S. ...	(*a*) Anatomy and Physiology under Old Regulations.
	(*b*) Organic Chemistry under old Regulations to be held for the benefit of referred candidates.
Second M.B. & B.S.	(*a*) Hygiene and Forensic Medicine under New Regulations.
	(*b*) Pharmacology under Old Regulations—to be held for the benefit of referred candidates.
	(*c*) Pathology and Ophthalmology—to be held under Old Regulations for the benefit of referred candidates.
Final M.B. & B.S. ...	Medicine, Surgery and Midwifery under Old Regulations.

Note.—Candidates who appear for Final M.B. & B.S., Part I, as regular or referred candidates under Old Regulations will take the examination in that subject held under Second M.B. & B.S. (New Regulations).

March-May 1941 :

First M.B. & B.S. ...	Under New Regulations.
Second M.B. & B.S.	Under New Regulations.
Final M.B. & B.S. ...	Under Old Regulations.

Note.—Candidates who appear for Forensic Medicine under Final M.B. & B.S. (Old Regulations) shall take the examination in that subject held under Second M.B. & B.S. (New Regulations).

December 1941 ... All the examinations under New Regulations.

37. (1) Candidates who have been referred to their studies in one or more subjects of the First M.B. & B.S. Examination under Old Regulations prior to April 1941 shall take the examination under New Regulations in April 1941 in the subjects in which they have been referred and they shall thereafter continue the course of study under New Regulations.

(2) Candidates who do not complete a pass in the Second M.B. & B.S. Examination under Old Regulations in December 1940 or earlier will take the Second M.B. & B.S. Examination under New Regulations in April 1941 in the subjects of the Second M.B. & B.S. under New Regulations in which they have been referred to their studies along with Forensic Medicine ; successful candidates at that examination will take the Final M.B. & B.S. Examination under New Regulations in December 1941. Such of these candidates who have passed in Pathology or Ophthalmology or both in the Second M.B. & B.S. Examination held under Old Regulations shall be exempted from appearing in the subject or subjects in which they have passed while they take the Final M.B. & B.S. Examination under the New Regulations.

(3) Candidates who are referred to their studies in the Final M.B. & B.S. Examination held in April 1941 for the last time under Old Regulations shall appear only in those subjects in which they have been referred in the examinations held under New Regulations. Such of these candidates who fail to complete the whole examination within a period of two years from the date of first appearance shall appear again for all the subjects of the Final M.B. & B.S. Examination under Old Regulations, viz., Forensic Medicine, Medicine, Surgery and Midwifery only in the corresponding examinations held under New Regulations.

(4) Candidates who having been referred to their studies in any of the subjects under Old Regulations take the examination in the corresponding subjects under New Regulations shall undergo the additions to the courses of study in these subjects under New

Regulations, if any, while they are re-engaged in the studies of the subjects as referred candidates.

(5) Candidates for the M.B. & B.S. Degree who had qualified for the L.M.S. Degree after a five years course, shall be exempted from re-examination in the subject in which they had obtained 50 per cent of the marks and from the production of the additional attendance certificates in other subjects.

SYLLABUSES.

PRE-REGISTRATION EXAMINATION.

INORGANIC CHEMISTRY.

The whole subject is to be treated in an elementary manner and with regard to the subsequent work of the student.

The syllabus includes the subjects of the Intermediate examination with the addition of the following.

Lectures.

Atomic theory. Avogadro's law Equivalent atomic and molecular weights and their determination.

Classification of the elements.

Solution and such properties of liquids as diffusion, osmotic pressure, freezing and boiling points, electrical conductivity.

Electrolysis. Ionisation. Hydrogen-ion concentration. Relative strengths of acids and bases.

Speed and reaction and the law of mass action. Hydrolysis in aqueous solution. Thermal dissociation.

Catalysis. The colloidal state. Combustion. Heat of combustion and of formation. Heat of solution. Elements of Radioactivity.

Simple calculations based on the foregoing.

Practical Work.

The determination of: Vapour density by Meyer's method; Molecular weight by the freezing point and boiling point methods; the solubility of a solid and of a gas; partition co-efficient; P.H of a solution by indicators.

Quantitative analyses—

Gravimetric estimation of a sulphate and a phosphate.

Direct and indirect estimations by means of a standard acid or alkali.

Estimation of iron, oxalates, and hydrogen peroxide by potassium permanganate.

Estimation of a chloride by silver nitrate and potassium chromate and by Volhard's thiocyanate method.

Estimations by means of iodine and sodium thiosulphate, namely free halogens, sulphur dioxide, hypochlorites, and permanganates.

Qualitative analyses—

Identification of an element, a free acid or a base, or a salt containing not more than one basic and one acidic radical selected from the following :—

"Silver, Lead, Mercury, Bismuth, Copper, Arsenic, Antimony, Tin, Aluminium, Iron, Zinc, Calcium, Barium, Magnesium, Sodium, Potassium, Ammonium, Carbonate, Chloride, Iodide, Nitrite, Nitrate, Phosphate, Borate, Sulphide, Sulphite, Sulphate, Thiosulphate, Arsenate, Chromate."

One book on qualitative analysis may be brought into the examination room by the candidates.

Candidates will be required to write out a clear account of their practical work, accurately describing the nature of the process employed and where possible representing by equations the chemical changes involved. They will be further required to bring to the practical examination note books containing a record of their previous practical work. These note books must be certified by the teachers of the candidates as being the actual working notes made by them in the laboratory.

PHYSICS

The whole syllabus is to be treated in an elementary manner and with reference to the subsequent work of the student. The treatment will be mostly experimental and in no case will Mathematics be required beyond Elementary Algebra and Geometry.

General Physics.—Units and measurements of length, mass and time, and the derived units and measurements of velocity, acceleration, force, work and energy, power and efficiency. The laws of motion and conditions of equilibrium of bodies under the action of forces. Simple machine. Uniform circular motion and the centrifuge.

The elements of hydrostatics including methods for the determination of densities. Elementary principles governing the flow of liquids in rigid and elastic tubes. Viscosity and surface tension and their measurements.

Gas laws including the diffusion of gas and elementary ideas of the kinetic theory of matter.

Heat.—The effect of heat on bodies including thermometry, dilatation, change of state and calorimetry. Convection, conduction and radiation of heat. The relation between heat and work.

Sound.—The production, propagation and reception of sound waves. The measurement of velocity, frequency and wave length of sound.

Light.—Outlines of the wave theory of light including interference, diffraction, double refraction and polarization of light. Simple geometrical optics, including reflection and refraction at plane and curved surfaces. The range of electro-magnetic waves and various kinds of spectra. Optical instruments including the spectrometer, and photographic camera, the eye as an opitical instrument, the microscope and the polarimeter.

Electricity and Magnetism.—The elementary facts and phenomena of magnetism and static electricity.

The production of electric currents and the chemical, magnetic and heating effects of them. Units and measurements of current strength, potential difference and resistance. Thermo-electric couples

Electric-magnetic induction and Ruhmkorff's coil, Electric discharge in rarefield gases. Cathode and X-Ray.

Practical Physics—Students are expected to have a practical knowledge of the following subjects :—

General.—The use of graphs and diagrams.

Elementary mensuration and mechanics.

The use of a delicate balance, thermometers and the barometer.

The use of the vernier, the screw-gauge and the spherometer.

The determination of densities of solids, liquids and gases.

The use of the falling plate, Fletcher's trolley or Atwood's machine to determine g and n

The simple pendulum.

The determination of surface tension by (a) the rise in a capillary tube, (b) the surface tension balance.

The comparison of viscosities of liquids.

Heat.—The determination of melting and boiling points.

The determination of the co-efficients of expansion of solids, liquids and gases.

The determination of specific and latent heats by the method of mixtures and of specic heats by the method of cooling.

The determination of the mechanical equivalent of heat.

The use of hygrometers.

Sound —The use of the sonometer and resonating columns of gases.

Light.—The use of Photometers.

The determination of focal lengths of spherical mirrors, thin lenses and combination of thin lenses.

The determination of the wave length of light by a diffraction grating.

The use of the polarimeter, the spectro-meter and the microscope

Electricity.—The use of electric batteries.

Mapping magnetic fields.

The experimental proof of the Laws of Electrolysis.

The measurement of resistance by the meter and the microscope.

The comparison of E.M.Fs. by (1) Tangent Galvanometer. (2) the Potentiometer.

The use of the electrical calorimeter.

The measurement of the conductivity of an electrolyte.

The use of a Thermo-couple.

BIOLOGY.

The examination in Biology shall comprise the subject included in the following syllabuses which are intended only to indicate its general scope and character.

A. General Biology—

The distinctive properties of living and non-living matter.

The difference between animals and plants.

The nature and properties of protoplasm.

The structure of the cell; Cell divisions and gametogenesis.

Conjugation and fertilisation.

Segmentation and formation of germ layers.

Structure and function of animal tissues.

B. Botany—

The structure, life-history, and physiology of Yeast, Bacteria, Penicillium or other mould, Spirogyra, Chara, Fern.

The elements of the morphology and physiology of the Angiosperms embracing (a) the structure (macroscopic and microscopic) of the root, stem and leaf; (b) the structure of a typical flower and modifications of the type; (c) the inflorescence, and the principal types of branching; (d) the structure and development of the seeds and embryo; (e) the principal types of fruits; (f) the dispersal of seeds and embryo; (g) the main facts in relation to nutrition, growth and reaction to environments.

The reproduction and life-history of Angiosperms.

C. Zoology.—

The tructure, life-history and physiology of amoeba, paramaecium, Euglena, Hydra, Earthworm, Leech, Cockroach and the anatomy of Frog and Rabbit. (Only an elementary knowledge of the muscular system of the frog, and the muscular and nervous system of the rabbit will be required.)

An elementary knowledge of the more important types of animal parasites, Protozoan, and Metazoan, such as Entamoeba, Trypanosomes, Plasmodium, Liver fluke, Tape-worm, Roundworm, etc.

The leading types of reproduction in animals. The main features of the larval history and metamorphosis of the frog, the embryonic membranes and placenta of the foetus of the rabbit.

The chief external characters and poison apparatus of the poisonous snakes of South India

Variation, Heredity, Natural Selection, Evolution treated in an elementary manner.

Practical Examination.

Each candidate must be prepared to examine microscopically, to dissect and to describe the pecimen of parts of the animals and plants enumerated in the foregoing syllabus with the exception that for the skull of the rabbit will be substituted that of the dog.

FIRST M.B.B.S. EXAMINATION

Organic Chemistry

Methods of purifying organic compounds. Detection and the estimation of the constituent elements of organic compounds. Deduction of empirical formulæ. Determination of molecular formulæ. Structural formulæ and isomorism. The constitution, and the characteristic reaction of aliphatic compounds as illustrated by the simple paraffin, olefine, and acetylene hydro-carbon, halogen derivatives alcohols, aldehydes, ketones, acids, ethers, esters. Glycol and its oxidation products. Discarboxylic acids, oxalic and malonic acids. Glycerol, fats and oils, soaps, hydroxy acids including the stereoisomorism of lactic and tartaric acids.

Nitrogen derivatives including amides, amines, nitriles, iso-nitriles, and the esters of nitrons and nitric acids. Nitro-paraffins—Urea—Barbituric acid. The simpler amine acids including botaine. Xetonic acid and syntheses involving the use of aceto-acetic ester.

The Benzenoid hydrocarbons as illustrated by benzene and tolune. Halogen derivatives. Nitro compounds. Amino compounds including an elementary study of the diazo reaction. Sulphonic acids, Phenol, Benzyl alcohol. Benzaldehyde, aromatic ketones, Benzoic, salicylic and cinnamic acids, and their important derivatives. Aromatic, arsenic and antimony compounds.

Elementary study of Naphthalene, anthracene and Phenanthrene and their important derivatives. Simple dyes, alkaloids, their classification, extraction, and general properties. An elementary study of important members of the pyridine, tropane, quinoline and the Iso-quinoline groups. Simple terpenes, and glucosides, Purine and Pyrimidine.

List of Practical Exercises.

1. Detection of elements in an organic compound :—Carbon, hydrogen and nitrogen.
2. Detection of halogens, sulphur and phosphorus.
3. Reactions of hydro-carbons-Ligroin, amylene, benzene, naphthalene and anthracene.
4. Fractional distillation and the study of the properties of alcohols : methyl alcohol and benzyl alcohol.
5. Reactions of aldehydes, chloral hydrate and ketones—Formaldehyde, acetaldehyde, benzaldehyde, chloral hydrate, acetone and acetophenone.
6. Reactions of acids—Monocarboxylic—Formic acid, acetic acid, benzoic acid, lactic acid and salicylic acid.
7. Reactions of dicarboxylic acids. Oxalic acid, citric acid, Phthalic acid.
8. Reactions of esters and ethers—Ethyl acetate, Ethyl aceto-acetate, ethyl benzoato, methyl salicylate, ether.
9. Reactions of amines and amides ; Aniline, Methyl aniline—dimethyl aniline, acetamide.
10. Reactions of glycerol.
11. Urea.
12. Amino acids—Glycine.
13. Reactions of phenols ; Phenol, cresol, resorcenol, catechol, quinol, pyrogollol.

14. Preparation of ether.

15. Do. chloroform.

16. Do. ethyl acetate.

17. Do. acetamide.

18. Do. a fatty acid from a fat ; oleic acid from olive oil

19. Do. benzoic acid from toluene (Demonstration)

20. Do. aniline from nitrobenzene (Demonstration).

21 Do. Chloro-benzene by Sandmeyer's reaction (Demonstration).

22. Do. acetanilide.

23. Reactions of the more common alkaloids, quinine, strychnine, brucine, morphine and atropine.

24. Identification of simple organic compounds containing carbon, hydrogen, oxygen and nitrogen.

25. Saponification value, acid value, and Iodine value of a fat.

ANATOMY

First Year

July to September ... ... Osteology of extremities and trunk dissection of the extremity, upper or lower.

October to December ... ... Osteology of skull and face. General embryology. Dissection of one extremity, upper or lower.

January to March .. ... Extremities and thorax. Developmental anatomy of the limbs and thoracic viscera. Dissection of the thorax.

Second Year.

July to September ... ... Anatomy of the abdomen, developmental topographical and applied anatomy of the abdominal viscera, dissections.

October to December ... ... Anatomy of the head and neck. Embryology and applied and topographical anatomy. Dissections.

January to March ... ... Anatomy and embryology of the nervous system nnd special sense organs. Dissection of the human brain and Spinal cord and of bovine eye.

A sufficient number of classes will be devoted to applied Anatomy.

NOTE.—The demonstration of structure and function in the teaching of Anatomy and Physiology should be done as far as possible on the living human subject and should include the information to be obtained from Radiology.

PHYSIOLOGY

(Including Bio-Chemistry and Bio-Physics.)

First Year

Voluntary striated muscle. Structure, excitation of muscle and other tissues. Chronaxie—Mechanical change during contraction Thermal and chemical changes—Electrical change Plain muscle and other contractile tissues

Nerve fibres.—Structure—Excitation—Conditions affecting the passage of the nervous impulse—Conditions affecting the excitability of nerve—The nature of the nerve impulse—Transmission of excitatory state from nerve to effector tissue.

Blood.—Physical properties—Coagulation—Volume and its regulation. Emythrocytes, origin, life-history and functions—Leucocytes, varieties, origin, life-history and functions Thromebocytes, blood substitutes—Blood groups.

Defence against Infection: Cellular mechanisms—Chemical mechanism—Anaphylaxis.

The Circulatory System.—General features, Heart—Structure—Contraction of the cold-blooded heart—Properties of cardiac muscle—Contraction of the mammalian heart—Cardiac cycle—Endocardiac pressure, Cardiac impulse; heart sounds—Electro Cardiagram—Output, Factors which modify heart's action—Rate:—Regulation of the heart—Action of adrenaline. Heart reflexes. Coronary circulation—Metabolism of cardiac muscle.

Blood vessels.—Blood pressure, arterial and venous—Elementary hydrodynamics of circulation—Arterial pulse—Circulation through the capillaries—Flow of blood in the veins, nervous control of the blood vessels. Vasomotor reflexes, Chemical regulation of the Arterioles. Regulation of blood flow through the capillaries, pulmonary, hepatic and cerebral circulation.

Circulatory adaptation.—Change during muscular exercise. Influence of variations in the total quantity of blood.

Spleen—Lymph.—Tissue fluids and cerebro-spinal fluid.

The Respiratory system.—Histology—Mechanics of the Respiratory movements—Pulmonary ventilation—Expired air, Aleveolar air. The exchange of

gases in the lungs—Exchange of gases in the tissues. Regulation of the respiratory movement—Effect on respiration of changes in the air breathed. Anoxia, Pressure conditions in the lungs, and thorax and their influence upon circulation.

The Digestive system.—Histology —Saliva —Mastication —Deglutition—Gastric Juice—Movements of stomach: vomitting—Pancreatic juice—Bile—Sucous entericus—Movements of intestines—Gall bladder—Absorption of food

Second Year

Urinary system.—Histology—Function of the glomeruli—Function of the Rinal Tubules—the adaption of the Renal functions—Micturition.

Skin.—Structure and functions.

Temperature of the body and its regulation—Endocrines.—The supra-renal bodies. The thyroid. The parathyroids. The pituitary body. Thymus. Mutual interaction. The internal secretion of the Testes and the Ovary.

Central Nervous system—Anatomy.—Structure of spinal cord and tracts—Structure of the Medulla Oblongata—Structure of pons varolii—Structure of midbrain—connexions of the cranial nerves—Diencephalon—Structure and connexions of the cerebellum—Structure and connexions of the Basal Ganglia—Structure of the cerebrum—Reflex actions—Postural reflexes—Tone of skeletal muscle—Spinal reflexes—Results following section of spinal cord—Functions of cerebellum—Functions of cerebrum motor and motor paths—Premotor area and extra-pyramidal system. Sensations. Sensory areas. Sensory paths. Visual path—Visual area—light reflex—Auditory path—Auditory area—Path for taste and smell. Centres for taste and smell—Speech and aphasia—Conditioned reflexes—Sleep and conscious states—Autonomic Nervous system

Special senses—Vision.—Structure of the eye-ball—nourishment and protection of the eye—the optical system of the eye. The refraction of the eye—The retina—The relationship between stimulus and sensation The subjective phenomena of vision—Colour vision—Binocular vision.

Hearing.—Structure of the auditory apparatus. Theories of hearing Phenomena of hearing.

Cutaneous sensations.—Smell and taste.

Reproductory system.—Male reproductive organs—Structure and functions—Female reproductive organs—Structure and functions—Cestrous cycle—Menstruation—Pregnancy—Parturition

Secretion of milk.—Sufficient importance is to be attached to *applied Physiology* during the course of the teaching.

Junior Course in Experimental Physiology

1. Simple experiments illustrating the use of electrical apparatus used in Physiology.

2. Nerve muscle preparation—Various methods of excitation of tissue.

3. Simple muscle twitch—
   (*a*) Time relations.
   (*b*) Influence of temperature.

4. Effect of varatriiance on simple muscle twitch.

5. Summation of stimuli and contractions.

6. Genesis of tetanus

7. Condition in nerve and transmission of nerve impulse in both directions.

8. Velocity of nerve impulse.

9. Frog's heart—Observation of the sequence of events during the heart beat and recording the heart beat.

10. Demonstration of the effect of—

   A. Heat and cold on—

      (*a*) Sinus venosus and
      (*b*) Ventricle.

   B The stannius ligatures.

11. The physiological anatomy of mammalian heart.

Senior Course in Experimental Physiology

Blood—Human.

1. A. Enumeration of blood carpuscles—

      (*a*) Red blood carpuscles—
      (*b*) Leucocytes.

   B. Calorimetric estimation of percentage of Hb. Determination of colour index from the data obtained.

2. Determination of coagulation time—
   Bleeding time.
   Sedimentation time.

3. Determination of specific gravity of blood—
   Fragility of R. B. C.
   Blood grouping.

Cardio-Vascular System.

4. Human—
   A. Determination of blood pressure.
      (*a*) Arterial.
      (*b*) Venous.

B. Recording of pulse tracings.

(*a*) Radical artery.
(*b*) Carotic artery.
(*c*) Jugular Vein.

5. Amphibian—Perfusion of the blood vessels of the frog and demonstration of the action of drugs.

Heart.

6. Human—
A. Physical examination of the chest.
B. Cardiac efficiency tests.

7. Amphibian—Demonstration of the properties of cardiac muscle—
1st Stannius ligature.
The all or nothing phenomenon.
The summation of stimuli.

8. (Contd.) Refractory period in beating heart, and in quiescent heart.

9. Perfusion of the frog's heart and demonstrating the action of salts.

10. Perfusion of the frog's heart and demonstrating the action of drugs.

11. Action of vegus on the frog's heart and demonstrating the effect of atropine and nicotine.

Respiratory System.

12. *Human*—Respiratory efficiency tests—
(*a*) Vital Capacity.
(*b*) Manometer tests.
(*c*) Endurance of fatigue tests
(*d*) Artificial respiration.

13. A. Analysis of respired air and
B. Determination of R. Q. at rest and in exercise.

14. Estimation of carbondioxide in alveolar air.

15. *Mammalian.*—Determination of alkali reserve by estimating the carbondioxide combining power of plasma.

16. Obtaining the dissociation curve of oxy-hæmoglobin.

Muscle.

17. Amphibian —The effect of after-loading and loading of muscle and calculation of mechanical work.

18. Fatigue including neuromuscular fatigue in man.

19. Demonstration of reciprocal innervation of antagonistic muscles.

Human—

Electric stimulation of nerves in a man.

Reflex action.

Frog—

A. Decerebrate frog.

B. Spinal frog.

20. *Human*—Demonstration of reflexes in man—

A. Superficial.

B. Deep.

21. *Special sense—Human—*

A. Dissection of eyeball (Bull's eye).

B. Demonstration of changes in the lens during accommodation (Phakoscope).

C. Use of ophthalmoscope.

22. A. Determination of field of vision, for ordinary light and colours—

B. Test for colour vision.

C. Tests for hearing. Webbels Rinne's.

23. Skin sensations—

A. Light touch.

B. Heavy touch.

C. Tactile localization and discrimination.

D. Heat and cold.

List of Experiments for demonstration.

1 Demonstration of the action of valves. Gad's experiment.

2. Electrical variations in heart. Capillary electromotor.

3. Perfusion of mammalian heart, and demonstrating the influence of temperature and the action of drugs.

4. Demonstration of the cardiac output in mammalian heart.

5. Innervation of mammalian heart.

6. Destruction of A. V. bundle.

7. Perfusion of rabbit's ear, and demonstrating the action of drugs.

8. Recording the arterial pressure in mammals and demonstrating the effect of—

(*a*) Vagal and sympathetic stimulation.

(*b*) Drugs.

(*c*) Asphyxia.

9. Velocity of arterial blood flow in mammals.

10. Demonstration of electro-cardisgraph (in the hospital).

11. Movements of stomach and intestine in mammals.

12. Electrotonus and Pfluger's Law.

13. Stimulation of anterior and posterior nerve roots in mammals.

14. Cerebral localization.

Bio-Chemistry

A. Applied Organic Chemistry : Chemistry of proteins, fats and Carbohydrates and related compounds—

(i) Proteins : Elementary composition, general properties and reactions, Structure, Amino acids, analysis and characterization, classification. Nucleoproteins. Components of nucleic acid, chemistry of purines and pyrimidines.

(ii) Fats (Lipides) Classification Simple lipides and compound lipides, their structure, reactions and physiological importance. Cholesterol. Its structure, reactions and metabolism. Physiological and clinical importance : Relation to other sterols, bile acids, sex hormones, etc.

(iii) Carbohydrates, Monosaccharides, di-saccharides and polysaccharides.

B. Chemistry of digestion of food.

Digestion in the mouth, stomach and intestines. Gastric analysis and its clinical application. Pancreatic juice. Bile. Van den Bergh reaction, Succus entericus.

C. Bacterial decomposition and food in the intestines. Formation of basic and phenolic substances Indian and etherial sulphates. Intestinal stasis. Fæces.

Metabolism of proteins Fats of absorbed amino-acids. Synthetic reactions. Combustive metabolism. Leamination and Urea formation. Urea clearance test. Urinary ammonia, its origin and significance. Creatine and creatinine. Their chemistry and metabolism. Importance in Physiology and Medicine. Metabolism of nucleo-proteins. Uric acid. Metabolism of fat. Role of the Liver. Fatty acid oxidation in the body. Ketogenesis and antiketogenesis.

Metabolism of carbohydrate : Storage and utilization of sugar. Endocrine factors. Carbohydrate utilization during muscular contraction. Blood sugar and its regulation Glucose tolerance test and its use in clinical medicine. Glycosuria beniga, experimental and pathological. Diabetes mellitus.

Energy exchanges. Basal metabolism. Effect of food and work on metabolism. Metabolism during starvation.

Nutrition : Nitrogen equilibrium and protein requirement. Biological value of proteins. Energy requirement, requirement of fats and carbohydrates

Mineral requirement, metabolism of calcium, phosphorus, magnesium, iron, chemistry, source and daily requirement.

Chemistry of blood : Hæmoglobin and its derivatives. Plasma proteins.

Other constituents of plasma and corpuscles. Acid-base equilibrium.

Chemistry of respiration. Transport of oxygen and carbondioxide.

Oxidation and reduction in the tissues. Tissue respiration. Chemistry of muscles. Cerebrospinal fluid. Urine. Detoxication and chemical protection of the body against injurious substances.

Practical Bio-Chemistry

Experiments on the properties and reactions of proteins, fats and carbohydrates.

Composition of some common foodstuffs, experiments on salivary and gastric digestion. Analysis of gastric contents following a test meal. Pancreatic juice. Blood : Hæmolysis, fragility of red blood corpuscles. Hæmoglobin and its derivatives. Spectroscopic examination of blood. Chemical tests for blood. Hæmin and hæmochromogen crystals. Hæmoglobin crystals.

Urine.—Constituents of normal urine. Examination of urine for common abnormal constituents.

Identification of unknown substances of physiological importance.

Quantitative analysis : Estimation of common sugars by any simple method

Quantitative determination of some of the important constituents of blood.

Sugar, Urea chloride, non-protein, nitrogen, uric acid and creatinine.

Estimation of urea, chloride and phosphate in urine, titrable acidity and ammonia.

Elementary normal psychology. Introduction to Pathology and Bacteriology and introduction to Pharmacology. The Professor of Medicine, Professor of Pathology and the Lecturer in Pharmacology respectively will deal with the above subjects in a very elementary manner in not more than six meetings (Lectures and Demonstrations) for each subject. These can conveniently be spread over the second year of study.

Elements of the methods of clinical examination, including the use of common instruments (stethoscope, ophthalmoscope, etc.) and examination of the body fluids, with demonstration on the normal and abnormal living subject, will be taught by the Professor of Physiology, Bio-Chemistry and Medicine.

Second M. B. B. S. Examination

The course in Pharmacology consists of lectures, demonstrations in experimental Pharmacology and Practical Pharmacy, the aim being to impart a general knowledge of the mode of action of drugs treated from an experimental point of view.

The lectures are devoted chiefly to the discussion of the effect of drugs and poisons on the tissues of man and animals and how the e effects may be utilised to relieve or cure disease. The total number of lectures shall not be less than 35. The general scheme of the lectures shall be as follows :—

The mode of action of drugs treated from an experimental stand-point.

Pharmacology of the Central Nervous System.

Alcohol: General anæsthetics, Hypnotics of the methane series; Bromides; Opium and Cannabis indica.

The Caffeine group Camphor, strychnine.

Peripheral Nervous action Curage group; nicotine group; Belladonna group, pilocarpine group, Aconite and Veratine.

Local Anæsthetic:—Cocane and its substitutes; Hydrocyanic acid.

Pharmacology of the Genito-Urinary system.

Diuretics and urinary antiseptics.

Ergot: Hydrastics.

Gland Secretions.—

Adrenalin, Pituitary extract, Thyroid extract, Parathyroids and Insulin.

Pharmacology of the Circulation.

Digitalis group.

Pharmacology of the Vessels.

Vaso-constrictors and Vaso-dilators.

Pharmacology of respiration.—

Stimulants, Depressants, Anti-spasmodics; Expectorants; Saponins. Ipecacuanha; Respiratory disinfectants.

Pharmacology of the Alimentary Canal—

Bitters: Volatile oils; Purgatives; Astringents; Emetics; Enthelmintics.

Pharmacology of Temperature regulation.—

Anti-pyretics, Salicylates.

Drugs acting on the excretion of Uric Acid.—
Colchicum ; Atophan.

Skin irritants and Counter-irritation.—
Antiseptics and disinfectants.

Drugs acting on metabolism.—
Phosphorus.

Specific Theraphy.—
Cinchona alkaloids ; Mercury ; Arsenic, Bismuth and Antimony.

Ion action and Salt action.—
Certain Positive ions.
Hydrates and Carbonates of the Alkalies Soap.

Certain Negative ions.
Acids.

General action of heavy metals.—
Iron ; Silver ; Zinc, Copper, Lead, Aluminium, Manganese ; Chromium, Gold, Radio-active metals.

Ferments. Sweetening agents, Demulcents and Emollients.

Vitamins.

Prescription writing, Incompatibility ; Synergism ; Antagonism.

The physical and chemical properties of the drugs considered only in so far as they concern their action and the methods of administration. A selection of the more important pharmaceutical preparations.

Demonstration in Experimental Pharmacology shall be used to illustrate the lectures as far as practicable, and for this purpose the class shall be divided into sections so that each student may see some of the effects of drugs actually occurring. The total number of demonstrations to each batch shall not be less than 25.

Instruction in Practical Pharmacy shall be given in batches ; the total number of meetings for each batch shall be not less than 20. In the practical class the student shall be instructed to prescribe some of the more important drugs dealt with in the lectures, and to dispense his prescriptions.

Final M. B. & B. S. Examination

Mental Diseases

The course of mental diseases shall comprise instruction in the following types of disorder :—

(i) Failure of Mental Development.
Idiocy ; Imbecility ; Weak-mindedness.

(ii) Mania—Depressive Insanity.
Mania; Melancholia; Stupor; Alternating and Circular conditions.

(iii) Delusional Insanity and Paranoia.

(iv) Dementia—
Primary or Adolescent (D. præcox); Consecutive or Termin; Organic; Para-Syphilitic (G. P. I.); Senile.

(v) Insanity due to drugs—
Alcohol; Indian Hemp; Opium and its derives; Cocaine; Lead.

(vi) Epileptic Insanity.

(vii) Hysteria and Psychasthenia.

(viii) Exhaustion Psychoses—
Port Febrile Insanity: Acute Delirium; Neurasthenia.

(ix) Epochal Insanities—
Insanity of Puberty and Adolescence; Insanity of the child-bearing period; Insanity of Climacteric; Insanity of old age.

(x) Mental disorder, associated with physical diseases—Diseases of the Thyroid Gland; Polioencephalitis Syphilis, Tubercle, Nephritis, Diabetes and Gout.

(xi) The Medico-Legal and Social relationships of Insanity.

(xii) General Treatment.

CHAPTER L.

DEGREE OF DOCTOR OF MEDICINE AND MASTER OF SURGERY

(*Regulations*)

(1) Degree of Doctor of Medicine

Admission

1. (*a*) No candidate shall be admitted to the examination for the Degree of Doctor of Medicine unless he produces a certificate showing that :—

(1) having passed the M.B. & B.S. Degree examination of this University, he has been engaged for three years continuously in the practice of the medical profession ; or

(2) after qualifying for the M.B. & B.S. Degree, he has passed two years in hospital practice ; or

(3) having passed the M.B. & B.S. Degree examination in the first class, he has passed one year in hospital practice.

(*b*) Each candidate must also produce a testimonial, signed by at least two Doctors of Medicine, two members of any of the Royal College of Physicians, or two Masters of Surgery, or two Fellows of any of the Royal College of Surgeons, or two members of the Senate of the Andhra University, certifying that he is in habits and character a fit and proper person to receive the Degree of Doctor of Medicine.

(*c*) Candidates who have qualified for the M.B.B.S. Degree of a University recognized by the Medical Council of India and which Degree has been accepted by the Syndicate as equivalent to the M.B.B.S. Degree of this University, shall be permitted to appear for the M.D. Degree Examination of this University provided—

(i) they have qualified for the M.B.B.S. Degree three years prior to their admission to the M.D. Degree examination ;

(ii) they put in a course of one academic year at least in an institution or institutions affiliated to this University ; and

(iii) that reciprocal recognition is given by the University concerned.

Provided however that as a temporary measure and for a period of five years from the date of passing this regulation an L.M.S. Degree holder of the Andhra University may be permitted to appear for the M.D. Degree Examination of the University on the following conditions :—

(i) That the candidate produces satisfactory evidence of having been regularly engaged in the practice of medicine for a period of not less than five years subsequent to obtaining the L.M.S. Degree ;

(ii) That the candidate produces satisfactory evidence of having taken an approved course or courses or of having held a medical appointment at one or more of the hospitals attached to a college of Medicine recognized by or affiliated to this University for a period of not less than one year immediately preceding the date on which he has applied to be admitted to the Examination of the M. D. Degree ;

(iii) That the candidate produces a certificate signed by the President of the Faculty of Medicine or Chairman of the Board of Studies in Medicine and by the Medical Officer in charge of the hospital in which he has taken the course at which he has held an appointment as approved in clause (ii) above, that the work in which he has been specially engaged in the said hospital is a suitable preparation for the particular branch of the M. D. Degree Examination for which he selects to appear.

Branches of Examination

2. Candidates shall be examined in one of the following branches :—

Branch I—Medicine including Tropical Medicine—

(*a*) Medicine—one paper ; Tropical Medicine—one paper.

(*b*) Pathology and Bacteriology—one paper.

(*c*) An essay in one or two subjects in Medicine.

(*d*) A clinical and oral examination, including an examination in Pathological specimens.

Branch II—Pathology including Bacteriology—

(*a*) Pathology—two papers.

(*b*) Medicine including Tropical diseases—one paper.

(*c*) An essay in one or two subjects in Pathology.

(*d*) A practical and oral examination including the examination of Pathological specimens.

Candidates may qualify in two branches

3. A candidate who has passed the examination in one branch may appear, on a subsequent occasion, in another branch, but no candidate may appear for the examination in two branches in the same year.

4. Candidates shall be approved by the examiners and shall be declared to have passed, if they have shown a competent knowledge in all the subjects of the examination. All other candidates shall be deemed to have failed in the examination.

(ii) Degree of Master of Surgery

Admission

5. (*a*) No candidate shall be admitted to the examination for the Degree of Master of Surgery unless he produces a certificate showing that :—

(1) having passed the M.B. & B.S. Degree examination of this University, he has been engaged for three years continuously in the practice of medical profession ; or

(2) after qualifying for the M.B. & B.S. Degree examination he has passed two years in hospital practice ; or

(3) having passed the M.B. & B.S. Degree examination in the first class, he has passed one year in hospital practice.

(*b*) Each candidate must also produce a testimonial, signed by at least two Doctors of Medicine, or two members of any of the Royal College of Physicians, or two Masters of Surgery, or two Fellows of any of the Royal College of Surgeons, or two members of the Senate of the Andhra University, certifying that he is in habits and character a fit and proper person to receive the Degree of Master of Surgery.

(*c*) Candidates who have qualified for the M. B. B. S. Degree of a University recognized by the Medical Council of India and which Degree has been accepted by the Syndicate as equivalent to the M. B. B. S. Degree of this University shall be permitted to appear for the M. S. Degree examination of this University provided—

(i) they have qualified for the M. B. B. S. Degree three years prior to their admission to the M. S. Degree examination ;

(ii) they put in a course of one academic year at least in an institution or institutions affiliated to the University ; and

(iii) that reciprocal recognition is given by the University concerned.

Provided however that as a temporary measure and for a period of five years from the date of passing this regulation an L. M. S. Degree holder of the Andhra University may be permitted to appear for the M. S. Degree examination of the University on the following conditions :—

(i) That the candidate produces satisfactory evidence of having been regularly engaged in the practice of medicine for a period of not less than five years subsequent to obtaining the L. M. S. Degree ;

(ii) That the candidate produces satisfactory evidence of having taken an approved course or courses or of having held a surgical appointment at one or more of the hospitals attached to a College of Medicine recognised by or affiliated to this University for a period not less than one year immediately preceding the date on which he has applied to be admitted to the Examination of the M. S. Degree ;

(iii) That the candidate produces a certificate signed by the President of the Faculty of Medicine or Chairman of the Board of Studies in Medicine and by the Medical Officer in-charge of the hospital in which he has taken the course at which he has held an appointment as approved in clause (ii) above, that the work in which he had been specially engaged in the said hospital is a suitable preparation for the particular subject of the M. S. Degree Examination for which he selects to appear.

Subjects for Examination

6. Candidates shall be examined in—

(1) Surgery—one paper.

(2) Surgical Anatomy and Pathology—one paper.

(3) One of the following special subjects—one paper—
(i) Ophthalmology.
(ii) Venereal and Genito-Urinary Surgery.
(iii) Aural and Laryngeal Surgery.

(4) An essay in General Surgery.

(5) Operative Surgery and the use of Instruments.

(6) A clinical and oral examination including the examination of Pathological specimens.

Approved candidates

7. Candidates shall be approved by the examiners and shall be declared to have passed, if they have shown a competent knowledge in all the subjects of the examination. All other candidates shall be deemed to have failed in the examination.

CHAPTER LI.

ORIENTAL TITLES AND CERTIFICATES OF PROFICIENCY

(Regulations)

Examination

1. The following examinations other than the Degree of Master of Oriental Learning shall be conducted in the Faculty of Oriental Learning :

(i) Titles : (*a*) Vidya Praveena, (*b*) Bhasha Praveena, (*c*) Alim-i-Fazil and (*d*) Munshi-i-Kamil.

(ii) Certificates of Proficiency in the Modern Methods of study.

2. The titles shall be as follows :—

Names of Titles

Vidya Praveena, added to Mimamsa, Vedanta, Nyaya, Vyakarana or Sahitya according to the special branch of study selected by the candidate who has offered for his examination Sanskrit alone.

Bhasha Praveena in the case of a candidate who has offered for his examination (*a*) any one of the following modern Indian languages : Telugu, Kannada, Oriya and Hindi and (*b*) Sanskrit.

Alim-i-Fazil in the case of a candidate who has offered for his examination Arabic alone *.

Munshi-i-Kamil in the case of a candidate who has offered for his examination Persian as the principal language, and Urdu as the subsidiary language, and also possesses an elementary knowledge of Arabic Grammar *.

Subjects

3. Candidates for the *Vidya Praveena* title shall offer for their examination Sanskrit alone ; and those for the *Bhasha Praveena title* (*a*) any one of the following modern Indian languages : Telugu, Kannada, Oriya and Hindi and (*b*) Sanskrit.

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* No examination for Alim-i-Fazil and Munshi-i-Kamil titles are held after April 1933, as there is no recognised institution presenting candidates for the examinations from 1934.

Candidates for the *Alim-i-Fazil* title shall offer for their examination Arabic alone ; and those for the *Munshi-i-Kamil* title, Persian as the principal language and Urdu as the subsidiary Language.

Course of studies—Four years

4. The course of studies for the examination for Titles shall extend over four years and shall be taken in an institution or institutions approved by the Syndicate.

Examination—Preliminary and Final

5. The examination for Titles shall be divided into two parts viz.—preliminary and final—the preliminary examination in a specified portion of the course at the end of the second year and the final in the remaining portion of the course at the end of the fourth year. No candidate shall be admitted to the final course until he has passed the preliminary examination.

(a) Vidya Praveena

Course of studies

6. (i) The course of studies shall be as follows :—

A. GENERAL.

(*a*) The History of Sanskrit Language and Literature.

(*b*) Prescribed text-books.

A. ANY ONE OF THE FOLLOWING SPECIAL BRANCHES OF STUDY .

(*a*) Branch I—Mimamsa Group.

(*b*) Branch II—Vedanta Group.

(*c*) Branch III—Nyaya Group.

(*d*) Branch IV—Vyakarana Group.

(*e*) Branch V—Sahitya Group.

General part

(ii) For the preliminary examination, the course in the general parts shall comprise—

(*a*) Prescribed text-books relating to the elements of Vyakarana for candidates taking up Branches I, II and III only, of Tarka for candidates taking up Branches IV and V only and of Mimamsa for all.

(*b*) Prescribed text-books chosen from among the Mantras, the Brahmanas, the Upanishads, the Grihya and Dharma Sutras and Smritis.

For the final examination, the course in the general part shall comprise the History of Sanskrit Language and Literature. Special part

(iii) The course in the special part shall consist of one of the following branches of study taken by the candidate :—

Branch I.—Mimamsa Group.

Preliminary Examination :—Prescribed Text-books relating to Purvamimamsa, Veda, Srauta and Dharmasastra.

Final Examination :—(*a*) Prescribed text-books relating to Purvamimamsa. (*b*) The application of Mimamsa to Vedic exegesis and to the proper comprehension of the social and the legal aspects of the Dharmasastras.

Branch II.—Vedanta Group.

Preliminary Examination :—(*a*) Prescribed text-books relating to the *Bhashya Prasthana* of one of the three South Indian Schools of Vedanta, viz., Advaita, Visistadvaita and Dvaita ; and (*b*) prescribed text-books relating to Yoga, Sankhya and the elements of the three South Indian Schools of Vedanta.

There shall be two papers, one on (a) and the other on (b).

Final Examination :—(*a*) Prescribed text-books relating to the *Bhashya Prasthana* of one of the three South Indian Schools of Vedanta, viz., Advaita, Visistadvaita and Dvaita ; and (*b*) prescribed text-books relating to the *Vada Prasthana* of one of the three South Indian Schools of Vedanta.

There shall be two papers on the books prescribed under (a) and one paper on the books prescribed under (b).

Branch III.—Nyaya Group.

Preliminary Examination :—Prescribed text-books relating to the Nyaya and Vaisesika Darsanas including select portions of Purvavada.

Final Examination :—Prescribed text-books relating to Nyaya and Vaisesika Darsanas including select portions of Uttaravada and of the Sabdabodha works in Nyaya and Mimamsa.

Branch IV.—Vyakarana Group.

Preliminary Examination :—Prescribed text-books relating to advanced Vyakarana, including select portions of standard commentaries on the *Sidhantakaumudi.*

Final Examination :—Prescribed text-books relating to advanced Vyakarana, including Sabdabodha works in Vyakarana and select portion of the *Mahabhasya* and standard commentaries on the *Sidhantakaumudi.*

Branch V.—Sahitya Group.

Preliminary Examination :—Prescribed Kavyas and Natakas and a simple work in Poetics and a prescribed portion in Grammar.

Final Examination :—(*a*) Prescribed text-books relating to Grammar including Prakrit Grammar, Prosody and Poetics ; and (*b*) prescribed text-books of an advanced character, relating to Alankara Sastra.

There shall be one paper on the books prescribed under (*a*) and two papers on the books prescribed under (*b*).

(iv) Vidya Praveena Examination—

Question papers

(*a*) In the preliminary examination there shall be in the general part two papers on the prescribed text-books ; the first paper being on those mentioned in Section 6 ii-(*a*) and the second on those mentioned in Section 6 ii-(*b*) *supra* and, in the special part, two papers on the prescribed text-books.

(*b*) In the final examination, there shall be in the general part one paper on the History of Sanskrit Language and Literature and in the special part, there shall be three papers on the prescribed text-books.

(b) Bhasha Praveena

7. (*i*) The course of studies shall be as follows :—

*A. Modern Indian Language**

Course of studies

For the preliminary Examination (*a*) prescribed text-books in Sravya Kavyas, Drsya Kavyas, Grammar and Prosody and (*b*) Composition in Modern Indian Language.

For the final Examination, (*a*) prescribed text-books relating to Sravya Kavyas, Grammar, Prosody and Poetics, (*b*) the History of Modern Indian Language and Literature and (*c*) An intensive study of a special period of Modern Indian Language literature to be prescribed from time to time.

B. Sanskrit.

For the Preliminary examination, prescribed Sravya Kavyas, Drsya Kavyas, applied Prosody and Poetics and elements of Sanskrit Grammar. The text-books prescribed under this head shall, as far as possible, be included in those that are prescribed for the Preliminary examination under Branch V—Sahitya Group —Vidya Praveena Course.

Provided that in the case of Bhasha Praveena examination courses with Hindi, some books of prose and poetry in Sanskrit shall be prescribed in the place of Sanskrit Grammar.

For the Final examination, elements of Sanskrit Grammar. The text-books prescribed under this head shall as far as possible be included in those prescribed for the Final Examination under Branch V—Sahitya Group—Vidya Praveena Course.

Provided that in the case of Bhasha Praveena examination courses with Hindi, some books of prose and poetry in Sanskrit shall be prescribed in the place of Sanskrit Grammar.

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*The following change will come into effect as from the examinations of 1944 :—

For the Preliminary Examination, (*a*) Text-books prescribed for detailed study in Sravya Kavyas, Drsya Kavyas, Grammar and Prosody; and (*b*) Composition on text-books prescribed for non-detailed study, in Modern Indian Language.

(*ii*) The Examination shall be as follows :—

Question papers

*In the Preliminary examination, there shall be three papers on the prescribed Text-books and Composition in the Modern Indian Language and two papers on the prescribed text-books in Sanskrit.

In the Final examination there shall be four papers in the Modern Indian Language and one paper in Sanskrit.

(c) Alim-i-Fazil

Course of studies

8. The following shall be the course of studies for the title *Alim-i-Fazil* :—

Preliminary—

The courses of study shall consist of—

I. Tafsir and Hadith.

II. Fiqh, Aqaid and Mantiq.

III. Prose Text-books.

IV. Poetry Text-books.

V. History.

VI Translation from Arabic into Urdu and from Urdu into Arabic.

Text-books will be prescribed from time to time.

Final—

The course of study shall consist of—

I. Tafsir and Hadith and Ilmul Hadith.

II. Fiqh, Usulul-Fiqh.

III. Prose Text-books.

IV. Poetry Text-books.

V. History.

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*This sentence will read as follows as from the examinations of 1944 :—

"In the Preliminary Examination, there shall be *three* papers in Modern Indian Language the first and second set on the text-books prescribed for detailed study and shall include questions on Grammar and Prosody, and the third set in Composition on text-books prescribed for non-detailed study and *two* papers on the prescribed text-books in Sanskrit.

VI. Translation from Arabic into Urdu and from Urdu into Arabic.

VII. Mantiq and Balaghat.

VIII. Composition.

Text-books will be prescribed from time to time.

(d) Munshi-i-Kamil

9. The following shall be the course of studies for the title *Munshi-i-Kamil* :— Course of studies

Preliminary—

The courses of study shall consist of Persian as the Main language and Urdu as the Subsidiary language, together with a text-book in Arabic.

Persian as the Main subject will include—

I. Persian Prose.

II. Persian Poetry.

III. Translation from Persian into Urdu and *vice versa*.

IV. Composition in Persian.

Urdu as the Subsidiary subject will include—

I. Urdu Prose.

II. Urdu Poetry.

Text-books will be prescribed from time to time.

Questions on Grammar may be put in the examination paper on the text-books.

Final—

The courses of study shall consist of Persian as the Main language and Urdu as the Subsidiary language, together with a text-book in Arabic.

Persian as the Main subject will consist of—

I. Persian Prose.

II. Persian Poetry.

III. Translation from Persian into Urdu and *vice versa*.

IV. History of Persian Language and Literature.

V. Composition in Persian.

Urdu as the Subsidiary subject will consist of—

I. Urdu Prose.

II. Urdu Poetry.

Text-books will be prescribed from time to time.

Questions on Grammar may be put in the examination papers on the text-books.

Setting and answering of papers.

10. All the papers in the examination for titles shall be set and answered in the respective languages to which they relate. Devanagari script shall be used for Sanskrit.

Admission Test: Vidya Praveena and Bhasha Praveena

11. No person shall be permitted to enter upon any of foregoing Vidya Praveena and Bhasha Praveena courses of study unless he has passed the prescribed Admission Test.

Candidates seeking admission to the Vidya Praveena courses of study shall be required to have passed the Admission Test conducted by the Education Department and obtained from the Department a certificate of fitness for admission to the said courses.

Candidates seeking admission to the Bhasha Praveena courses of study shall be required to have passed either the Admission Test conducted by the University or the one conducted by the Education Department.

The Admission Test conducted by the University shall consist of three papers, each of three hours' duration, two papers in the selected Modern Indian Language and one in Sanskrit, each carrying 100 marks. The paper in Sanskrit shall be set in Sanskrit and answered in the selected Modern Indian Language.

Of the two papers in the Modern Indian Language, the first paper shall be set on prescribed text-books and the other on Composition and Precis in the selected Modern Indian Language and translation from Sanskrit into that language. The paper in Sanskrit

shall be set on the prescribed text-books including (in the case of those intending to take Languages other than Hindi for the Bhasha Praveena courses of study) some questions of elementary nature on Applied Grammar.

Candidates obtaining not less than 35 per cent of the total marks in each language and 40 per cent in the aggregate shall be certified eligible for admission.

Admission Test: Munshi-i-Kamil and Alim-i-Fazil

12. No person shall be permitted to enter upon Munshi-i-Kamil and Alim-i-Fazil courses of study unless he has passed the prescribed admission test.

In the case of candidates selecting courses of study for Munshi-i-Kamil the text-books shall be the same as those prescribed for Persian and Urdu as an advanced second language under Part III of the Intermediate Examination. There will be two papers, each of three hours' duration. The first paper shall be on prescribed text-books in Urdu including translation from Urdu into Persian. The second paper shall be on text-books in Persian including translation from Persian into Urdu.

In the case of candidates selecting courses of study for Alim-i-Fazil, the text-books shall be the same as those prescribed for Arabic as an advanced second language under Part III of the Intermediate Examination. There will be two papers, each of three hours' duration. The first paper shall be in the prescribed text-books in Arabic and Grammar. The second paper shall consist of questions on translation from Arabic into Urdu and *vice versa* with a question on Composition in Arabic.

Answering of papers

The answers in respect of these admission tests should be written in Urdu.

Candidates obtaining not less than 35 per cent of the marks in each of two papers and 40 per cent of the marks in the aggregate shall be certified eligible for admission.

Certificate of fitness

13. No person shall be permitted to enter upon the courses of study prescribed for the titles, ***Alim-i-Fazil*** and ***Munshi-i-Kamil***,

unless he has obtained a certificate of fitness from the head of the approved institution which he proposes to enter.

Conditions of appearing for additional Titles, Branches or Languages

14. Candidates who have qualified under the regulations of this Chapter for Titles in Oriental Learning may continue their studies under the same regulations in order to qualify further (i) for the same title in an additional branch or in an additional language, or (ii) for other titles without passing the entrance test prescribed therefor under the following conditions :—

GENERAL

(i) No candidate who has qualified for a title will be admitted to any further examination for a title, except after the expiry of two years from the date of passing the last preceding qualifying examination provided that candidates who have qualified for (1) the Vidya Praveena Title in any one of three South Indian Schools of Vedanta included in Branch II or (2) one of the title in Arabic or Persian shall be admitted to a further examination (*a*) in any other South Indian School of Vedanta, or (*b*) in the other title in Arabic or Persian after the expiry of one year from the date of passing the last preceding qualifying examination.

(ii) Applications for exemption from the production of the prescribed certificates shall be forwarded so as to reach the Registrar before the 1st October preceding the examination.

(iii) No candidate who has already proceeded to a title and has been awarded his diploma shall be admitted at Convocation a second time to the same title, notwithstanding that he may have qualified in an additional branch or in an additional language ; an endorsement will be made upon his diploma setting forth the further examinations passed by him, the dates of such examinations and the class in which he was placed.

(iv) A candidate shall be declared to have passed any of the examinations held under this regulation which are not specifically referred to as Preliminary, if he obtains not less than 40 per cent of the total marks in that examination. Of the successful candidates, those who obtain not less than 60 per cent of the total number of

marks shall be placed in the first class ranked in the order of proficiency as determined by the total number of marks obtained by each, those who obtain not less than 50 per cent of the total number of marks in the second class, and the rest in the third class.

SPECIAL

(i) *Vidya Praveena.*

A candidate who has qualified for the Title of Vidya Praveena in any one of the special branches of study may further qualify in any other branch by passing in one and the same year an examination in such branch consisting of question papers set that year in the special part only for both the Preliminary and Final Examinations in that branch provided that, in the case of candidates who have already qualified in one of the three South Indian Schools of Vedanta and seek to qualify in any other South Indian School of Vedanta such further examination in the special part alone shall consist only of all papers except that relating to (*b*) in the Preliminary Examination.

(ii) *Vidya Praveena and Bhasha Praveena.*

A candidate who has qualified for the Title of Vidya Praveena may further qualify for the Title of Bhasha Praveena by passing the examination for that title in accordance with the regulations, provided that he shall be exempted from examination in Sanskrit and shall be required to take the whole examination in the Modern Indian language in one and the same year.

(iii) *Bhasha Praveena.*

A candidate who has qualified for the Title of Bhasha Praveena may qualify in an additional language by passing the examination in such language according to the regulations; provided that he shall take the whole examination in one and the same year.

(iv) *Ubhayabhasha Praveena-A and Vidya Praveena.*

A candidate who has qualified for the title of Ubhayabhasha Praveena Part A, under the Old Regulations, may further qualify himself for the title of Vidya Praveena Sahitya Branch after the

expiry of one year by passing the examination for that title in accordance with the regulations subject to the following conditions :—

(i) that he shall not be required to pass the Entrance Test prescribed for the Vidya Praveena Sahitya Branch ; and

(ii) that he shall answer all the papers of both the Preliminary and Final examinations in the same year provided that a candidate who secured in Sanskrit at the Ubhayabhasha Praveena Examination Part A, 30% of the total marks prescribed therefor, shall be exempted from answering the corresponding papers when he appears for Vidya Praveena examination.

(v) *Ubhayabhasha Praveena—A and Bhasha Praveena.*

A candidate who has qualified for the title of Ubhayabhasha Praveena Part A, under the Old regulations may further qualify himself for the title of Bhasha Praveena in accordance with the regulations, provided that he shall be exempted from examination in the Sanskrit Part if he had secured 30 per cent of the total marks in Sanskrit at the Ubhayabhasha Praveena examination in the year in which he passed in that examination and he shall be required to take the whole examination in one and the same year.

(vi) *Ubhayabhasha Praveena—B and Bhasha Praveena.*

A candidate who has qualified for the title of Ubhayabhasha Praveena Part B, under the Old Regulations may further qualify himself for the title of Bhasha Praveena in a selected Modern Indian Language by passing the examination both in Sanskrit and the selected language ; provided, however, that he shall be exempted from examination in the selected language if he had obtained 35 per cent of the marks in it at the Ubhayabhasha Praveena examination in the year in which he passed in that examination and he shall be required to take the whole examination in one and the same year.

15. The Syndicate shall have the power to grant exemption from the production of either or both of the annual certificates of attendance required by candidates for the Oriental Title Examinations, provided that the candidate— **Exemption from certificates**

(1) is at the time of the examination at least twenty-five years of age, subject to the provision that this age rule shall not apply in the case of (i) women candidates or (ii) candidates who, after getting themselves qualified for one Oriental Title, wish to appear for another examination in Oriental Titles or a Certificate of Proficiency in Oriental Learning, or (iii) candidates who have passed the B.A. Degree Examination of this University or an examination recognised as equivalent thereto;

(2) is certified by the head of an approved institution, or by a member of the Board of Studies dealing with the subject or language offered for the examination, or by a Mahamahopadhyaya or a Shamsul-ul-ulama or by any other competent scholar recognised by the Syndicate to be qualified by his attainments to appear for the examination in the following form :—

Certificate for exemption.

I hereby certify that to the best of my knowledge and belief will have completed his twenty-fifth year before the date of the next Oriental Title Examination, and that he is qualified by his attainments to appear for the examination.

Station.

Date. *Signature and Designation.*

Applications for exemption under this regulation must be forwarded so as to reach the Registrar before the 1st October preceding the examination.

Marks qualifying for a pass in V. P. Munshi-i-Kamil and Alim-i-Fazil Examinations

16. A candidate shall be declared to have passed the preliminary examination if he obtains not less than forty *per cent* of the total marks in that examination, provided that in the case of Vidya Praveena examination, he shall also obtain not less than thirty *per cent* of the marks in the paper on the prescribed text-books mentioned in section 6 ii-(*a*) *supra*, and a candidate shall be declared to have passed the final examination if he obtains not less than forty *per cent* of the total marks in that examination. All other candidates shall be deemed to have failed.

Classification of successful candidates

Successful candidates in that examination shall be arranged in three classes:—

The first, consisting of those who obtain not less than sixty *per cent* ranked in the order of proficiency as determined by the total number of marks obtained by each; the second, of those who obtain not less than fifty *per cent* ranked in the order of proficiency as determined by the total number of marks obtained by each; and the third, of those who obtain not less than forty *per cent* of the total marks.

Marks qualifying for a pass in B P. examination

A candidate shall be declared to have passed the Preliminary examination if he obtains not less than thirty-five *per cent* of the total marks in Sanskrit and not less than forty *per cent* of the total marks in the Modern Indian language in one or separate examinations.

A candidate shall be declared to have passed the Final Examination if he obtains not less than thirty-five *per cent* of the total marks in Sanskrit and not less than forty *per cent* of the total marks in the Modern Indian language in one or separate examination. All other candidates shall be deemed to have failed.

Classification of successful candidates

Out of candidates who pass in both the languages—Sanskrit and Modern Indian language of the Final course, in one and the same examination, those who obtain not less than sixty *per cent* of the total number of marks in both the languages shall be placed in the first class and ranked in the order of proficiency as determined by the total number of marks obtained by each, those who

obtain not less than fifty *per cent* of the total number of marks in both the languages in the second class and ranked in the order of proficiency as determined by the total number of marks obtained by each, and the rest in the third class. Those who obtain not less than sixty *per cent* of the total marks in Sanskrit or the selected Modern Indian language shall be declared to have gained distinction in that language.

Candidates for the Final, who obtain the prescribed number of marks in each language in separate examinations and are declared to have passed the whole examination, shall be placed in a separate list in the third class.

Transitory Regulations.

It shall be competent for the Syndicate to grant exemption to candidates who have passed the Ubhayabhasha Praveena A or B Preliminary Examination in 1937 or earlier to appear for the Ubhayabhasha Praveena Final Examination under the Old Regulations in 1938 or 1939. In no case, however, shall the Ubhayabhasha Praveena Final Examination under the Old Regulations be conducted after the year 1939.

For the benefit of candidates who fail in Ubhayabhasha Praveena Preliminary examination (Groups A, B and C) in 1935 or earlier, the Ubhayabhasha Praveena Preliminary examination under the Old Regulations (i.e., in force up to the examinations of 1935) will be held in March—April of 1936 and 1937 under the old time-tables. Similarly for the benefit of candidates who fail in Ubhayabhasha Praveena Final examination (Groups A, B and C) in 1937 or earlier, the Ubhayabhasha Praveena Final examination under the Old Regulations (i.e., in force up to the examinations of 1937) will be held in March-April of 1938 and 1939 under the old time-tables. The text-books and syllabuses for the Preliminary examinations of 1936 and 1937 and for the final examinations of 1938 and 1939 shall be the same as those prescribed for the Preliminary and Final examinations of 1935 and 1937 respectively.

No examination for the Ubhayabhasha Praveena examination (Preliminary and Final) under the Old Regulations shall be held as from the examinations of 1938 and 1940 (Preliminary and Final) respectively.

Candidates who failed in Ubhayabhasha Praveena Part A or B examination under the Old Regulations shall be permitted to appear for Bhasha Praveena examination under the New Regulations provided they offer for the Bhasha Praveena examination the same languages in which they appeared for the Ubhayabhasha Praveena examination.

2. Certificate of Proficiency in Oriental Learning.

Subjects for examination

17. Candidates for Certificates shall offer for their examination one of the following subjects :—

(1) Literary Criticism as applied to Sanskrit Literature, according to a syllabus.

(2) Indian Philosophy in its relation to Western Philosophy, according to a syllabus.

(3) Indo-European Philology with special reference to Sanskrit according to a syllabus.

(4) South Indian Languages and Literatures in their bearing on Ancient Indian History and Culture.

(5) Hindu Law and Jurisprudence.

(6) Muhammadan Law and Jurisprudence.

(7) Literary Criticism as applied to Arabic or Persian Literature, according to a syllabus.

(8) Arabian Philosophy in its relation to Western Philosophy, according to a syllabus.

(9) Semitic Philosophy—for Arabic; and Indo-Persian Philology with special reference to Persian—for Persian according to a syllabus.

18. The course of studies for the examination shall extend over a period of two years and shall be taken in an institution or institutions approved for the purpose by the Syndicate. Courses of studies—two years

19. The question papers in the examination for certificates shall be set and answered in English. Papers set and answered in English

20. The Examination for certificates shall follow immediately after the Final Examination for Titles in Oriental Learning. Day of examination

21. No candidate shall be admitted to the examination for certificates until the expiry of two years from the date of his appearing and passing the preliminary examination for Titles. He shall also satisfy the conditions laid down in section 15 supra. Admission

22. Applications for exemption from the production of the prescribed certificate shall be forwarded so as to reach the Registrar before the 1st October preceding the examination. Exemption

23. Candidates for certificates, who have passed the examination for Titles and have satisfied the examiners in one optional subject, may present themselves for examination in another optional subject after an interval of two years without further attendance in an approved institution. Candidates may qualify for another optional

24. In each subject for examination for certificates there shall be one paper of three hours' duration, which candidates shall be required to answer on the morning of the day following the Final examination for Titles. Duration of paper

25. A candidate shall be declared to have passed the examination, if he obtains not less than forty *per cent* of the marks. All others shall be deemed to have failed in the examination. Successful candidates shall be arranged in three classes ;— Classification of successful candidates

(a) Those who obtain not less than sixty *per cent* of the marks shall be placed in the first class. (b) Those who obtain not less than fifty *per cent* of the marks shall be placed in the second class. (c) The rest shall be placed in the third class.

SYLLABUSES

Bhasha Praveena—Final Examination.

(1) Outlines of the History of Telugu Language and (2) Outlines of the History of Telugu Literature

N.B—The syllabus is the same as that prescribed for the B. A. (Pass) Group VI.

History of Oriya Language

General.—The origin of the Oriya language. The area in which it is spoken. Its place in the Aryan family of languages. The period of its beginning as known from the inscriptions, etc. Its use as a literary language.

The periods of the Oriya language.—Classical and modern characteristics of the language. Illustrative literature of each period. Difference in point of grammar and vocabulary.

Language and Dialect.—The standard of literary language and the spoken language. Their relation and mutual influence. Dialects and their formation. Their difference in different localities and among the different classes of people of the same locality.

Elementary Phonetics.—The organs of speech Production and classification of speech sounds.

The Alphabet.—Growth and history of alphabets in general. Different opinions about the origin of the Indian alphabets Bramhi and Kharostri. Origin of the Oriya alphabet. Its phonetic value.

Phonology.—(a) Vowels and their relation to the P.I.E, vowel system. Their classification according to the place of production. Primary and secondary vowels. Diphthongs. Vowel-gradation and its bearing on Morphology. Vowel sandhi and glides.

(b) Consonants and their relation to the P.I.E. consonantal system. Their classification according to the place of articulation, etc. Mutation of consonants. Assimilation of consonants and consonantal sandhis.

Accidence.—Word-formation. Base. Stem. Suffixes and prefixes. Their origin.

Compounds.—Their classification. Co-ordinating. Sub-ordinating.

Nouns.—Inflection of nouns for gender, number and case. Classification of nouns. Origin of the individual inflections.

Pronouns.—Personal, demonstrative, relative and interrogative Origin of the pronouns. Comparison of Gaudian pronouns.

Adjectives —Their classification. Formation of adjectives. Comparison of adjectives.

Numerals.—Cardinals and ordinals.

Avyayas.—Their origin and classification.

Verbs.—Origin of the roots. Structure of the verbs. Tense suffixes. Classification of verbs. Voice. Mood.

Verbs (continued).—Causatives; desideratives; frequentatives; denominatives.

Vocabulary.—Classification into tadbhavas, tatsamas, desyas. Borrowing—periods and causes of borrowing—loss of old words: nature and extent.

Word-building.—Formative suffixes. Primary (krt), Secondary (taddhitas) Purely Oriya suffixes. Their origin

Semeiotics —Tendency to change meaning: Laws of change not yet discovered. Changes of meaning classified. Changes produced by specialising and narrowing by generalizing and widening—by shifting and transference—classification of motives for change.

Oriya Poetics.

1. *Kavyaprakarana.*—Various definitions of kavya. Their criticism. Various classifications of kavya—drsya, sravya, gadya; padya, champu; dhvani; gunibhutavyangya; chitra; vrittis; abhidha-lakshana, vyanjana, their subclasses; pada; vakya; akanksha, yogyata, asatti.

2. *Nayakaprakarana.*—Nayakas and Nayis—defined and classified. Sattvika gunas. Alankaras of Nayikas—their classification. Manavrttis. Associates of Nayakas and Nayikas.

3. *The doctrine of Rasa.*—Definitions of Rasa. The theories of Rasa. The elements of Rasa—vibhava, anubhava, sattvika and vyabhichari. The different classes of Rasa and their nature. Sub-divisions of individual Rasas; Mutual incongruities of Rasas. Bhavodaya. Bhavasabalata. Rasasraya (Loukika and Aloukika). General criticism.

4. *Dosaprakarana.*—Dosa defined. Dosas classified—pada, padamsa, vakya, artha, rasa, alankara; places where they are treated as gunas—not counted as dosas.

5. *Gunaprakarana.*—Gunas defined and classified. Old and new schools. Difference between guna and alankara.

6. *Kavyatmavimarsha.*—Riti—vakrokti—ouchitya—rasa, etc.

7. *Alankaraprakarana.*—Alankara defined and classified—Sabdalankara—Arthalankara—Ubhayalankara—classification on the basis of (1) Sadrsya, (2) Vyanjana, (3) Svabhavokti. (4) Vakrokti. Individual Alankaras—their mutual difference.

8. *Dhvaniprakarna.*—Dhvani defined. Its classifications—Gunibhuta Vyangya and its classifications.

CHAPTER LII.

DEGREE OF BACHELOR OF ORIENTAL LEARNING (B. O. L.) (PAREENA)

(Regulations)

Conditions of admission.

1. Candidates for the Degree of the Bachelor of Oriental Learning (Pareena) shall be required (i) to have passed the Vidya Praveena examination of the University or an examination of any other Indian University accepted as equivalent thereto ; (ii) to have attained the Fourth Form standard of English ; and subsequently (iii) to have undergone in the University College a course of study extending over two years each consisting of three consecutive terms; and (iv) to have passed the examination for the degree hereinafter prescribed.

Courses of study.

2. The course for the B. O. L. degree (Pareena) examination shall consist of two parts, of which Part I shall be devoted to the study of English, and Part II to the study of one of the following special subjects :—

(1) Nyaya
(2) Vyakarana
(3) Alamkara
(4) Dharma Sastra

3. The courses of study shall be as indicated in the syllabus, in addition to the text-books which will be prescribed from time to time.

The text-books prescribed for the Matriculation examination shall be studied by the candidates for Part I. Text-books for advanced study of the Sastra (optional selected) shall be prescribed year after year. The candidates shall also be introduced to the comparative study of the subject from the standpoint of the Western culture.

4. Candidates shall be examined in:—

Examination.

Part I—English :—There shall be one paper of three hours' duration carrying 100 marks in English Composition, Precis Writing

based on the text-books studied in the course and Translation from Sanskrit to English.

Part II:—There shall be four papers, each of three hours' duration carrying 100 marks. Two papers will be set on the text-books prescribed for study, and the questions set shall be such as to test the detailed knowledge of these books. The third paper shall be devoted to the writing of an essay or essays on some aspect or aspects of the optional subject of the candidate. These papers shall be set and answered in Sanskrit. The fourth paper shall contain questions requiring discussion, from the point of Western thought and in accordance with the modern historical and critical method of Western scholars, of the History of the special subject and of the value of its main concepts and theories, as indicated in the syllabus. This paper will be set and answered in English.

5. A candidate may appear for both the Parts or Part I or Part II separately.

Marks qualifying for a pass.

6. A candidate shall be declared to have passed Part I if he gets 35 per cent of the marks prescribed for that part.

A candidate shall be declared to have passed Part II if he gets 35 per cent of the marks prescribed for papers I and II taken together and 35 per cent of the marks prescribed for papers III and IV taken together and 40 per cent of the total marks prescribed for this part.

All other candidates shall be deemed to have failed in the examination.

Classification of successful candidates.

7. Candidates who pass in Part I and obtain not less than 60 per cent of the marks prescribed in Part II shall be declared to have passed the whole examination in the first class and they shall be ranked in the order of proficiency as determined by the total number of marks obtained by each in Part II. The rest shall be placed in the second class.

CHAPTER LIII.

DEGREE OF MASTER OF ORIENTAL LEARNING.

Admission to Examination

1. Every candidate for the Degree of Master of Oriental Learning shall have passed the Examination for Certificates of Proficiency in Oriental Learning and shall have thereafter pursued for two years an advanced course of study bearing upon the subject selected by him for the examination for that certificate.

Application

2. Every candidate for the Degree shall be required to submit with his application—

(a) Certificate

(*a*) a certificate in the following form from the head of an institution approved under Regulation 15 of Chapter LI for imparting instruction in, or from a member of the Board of Studies dealing with, the subject of the candidate's Certificate of Proficiency, or from some competent scholar recognized by the Syndicate :—

Form of Certificate.

I hereby certify that, to the best of my knowledge and belief.....has pursued, for not less than two years after qualifying for the Certificate of Proficiency in Oriental Learning, an advanced course of study bearing upon the subject of his Certificate of Proficiency.

Date

Station. *Signature with Designation.*

and

(b) Thesis

(*b*) an original thesis in English showing evidence of original work connected with the special subject in which he qualified himself for his certificate, the candidate indicating in a preface to his thesis, and specially in notes, the sources from which his information is taken and the extent to which he has availed himself of the work of others.

The application with the certificate mentioned above together with three copies printed or type-written, of the thesis should be forwarded so as to reach the Registrar between 1st June and 1st July of any year.

Examination of Thesis.

3. The thesis shall be referred by the Syndicate to a Board consisting of not more than three persons who at their discretion may require the candidate to appear before them to be tested orally with reference to the thesis (and to his facility in the use of the English Language). The Board shall report to the Syndicate the result of the examination of the thesis, and of the oral examination, if any, stating whether, in their opinion the candidate is, by reason of his attainments, a fit person to receive the Degree of Master of Oriental Learning. The Syndicate shall publish the name of each successful candidate for the Degree with the title of his thesis.

Publication of Thesis

4. Every candidate shall be at liberty to publish his thesis. The thesis of any candidate may be published by the University with the inscription 'Thesis approved for the Degree of Master of Oriental Learning'.

CHAPTER LIV

DIPLOMA IN MUSIC

(Regulations.)

Conditions of admission to examination

1. No candidate shall be eligible for the Diploma in Music unless he has undergone the prescribed course in an affiliated or recognized institution or institutions and passed the Diploma Examination hereinafter prescribed.

Provided, however, that a candidate who is certified by a member of the Board of Studies in Music, or the Head of the department of Music in any of the aforesaid institutions, or any other competent person recognized by the Syndicate, to be qualified by his attainments to appear for the Diploma examination, may be permitted by the Syndicate to appear for the said examination exempting him from taking the course as aforesaid.

Course of study

2. The course shall be a full-time one primarily intended for such persons as are desirous to attain high proficiency in Music.

3. The course shall extend over a period of two academic years each consisting of three consecutive terms.

4. The course of instruction shall consist of (1) Theory, (2) Practice of Music—Vocal, Vina, Violin, Flute or Nagasvara.

5. The course of study shall be prescribed from time to time. Candidates shall take either vocal music or instrumental music (Vina, Violin, Flute or Nagasvara.)

6. No candidate, who does not produce the certificate as prescribed in proviso to Regulation 1 above, shall be admitted to the examination unless he or she has kept at least three-fourths of the attendance and produced the required certificates of attendance and progress.

Scope of Examination

7. The examination shall be both written and practical. There shall be two papers on theory, each of three hours' duration carrying 75 marks, and two practical tests each carrying 125 marks, making up a total of 400 marks. In the practical tests candidates

will be expected to render any of the ragas, compositions and Kalpana svaras in any of the ragas and talas prescribed.

Marks qualifying for a pass

8. A candidate shall be declared to have passed the examination if he obtains not less than 35 per cent of the marks in Theory 40 per cent of the marks in Practical and 45 per cent of the marks in the aggregate.

Successful candidates obtaining not less than 60 per cent of the marks in the practical tests and 60 per cent of the marks in the aggregate shall be declared to have passed with distinction.

9. The question papers for the examination shall be set in English and answered either in English or in Telugu.

SYLLABUSES

(*i*) *Theory*

1. Acoustics : Production and transmission of sounds ; vibration of strings and air columns ; sympathetic vibration ; upper partials ; pitch, intensity and timbre ; reasonance ; echoes ; and acoustics of music halls.

Nada ; sruti, svarasthanas and svaras ; sthayi ; 22 srutis and views thereon.

2. Larynx and ear.

3. Grama, murchana and jati ; history and development of scales ; melody and harmony.

4. Gamakas and alankaras.

5. Tala system ; seven talas ; thirty-five talas ; matra ; Aksharakala and Anga ; study of ten pranas ; Chapu, Desadi and Madhyadi talas.

6. Musical forms and compositional types and their lakshanas ; Gita, varna, kirtana, pada, ragamalika, prabandha, thaya, suladi, sabda, jatiswara, svarajati, tillana and folk songs. Musical diction and rules of composition.

7. Raga and ragalakshana in general ; definition and classification of ragas ; the study of thirteen lakshanas ; raga alapana paddhati.

8. South-Indian Notation.

9. Musical instruments and their classification ; special study of the Tambura, Vina, Violin, Flute, Nagasvara and Mridanga.

Matanga, Narada, Ahobila, Ramamatya, Somanatha Govinda Dikshitar, Venkatamakhi, Tolajaji and Govindacharya.

11. Study of the styles and characteristics of the compositions of Jayadeva, Purandaradas, Tirtha Narayana, Bhadrachelam Ramdas, Kshetragna, Sarangapani, Pallavi Doraiswami Ayyar, Tyagaraja, Muthuswami Dikshita, Syama Sastri, Paidala Gurumurti Sastri, Adiappa Ayyar, Pallavi Gopala Ayyar, Anayya, Subrahmanya Kavi, Gopalakrishna Bharati, Sadasiva Brahmendra, Karur Dakshinamurti Sastri, Subbaraya Sastri, Sadasivarao, Svati Tirunal, Pallavi Sesha Ayyar, Patnam Subrahmanya Ayyar, Vina Kuppier, Tiruvottiyur Tyaga Ayyar, Dharmapuri Subbarao and Ramnad Srinivasa Ayyangar.

Short biographical sketches of the writers and composers mentioned in paragraphs 10 and 11.

12. Contemporary Music.

(ii) Practical.

1. In addition to preliminary exercises and chitta tanas, the following :—

12 Gitas including two lakshna gitas.
8 Varnas including three in Ata and one in Jhampa tala.
32 Kirtanas.
2 Astapadis.
2 Tarangas.
2 Adhyatma Ramayana kirtanas.
4 Padas.
1 Padavarna.
2 Ragamalikas.
1 Tillana.

The compositions shall be representative of at least one each of the composers mentioned in paragraph 11 (Theory) and of the ragas enumerated in paragraph 2 below.

The candidates will be expected to comprehend fully the tone, bhava and import of the compositions learnt.

2. (*a*) Todi, Mayamalavagaula, Bhairavi, Kambhoji, Sankarabharana and Kalyani.

(*b*) Dhanyasi, Nadanamakriya, Saveri, Vasanta, Saurastra, Kharaharapriya, Anandabhairavi, Mukhari, Kannada, Yadukulakambhoji, Khamas, Mohana, Surati, Sahana, Madhyamavati, Kedaragaula, Bilahari, Begada, Athana, Purva Kalyani and Saranga.

(*c*) Asaveri, Punnagavarali, Gaula, Gaulipantu, Chakravaka, Ritigaula, Sri, Darbar, Sriranjini, Huseni, Harikambhoji, Natakuranji, Suddhasaveri, Arabhi, Kedara, Nilambari, Devagandhari, Hamsadhvani, Nata and Pantuvarali.

Lakshanas and Sancharas of ragas in groups (*a*), (*b*) and (*c*) above; Alapana of ragas mentioned in groups (*a*) and (*b*) above.

3. Svara improvisation in Adi, Rupaka, Triputa, Jhampa and Chapu tala in the compositions of the ragas in group (*a*) and any ten of the ragas in group (*b*) in paragraph 2.

Candidates may offer for the practical examination Vocal music, Vina, Violin, Flute or Nagasvara.

Candidates shall sing or play to the sruti of Tambura. Candidates shall tune the Tambura.

CHAPTER LV.

DIPLOMA IN LIBRARIANSHIP.

1. No candidate shall be eligible for the Diploma in Librarianship unless he has undergone the prescribed course and satisfied the examiners in the qualifying examination.

2. No candidate shall be admitted to the Diploma Course unless he has passed the Matriculation examination of this University or any other examination accepted as equivalent thereto* by the Syndicate.

3. Applications for admission to the course must reach the Registrar in the prescribed form not later than 15th June of each year.

4. The course for the Diploma Examination shall extend over one academic year consisting of three terms (from July to March) and shall be as follows :—

i. Library Organization.

ii. Library Administration and Routine.

iii. Classification Theory.

iv. Classification Practical.

v Cataloguing and Indexing.

vi. Practical Cataloguing.

vii. Bibliography, book-selection and Reference work

viii. Special Library problems.—

a. Public Libraries and their branches.

b. University and College Libraries and Libraries of Learned Societies

c. School Libraries.

d. Juvenile Libraries.

e. Rural Library Service.

f. Archives and Government Records.

g. Other types of Libraries.

Vide foot-note to Chapter XXXVII.

5. No student shall be admitted for the examination unless he has attended not less than three-fourths of the lectures and other classes provided and has obtained from the Director of the School the prescribed progress and attendance certificate.

6. The fees for the courses and examinations shall be as follows :—

*(*a*)	(i) Admission fee	...	Rs. 5
	(ii) Tuition fee	...	Rs. 20 per term.
†(*b*)	Examination—		
	Whole examination (1st appearance).		Rs. 20
	One or more papers	...	Rs. 5 each

7. Each paper shall be of three hours' duration and shall carry 100 marks. The Examination will be in the following subjects divided into three groups A (Nos. 1 and 2), B (Nos. 3 and 4) and C (Nos. 5 and 6)—

Paper No. 1. Library Organization.
2. Library Administration.
3. Classification, theory and practical.
4. Cataloguing, theory and practical.
5. Bibliography, Book selection and Reference work.
6. Special Library problems.

8. A candidate presenting himself for the examination for the first time must appear for the whole examination and thereafter may appear in one or more groups in which he has failed.

9. A candidate shall be declared to have passed the examination if he obtains not less than 45 per cent of the marks in each group.

Successful candidates who obtain not less than 60 per cent of the aggregate marks in the whole examination in any one year shall be declared to have passed the examination with distinction.

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*Ordinance.

†Statute.

TRANSITORY REGULATIONS.

(i) A candidate shall be declared to have passed the examination if he obtains not less than 35 per cent of the marks in each paper.

(ii) Candidates who fail in any subject or subjects may, without putting in any additional attendance, appear for and complete the examination in any subsequent year.

10. Candidates who fail in any group may, without putting in any additional attendance at the course, appear for the examination in any subsequent year.

11. The Syndicate will be empowered to organize vacation courses in such a way that in the course of two consecutive vacations a candidate can complete the whole of the above course. An examination shall be held at the end of each vacation and certificates of pass shall be given to those who obtain in the aggregate 35 per cent of the marks prescribed. A candidate who obtains two such certificates covering the whole course shall be eligible for the Diploma in Librarianship.

It shall be competent for the Syndicate to suspend the vacation courses whenever it so decides.

SYLLABUSES

1. **Library Organisation.**—A course of lectures on the history of Libraries, modern Library movement, Library legislation in various countries and the Organisation of different types of Libraries.

2. **Library Administration and Routine.**—Both lectures and practical work in administrative details such as preparing budget, distribution of funds, keeping accounts, ordering, collecting and accessioning stock, charging, discharing, etc.

This will include a special course of lectures and practical demonstration in the art of book-binding and book-repairing.

3. **Classification.**—Lectures on the history and science of classification as well as a detailed examination of the principles and method of important schemes of classification such as Brown, Cutter, Congress, Dewey Decimal and Expanded Decimal Schemes.

4. **Practical Classification.**—Students will be required to classify not less than 500 books on various subjects during the course. Their work will be examined in class. Classification will be based on the Dewey Decimal scheme (expanded decimal included) and the Congress scheme

5. **Cataloguing and Indexing.**—The course is designed to give instruction in different forms of cataloguing as well as in various codes of cataloguing such as the Bodleian, British Museum, Cutter's dictionary and the Anglo-Saxon codes.

6. **Practical Cataloguing** —Cataloguing and indexing of not less than 250 books of various types will be done in class. Care form will be followed.

Instruction in practical classification and practical cataloguing will be combined during the third term so as to give students a clear idea of the scope and purpose of cross-references, cross-reference index, analytic entries etc.

7. **Bibliography, Book-selection and Reference work.**

(a) Lectures in historical and analytical bibliography as well as practical work in compiling bibliographies of various subjects.

(b) Principle and practice of Book-selection for various types of libraries. Students will be expected to do book-selection work throughout the year with the aid of bibliographies, current sale catalogues, reviews of books in papers, periodicals etc.

(c) Lectures and practical work in the art of helping readers in their selection of literature and reading.

8. **Special Library problems.**—

(a) **Public Libraries** and their branches. A study of special problems connected with the organisation and administration of public libraries such as rating, site, plan, construction, publicity, book-selection, control, supervision, charging, etc.

(b) 1. **University and College Libraries.**

2. **Libraries of Learned Societies.**

A seminar course for the discussion of peculiar problems connected with libraries of Universities, colleges and learned societies such as departmental libraries, control of issues to teachers, patrons and subscribers, aid to research workers, etc.

(c) **School Libraries.**—Lectures on the formation and administration of Libraries in schools of every type ; aid to pupils in their book-selection and reading ; instruction in the use of books and other problems.

(d) **Juvenile Libraries.**—Lectures on child psychology, Juvenile literature, art of story telling, organization and administration of Juvenile libraries as a part of the public library programme, etc.

(e) **Rural Library Service.**—A survey of rural Library systems in other countries; a study of Indian rural problems, with special reference to rural libraries; plans to establish rural library centres, travelling libraries, lecture centres, cinema house etc in rural districts.

(f) **Archives and Government Records.**—Study of the methods of preservation and use of ancient records and government documents as well as peculiar problems connected with the administration of Government Libraries.

(g) **Other types of Libraries.**—Commercial and technical libraries, hospital libraries, libraries for the blind etc. which are common in Western countries will be studied with a view to their introduction and establishment in this country.

CHAPTER LVI

COURSES IN FRENCH AND GERMAN

1. There shall be a Diploma course and a vacation course in French and German.

Diploma Course.

2. No candidate shall be eligible for Diploma in French or German who has not undergone a prescribed course and satisfied the examiners in a qualifying examination.

3. No candidate shall be admitted to the course of instruction in French and German who has not passed the Matriculation examination of the University or an examination recognised by the Syndicate as equivalent thereto.*

4. The course shall consist of three terms extending over one academic year. Applications for admission must reach the Registrar not later than 15th May.

5. For the purpose of entrance to the course no previous acquaintance with the language is required and the candidates will be taught on a syllabus and text-books to be prescribed from year to year.

6. There shall be an examination held annually in the first week of July or on such dates as may be fixed by the Syndicate. Stress shall be laid on the aptitude of candidates for translation both out of and into the selected language rather than for grammar.

7. The examination shall consist of two papers, the first of three hours' and the second of two hours' duration. The first paper shall contain questions on text-books and grammar and the second paper shall contain questions on translation from the selected language into English and *vice-versa*.

8. No candidate shall be admitted to the examination unless he has attended not less than 75 per cent of total number of lectures and has produced a certificate from the lecturer certifying that his progress and conduct have been satisfactory. But persons

* *Vide* foot-note under Chapter XXXVII.

who have attended two vacation courses—one junior and the other senior—may sit for the examination.

9. A candidate shall be declared to have passed the examination if he obtains not less than 40 per cent of the total marks in all the papers taken together. All other candidates shall be deemed to have failed in the examination. Successful candidates obtaining not less than 60 per cent of the marks shall be declared to have passed with distinction.

10. The fee for the course in either French or German shall be Rs. 45 for the whole course, payable at the beginning of the academic year.

11. Notwithstanding anything contained in this Chapter, it shall be competent for the Syndicate, by previous notice in the Fort St. George Gazette, to suspend for any year or any number of years the course and examination for the Diploma in French or German.

Vacation Course

12. For the benefit of mofussil teachers and others desirous of gaining some knowledge of either French or German, vacation courses may be arranged by the Syndicate should there be a sufficient number of applicants joining the course. The lectures will last for about three months (April—June). The fee for the course shall be Rs. 40. There will be no University Examination at the end of the course, but a certificate of having undergone the course satisfactorily shall be given to each candidate if he satisfies a test.

Notwithstanding anything contrary to the first paragraph of the section, it shall be competent for the Syndicate to arrange for two vacation courses—one junior and the other senior—and those who attend these courses and put in the prescribed attendance will be permitted to sit for the Diploma examination. The fee for the whole course will be Rs. 40 payable at the rate of Rs. 20 at the beginning of each course.

It shall be competent for the Syndicate, by previous notice, to suspend the vacation course for any year or number of years.

CHAPTER LVII.

DATES FOR PAYMENT OF EXAM. FEES, SUBMISSION OF CERTIFICATES, COMMENCEMENT OF EXAMS. AND PUBLICATION OF RESULTS

(Ordinances)

1. The latest dates on which fees for examination shall be payable and applications for admission thereto and certificates to be produced by candidates or to be submitted to the Registrar in the forms prescribed, the dates on which examinations shall begin and the dates on which the results of the examination shall be published at the University Office shall be as follows:—

Examination.	Latest date for payment of fees and for submitting applications.	Latest day for submitting certificates	Date for commencement of examination.	Latest date for publication of results.
Matriculation ...	Dec. 15 ...	March 9 ...	4th Monday in March ...	3rd Monday in May.
Intermediate ...	Dec. 15 or July 15.	March 9 or August 19	4th Monday in March or 2nd Monday in Sept.	3rd Monday in May or October
B.A. Part I ...	Jan. 5 or July 15 ...	March 19 or August 19	Monday following 4th Monday in March or 2nd Monday in Sept	3rd Monday in May or October.
Part II ...	Do.	Do.	Next day after Part I ...	Do
Part III ...	Do	Do.	2nd Monday following 4th Monday in March or the Thursday following the 2nd Monday in Sept.	Do.
B.A. (Hons.) Part I ...	Dec 15 or July 15.	March 19 or August 19	Monday following 4th Monday in March or 2nd Monday in Sept.	3rd Monday in May or October.
B.A. (Hons.) Part II ...	Dec 15 ...	March 19 ...	4th Monday in March ...	3rd Monday in May.
B. Com. Part I ...	Dec. 15 or July 15.	March 19 or August 19	4th Monday in March or 2nd Monday in Sept.	3rd Monday in May or October.
Do Part II ...	Do.	Do.	Next day after Part I ...	Do.
B. Com. (Hons.) Part I.	Do.	Do	4th Monday in March or 2nd Monday in Sept. ...	Do.
Do. Part II.	Dec 15 ...	March 19 ...	3rd Monday in March ...	Do.
B.Sc. Part I ...	Jan. 5 or July 15 ..	March 19 or August 19	Monday following 4th Monday in March or 2nd Monday in Sept.	Do.

B.Sc. Part II ...	Jan. 5 or July 15 ...	March 19 or August 19	Next day after Part I for the Main subject and next day after Main for the subsidiary subjects.	Do.
B.Sc. (Hons.)— Part I ...	Dec. 15 or July 15	March 19 or August 19	Monday following 4th Monday in March or 2nd Monday in Sept.	Do.
Part II (Main) ...	Dec 15 ..	March 19 ...	Monday following 4th Monday in March.	3rd Monday in May.
Part II (Technology Main).	Dec 15 ...	March 19 ...	April 15.	Do.
Part II (Subsidiary subjects).	Dec 15 or July 15	March 19 or August 19	Same dates as for B.Sc Subsidiary.	3rd Monday in May or October.
M.Sc. in Chemistry (including Microscopy) of Foods, Drugs and Water and in Chemical Technology.	Dec 15 ...	May 19 ...	1st Monday in June ...	20th June.
M.Sc. in other subjects.	Dec. 15 ...	March 19 ...	1st Monday in April ...	3rd Monday in May.
M.Sc. by Research ...	Dec. 15 or June 15	March 19 or Sept. 1	1st Monday in April or 2nd Monday in September. (Date of Written Exam) 30th June or 30th Dec. (last date for submitting thesis and practical records)	15th September or 15th March.
B. Ed. ...	Jan 15 ..	March 9 ...	3rd Monday in March (Practical) Last Monday in March (Written).	1st Monday in May.
Pre-Registration ...	Feb 1 or Oct. 15 ...	Eight days before the date of examination.	March 25 or January 3 ...	April 15 or January 15.
I M.B.B.S. ...	Do.	Do.	March 25 or December 15 ...	April 15 or January
II M B B S. ...	Do.	Do.	Do.	Do. [5
Final M.B B.S., Part I.	Do.	Do.	Do.	Do.
Final M B B S., Part II.	Do.	Do.	1st Monday in May or December 15.	3rd Monday in May or January 5.
M D. and M.S. Examinations	Sept. 15 ..	Eight days before the date of exam	December 15 ...	January 5.

Examination.	Latest date for payment of fees and for submitting applications.	Latest day for submitting certificates.	Date for commencement of examination.	Latest date for publication of results.
Oriental Titles—				
Preliminary ...	Nov. 30 ...	March 9 ...	4th Monday in March ...	1st Monday in May.
Final ...	Nov. 30 ...	March 9 ...	Immediately after the Preliminary examination.	Do.
Opitional Division for Certificates of Proficiency.	Nov. 30 ...	March 9 ...	Immediately after the Final examination.	Do.
Diploma in Music ...	Nov. 30 ...	March 9 ...	4th Monday in March ...	Do.

2. Examinations will commence on the next working day if the dates above mentioned happen to be holidays. Provided that in the case of March—April examinations—

(1) if the fourth Monday in March falls in the week preceding Easter Day, the Matriculation Examination shall commence on the previous Saturday and the Intermediate and Oriental Title examinations shall commence on the previous Tuesday,

(2) Thursday, Friday and Saturday before Easter Day and Easter Monday shall be *dies non*;

(3) The dates for the commencement of the Bhasha Praveena Preliminary and Final Examinations shall be so fixed as to avoid, as far as may be practicable, the setting of duplicate sets of question papers in the same subject.

3. Applications for admission to examinations received within a period of five days after the dates prescribed above will be accepted on payment of a fee of Rupee one per candidate. The Vice-Chancellor may, at his discretion, accept applications for Examinations submitted thereafter on payment of a fee of Rupees five per candidate provided (i) the candidates do not present new subjects and (ii) the nominal roll of the concerned examination is not closed.

CHAPTER LVIII.

TIME-TABLES FOR EXAMINATIONS

The order of time and subjects in which the several examinations shall be as set forth in the following tables and the number of marks assignable to each subject shall be as therein specified :—

Provided always—

(1) that in the case of Part III of the B.A. examination held in April the first day of the examination in each of the optional groups shall be determined annually by the Syndicate and shall be notified in the Gazette in the month of February ;

(2) that unless otherwise determined by the Syndicate, the Practical, Clinical and Oral Examinations shall follow the written Examinations ;

(3) that the time-table for the Bhasha Praveena Examination as may be annually determined by the Syndicate shall be duly notified in the Gazette in the preceding February.

MATRICULATION EXAMINATION

Days	*Hours*	*Subjects*	*Marks*
First day	10- 12-30	English 1st paper	75
	2— 4-30	Do. 2nd paper	75
Second day	10— 1	Arithmetic and Algebra	80
	2— 4-30	Geometry	70
Third day	10— 1	Second Language	75
	2— 4	History	50
Fourth day	10— 1	Elementary Science	75
	2— 4	Geography	50

INTERMEDIATE EXAMINATION IN ARTS AND SCIENCE

PART I—ENGLISH.

Days	*Hours*	*Subjects*	*Marks*
First day	10—1	Poetry	70
	2—5	Prose	60
Second day	10—1	Composition	70

PART II—A SECOND LANGUAGE.

Third day	10—1	Prescribed Text-books	50
	2—5	Translation for Classical Languages or Composition and Translation for Modern Languages.	50

PART III—OPTIONAL SUBJECTS.

Fourth day	10—12-30	Mathematics I paper (Algebra and Trigonometry)		50
	2— 4-30	Do. II Do (Geometry—Pure and Analytical)		50
Fifth day	10—12	Physics	I paper	50
	2— 4	Do.	II paper	50
	Three hours practical Examination.	Practical test Note books	40 10	50
Sixth day	10—12	Chemistry	I paper	50
	2— 4	Do.	II paper	50
	Three hours practical Examination.	Practical test Note books	40 10	50
Seventh day	10—12	Botany	I paper	50
	2— 4	Do.	II paper	50
	Three hours practical Examination.	Practical test Note books	40 10	50
Eighth Day	10—12	Zoology	I paper	50
	2— 4	Do.	II paper	50
	Three hours practical Examination.	Practical test Note books	40 10	50
Ninth day	10—12	Biology	I paper	50
	2— 4	Biology	II paper	50
	Three hours practical Examination.	Practical test Note books	40 10	50

INTER. EXAM.—(*Contd.*)

PART III.—(*Contd.*)

Days	*Hours*	*Subjects*		*Marks*
Tenth day	10—12-30	Geography	I paper	50
	2— 4-30	Do.	II paper	50
Eleventh day	10—12-30	Logic	I paper	50
	2— 4-30	Do.	II paper	50
Twelfth day	10—12-30	Indian History	I paper	50
	2— 4-30	Do.	II paper	50
Thirteenth day	10—12-30	World History (up to 1450)	I paper	50
	2— 4-30	World History (from 1450 to the present day)	II paper	50
Fourteenth day	10—12-30	Civics and Indian Administration—Civics	I paper	50
	2— 4-30	Civics and Indian Administration—Indian Administration	II paper	50
Fifteenth day	10—12-30	British History	I paper	50
	2— 4-30	Do.	II paper	50
Sixteenth day	10—12-30	Text-books for classical languages (Advanced Language)		50
	2— 4-30	Translation for classical languages (Advanced Language)		50
Seventeenth day	10—12	Advanced Languages—Modern Indian and English—First Paper (Text-books)		50
	2— 4-30	Advanced Languages—Modern Indian and English—Second Paper (Text-books)		50
Eighteenth day	10—12-30	Economic Geography and Economic History.	I paper	50
	2— 4-30	Do.	II paper	50
Nineteenth day	10—12-30	Economics and Banking	I paper	50
	2— 4-30	Do.	II paper	50

INTER. EXAM.—(*Contd.*)

PART III—(*Contd.*)

Days	*Hours*	*Subjects*		*Marks*
Twentieth day	10—12-30	Accountancy and General Commercial Knowledge	I paper	50
	2— 4-30	Do.	II paper	50
Twenty first day	10—12	Agriculture—I		50
	2— 4	Agriculture—II		50
Three hours practical examination		Practical test Note books	40 10	50
Twenty second day	10—12-30	Electrical Engineering	I paper	50
	2— 4-30	Do.	II paper	50
Twenty third day	10—12-30	Mechanical Engineering	I paper	50
	2— 4-30	Do.	II paper	50
Twenty fourth day	10—12-30	Surveying (written)		50
	2— 4-30	Do. (practical)		50
Twenty fifth day	10—12-30	Drawing (written)		50
	2— 4-30	Do. (practical)		50
Twenty sixth day	10— 1	Music (written)		50
Twenty seventh day		Music (practical)		50

Note:—Every year the exact dates of Part III of the Intermediate Examination will be notified on receipt of information from the affiliated colleges as to the different groupings of subjects offered by their candidates.

B. A. DEGREE EXAMINATION.

PART I—ENGLISH LANGUAGE AND LITERATURE.

First day	10—1	Composition		90
	2—5	Modern Poetry		80
Second day	10—1	Shakespeare		90
	2—5	Modern Prose		90
			Total	350

PART II—A SECOND LANGUAGE.

Third day	10—1	First Paper		100
	2—5	Second Paper		100
			Total	200

B.A. DEGREE EXAMINATION—(*Contd.*)

PART III—OPTIONAL GROUPS.

(i) MATHEMATICS.

Days	*Hours*	*Subjects*	*Marks*
First day	10—1	Algebra and Trigonometry	90
	2—5	Astronomy or Statistics	90
Second day	10—1	Pure and Analytical Geometry	90
	2—4	Dynamics	70
Third day	10—1	Calculus	90
	2—4	Hydrostatics and Properties of Matter	70
		Total	500
		GROUP (ii-A)—PHYSICS (MAIN).	
First day	10—12	Dynamics and Hydrostatics	75
	2— 4	Properties of Matter and Heat	75
Second day	10—12	Light and Sound	75
	2— 4	Magnetism and Electricity	75
	*3 hours	Practical Examination	80
		Laboratory Record	20
		Total	400
		GROUP (ii-B)—CHEMISTY (MAIN)	
First day	10—1	Inorganic Chemistry	100
	2—5	Physical Chemistry	100
Second day	10—1	Organic Chemistry	100
	*3 hours	Practical Examination	80
		Laboratory Record	20
		Total	400
		MATHEMATICS (SUBSIDIARY).	
Fourth day	10—1	Algebra, Trigonometry and Analytical Geometry.	100
	2—5	Calculus and Differential Equations	100
		Total	200
		PHYSICS (SUBSIDIARY).	
Fifth day	10—1	Physics (written)	100
	*3 hours	Physics (practical)	100
		Total	200

*The date and hour of the Practical Examination will be notified later.

B.A. DEGREE EXAMINATION—(*Contd.*)

CHEMISTRY—(SUBSIDIARY).

Days	*Hours*	*Subjects*	*Marks*
Sixth day	10—1	Chemistry (written)	100
	*3 hours	Chemistry (practical)	100
		Total	200

GROUP (iii-A)—PHILOSOPHY.

First day	10— 1	Logic and Theory of Knowledge	100
	2— 5	Ethics	100
Second day	10—12-30	European Philosophy	80
	2— 4-30	Indian Philosophy	80
Third day	10—12	Psychology—1st paper	70
	2— 4	Psychology—2nd paper	70
		Total	500

GROUP (iii-B)—PHILOSOPHY.

First day	10— 1	Economics—General	100
	2— 5	Ethics	100
Second day	10—12-30	European Philosophy	80
	2— 4-30	Optional subject other than European Philosophy	80
Third day	10—12	Psychology—1st paper	70
	2— 4	Psychology—2nd paper	70
Fourth day	10—12-30	Politics	80
	2— 4-30	Sociology	80

(iv) HISTORY AND ECONOMICS (HISTORY MAIN)

First day	10—1	Economics—General	100
	2—5	Modern History	100
Second day	10—1	Indian History—Special Period	100
	2—5	Constitutional History of India—British Period	100
Third day	10—1	Politics	100
		Total	500

*The date and hour of the Practical Examination will be notified later.

B.A. DEGREE EXAMINATION—(*Contd.*)

(v) History and Economics (Economics Main).

Days	*Hours*	*Subjects*	*Marks*
First day	10—1	Economics—General	100
	2—5	Modern History	100
Second day	10—1	Economics—Special I	100
	2—5	Economics—Special II	100
Third day	10—1	Politics	100
	2—5	Sociology	100
		Total for five subjects	500

(vi) LANGUAGES INCLUDING ENGLISH.

(1) Sanskrit and Early Indian History.

First day	10—1	Books of the Early Period	80
	2—5	Books of the Later Period I	80
Second day	10—1	Books of the Later Period II	80
	2—5	Grammar	80
Third day	10—1	History of Sanskrit Literature	80
	2—5	Early Indian History	100
		Total	500

(2) Pali and Early Indian History or Sanskrit.

First day	10—1	Prose Books	80
	2—5	Poetry	80
Second day	10—1	Translation	80
	2—5	Grammar	80
Third day	10—1	History of the Language and Literature	80
	2—5	Early Indian History or Sanskrit	100
		Total	500

(3) Arabic or Persian and Early Muslim History.

First day	10—1	Prose	80
	2—5	Poetry	80
Second day	10—1	Translation	80
	2—5	Grammar including Rhetoric and Prosody	80
Third day	10—1	History of Arabic or Persian Language and Literature	80
	2—5	Early Muslim History	100
		Total	500

B.A. DEGREE EXAMINATION —(*Contd.*)

(4) URDU AND INDIAN HISTORY—MUSLIM PERIOD OR ARABIC OR PERSIAN.

Days	*Hours*	*Subjects*	*Marks*
First day	10—1	Prose	80
	2—5	Poetry	80
Second day	10—1	Translation	80
	2—5	Grammar including Rhetoric and Prosody	80
Third day	10—1	History of Language and Literature	80
	2—5	Indian History—Muslim period or Arabic or Persian	100
		Total	500

(5) DRAVIDIAN LANGUAGE OR ORIYA AND A RELATED SUBJECT OR SANSKRIT.

First day	10—1	Related subject or Sanskrit	100
	2—5	Set books and Prosody and Poetics	80
Second day	10—1	Set books and Grammar	80
	2—5	History of Language and Grammar	80
Third day	10—1	Comparative Grammar—Dravidian or Gaudian	80
	2—5	Composition	80
		Total	500

(6) HINDI AND MEDIAEVAL HISTORY OF NORTHERN INDIA OR SANSKRIT.

First day	10—1	Prose books	80
	2—5	Poetry	80
Second day	10—1	Comparative Grammar—Gaudian	80
	2—5	History of Literature	80
Third day	10—1	Composition	80
	2—5	Mediaeval History of Northern India or Sanskrit	100
		Total	500

B. A. DEGREE EXAMINATION—(*Contd.*)

(7) ENGLISH.

Days	*Hours*	*Subjects*	*Marks*
First day	10—1	Drama	80
	2—5	Poetry	80
Second day	10—1	Prose	80
	2—5	Outlines of History of English Literature and Analysis of Literary forms	80
Third day	10—1	Outlines of History of English Language and either (a) Primer of Anglo-Saxon or (b) Set book from Chaucer	80
	2—5	General Essay	100
		Total	500

GROUP (VII)—MUSIC.

First day	10—1	Written-Theory and History of Music I	100
Second day	10—1	Written-Theory and History of Music II	100
		Practical*-Compositions	100
		Ragas	100
		Svaras	100
		Total	500

B. A. (HONS.) DEGREE EXAMINATION

Part I

First day	10—1	English	90
	2—4 or 2—5	Translation or Related subject	60
		Total	150

Part II

BRANCH I.—MATHEMATICS.

First day	10—1	1st paper	150
Second day	10—1	2nd paper	150
Third day	10—1	3rd paper	150
Fourth day	10—1	4th paper	150
Fifth day	10—1	5th paper	150

* Date and hour of the practical examination will be notified later.

B.A. (HONS.) DEGREE EXAMINATION—*(Contd.)*

Part II—*(Contd.)*

BRANCH I—MATHEMATICS—*(Contd.)*

Days	*Hours*	*Subjects*	*Marks*
Sixth day	10—1	6th paper	150
Seventh day	10—1	*7th paper	150
Eighth day	10—1	*8th paper	150
		Total	1,200

BRANCH II—PHILOSOPHY.

First day	10—1	General I	100
Second day	10—1	General II	100
Third day	10—1	General III	100
Fourth day	10—1	General IV	100
Fifth day	10—1	General V	100
Sixth day	10—1	General VI	100
Seventh day	10—1	Special I	100
Eighth day	10—1	Special II	100
		Total	800

BRANCH III—HISTORY, ECONOMICS AND POLITICS

First day	10—1	General I	100
Second day	10—1	General II	100
Third day	10—1	General III	100
Fourth day	10—1	General IV	100
Fifth day	10—1	Special I	100
Sixth day	10—1	Special II	100
Seventh day	10—1	Special III	100
Eighth day	10—1	Essay	100
		Total	800

* Note.—The paper on 'Theory of Numbers' shall be of four hours' duration

B.A. (HONS.) DEGREE EXAMINATION.—(*Contd.*)

BRANCH IV—TELUGU LANGUAGE AND LITERATURE.

Days	*Hours*	*Subjects*	*Marks*
First day	10—1	Poetry and Drama	100
Second day	10—1	Prose and History of Language or Literature	100
Third day	10—1	Telugu Grammar, Prosody and Poetics	100
Fourth day	10—1	Elementary Sanskrit and Elementary Prakrit Grammar	100
Fifth day		Essay	100
Sixth day	10—1	Special I	100
Seventh day	10—1	Special II	100
Eighth day	10—1	Special III	100
		Total	800

B. COM. (PASS) DEGREE EXAMINATION.

(Old Regulations.)

PART I

First day	10— 1	Commercial Correspondence and Precis Writing including General Essay	100
Second day	10—12-30	Translation	100
		PART II—A.	
First day	10— 1	Commercial Knowledge and Commercial Arithmetic.	100
	2— 5	Commercial Geography	100
Second day	10— 1	Book-keeping and Accounts	100
	2— 5	Law and Practice of Banking in India	100
		Total	400
		PART II—B.	
Third day .	10— 1	Business Organization	100
	2— 5	Economics	100

B. COM. (PASS) DEGREE EXAMINATION—(*Contd.*)

PART II—B—(*Contd.*)

Days	*Hours*	*Subjects*	*Marks*
Fourth day	10—1	Mercantile and Industrial Law	100
	2—5	*Special Subject—Paper I	100
Fifth day	10—1	*Special Subject—Paper II	100
		Total	500

(Current Regulations).

PART I—ENGLISH.

First day	10—1	*English Composition	90
	2—5	English Modern Prose and Poetry	90
Second day	10—1	Commercial Correspondence and Precis Writing	90

PART II—HINDI.

Third day	10—1	Prescribed text books on Prose, Composition and Translation.	100

PART III—SUBJECTS.

Fourth day	10—1	Economics including Money Exchange and Banking	100
	2—5	Accountancy	100
Fifth day	10—1	Business Organisation	100
	2—5	Mercantile Law	100
Sixth day	10—1	Commercial Geography	100
Seventh day	10—1	†Special Subject—Paper I	100
	2—5	Do. —Paper II	100

*The papers on the Special subjects 'Advanced Accountancy and Auditing' and 'Advanced Banking and Currency' shall be as follows:—

Advanced Accounting and Auditing—
Paper I—Advanced Accounting.
Paper II—Auditing.

Advanced Banking and Currency—
Paper I—Advanced Banking.
Paper II—Advanced Currency.

*Common to B.A., B. Com. (Pass) and (Hons.) Degree Examinations.

†*Note*:—The papers on the Special Subjects shall be as follows:—

(1) *Advanced Accounting and Auditing*:—
Paper I—Advanced Accounting.
" II—Auditing.

B. COM. (HONS.) DEGREE EXAMINATION.

PART I

Days	*Hours*	*Subjects*	*Marks*
First day	10— 1	Commercial Correspondence and Precis Writing including General Essay	100
Second day	10—12-30	Translation	100
		PART II	
First day	10— 1	Economics	100
Second day	10— 1	Law and Practice of Banking in India	100
Third day	10— 1	Business Organisation	100
Fourth day	10— 1	Book-keeping and Accountancy	100
Fifth day	10— 1	Mercantile and Industrial Law	100
Sixth day	10— 1	Commercial Geography	100
Seventh day	10— 1	Statistical Method and Applied Statistics	100
Eighth day	10— 1	Commercial Knowledge and Commercial Arithmetic	100
Ninth day	10— 1	Special subject I—Paper I	100
Tenth day	10— 1	Special subject I—Paper II	100
Eleventh day	10— 1	Special subject I Paper III	100
Twelfth day	10— 1	Special subject II—Paper I	100
Thirteenth day	10— 1	Special subject II Paper II	100
Fourteenth day	10— 1	Special subject II—Paper III	100
		Total	1,400

(2) *Advanced Banking and Currency, including Law and Practice of Banking* :—
Paper I—Advanced Banking, including Law and Practice of Banking.
,, II—Currency and Exchange.

(3) *Transport* :—
Paper I—Road and Railway Transport.
,, II—Ocean and Air Transport.

(4) *Statistics and their Application to Commerce* :—
Paper I—Statistical Methods.
,, II—Applied Statistics.

(5) *Recent Economic History* :
Paper I—Economic History of England, France, Germany, Italy and U. S. A.
,, II—Economic History of India and Japan.

B. COM. (HONS.) DEGREE EXAMINATION—(*Contd.*)

PART II—A.

Days	*Hours*	*Subjects*	*Marks*
First day	10—1	Commercial Knowledge and Commercial Arithmetic	100
Second day	10—1	Commercial Geography	100
Third day	10—1	Business Organization	100
Fourth day	10—1	Law and Practice of Banking in India	100
		Total	400

PART II—B.

Fifth day	10—1	Economics	100
Sixth day	10—1	Book-keeping and Accountancy	100
Seventh day	10—1	Mercantile and Industrial Law	100
Eighth day	10—1	Statistical Method and Applied Statistics	100
Ninth day	10—1	Special subject I—Paper I	100
Tenth day	10—1	Special subject I—Paper II	100
Eleventh day	10—1	Special subject I—Paper III	100
Twelfth day	10—1	Special subject II—Paper I	100
Thirteenth day	10—1	Special subject II—Paper II	100
Fourteenth day	10—1	Special subject II—Paper III	100
		Total	1,000

B. COM. (HONS.) DEGREE EXAMINATION

(New Regulations)

PART I

First day	10—1	*English Composition	90
	2—5	English—Modern Prose	90
Second day	10—1	Translation	100

* Common to B.A., B. Com. (Pass) and (Hons.) Degree Examinations.

B. COM. (HONS.) DEGREE EXAMINATION—(*Contd*)

PART II.

GROUP A.—(*General subjects.*)

Days	*Hours*	*Subjects*	*Marks*
First day	10—1	General Economics	100
Second day	10—1	Banking	100
Third day	10—1	Accountancy	100
Fourth day	10—1	Business Organisation	100
Fifth day	10—1	Secretarial Practice	100
Sixth day	10—1	Commercial Geography	100
Seventh day	10—1	Mercantile Law	100
Eighth day	10—1	Statistics and their application to Commerce	100
		GROUP B.—(*Optional subjects.*)	
Ninth day	10—1	*Special subject—Paper I	100
Tenth day	10—1	*Special subject—Paper II	100

**Note* :— The papers on the Special Subjects shall be as follows —

(*1*) *Advanced Accounting and Auditing* :—
Paper I—Advanced Accounting.
„ II—Auditing.

(*2*) *Transport* :—
Paper I—General Principles.
„ II—Special Problems, including Rates-fixing, State Control etc.

(*3*) *International Trade* :—
Paper I—General Principles.
„ II—Special Problems, including Free Trade *vs.* Protection, Controversial points and Counter-theories.

(*4*) *Currency and Exchange* :—
Paper I—Currency.
„ II—Exchange.

(*5*) *Recent Economic History* :—
Paper I—Economic History of England, Germany and U.S.A.
„ II—Economic History of India and Japan.

B.Sc. (PASS) DEGREE EXAMINATION.

PART I.

Days	*Hours*	*Subjects*	*Marks*
First day	10—1	English	90
		PART II	
		MATHEMATICS (MAIN).	
Second day	10—1	Algebra and Trigonometry	100
	2—5	Pure Geometry	100
Third day	10—1	Analytical Geometry	100
	2—5	Calculus	100
Fourth day	10—1	Statics and Dynamics	100
	2—5	Hydrostatics and Astronomy	100
		PHYSICS (MAIN).	
Second day	10—1	Dynamics and Hydrostatics	100
	2—5	Properties of Matter and Heat	100
Third day	10—1	Light and Sound	100
	2—5	Electricity and Magnetism	100
	*3 hours	Practical Examination	80
	*3 hours	Practical Examination	80
		Laboratory Record Note books	40
		CHEMISTRY (MAIN).	
Second day	10—1	General Chemistry, including History of Chemistry	100
	2—5	Inorganic Chemistry	100
Third day	10—1	Physical Chemistry	100
	2—5	Organic Chemistry	100
	*6 hours	Practical Examination	85
	*6 hours	Practical Examination	85
		Laboratory Record Note books	30
		BOTANY, ZOOLOGY OR GEOLOGY (MAIN).	
Second day	10—1	First paper	100
	2—5	Second paper	100
Third day	10—1	Third paper	100

*Dates and hours of the Practical Examinations will be notified later.

B.Sc. (PASS) DEGREE EXAMINATION—(*Contd*)

BOTANY.

Days	*Hours*	*Subjects*	*Marks*
	*3 hours	Practical Examination	80
	*3 hours	Do.	80
	*3 hours	Do.	80
		Laboratory Record	30
		Field notes and collection of plants	30

ZOOLOGY.

	*3 hours	Practical Examination	90
	*3 hours	Do.	90
	*3 hours	Do.	90
		Laboratory record	30

GEOLOGY.

	*3 hours	Practical Examination	100
	*3 hours	Do.	100
	*3 hours	Do.	100
		Laboratory and field records	100

PHYSIOLOGY (MAIN.)

Second day	10—1	First paper	150
	2—5	Second paper	150
	*3 hours	Practical Examination	100
	*3 hours	Do.	100
	*3 hours	Do.	100

MATHEMATICS (SUBSIDIARY).

Fourth day	10— 1	Algebra, Trigonometry and Analytical Geometry	100
	2— 5	Calculus and Differential Equations	100

PHYSICS (SUBSIDIARY).

Fifth day	10— 1	Physics (written)	100
	*3 hours	Practical Examination	100

CHEMISTRY (SUBSIDIARY).

Sixth day	10— 1	Chemistry (written)	100
	*3 hours	Practical Examination	100

*Dates and hours of the Practical Examinations will be notified later.

B.Sc. (PASS) DEGREE EXAMINATION—(*Contd.*)

BOTANY (SUBSIDIARY).

Days	*Hours*	*Subjects*	*Marks*
Seventh day	10—12-30	Botany I Paper	50
	2— 4-30	Botany II Paper	50
	*3 hours	Practical Examination	100
		ZOOLOGY (SUBSIDIARY).	
Eighth day	10—12-30	Invertebrata	50
	2— 4-30	Vertebrata	50
	*3 hours	Practical Examination	100
		GEOLOGY (SUBSIDIARY).	
Ninth day	10—12-30	General, Structural, Stratigraphical Geology, Palaeontology	50
	2— 4-30	Crystallography, Mineralogy and Petrology	50
	*3 hours	Practical Examination	100
		PHYSIOLOGY (SUBSIDIARY)	
Tenth day	10— 1	Physiology	100
	*3 hours	Practical Examination I	150
	*3 hours	Practical Examination II	50

Note :—Every year the exact dates of Part II of the B.Sc. Examination will be notified on receipt of information from the affiliated colleges as to the different Main and Subsidiary Subjects offered by candidates.

B.Sc. (HONS.) DEGREE EXAMINATION IN PHYSICS AND CHEMISTRY.

PART I.

First day	10— 1	English	90
	2— 4	Translation	60
		Total	150

PART II.

PHYSICS (MAIN).

First day	10— 1	Properties of Matter and Dynamic Theory of Sound	100

*Day and hour will be notified later.

B.Sc. (HONS.) DEGREE EXAMINATION IN PHYSICS AND CHEMISTRY—(*Contd.*)

PART II—(*Contd.*)

PHYSICS (MAIN)—(*Contd.*)

Days	*Hours*	*Subjects*		*Marks*
Second day	10—1	Sound and Heat		100
Third day	10—1	Light		100
Fourth day	10—1	Electricity and Magnetism		100
Fifth day	10—1	Modern Physics	I	100
Sixth day	10—1	Do.	II	100
		Practical examination	I	100
Dates and hours will be notified later.		Do.	II	100
		Do.	III	100
		Do.	IV	100
		Practical Record		100
			Total	1,100

CHEMISTRY (MAIN).

First day	10—1	General and Historical Chemistry		100
Second day	10—1	Physical Chemistry		100
Third day	10—1	Inorganic Chemistry		100
Fourth day	10—1	Organic Chemistry		100
Fifth day	10—1	Special subject		100
		Practical examination	I	100
Dates and hours will be notified later.		Do.	II	100
		Do.	III	100
		Do.	IV	100
		Practical Record		100
			Total	1,000

PHYSICS (SUBSIDIARY).

Sixth day	10—1	Physics (Theory)	100
Date and hour will be notified later.		Physics (Practical)	100
		Total	200

B.Sc. (HONS). DEGREE EXAMINATION IN PHYSICS AND CHEMISTRY—(*Contd.*)

CHEMISTRY (SUBSIDIARY).

Days	*Hours*	*Subjects*	*Marks*
Seventh day	10—1	Chemistry (Theory)	100
Date and hour will be notified later.		Chemistry (Practical)	100
		Total	200

MATHEMATICS (SUBSIDIARY TO PHYSICS MAIN).

Eighth day	10— 1	Algebra, Trigonometry and Analytical Geometry	100
	2— 5	Calculus and Differential Equations	100

MATHEMATICS (SUBSIDIARY TO CHEMISTRY MAIN)

*	10—1	Mathematics	100

B.Sc. (HONS.) DEGREE EXAMINANION IN CHEMICAL TECHNOLOGY.

PART I.

First day	10— 1	Mathematics	100
Second day	10— 1	Physics (Written)	100
		Do. (Practical)	100
		Total	200
Third day	10— 1	Chemistry (Written) I (Inorganic)	100
Fourth day	10— 1	Do. (Written) II (Physical)	100
Fifth day	10— 1	Do. Written III (Organic)	100
		†Chemistry Practical I { Inorganic and Physical Chemistry }	200
		Do. Practical II { Inorganic and Physical Chemistry }	
		Do. Practical III { Organic Chemistry }	100
		Practical Records	50
		Oral	50
		Total	700

*Common with Chemical Technology Main.

†Dates and hours of practical examinations will be notified each year.

B.Sc. (HONS.) DEGREE EXAMINATION IN CHEMICAL TECHNOLOGY—(*Contd.*)

PART I—(*Contd.*)

Days	*Hours*	*Subjects*	*Marks*
Sixth day	10— 1	General Engineering (Written)	100
		*Do (Practical)	50
		Drawing Records	50
		Total	200
Seventh day	10—12	Pharmaceutical Botany (Written)	50
		*Do. (Practical)	50
		Total	100
		PART II.	
First day	10— 1	Chemical Technology Written, I Paper	100
Second day	10— 1	Do. Written, II Paper	100
		*Do. Practical I	100
		Practical II	100
		Records	50
		Total	450
Third day	10— 1	Chemical Engineering (Written)	100
		*Do. Practical	100
		Records	50
		Total	250
Fourth day	10— 1	Special subject (Written)	100
		*Do. Practical	100
		Records	50
		Total	250
		Grand total	950

B.Sc. (HONS.) DEGREE EXAMINATION IN BOTANY, ZOOLOGY AND GEOLOGY.

PART I

First day	10—1	English	90
	2—4	Translation	60
		Total	150

*Dates and hours of Practical examinations will be notified each year.

B.Sc. (HONS.) DEGREE EXAMINATION IN BOTANY, ZOOLOGY AND GEOLOGY—(*Contd.*)

PART II.

BOTANY (MAIN).

Days	*Hours*	*Subjects*	*Marks*
First day	10—1	Alage, Fungi and Bryophytes	150
Second day	10—1	Pteridophytes, Cynosperms and Morphology of Angiosperms	150
Third day	10—1	Histology, Physiology, Ecology and Distribution	150
Fourth day	10—1	Systematic Botany, Economic Botany and General Principles	150
Fifth day	10—1	Special subject	150
		*Practical Examination I	100
		Do. II	100
		Do. III	100
		Do. IV	100
		Practical record and collections	100
		Total	1,250

ZOOLOGY (MAIN).

First day	10—1	Invertebrata, including Invertebrate Embryology	150
Second day	10—1	Chordata including Vertebrate Embryology	150
Third day	10—1	Minor groups and Palæontology and South Indian Fauna	150
Fourth day	10—1	Genetics, Cytology and General Principles	150
Fifth day	10—1	Special subject	150
	3 hours each.	*Practical Examination I	100
		Do. II	100
		Do. III	100
		Do. IV	100
		Practical record and microscopic slides	100
		Total	1,250

*Days and hours will be notified later.

B.Sc. (HONS.) DEGREE EXAMINATION IN BOTANY, ZOOLOGY AND GEOLOGY—(*Contd.*)

GEOLOGY (MAIN).

Days	*Hours*	*Subjects*	*Marks*
First day	10—1	General Geology—Physical, Dynamical and Structural Geology	150
Second day	10—1	Crystollography and Mineralogy	150
Third day	10—1	Petrology	150
Fourth day	10—1	Indian Geology, Stratigraphy and Palæontology	150
Fifth day	10—1	Special subject	150
	3 hours. each.	*Practical Examination I	100
		Do. II	100
		Do. III	100
		Do. IV	100
		Field and Laboratory Records and Viva Voce	100
			1,250

PHYSICS (SUBSIDIARY).

Sixth day	10—1	Physics (Theory)	100
	3 hours	*Physics (Practical)	100
		Total	200

CHEMISTRY (SUBSIDIARY).

Seventh day	10—1	Chemistry (Theory)	100
	3 hours.	*Chemistry (Practical)	100
		Total	200

BOTANY (SUBSIDIARY).

Eighth day	10-12-30	Botany I Paper	50
	2—4-30	Botany II Paper	50
	3 hours.	*Practical Examination	100
		Total	200

*Dates and hours will be notified later.

B.Sc. (HONS.) DEGREE EXAMINATION IN BOTANY, ZOOLOGY AND GEOLOGY—(*Contd.*)

ZOOLOGY (SUBSIDIARY).

Days	*Hours*	*Subjects*	*Marks*
Ninth day	10-12-30	Invertebrate	50
	2—4—30	Vertebrata	50
	3 hours.	*Practical Examination	100
		Total	200

GEOLOGY (SUBSIDIARY).

Tenth day	10-12-30	General, Structural and Stratigraphical Geology and Palæontology	50
	2—4-30	Crystallography, Mineralogy and Petrology	50
	3 hours.	*Practical Examination	100
		Total	200

I. M.Sc. DEGREE EXAMINATION IN APPLIED PHYSICS.

First day	10—1	Applied Mechanics	100
Second day	10—1	Optical Instruments	100
Third day	10—1	Applied Electricity	100
	3 hours.	Applied Mechanics—	
		*Practical Examination	100
		Records	30
	3 hours.	Optical Instruments—	
		*Practical Examination	100
		Records	30
	3 hours.	Applied Electricity—	
		*Practical Examination	100
		Records	40
	3 hours.	Drawing—	
		*Practical Examination	60
		Records	40
		Total	800

* Dates and hours will be notified later.

II. M.Sc. IN APPLIED PHYSICS EXAMINATION FOR PASS GRADUATES AT THE END OF FIRST YEAR.

Days	*Hours*	*Subjects*	*Marks*
First day	10–12	Properties of Matter	60
Third day	10—1	Light	100
Fourth day	10—1	Electricity and Magnetism	100
		* Practical Examination I	100
		Do. II	100
		Practical Records	40
		Total	500

(Table common with B.Sc. Hons. Physics Main Part II).

III. M.Sc. DEGREE EXAMINATION IN CHEMISTRY (INCLUDING MICROSCOPY) OF FOODS, DRUGS AND WATER AS SPECIAL SUBJECT.

First day	10—1	Written—Paper I	100
Second day	10—1	Do. Paper II	100
		*Practical I	100
		Do. II	100
		Do. III	100
		Oral and records	100
		Total	600

IV. M.Sc IN CHEMISTRY (INCLUDINC MICROSCOPY) OF FOODS, DRUGS AND WATER AS SPECIAL SUBJECT FOR PASS GRADUATES AT THE END OF FIRST YEAR.

† 10—1	Organic Chemistry	100
10—1	Chemistry of Foods and Drugs	100
	*Practical I	100
	Do. II	100
	Practical Record	40
	Total	440

* Dates and hours of practical examinations will be notified each year.

† Common papers with B.Sc. Hons. Chemistry Main, Part II.

V. M.Sc. DEGREE EXAMINATION IN CHEMICAL TECHNOLOGY.

Days	*Hours*	*Subjects*	*Marks*
First day	10—11-30	Scientific German Translation	50
Second day	10—12	General Economics and Factory Management	50
Third day	10— 1	Special subjects in Chemical Technology—Written I	100
Fourth day	10— 1	Do. Written II	100
Fifth day	10— 1	Do. Written III	100
		*Do. Practical I	100
		Do. Practical II	100
		Do. Practical III	100
		Home Paper	100
		Oral	100
		Records	100
		Total	1,000

B. Ed. DEGREE EXAMINATION.

(*a*) *Practical Examination.*—

Lesson I	100
Lesson II	100

Note.—Date and hour of the Practical examination will be notified each year.

(*b*) *Written Examination.*—

First day	10— 1	Theory and Practice of Education Part I	100
	2— 5	Theory and Practice of Education Part II	100
Second day	10— 1	History of Education	100
	2— 5	Methods appropriate to teaching—English	100
Third day	10— 1	Methods appropriate to teaching—Special subject	100

*Dates and hours will be notified later.

MEDICAL EXAMINATIONS.

PRE-REGISTRATION EXAMINATION.

Days	*Hours*	*Subjects*	*Maximum*	*Minimum*
First day	*	Inorganic Chemistry—Practical	50	18
	10—1	Inorganic Chemistry—Written	100	53
	*	Inorganic Chemistry—Oral	50	
	*	Physics—Practical	50	18
	2—5	Physics—Written	100	53
	*	Physics—Oral	50	
Second day	*	General Biology—Practical	50	18
	10—1	General Biology—Written	100	53
	*	General Biology—Oral	50	
		Total	600	213

FIRST M.B B S. EXAMINATION.

ORGANIC CHEMISTRY.

First day	10—1	Practical	50	25
	*	Written	50	50
	*	Oral	50	
		Total	150	75

ANATOMY, ETC.

First day	*	Practical (Dissection)	50	25
	2—5	Written	100	75
	*	Oral	50	
		Total	200	100

PHYSIOLOGY, ETC.

Second day	*	Practical	50	25
	10—1	Written	100	75
		Oral	50	
		Total	200	100
		Grand Total	550	275

* Days and hours will be decided before the commencement of each examination.

MEDICAL EXAMINTIONS—(*Contd.*)

SECOND M.B.B.S. EXAMINATION.

PHARMACOLOGY.

Days	*Hours*	*Subjects*	*Maximum*	*Minimum*
First day	*	Practical	50	25
	10— 1	Written	100	75
	*	Oral	50	
		Total	200	100

HYGIENE.

First day	*	Practical	25	13
	2— 5	Written	100	63
	*	Oral	25	
		Total	150	76

FORENSIC MEDICINE.

Second day	10— 1	Written	100	75
	*	Oral	50	
		Total	150	75
		Grand Total	500	251

FINAL M.B.B.S. EXAMINATION.

MEDICINE.

First day	10—12	Written	50	100
	2— 4	,,	50 (40)	
	*	Practical	100	
	*	Oral		
	*	Clinical—		
	1 hour	Examination of a patient and report (written) thereon	75	75
	½ hour	Short examination of two patients	75	
		Total	350	175

* Days and hours will be decided before the commencement of each examination.

MEDICAL EXAMINATIONS—(*Contd.*)

FINAL M.B. & B.S. EXAMINATION—(*Contd.*)

SURGERY.

Days	*Hours*	*Subjects*	*Maximum*		*Minimum*
Second day	10—12	Written	50	40	100
	2— 4	"	50		
	*	Oral	50		
	*	Operative	50		
	*	Clinical—			
	1 hour.	Examination of a patient and a report (written) thereon	75		75
	½ hour	Short examination of not less than two cases	75		
		Total	350		175

OBSTETRICS AND GYNAECOLOGY.

Third day	10— 1	Written	100	40	100
	*	Practical	100		
	*	Oral			
	*	Clinical	100		50†
		Total	300		150

OPHTHALMOLOGY.

Third day	2— 5	Written	50	20	50
	*	Practical	50		
	*	Oral			
	*	Clinical	50		25†
		Total	150		75

PATHOLOGY, ETC.

Fourth day	10— 1	Written	100		40
	*	Written	100		50
	*	Practical			
		Oral			
		Total	200		90
		Grand Total	1,350		665

* Days and hours will be decided before the commencement of each examination.

† Minimum for a pass—(1) 50 per cent of the total marks in the whole subject.

(2) 50 per cent of the marks in the clinical examination.

(3) 40 per cent of the aggregate marks in written, practical and oral examination.

M. D. DEGREE EXAMINATION.

Branch I—Medicine including Tropical Medicine

Days	*Hours*	*Subjects*
First day	10—1	Medicine
	2—5	Tropical Medicine
Second day	10—1	Pathology and Bacteriology
	2—5	Essay
Third day	10—1	Clinical
	2—5	Practical and Oral
	Branch II—Pathology including Bacteriology	
First day	10—1	Pathology I
	2—5	Pathology II
Second day	10—1	Medicine including Tropical Diseases
	2—5	Essay
Third day	10—4	Practical and Oral

M. S. DEGREE EXAMINATION.

First day	10—1	Surgery
	2—5	Surgical Anatomy and Pathology
Second day	10—1	Special subject
	2—5	Essay in General Surgery
Third day	10—1	Operative Surgery and the use of instruments
	2—5	Clinical and Oral

ORIENTAL TITLE EXAMINATIONS.

VIDYA PRAVEENA.

Preliminary.

Days	*Hours*	*Subjects*	*Marks*
First day	10—1	Prescribed Text-books Genl. (i)	200
Second day	10—1	Prescribed Text-books Genl. (ii)	200
Third day	10—1	Prescribed Text-books Spl. (i)	200
Fourth day	10—1	Prescribed Text-books Spl. (ii)	200
		Total	800

ORIENTAL TITLE EXAMINATIONS—(*Contd.*)

VIDYA PRAVEENA—(*Contd.*)

Final.

Days	*Hours*	*Subjects*	*Marks*
First day	10—1	History of Sanskrit Language and Literature	200
Second day	10—1	Prescribed Text-books Spl. (i)	200
Third day	10—1	Prescribed Text-books Spl. (ii)	200
Fourth day	10—1	Prescribed Text-books Spl. (iii)	200
		Total	800

UBHAYABHASHA PRAVEENA.

Final.

FOR PARTS A AND C IN REGULATION 7 OF CHAPTER LI.

First day	10—1	History of Sanskrit Language and Literature	200
Second day	10—1	Prescribed Sanskrit Text-books	200
Third day	10—1	Prescribed Text-books in Modern Indian Language I	200
Fourth day	10—1	Prescribed Text-books in Modern Indian Language II	200
		Total	800

FOR PART B IN REGULATION 7 OF CHAPTER LI.

First day	10—1	Prescribed Text-books I	150
	2—5	Prescribed Text-books II	150
Second day	10—1	History of Language and Literature	150
Third day	10—1	Sanskrit Text-books	150
		Total	600

BHASHA PRAVEENA.

Admission Test

First day	10—1	Prescribed Sanskrit Text-books and Grammar	100
Second day	10—1	Modern Indian Language I—Paper	100
	2—5	Do. II—Paper	100
		Total	300

ORIENTAL TITLE EXAMINATIONS—(*Contd*).

BHASHA PRAVEENA—(*Contd.*)

Preliminary.

Days	*Hours*	*Subjects*	*Marks*
First day	10—1	Prescribed Text-book in Modern Indian Language I	150
	2—5	Do. II	150
Second day	10—1	Vernacular Composition	150
Third day	10—1	Sanskrit Text-Books I	150
	2—5	Do. II	150
		Total	750

Final.

First day	10—1	Prescribed Text-Books in Modern Indian Language I	150
	2—5	Do. II	150
Second day	10—1	History of Language and Literature	150
	2—5	Special period of Literature	150
Third day	10—1	Sanskrit Text-Books	150
		Total	750

CERTIFICATE OF PROFICIENCY.

A paper of three hours' duration to be answered on the morning of the day following Final Examination for Titles and shall carry 100 Marks.

B.O.L. DEGREE EXAMINATION.

PART I

First day	10—1	English Composition and Translation (including Precis Writing)	100

PART II

Second day	10—1	Prescribed Text-books—I Paper	100
	2—5	Do. II Paper	100
Third day	10—1	Essay	100
	2—5	History of the special subject	100
		Total	500

ORIENTAL TITLE EXAMINATION—(*contd.*)

ALIMI-I-FAZIL.

Preliminary.

Days	*Hours*	*Subjects*	*Marks*
First day	10—1	Tafsir and Hadith	100
	2—5	Fiqh Aqualid	100
Second day	10—1	Prose Text-books	100
	2—5	Poetry Text-books	100
Third day	10—1	History	100
	2—5	Translation from Arabic into Urdu and vice versa	100
		Total	600

Final.

First day	10—1	Tafsir, Hadith and Ilmul-Hadith	100
	2—5	Fiqh and Usulul-Fiqh	100
Second day	10—1	Prose Text-books	100
	2—5	Poetry Text-books	100
Third day	10—1	History	100
	2—5	Translation from Arabic into Urdu and vice versa	100
Fourth day	10—1	Mantiq and Balaghat	100
	2—5	Composition in Arabic	100
		Total	800

MUNSHI-I-KAMIL.

Preliminary.

First day	10—1	Persian Text-books	100
	2—5	Urdu Text-books	100
Second day	10—1	Translation from Persian into Urdu	100
	2—5	Translation from Urdu into Persian	100
Third day	10—1	Composition in Persian	100
	2—5	Arabic Text-books	100
		Total	600

ORIENTAL TITLE EXAMINATIONS—(*Contd.*)

MUNSHI-I-KAMIL—(*contd.*)

Final.

Days	*Hours*	*Subjects*	*Marks*
First day	10—1	Persian Text-books	100
	2—5	Urdu Text-books	100
Second day	10—1	Translation from Persian into Urdu	100
	2—5	Translation from Urdu into Persian	100
Third day	10—1	History of Persian Language and Literature	100
	2—5	Arabic Text-books	100
Fourth day	10—1	Composition in Persian	100
		Total	700

DIPLOMA EXAMINATION IN MUSIC.

First day	10—1	Music—Written Paper I	75
	2—5	Do. Paper II	75
Second day*	10—1	Music—Practical I	125
	2—5	Do. Practical II	125
		Total	400

*The exact dates and hours of the practical examination will be notified every year.

CHAPTER LIX

TRANSFER AND TERM OR ANNUAL CERTIFICATES.

Transfer Certificate

1. No student who has previously studied in any recognized school or college shall be admitted to a college unless he presents a transfer certificate showing :—

(a) the name of the student in full;

(b) the date of birth as entered in the admission register;

(c) the dates on which he was admitted to and on which he left the institution;

(d) the class in which he studied at time of leaving it,

(e) the subjects or portions thereof studied by him while enrolled;

(f) if it be the time when annual promotions take place whether he is qualified for promotion to a higher class;

(g) that he has paid all fees or other moneys due to that institution in respect of the last term in which he was enrolled.

No student shall be enrolled pending the production of such certificate. Every such certificate shall be endorsed with the admission number under which the student is enrolled and shall be filed for reference and inspection.

Issue of Transfer Certificate.

2. A student applying for a transfer certificate during a college term on any day on which he has been enrolled, or applying not later than the fifth working day of the college term immediately following shall forthwith be given such certificate upon payment of all fees or other moneys due, or of such portion thereof as the Principal may see fit to demand, for the college term in which he was enrolled.

A student applying for such certificate after the fifth working day of the college term immediately following that during which he has been last enrolled shall forthwith be given it on payment

of (1) all fees or other moneys due or of such portion thereof as the Principal may see fit to demand in respect of the college term in which he was last enrolled and (2) an additional fee of Rs. 3 at the option of the Principal.

Provided that, when a student has been enrolled at favourable fee rates, he shall be liable for such rates only.

No student shall be considered to have been enrolled in any college term unless he has attended the college and received instruction for at least one day of that college term or has paid the fees of portions thereof prescribed.

In the case of a student who has been a candidate for a University Examination, the results of which have not been published before the beginning of the college term the eleventh day after the results of that examination have been announced at the Senate House shall be counted for him the first working day of the college term so far as the grant of a transfer certificate is concerned.

In the event of a Principal refusing or delaying to give a transfer certificate to which a student may be entitled the student shall have right of appeal to the Syndicate.

Expulsion of student from College

3. If any student is expelled from an affiliated college, intimation of the fact of expulsion, with a statement of the reasons therefor, shall be given forthwith by the Principal (a) to the parent or guardian of the student and (b) to the Syndicate ; intimation to the Syndicate shall be accompained by the transfer certificate of the student. The Syndicate, on the application of the student or his parent or guardian, may after making such enquiry as it deems proper deliver the certificate to the student with any necessary endorsement or withhold temporarily or permanently.

Academic year

4. The academic year for colleges affiliated in Arts, Science and Teaching shall consist of three terms, which shall ordinarily begin and end as follows :—

First term—June to September, closing with the Michaelmas holidays.

Second term—October to December, closing with the Christmas holidays.

Third term—January to April closing with the Summer holidays.

Combination of attendances

5. A student shall ordinarily qualify for the annual certificate in one and the same college but in special cases the Syndicate may allow attendance in different colleges to be combined for the purposes of the annual certificate.

Annual Certificate

6. In colleges affiliated in Arts and Teaching the grant of the annual certificate shall be in respect of three terms ordinarily consecutive comprising one year; but it shall be competent for the authorities of an affiliated college to grant such certificate in respect of three terms which are not consecutive provided that the student has during those terms completed the necessary courses of study for the year.

Conditions of grant of annual Certificate

7. The grant of the annual certificate shall be subject, in addition, to the following conditions:—

(1) In colleges affiliated in Arts and Teaching, the certificate shall not be granted unless a student has kept three-fourths of the attendances prescribed by the college in the course of instruction followed by him during the year, and in institutions approved by the Syndicate under the regulations for Oriental Titles and Certificates of Proficiency in Oriental Learning unless he has kept three-fourths of the attendance prescribed by the institution in the particular course of study for which the certificate is issued.

(2) In colleges of Science the certificate shall not be granted unless a student has kept three-fourths of the attendances prescribed by the college in the course of instruction followed by him during the year; in colleges in Medicine unless he has attended four-fifths of the lectures in each course.

(3) The certificate shall not be granted unless the student has completed the course of instruction to the satisfaction of the authorities of his colleges and his progress and conduct have been satisfactory.

8. The annual attendance certificates once issued by the Principals of Colleges shall not be cancelled by them, but the Syndicate may direct the heads of colleges not to admit to further courses of studies for a certain period, students who are found guilty of any serious offence or misconduct after the issue of attendance certificates.

Form of certificates

9. The certificates shall be drawn up in the following forms :—

1. MATRICULATION EXAMINATION

I hereby certify that.....has kept attendance for not less than 120 days of the previous school year before 10th March in.....School .....that he has completed the course of study prescribed for the several classes of a high school and that his progress and conduct have been satisfactory.

.....19 .

Headmaster

2. INTERMEDIATE EXAMINATION IN ARTS AND SCIENCE

FIRST YEAR

I certify that.....has kept three-fourths of the attendances prescribed by the.....College.....in the course of instruction followed by him during the year consisting of the following terms :—

1.....

2.....

3.....

and that his progress and conduct have been satisfactory.

(*Signature*).....

.....19 . *Principal.*

I certify that.....has attended the course of practical instruction in.....

(*Signature*).....

.....19 . *Professor or Lecturer.*

I certify that.....has attended the course of practical instruction in.....

(*Signature*).....

.....19 . *Professor or Lecturer.*

I certify that.....has attended the course of practical instruction in..... ....

(*Signature*).....

(*1*).....

.....19 . *Professor or Lecturer.*

(*2*).....

.....19 . *Professor or Lecturer.*

SECOND YEAR

I certify that.....has kept three-fourths of the attendances prescribed by the..... College.....in the course of instruction followed by him during the year consisting of the following terms:—

1.....

2..... ....

3.....

that his conduct and progress have been satisfactory and that he has completed the course of study prescribed for the Intermediate Examination in Arts and Science

(*Signature*).....

..... 19 . *Principal.*

I certify that.....has saisfactorily completed the course of practical instruction in..... .....

(*Signature*).....

.....19 . *Professor or Lecturer.*

I certify that.....has satisfactorily completed the course of practical instruction in.....

(*Signature*).....

.....19 . *Professor or Lecturer.*

I certify that.....has satisfactorily completed the course of practical instruction in.....

(*Signature*).....

.....19 . *Professor or Lecturer.*

3. B.A. DEGREE EXAMINATION

FIRST YEAR

I certify that.....has kept three-fourths of the attendances prescribed by the.....College.....in the course of instruction in.....during the year consisting of the following terms :—

1.....
2.....
3.....

and that his conduct and progress have been satisfactory.

(Signature).....
.....19 . *Principal.*

SECOND YEAR

I certify that.....has kept three-fourths of the attendances prescribed by the.....College.....in the course of instruction in.....during the year consisting of the following terms :—

1.....
2.....
3.....

that his conduct and progress have been satisfactory and that he has completed the course of study prescribed for the B.A. Degree Examination.

(Signature).....
.....19 . *Principal.*

**I certify that.....has attended the course of practical instruction in.....for the B.A. Degree Examination at the..... during the year consisting of the following terms :—*

1.....
2.....
3.....

and that he has satisfactorily completed the course.

(Signature).....
.....19 . *Professor or Lecturer.*

**I certify that.....has attended the course of practical instruction in.....for the B.A. Degree Examination at the..... during the year consisting of the following terms :—*

1.....
2.....
3.....

and that he has satisfactorily completed the course.

(Signature).....
.....19 . *Professor or Lecturer.*

---

* These certificates have to be produced only by candidates in Groups (i), (ii-a) and (ii-b).

4. EXAMINATION FOR THE DEGREE OF BACHELOR OF ARTS (HONOURS)

PRELIMINARY EXAMINATIONS

I certify that.....has kept three-fourths of the attendances prescribed by the University College of Arts,.....for the year consisting of the following terms :—

1.....
2.....
3.....

in the course of instruction in English and French or German or Early South Indian History, that his progress and conduct have been satisfactory and that he has completed the course of study prescribed for the Preliminary Examination for the B.A. (Honours) Degree.

(Signature).....
.....19 . Principal.

FINAL EXAMINATION

I certify that.....has kept three-fourths of the attendances prescribed by the University College of Arts,..... for the year consisting of the following terms :—

1.....
2.....
3.....

in the course of instruction in.....and that his progress and conduct have been satisfactory.

(Signature).....
.....19 . Principal.

I certify that.....has kept three-fourths of the attendances prescribed by the University College of Arts,.....for the year consisting of the following terms :—

1.....
2.....
3.....

in the course of instruction in.....and that his progress and conduct have been satisfactory.

(Signature).....
.....19 . Principal.

I certify that..... ....has kept three-fourths of the attendances prescribed by the University College of Arts,..... . for the year consisting of the following terms:—

1.....
2..... . .. .
3..... ..... - .....

in the course of instruction in..... that his progress and conduct have been satisfactory, and that he has completed the course of study prescribed for the B A (Honours) Degree Examination.

(Signature)..... . ...
... .19 . *Principal.*

I certify that.....has attended and has satisfactorily completed the course of practical instruction in Experimental Psychology required of candidates selecting Experimental Psychology in the B A (Honours) Degree Examination, at the.....during the year.....

(Signature).....
.....19 . *Professor or Reader or Lecturer.*

5. B COM. DEGREE EXAMINATION

Part I

* FIRST YEAR

I certify that..... .....has kept three-fourths of the attendances prescribed by the .... College . ...in the course of instruction in Part I (a) English and Translation (Hindi) during the year consisting of the following terms:—

1.....
2..... .....
3..... ..

that his conduct and progress have been satisfactory and that he has completed the course of study prescribed for part I of the B. Com. Degree Examination.

(Signature).....
.....19 . *Principal.*

Part II

FIRST YEAR

I certify that.....has kept three-fourths of the attendances prescribed by the.....College..... ...in the course of instruction in Part II during the year consisting of the following terms:—

1..... ....
2.....
3..... . .....

and that his progress and conduct have been satisfactory.

(Signature).....
....19 . *Principal.*

* To be filled in only on behalf of candidates appearing for Part I of the examination at the end of the first year's course. To be struck off in other cases.

SECOND YEAR

I certify that..... has kept three-fourths of the attendances prescribed by the .....College..... ...in the course of instruction in Part II during the year consisting of the following terms · –

1.....
2.....
3.....

and that his progress and conduct have been satisfactory and that he has completed the course of study prescribed for the B. Com. Degree Examination.

(Signature)..... ....
....19 *Principal.*

5-A. B. COM. DEGREE EXAMINATION

(Under New Regulations)

FIRST YEAR

I certify that..... .....has kept three-fourths of the attendances prescribed by the..... . ....College..... . ... ..in the course of instruction in.....during the year consisting of the following terms —

1.....
2 .....
3.....

and that his conduct and progress have been satisfactory.

(Signature).....
.....19 . *Principal.*

SECOND YEAR

I certify that..... .....has kept three-fourths of the attendances prescribed by the.....College..... .....in the course of instruction in.....during the year consisting of the following terms :—

1.....
2.....
3.....

that his conduct and progress have been satisfactory and that he has completed the course of study prescribed for the B. Com. Degree Examination.

(Signature)..... . .....
.....19 . *Principal.*

6. B. COM. (HONS.) DEGREE EXAMINATION

I certify that.....has kept three-fourths of the attendances prescribed by the University College of Arts and Commerce,.....for the year consisting of the following terms :—

1.....
2.....
3.....

in the course of instruction in.....and that his progress and conduct have been satisfactory.

(Signature).....
.....19 . *Principal.*

I certify that..... .....has kept three-fourths of the attendances prescribed by the University College of Arts and Commerce,.....for the year consisting of the following terms : —

1.....
2..... .....
3.....

in the course of instruction in.....and that his progress and conduct have been satisfactory.

(Signature).....
.....19 . *Principal.*

I certify that.....has kept three-fourths of the attendances prescribed by the University College of Arts and Commerce, ...for the year consisting of the following terms :—

1.....
2.....
3.....

in the course of instruction in.....that his progress and conduct have been satisfactory, and that he has completed the course of study prescribed for the B. Com. (Honours) Degree Examination.

(Signature).....
.....19 . *Principal.*

6-A. B. COM. (HONS). DEGREE EXAMINATION

(Under New Regulations)

FIRST YEAR

Part I—Preliminary Examination

I certify that.....has kept three-fourths of the attendances prescribed by the University College of Arts and Commerce,.....for the year consisting of the following terms :—

1.....

2.....

3.....

in the course of instruction in Part I (a) English and (b) Translation (Hindi), that his progress and conduct have been satisfactory and that he has completed the course of study prescribed for Part I Examination of the B.Com (Honours) Degree.

(Signature).....

.....19 . *Principal.*

Part II

FIRST YEAR

I certify that.....has kept three-fourths of the attendances prescribed by the University College of Arts and Commerce,..... .....for the year consisting of the following terms :—

1.....

2.....

3.....

in the course of instruction in.....and that his progress and conduct have been satisfactory.

(Signature).....

.....19 . *Principal.*

SECOND YEAR

I certify that.....has kept three-fourths of the attendances prescribed by the University College of Arts and Commerce,.....for the year consisting of the following terms :—

1.....

2.....

3..... . .....

in the course of instruction in.....and that his progress and conduct have been satisfactory.

(Signature).....

.....19 *Principal.*

THIRD YEAR

I certify that..... .....has kept three-fourths of the attendances prescribed by the University College of Arts and Commerce,..... .....for the year consisting of the following terms :—

1.....
2.....
3.....

in the course of instruction in.....that his progress and conduct have been satisfactory, and that he has completed the course of study prescribed for the B. Com. (Honours) Degree Examination.

(Signature).....
.....19 . Principal.

7. B.Sc. DEGREE EXAMINATION

I certify that..... .....has kept three-fourths of the attendances prescribed by the.....College.....in the course of instruction in English during the year consisting of the following terms :—

1.....
2.....
3.....

and that his conduct and progress have been satisfactory.

(Signature).....
.....19 . Principal.

I certify that..... .....has kept three-fourths of the attendances prescribed by the..... ..College .....in the course of instruction in .....during the year consisting of the following terms :—

1..... .....
2.....
3.....

that his conduct and progress have been satisfactory and that he has completed the course of study prescribed for the B.Sc. Degree Examination.

(Signature)..... .....
.. ..19 . Principal.

* *I certify that..... .....has attended the course of practical instruction in..... .....for the B.Sc. Degree Examination of the .....during the year consisting of the following terms :—*

1.....
2.....
3.....

(Signature).....
(1).....
(2).....
(3).....
.....19 . Professor or Lecturer.

* This will not be required in the case of Mathematics.

* *I certify that..... .... has attended the course of practical instruction in.. ... .for the B.Sc Degree Examination at the ....during the year consisting of the following terms :—*

1..... ....

2.....

3..... ....

and that he has satisfactorily completed the course

(*Signature*)..... ....

(*1*).....

(*2*).....

(*3*).....

.....*19* . *Professor or Lecturer.*

8. B.Sc. (HONS) DEGREE EXAMINATION

Part I

I certify that..... ....has kept three-fourths of the attendances prescribed by the Jeypore Vikrama Deo College of Science and Technology, ...in the course of instruction in English and German during the year ..... . that his progress and conduct have been satisfactory and that he has completed the course of study prescribed for Part I of the B.Sc. (Honours) Degree Examination

(*Signature*)... ....

.....*19* *Professor or Lecturer.*

Part II

I certify that.....has kept three-fourths of the attendances prescribed by the Jeypore Vikrama Deo College of Science and Technology, ...in the course of instruction in... . ...during the year .... and that his progress and conduct have been satisfactory.

(*Signature*)..... . . ..

.... *19* . *Principal.*

I certify that..... ..... has kept three-fourths of the attendances prescribed by the Jeypore Vikrama Deo College of Science and Technology, ...in the course of instruction in... ....during the year .....and that his conduct and progress have been satisfactory † and that he has completed the course of study in.....(Subsidiary) prescribed for the B.Sc. (Honours) Degree Examination.

(*Signature*)..... .....

.....*19* . *Principal.*

---

* This will not be required in the case of Mathematics.

† To be filled in on behalf of candidates appearing for the Subsidiary subjects at the end of the second year.

I certify that ....has kept three-fourths of the attendances prescribed by the Jeypore Vikrama Deo College of Science and Technology, ...in the course of instruction in..... .....that his progress and conduct have been satisfactory and that he has completed the course of study prescribed for the B. Sc. (Honours) Degree Examination.

(Signature).....

.....19 . Principal.

***I certify that..... .... ..has attended the course of practical instruction in.....for the B Sc. (Honours) Degree Examination of the Jeypore Vikrama Deo College of Science and Technology .... during the year.....**

(Signature) .....

....19 Professor or Reader or Lecturer.

***I certify that... .. ..has attended the course of practical instruction in... .. ..for the B Sc (Honours) Degree Examination at the University College of Science and Technology.... . .....during the year.....**

(Signature).....

.....19 . Professor or Reader or Lecturer.

***I certify that .....has attended the course of practical instruction in... .. . .for the B. Sc (Honours) Degree Examination of the Jeypore Vikrama Deo College of Science and Technology. .... during the year..... .. ..and that he has satisfactorily completed the course.**

(Signature) ....

.... .19 Professor or Reader or Lecturer.

9. M.Sc. DEGREE EXAMINATION

I certify that ....has kept three-fourths of the attendances prescribed by the Jeypore Vikrama Deo College of Science and Technology, ...in the course of instruction in ....during the year ....that his progress and conduct have been satisfactory †and that he has completed the course of study prescribed for the M.Sc. Degree Examination in.....

(Signature).....

.....19 . Principal.

---

* These will not be required in the case of Mathematics.

†To be struck off in the case of students appearing at the end of first year for subjects in M.Sc. Applied Physics and M.Sc. Chemistry (including Microscopy) of Foods, Drugs and Water.

I certify that... . ...has attended the course of practical instruction in..... ....for the M Sc Degree examination in..... at the Jeypore Vikrama Deo College of Science and Technology..... during the year..... . ...and that he has satisfactorily completed the course in..... ...*

(Signature)..... ....
..... .19 . Professor or Reader or Lecturer.

10 B Ed. DEGREE EXAMINATION

I certify that..... ....has kept three-fourths of the attendances prescribed by the .. ..College..... .....in the course of instruction and practical training in teaching during the year consisting of the following terms :—

1 ....
2... . ...
3..... . . . .

that he has completed the course prescribed for the B Ed. Degree, and that his conduct and progress have been satisfactory

(Signature). ....
... .19 . Principal.

11. PRE-REGISTRATION EXAMINATION

I certify that ....has undergone the prescribed course of study extending over a period of six months, subsequent to his passing the Intermediate Examination and that his progress and conduct have been satisfactory.

(Signature).....
.....19 . Principal.

I certify that..... ..... . has attended a course of lectures on Inorganic Chemistry and a course of instruction in Practical Chemistry.

(Signature).....
.....19 . Professor of Chemistry.

I certify that..... .....has attended a course of Experimental Physics, including Practical Physics.

(Signature).....
.....19 . Professor of Physics.

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*To be filled in on behalf of candidates appearing at the end of first year for examinations in M Sc. Applied Physics and M Sc. Chemistry (including Microscopy) of Foods, Drugs and Water.

I certify that..... .....has attended a course of General Biology, Theoretical and Practical.

(Signature).....

.....19 . *Professor of Biology.*

ADDITIONAL CERTIFICATE

*I certify that..... ....has been re-engaged in the prescribed course of studies for the Pre-Registration Examination for a period of one term subsequent to his appearance at that examination in * ....when he was referred to his studies by the Examiners and that his progress and conduct have been satisfactory*

(Signature)..... .....

....19 . *Principal*

12. FIRST M.B.B.S. DEGREE EXAMINATION

I certify that to the best of my knowledge and belief..... .....completed the age of seventeen years on or before the date of admission to the Andhra Medical College, Vizagapatam, that he has been engaged in medical studies of the Andhra Medical College, Vizagapatam, for not less than one academic year subsequent to his passing the Pre-Registration, and that his progress and conduct have been satisfactory.

(Signature).....

.....19 . *Principal.*

I certify that..... . ...has attended a course of lectures on Organic Chemistry and a course of instruction of Practical Organic Chemistry

(Signature)..... .. ..

....19 . *Professor of Chemistry.*

I certify that..... .....has been engaged in medical studies for two academic years subsequent to his passing the Pre-Registration Examination, and that his progress and conduct have been satisfactory.

(Signature)..... .....

.....19 . *Principal.*

I certify that..... . ...has attended a course of instruction in Anatomy including Elements of Human Embryology, Theoretical and Practical.

(Signature).. .....

..... 19 . *Professor of Anatomy.*

I certify that.. .....has dissected for 300 periods each period being a duration of three hours during the regular sessions and has completed the dissection of the human body.

(Signature).....

.....19 . *Professor of Anatomy.*

* Date of Examination should be noted here.

I certify that..... .....has attended a course of lectures on Physiology and a course of instruction in Practical Physiology including Histology.

(*Signature*).. ....
....19 . *Professor of Physiology.*

I certify that .. .. has attended a course of lectures in Bio-Chemistry and Bio-Physics and a course of instruction in practical Chemical Physiology and Bio-Chemistry and Bio-Physics.

(*Signature*).. .....
.....19 . *Professor of Physiology.*

I certify that .....has attended a course of lectures on Pharmacology and a course of instruction in Practical Pharmacy.

(*Signature*).. .....
....19 . *Professor of Pharmacology.*

ADDITIONAL CERTIFICATE

I certify that .. . .has been re-engaged in medical studies for the First M. B. B. S Examination for a period of one term subsequent to his appearance at that examination in. ... . when he was referred to his studies by the Examiners and that his progress and conduct have been satisfactory.

(*Signature*). ... .
....19 . *Principal.*

13. SECOND M.B.B.S. DEGREE EXAMINATION

I certify that . ... has been engaged in medical studies at the Andhra Medical College, Vizagapatam, for not less than one academic year for Pharmacology, Hygiene and Forensic Medicine after passing the First M. B. B. S. Examination, and that his progress and conduct have been satisfactory.

(*Signature*)..... ....
.... 19 . *Principal of the College.*

I certify that .. .. .has attended a course of lectures on Pharmacology and a course of instruction in Practical Pharmacy

(*Signature*) .. ..
....19 . *Professor of Pharmacology.*

I certify that ....has attended a course of lectures on Hygiene and a course of instruction in Practical Hygiene.

(*Signature*). .. ..
.. ..19 *Professor of Hygiene.*

I certify that . . .. has attended a course of instruction in Forensic Medicine including demonstrations.

(*Signature*)... .. ..
.... 19 . *Professor of Medicine.*

ADDITIONAL CERTIFICATE .

I certify that. .. ..has been re-engaged in medical studies for the Second M.B.B.S Examination for a period of one term subsequent to his appearance at that examination in .. ..when he was referred to his studies by the Examiners and that his progress and conduct have been satisfactory.*

(*Signature*).. .. ..
.... .19 . *Principal, Andhra Medical College.*

14. FINAL M.B.B S. DEGREE EXAMINATION

I certify that ....has been engaged in medical studies at the Andhra Medical College, Vizagapatam, for not less than one year after passing the First M.B B.S. Examination and that his progress and conduct have been satisfactory.

(*Signature*).....
.....19 . *Principal, Andhra Medical College.*

I certify that..... .....has been engaged in medical studies at the Andhra Medical College, Vizagapatam, for not less than three academic years after passing the First M.B B.S. Examination and that his progress and conduct have been satisfactory.

(*Signature*).....
....19 . *Principal, Andhra Medical College.*

I certify that.. .....has attended a course of instruction in Medicine including Therapeutics.

(*Signature*).....
....19 . *Professor of Medicine.*

* The date of the Examination should be noted here.

I certify that.....has been engaged as clinical clerk in the Medical wards of a recognized hospital for a period of nine months.

(*Signature*).....

.....19 . *Physician,.....Hospital.*

I certify that.....has been engaged as clinical clerk in the Medical Out-Patients Department of a recognized hospital for a period of three months.

(*Signature*).....

.....19 . *Medical Officer,.....Hospital.*

I certify that.....has been engaged as clinical clerk for not less than one month in a Children's Out-patient department

(*Signature*).....

.....19 . *Medical Officer.*

I certify that.....has attended a recognized course of instruction in Infectious Diseases

(*Signature*).....

.....19 . *Professor of Medicine.*

I certify that.....has attended as clinical clerk in a recognized hospital for Infectious Diseases on two days in the week for a period of three months.

(*Signature*) ....

.....19 . *Medical Officer, Hospital for Infectious Diseases.*

I certify that..... ..has attended a recognized course of instruction in Psycho-Pathology and Mental Diseases.

(*Signature*)..... ....

.....19 . *Professor of Mental Diseases.*

I certify that.....has attended as clinical clerk in a recognized Mental Hospital on one day in the week for a period of three months.

(*Signature*).....

.....19 . *Superintendent, Hospital for Mental Diseases.*

I certify that... ....has attended a recognized course of instruction in Tuberculosis.

(*Signature*).....

.....19 . *Professor of Medicine.*

I certify that . .. .has attended as clinical clerk in a Tuberculosis Hospital on one day in the week for a period of three months

(*Signature*)..... .....
....19 . *Medical Officer, Tuberculosis Hospital.*

I certify that . ...has attended a recognized course of instruction in Dermatology.

(*Signature*)..... ....
.....19 . *Professor.*

I certify that..... ..has attended the special departments relating to skin diseases on two days in the week for a period of three months.

(*Signature*).. ..... .
....19 *Medical Officer,.....Hospital.*

I certify that..... .. ..has attended a recognized course of instruction in vaccination by a qualified Health Officer

(*Signature*) . ...
.... 19 . *Health Officer.*

I certify that.. ....has attended a recognized course of instruction on Radiology and Electro-therapeutics in their application to Medicine.

(*Signature*)..... .....
....19 . *Radiologist.....*

I certify that ....has attended a recognized course of instruction in Children's Diseases

(*Signature*).....
.... 19 . *Professor.*

I certify that... .. ..has attended a course of instruction in Surgery.

(*Signature*)..... .....
.....19 . *Professor of Surgery.*

I certify that... ....has been engaged as a surgical dresser in the surgical wards of a recognized hospital for a period of nine months.

(*Signature*).....
.....19 . *Surgeon,.....Hospital.*

I certify that.....has been engaged as a surgical dresser in the Out-patient Department of a recognized hospital for a period of three months.

(*Signature*).....

.....19 . *Surgeon,.....Hospital.*

I certify that.....has attended (1) *a recognised course of instruction including demonstrations in clinical Surgery, and* (2) *General in-patient and out-patient practice during at least two years.*

(*Signature*).....

.....19 . *Professor.....*

I certify that.....has attended a course of practical instruction in Surgical Methods including Physiotherapy.

(*Signature*).....

.....19 . *Professor.....*

I certify that.....has attended a course of practical instruction in minor Surgery on the living.

(*Signature*).....

.....19 . *Professor.....*

I certify that.....has attended a course of practical instruction in applied Anatomy and Physiology throughout the period of clinical studies.

(*Signature*).....

....19 . *Professor of Surgery.*

I certify that.....has attended a course of instruction throughout the period of surgical dressership in clinical Pathology.

(*Signature*).....

.....19 . *Professor.*

I certify that.....has attended (1) *a recognized course of instruction in diseases of the Ear, Nose and Throat including the use of otoscope, laryngoscope and rhinoscope and* (2) *a recognized clinic as clinical clerk on three days in the week for a period of three months.*

(*Signature*).....

.....19 . *Professor.*

I certify that.....has attended (1) a recognized course of instruction in Orthopaedics and (2) a recognized clinic on two days in the week for a period of three months.

(*Signature*).....

.....19 . *Professor.*

I certify that..... .....has attended a course of practical instruction in the administration of anaesthetics and has personally administered a general anaesthetic in at least six cases.

(*Signature*).....

.....19 . *Surgeon-in-Charge.*

I certify that.....has attended a recognized course of instruction in Operative Surgery.

(*Signature*).....

.....19 . *Professor of Operative Surgery.*

I certify that.....has attended (1) a recognized course of instruction in Radiology and (2) on electro-therapeutics in their application to Surgery.

(*Signature*).....

.....19 . *Radiologist.*

I certify that..... .....has attended (1) a recognized course of instruction in Venereal Diseases and (2) a Venereal clinic for two days in the week for a period of two months.

(*Signature*)..... .....

.....19 *Professor*

I certify that.....has attended a recognized course of instruction in Dental Surgery (three lectures and six practical demonstrations) at the Dental clinic.

(*Signature*).....

.....19 . *Professor.*

I certify that.....has attended a recognized course of instruction in Surgical diseases of infancy and childhood.

(*Signature*).....

.....19 . *Professor.*

I certify that.....has attended a course of systematic instruction in the principles and practice of Midwifery and Gynaecology and infant Hygiene including applied Anatomy and Physiology of pregnancy and labour.

(*Signature*) . ...

....19 . *Professor.*

I certify that.....has attended (*1*) *a course of lectures and demonstrations in clinical Midwifery and Gynaecology and infant Hygiene and* (*2*) *maternity hospital or the maternity wards of a general hospital including* (*i*) *antenatal care and* (*ii*) *management of the puerperium and on in-patient and out-patient Gynaecological practice for a period of at least three months.*

(*Signature*).....

.....19 . *Professor of Obstetrics and Gynaecology.*

I certify that..... ..during the period of clinical instruction, not less than one month has been spent as a resident pupil in a maternity hospital in a hostel attached to a maternity hospital or to the maternity ward of a general hospital, and that he has during this period conducted at least twenty cases of labour under my supervision.

(*Signature*)... .....

Member of the staff of a Maternity Hospital or

.....19 *Maternity Ward of a General Hospital.*

I certify that... .....has personally attended each case during the course of labour making the necessary abdominal and other examinations under my supervision and that he has satisfactorily written histories of the cases attended by him.

(*Signature*).....

.....19 . *Professor.*

I certify that..... .....has been engaged as clinical clerk in the Gynaecologic wards and Out-patient department of a recognized hospital for a period of three months.

(*Signature*).....

.....19 . *Medical Officer,.....Hospital.*

I certify that.....has attended (1) a course of systematic lectures in Ophthalmology including refraction and the use of Ophthalmoscope and (2) an Ophthalmic hospital or Ophthalmic wards of a general hospital on the three days in the week for a period of three months.

(*Signature*).....

.....19 . *Professor of Ophthalmology.*

I certify that.....has attended a course of lectures on general Pathology and a course of instruction in practical Pathology.

(*Signature*).....

.....19 . *Professor of Pathology.*

I certify that.....has attended a course of lectures on Bacteriology and a course of instruction in practical Bacteriology.

(*Signature*).....

.....19 . *Professor of Bacteriology.*

I certify that.....(1) has received practical instruction in the conduct of autopsy and (2) has been engaged as post mortem clerk in at least ten cases.

(*Signature*).....

.....19 *Professor of Pathology.*

Certificate of further study

I certify that... ... .has put in a further course of Hospital Practice for the Final M.B.B.S. Degree Examination for a period of one term subsequent to his appearance at that examination in..... .....when he was referred to his studies by the examiners and that his progress and conduct have been satisfactory.

(*Signature*).....

.....19 . *Principal, Medical College.*

15. ORIENTAL TITLE EXAMINATION.

PRELIMINARY

I hereby certify that after passing the admission test mentioned in Regulation 11 of Chapter LI.....has kept three-fourths of the attendances prescribed by.....(name of institution) during the first

two years of the course, that he has received adequate instruction in .....and that his progress and conduct have been satisfactory.

Station..... *(Signature).....*

Date.....19 . *Principal.*

FINAL

I hereby certify that after completing the course of instruction prescribed for the preliminary part of the Oriental Title Examination..... has kept three-fourths of the attendances prescribed by..... (name of institution) for a further period of two years, that he has received adequate instruction in..... ...and that his conduct and progress have been satisfactory.

Station..... *(Signature).....*

Date.....19 . *Principal.*

16. EXAMINATION FOR CERTIFICATES OF PROFICIENCY IN ORIENTAL LEARNING

I hereby certify that after passing the Preliminary Examination for a title.....has kept three-fourths of the attendances prescribed by ....(name of institution) for a period of two years, that he has received adequate instruction in .....that he has completed the course prescribed and that his conduct and progress have been satisfactory

Station..... *(Signature) .....*

.....19 . *Principal.*

Ananda Press, Madras.