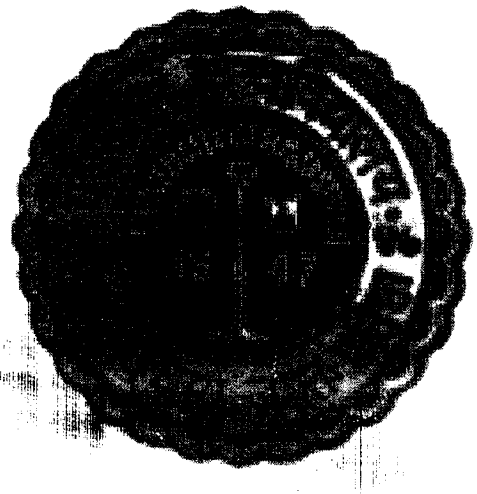
राजस्थान विश्वविद्यालय
जयपुर
University of Rajasthan



FACULTY OF EDUCATION

SYLLABUS

Integrated Programme of

B.Sc.- B.Ed. Degree (Four Year)

Annual Scheme

Academic Session 2018-19
Examination B.Sc B.Ed Part - II (2019)

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Appendix II

NOTICE

1. Change in syllabus/ordinance/rules/regulations/ syllabi and books may from time to time, be made by amendment or remaking and a candidate shall, accept in so far as the university determines otherwise comply with any change that applies to years he/she has not completed at time of change.
2. All court cases shall be subject to the jurisdiction of Rajasthan Univeristy head quarter Jaipur only and not any other place.

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B.Sc B.Ed PART - II

CONTENTS

Ordinance and Regulations related to the Integrated B.Sc.-B.Ed. Degree

01. The Objective and the Learning outcomes of the Integrated B.Sc.-B.Ed. Degree are-

Objectives:

- To promote capabilities for inculcating national values and goals as mentioned in the constitution of India.
- To act as agents of modernization and social change.
- To promote social cohesion, international understanding and protection of human rights and right of the child.
- To acquire competencies and skills needed for teacher.
- To use competencies and skills needed for becoming an effective teacher.
- To become competent and committed teacher.
- To be sensitive about emerging issues such as environment, population general equality, legal literacy etc.
- To inculcate logical, rational thinking and scientific temper among the students.
- To develop critical awareness about the social issues & realities among the students.
- To use managerial organizational and information & technological skills.

Learning outcomes:

1. Competence to teach effectively two school subjects at the Elementary & secondary levels.
2. Ability to translate objectives of secondary education in terms of specific Programmes and activities in relation to the curriculum.
3. Ability to understand children's needs, motives, growth pattern and the process of learning to stimulate learning and creative thinking to faster growth and development.
4. Ability to use-
5. Individualized instruction
6. Dynamic methods in large classes.
7. Ability to examine pupil's progress and effectiveness of their own teaching through use of proper evaluation techniques.

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8. Equipment for diagnosing pupil progress and effectiveness of their own teachings through the use of proper evaluation techniques.
9. *Readiness to spot talented and gifted children* and capacity to meet their needs.
10. Ability to organize various school programmes, activities for pupil.
11. Developing guidance point of view in educational, personal and vocational matters.
12. [illegible]ility to access the all round development of pupils and to maintain a cumulative [illegible]rd.
13. Developing certain practical skill such as:
    a. Black board work
    b. Preparing improvised apparatus
    c. Preparing teaching aids and ICT.
14. Interest and competence in the development of the teaching profession and education. Readiness to participate in activities of professional organizations.

Integrated Programme of B.Sc.-B.Ed. Degree Shall Consist of

i) First Year B.Sc.-B.Ed.
ii) Second Year B.Sc.-B.Ed.
Third Year B.Sc.-B.Ed.
[illegible]inal Year B.Sc.-B.Ed.

Duration of the Course - Four Years

Examinination after each session in theory papers

Scheme of Examination against each subject *separately.*

Compulsory Papers:

Year	Paper
I[st] Year	Gen. English
II[nd] Year	Gen. Hindi
III[rd] Year	Computer Application (ICT)
IV[th] Year	Environmental Education

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Group – A: - Subject Specialisation :

Year	Paper
I[st] Year	Instructional System & Educational
II[nd] Year	Peace Education
III[rd]	Guidance and Counselling in School
IV	Physical Education & Yoga

Group-B: Content of Science Subject: - A Student has to opt PCB & PCM Group select any three optional subject (papers) from group B which two must be the school teaching subjects.

Chemistry	I, II & III
Botany	I, II & III
Zoology	I, II & III
Physics	I, II & III
Mathematics	I, II & III

Group C: Pedagogy of School Subject 08 A/B: Pedagogy of a School Subject IIIrd Year and IVth Year (candidate shall be required to offer any two papers from the following, for part-III & part-IV).

Pedagogy of Chemistry
Pedagogy of Biology
Pedagogy of Physics
Pedagogy of Mathematics
Pedagogy of General Science

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- In all the subjects the student has to study a minimum of 12 papers in Ist year, 12 Paper in IInd Year. 12Paper in IIIrd Year and 7 Paper in IVth Year (Total 43Papers).
- Each theory paper will carry 100 marks and content base paper 05, 06, 07 (G-B) will carry 150 marks. (With practical part). Distribution of marks in Mathematics is according to their marking scheme in page no.7.

Scheme of Instruction for B.Sc. -B.Ed Courses

Details of course and scheme of study, titles of the papers, duration etc. for B.Sc.B.Ed Course are provided in Tables given below :-

Four Years Integrated Course
Scheme of B.Sc.-B.Ed. Ist Year

Theory Paper	Course Code	Title of the Paper	Evaluation			
			External	Internal	Practical	Total
I	B.Sc.- B.Ed. 01	Gen. English(Compulsory)*	100	-	-	100
II	B.Sc.-B.Ed. 02	Childhood and Growing Up	80	20	-	100
III	B.Sc.-B.Ed. 03	Contemporary India and Education	80	20	-	100
VIII	B.Sc.-B.Ed. 04 (G-A)	Instructional System & Educational Evaluation	80	20	-	100
V VI & VII	B.Sc.-B.Ed 05, 06 & 07 (G-B)	**Content (PCB & PCM Group) (Select any Three)**				
		1. Chemistry(I,II,III)	33+33+34		50	150
		2. Botany (I,II,III)	33+33+34		50	150
		3. Zoology(I,II,III)	33+33+34		50	150
		4. Physics (I,II,III)	33+33+34		50	150
		5. Mathematics(I,II,III)	40+40+40		30	150
						750

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Four Years Integrated Course
Scheme of B.Sc.-B.Ed. IInd Year

Theory Paper	Course Code	Title of the Paper	Evaluation			
			External	Internal	Practical	Total
I	B.Sc.-B.Ed. 01	Gen. Hindi (Compulsory)	100	-	-	100
II	B.Sc.-B.Ed. 02	Knowledge and Curriculum	80	20	-	100
III	B.Sc.-B.Ed. 03	Learning and Teaching	80	20	-	100
IV	B.Sc.-B.Ed 04 (G-A)	Peace Education	80	20	-	100
V VI & VII	B.Sc.-B.Ed 05, 06 & 07 (G-B)	**Content (PCB & PCM Group) (Select any Three)** 1. Chemistry(I,II,III) 2. Botany (I,II,III) 3. Zoology(I,II,III) 4. Physics (I,II,III) 5. Mathematics(I,II,III)	 33+33+34 33+33+34 33+33+34 33+33+34 40+40+40		 50 50 50 50 30	 150 150 150 150 150
VIII	B.Sc.-B.Ed.	**OPEN AIR / SHIBIR CAMP** 1. Community Service 2. Survey (Based on social and educational events) 3. Co-Curricular Activities 4. Health and Social awareness programme (DISASTER MANAGEMENT AND CLEANINESS)		25 25 25 25		100
						850

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Four Years Integrated Course
Scheme of B.Sc.-B.Ed. IIIrd Year

Theory Paper	Course Code	Title of the Paper	Evaluation			
			External	Internal	Practical	Total
I	Sc.- B.Ed. 01	Information & Communication Technology (ICT) (Compulsory)*	60	-	40 (30+10)	100
II	B.Sc.-B.Ed. 02	Language Across the Curriculum	80	20	-	100
IV	B.Sc.-B.Ed-04 (G-A)	Guidance and Counseling in School	80	20	-	100
V VI & VII	B.Sc.-B.Ed 05. 06 & 07 (G-B)	**Content (PCB & PCM Group) (Select any Three)**				
		1. Chemistry(I,II,III)	33+33+34		50	150
		2. Botany (I,II,III)	33+33+34		50	150
		3. Zoology(I,II,III)	33+33+34		50	150
		4. Physics (I,II,III)	33+33+34		50	150
		5. Mathematics(I,II,III)	40+40+40		30	150
V	08(a,b)	Pedagogy of a School Subject (part-1), 1st & IInd Year(candidate shall be required to offer any two papers from the following for part-1 & other for part-2). 1. Chemistry 2. Biology 3. Physics 4. Mathematics 5. General Science	80	20		100
Practicum		**Special Training Programme** • Micro Teaching • Practice Lesson • Observation Lesson			10 50 05	100

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		• Technology Based Lesson • Criticism Lesson • Attendance /Seminar/ Workshop			05 20 10	
		Final Lesson	**100**			100
						950

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Four Years Integrated Course
Scheme of B.Sc.-B.Ed. IVth Year

Theory Paper	Course Code	Title of the Paper	Evaluation			
			External	Internal	Practical	Total
I	B.Sc .-B.Ed. 01	Environmental Education(Compulsory)*	100	-	-	100
II	B.Sc - B.Ed. 02	Creating and inclusive school	80	20	-	100
III	B.Sc -B.Ed. 03	Understanding Disciplines and Subject	80	20	-	100
IV	B.Sc .-B.Ed. 04(G-A)	Physical Education & Yoga	80	20	-	100
V	B.Sc -B.Ed. 05	Gender, School and Society	80	20	-	100
VI	B.Sc -B.Ed. 06	Assessment for Learning	80	20	-	100

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VIII	B.Sc- B.Ed. 08(a,b)	Pedagogy of a School Subject (part-2), Ist & IInd Year(candidate shall be required to offer any two papers from the following for part-1 & other for part-2). 1. Chemistry 2. Biology 3. Physics 4. Mathematics 5. General Science	80	20	-	100
Practicum		1. Practice teaching 2. Block Teaching (Participation in School Activities Social Participation in Group) 3. Report of any feature of school / case study/action research 4. Criticism Lesson		50 20 10 20		100
		Final Lesson	**100**			**100**
						800

*[illegible]ITY CRITERION ON PASSING MARKS BUT MARKS SHALL NOT BE INCLUDED IN DIVISION.

Four Years Integrated Course
Scheme of B.Sc.-B.Ed.

Compulsory Papers*

Year	Paper
Ist Year	Gen. English
II Year	Gen. Hindi
III Year	Computer Application (ICT)
IV Year	Environmental Education

Compulsory Paper

	Paper
I[st] Year	1. Childhood and Growing Up 2. Contemporary India and

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	Education
II[nd] Year	3. Knowledge and curriculum 4. Learning and Teaching
III[rd] Year	5. Language Across the Curriculum
IV[th] Year	6. Creating and inclusive school 7. Understanding Disciplines and Subject 8. Gender, School and Society 9. Assessment for Learning

Group – A: - Subject Speciliasation :

Year	Paper
I[st] Year	Instructional System & Educational
II[nd] Year	Peace Education
III[rd] Year	Guidance and Counselling in School
IV[th] Year	Physical Education & Yoga

Group B: (PCB and PCM Group) (Select any three)

1. Chemistry (I, II, III)
2. Physics (I, II, III)
3. Biology (I, II, III)
4. Mathematics (I, II, III)
5. Physics (I, II, III)

Group C: Pedagogy of School Subject 08 A/B : Pedagogy of a School Subject IIIrd Year and IVth Year(candidate shall be required to offer any two papers from the following, for part-III & part-IV).

Pedagogy of Chemistry
Pedagogy of Biology
Pedagogy of Physics
Pedagogy of Mathematics
Pedagogy of General Science

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- ❖ In all the subjects the student has to study a minimum of 12 papers in Ist year, 12 Paper in IInd Year. 12Paper in IIIrd Year and 7 Paper in IVth Year (Total 43Papers).
- ❖ Each theory paper will carry 100 marks and content base paper 05, 06, 07 (G-[illegible]) will carry 150 marks. (With practical part). Distribution of marks in [illegible]thematics is according to the marking scheme in page no.7.

Scheme of Instruction for B.Sc. -B.Ed Courses

Details of courses and scheme of study, titles of the papers, duration etc. for B.Sc-.B.Ed Courses are provided in Tables given below :-

Years	Papers	Marks
I Year	12Paper +Practical	600 +150= 750
II Year	12Paper +Practical +Practicum	600 +150+100= 850
III Year	12Paper +Practical + Practicum +Final Lesson	600 +150+ 100 +100 = 950
IV Year	7 Paper +Practical + Practicum +Final Lesson	600+ 100 +100= 800
Total	**43Papers**	**2400 +550+200 +200= 3350**

O. The objectives of the practical work prescribed for the Integrated Programme of B[illegible] Degree (Four Year) are follows:

PART II

Practical Work

Objectives:

To develop the ability and self-confidence of pupil teachers:

1. To be conscious of sense of values and need for their inculcation in children through all available means including one's own personal life.
2. Possess a high sense of professional responsibility.
3. Develop resourcefulness, so as to make the best use of the situation available.
4. Appreciate and respect each child's individuality and treat him as independent and integrated personality.
5. [illegible]ouse the curiosity and interest of the pupils and secure their active participation in [illegible]ducative process.

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6. Develop in the pupil's capacity for thinking and working independently and guide the pupils to that end.
7. Organize and manage the class for teaching learning.
8. Appreciate the dynamic nature of the class situation and teaching techniques.
9. Define objectives of particular lessons and plan for their achievements.
10. Organize the prescribed subject- matter in relation to the needs, interest and abilities of the pupils.
11. Use the appropriate teaching methods and techniques.
12. Prepare and use appropriate teaching aids, use of the black board and other apparatus and material properly.
13. Convey ideas in clear and concise language and in a logical manner for effective learning.
14. Undertake action research.
15. Give proper opportunity to gifted pupils and take proper care of the back-ward *pupils.*
16. Co-relate knowledge of the subject being taught with other subjects and with real life situations as and when possible.
17. Prepare and use assignments.
18. Evaluate pupil's progress.
19. Plan and organize co curricular activities and participate in them.
20. Co-operates with school teachers and administrators and learns to maintain school records and registers.

Practical skill to teach the two school subjects offered under Theory papers VIII A/B and the following:

1. Observation of lesson delivered by experienced teachers and staff of the college.
2. Planning units and lessons.
3. Discussion of lesson plans, unit plans and lessons given (including criticism lesson)
4. Organization and participation in co- curricular activities.
5. Setting follows up assignment.
6. Evaluation in terms of educational objectives use of teachers made tests & administration of standardized tests.
7. Blackboard work.

8. Practical work connected with school subjects.
9. Preparation and use of audio visual aids related to methods of teaching.
10. Experimental and laboratory work in chemistry, botany, zoology, physics, and mathematics subjects of experimental and practical nature.
11. Study of the organization of work and activities in the school.
12. Observation and assistance in the health education programme.
13. Observation and assistance in the guidance programme.
14. Maintenance of cumulative records.
15. Techniques of teaching in large classes.

O. 322 A candidate has to deliver at least 40 lessons (20 Lessons of one teaching subject in 3rd year & 20 Lessons of other teaching subject in 4th year) in a recognized school under the supervision of the staff of the college shall be eligible for admission to the examination for the degree of B.Sc.-B.Ed.

Notes :-

i. Teaching subject means a subject offered by the candidate at his/her running B.Sc-B.Ed. course either as a compulsory subject or as an optional subject provided that the candidate studied it for at least two years. Thus the qualifying subjects like General English, General Hindi, Education and Environment Education. Prescribed for running B.Sc- *B.Ed.* course of the University or a subject dropped by candidates at the part I stage of the degree course shall not be treated as teaching subjects.

ii. Only such candidate shall be allowed to offer General Science for the B.Sc B.Ed Examination who had studied Chemistry and any one subject of life science i.e. Biology, Botany or Zoology.

O.323 No candidate shall be allowed to appear in the Integrated B.Sc/B.Ed examination I,II,III & IV Year unless he/she has attended (80% for all course work & practicum, and 90% for school internship)

O.324 The examination for Integrated B.Sc.-B.Ed. for Four Year shall be in two parts- part 1 comprising theory papers & part 2 practice of teaching in accordance with the scheme of examination laid down from time to time.

O.325 Candidates who fail in Integrated B.Sc-B.Ed examination in part 1or/ part 2 the theory of education may present themselves for re-examination there in at a

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subsequent examination without attending a further course at an affiliated training college.

Provided that a candidate who fails in any one of the theory papers and secures at least 48% marks in the aggregate of the remaining theory papers may be allowed to appear in the examination in the immediately following year in the paper in which he/she fails only. He/she shall be declared to have passed if he secures minimum passing marks prescribed for the paper in which he appeared and shall be deemed to have secured minimum passing marks only prescribed for the paper (irrespective of the marks actually obtained by him) for the purpose of determining his division in accordance with the scheme of examination. The candidate shall have to repeat the whole examination in subsequent year in case he fails to clear the paper in which he failed.

O.326 Candidates who fail in the Integrated B.Sc-B.Ed. examination part 1 and part 2 only in the practice of teaching may appear in the practical examination in the subsequent year provided that they keep regular terms for four calendar months per year and give at-least 40 lessons(20 in part 1& 20 in part 2) supervised lessons.

O.3 A candidate who complete a regular course of study in accordance with the provision laid down in the ordinance, at an affiliated teacher's training college for four academic year but for good reasons fails to appear at the Integrated B.Sc-B.Ed. examination may be admitted to a subsequent examination as an Ex-student as defined in *O.325* or O.326 Above.

O.326 B: No candidate shall be permitted to appear as an Ex-student at more than one subsequent examination. The Integrated B.Sc-B.Ed programme shall be of duration of four academic years, which can be completed in a maximum of five years from the date of admission to the Integrated B.Sc.-B.Ed. Degree.

Regulation 42 :-

Scheme of Integrated B.Sc-B.Ed Four Year Examination

The Integrated B.Sc-B.Ed. (Four years) will consist of the following components;

Pa[illegible] in theory papers at **B.Sc-B.Ed. II**, In Integrated B.Sc.-B.Ed II Paper nos. are 02, 03 & [illegible] each session are of three hours carrying 100 marks (80 for theory + 20 for sessional) each. Compulsory paper [illegible] of 100 marks and optional Paper 05, 06, 07 (G-B). in

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each session are three hours carrying 150 marks (100 marks theory 50 marks practical). Distribution of marks in mathematics is according to their marking scheme in page no.7. VIIIth paper practicum carrying 100 marks.

Part II: Practice Teaching - Micro Teaching, Internship, Practice Teaching of 20 weeks (10 at B.Sc.-B.Ed Year III & 10 at B.Sc.-B.Ed Year IV) Block Teaching, Criticism and Final Lesson in III & IV Year per teaching subject.

Organization evaluation of practice teaching:

1. Every candidate will teach at-least 40 lessons (20 in III Year & 20 in IV Year) during practice teaching session. At least ten lessons in each subject should be supervised.
2. 40 (20+20) lessons as desired in the syllabus should be completed as full period class room lesson. Micro teaching lesson to be used in addition to those 40 lessons for developing certain teaching skills.
3. A minimum of ten lessons in each subject will be supervised evaluated by the subject specialist or a team of specialists of the subjects.

   By and large, the evaluation of the performance in the practical teaching will be based on the last ten lessons in the subject when the student has acquired some competence and skills of teaching.
5. The internal assessment in practice of teaching will be finalized by the principal with the help of members of the teaching staff and the same will be communicated to the university before the commencement of the practical each year.
6. At Integrated B.Sc-B.Ed III Year each candidate should be prepared to teach one lessons at the final practical examination. At the Integrated B.Sc-B.Ed IV Year exam candidate should be prepared to teach two lessons (one in each subject).The external examiners may select at-least 10% of the candidates to deliver two lessons in Integrated B.Sc-B.Ed IV Year.

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7. There will be a board of Examiners for the external examination for each college which will examine each candidate in at-least one lesson and a minimum of 15% in two lessons (one in each of the two subjects).

The board of Examination will consist of:

(a) The principal of the college concerned.

(b) A principal or a senior and experienced member of the teaching staff of another training college, affiliated to University of Rajasthan.

(c) An external examiner from outside the University of Rajasthan or a senior member of the teaching staff of an affiliated training college.

(d) The board as far as possible will represent Social science, language and science.

9. Approximately 50 lessons will be examined by the board each day.

Working out the result and awarding the division:

A candidate in order to be declared successful at the Integrated B.Sc-B.Ed. I, II, III & IV Year Examination shall be required to pass separately in Part I (Theory) and Part II (Practice of Teaching).

(2) For a passing in Part I (Theory) a candidate shall be required to obtain at-least (a) 30 *percent marks in each* theory paper and sessionals (24 marks out of 80 and 6 marks out of 20); (b) 30% marks in each theory paper and sessional (11 marks out of 35 & 4 marks out of 15) (c) 36 percent marks in the aggregate of all the theory papers.

(3) For passing in Part II (school internship Practice of Teaching) a candidate shall be required to obtain separately at-least-

(a) 40 percent marks in the external examination.

(b) 40 percent marks in internal assessment.

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(4) The successful candidates at Integrated B.Sc.-B.Ed Four Year Examination obtaining total marks will be classified in three divisions and shall be assigned separately in theory and school internship Practice of teaching as follows:

Division	Theory	Practice of Teaching
I	60%	60%
II	48%	48%
Pass	36%	40%

The practical work record shall be properly maintained by the college and may be made available for work satisfaction of external examiner in school internship (practice teaching), those are expected to submit a report regarding this separately.

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पार्ट – II

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पूर्णांक [illegible] न्यूनतम उत्तीर्णांक 36

नोट : [illegible] अंक लाने पर छात्रों को उत्तीर्ण नहीं किया जायेगा। इस प्रश्न–पत्र में प्राप्त अंकों को श्रेणी निर्धारण में नहीं जोड़ा जायेगा।

अंक विभाजन – प्रश्न पत्र में दो भाग होंगे – 1. साहित्य खण्ड एवं 2. व्याकरण खण्ड। साहित्य खण्ड में दो भाग होंगे – गद्य भाग एवं पद्य भाग। प्रत्येक खण्ड के लिए 50 अंक निर्धारित है।

– 50 अंक

क	दो व्याख्या गद्य में (विकल्प देना है)	5 x 2 =	10 अंक
ख	दो व्याख्या पद्य में (विकल्प देना है)	5 x 2 =	10 अंक
ग	आलोचनात्मक प्रश्न गद्य से (विकल्प देना है)	$7\frac{1}{2}$ x 2 =	15 अंक
घ	आलोचनात्मक प्रश्न पद्य से (विकल्प देना है)	$7\frac{1}{2}$ x 2 =	15 अंक

साहित्य खण्ड – 'क' :– गद्य–पद्य की निर्धारित रचनाएँ

गद्य भाग –

1. [illegible] – प्रेमचन्द – बड़े भाई साहब
   विजयदान देथा – [illegible] और कौआ
2. [illegible] – कन्हैयालाल मिश्र 'प्रभाकर' – बंगालिस के ज्वार की उन लहरों में
3. [illegible] – वासुदेव [illegible] – रजिया
4. [illegible] – पुण्डाकर मुक्त – [illegible] सुन्दर ग्रह
5. निबंध – अगरचन्द नाहटा – राजस्थान की सांस्कृतिक धरोहर
6. व्यंग्य – शरद जोशी – जीप पर सवार इल्लियाँ
7. पर्यावरण – अनुपम मिश्र – आज भी खरे हैं तालाब

पद्य भाग :– (कबीर ग्रंथावली से सं. – श्यामसुंदर दास)

1. कबीर – साखी सं. – गुरूदेव को अंग – 7,12,26,30
   सुमरन को अंग – 10,17,24,26
   विरह को अंग – 2,6,10,18
2. सूरदास सूरसागर सार – सं. डॉ. धीरेन्द्र वर्मा
   – विनय भक्ति पद सं. – 21,33
   – गोकुल लीला पद सं. – 55,58
   वृंदावन लीला पद सं. – 10,28
   – उद्धव [illegible] सं. – 77,79
3. तुलसी[illegible] – विनय पत्रिका, गीताप्रेस, गोरखपुर पद सं. – 87,88,90,156,158
4. मी[illegible] – [illegible] – पुरुषोत्तम स्वामी पद सं. – 1,3,4,5,10
5. [illegible] – रहीम ग्रंथावली संपादक विद्यानिवास मिश्र, गोविन्द रजनीश (दोहावली) 186,191,211,212,214,218,219,220,223,224
6. [illegible] – [illegible] इस साधन के लिए मरते हैं (गीत–साकेत के नवम सर्ग से)
7. सुमित्रानंदन पंत : – नौका विहार
8. सूर्यकान्त त्रिपाठी निराला – वह तोड़ती पत्थर
9. सच्चिदानंद हीरानंद वात्स्यायन 'अज्ञेय' – हिरोशिमा

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(20)

[redacted]

50 अंक

[redacted] 200 शब्द — 8 अंक

1. [redacted] — कार्यालयीय पत्र, कार्यालय ज्ञापन, विज्ञप्ति एवं — 8 अंक
2. कार्यालय [redacted] कार्यालय आदेश, अधिसूचना, पृष्ठांकन 4 x 2 = — 4 अंक
3. संक्षेपण — 5 अंक
4. पल्लवन — 5 अंक
5. [redacted] — 5 अंक
6. [redacted] — 5 अंक
7. [redacted] — 5 अंक
8. [redacted] — 5 अंक

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B. Sc. - B.Ed. - 02
PART-II

KNOWLEDGE AND CURRICULUM

MARKS : 100

Objectives:

After Completing the course the students will be able:-

- To Provide awareness and understanding towards knowledge and curriculum.
- To create excellence in the educational system for facing the knowledge of challenges of the twenty first century.
- To realize the importance of curriculum modification.
- To examine the different sources of knowledge and their kinds.
- To familiarize students with the proess of construction of knowledge.
- To trans form pupil-teacher's into a vibrent knowledge-based society.

Unit I - Concept And Facts Of Knowledge

- Meaning and Nature of knowledge
- Distinctions between: Knowledge and skill, Teaching and Training, Knowledge and information, Reason and belief.
- Different facets of knowledge and relationship such as - Local and universal, concrete and Abstract, Theoretical and Practical, School and out of school.

Unit II - Child's Construction Of Knowledge

- Sources of knowledge : Empirical knowledge Vs Revealed knowlege.
- Different kinds of knowledge:
  - a) Disciplinary knowledge : Concepts and Alternative concepts
  - b) Course content knowledge : Criteria of Selection and concerns
  - c) Indigenous knowledge Vs Global knowledge
  - d) Scientific knowledge Vs Religious knowledge

Unit III - Concept Of Curriculum

- Meaning, Nature and objectives of curriculum, Need for curriculum in schools
- Distinction between curriculum and syllabus
- Factors influencing curriculum
- Various types of curriculum - subject centered, Experience centered, Activity Centered.

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Unit IV : Curriculum Planning and Transaction

- Constituents of Curriculum
- Models of Curriculum Development : Given by Franklin Bobbit, Ralph Tyler, Hilda Taba, Malcolm Knowles
- Curriculum Transaction : Role of Teacher in Knowledge Construction through Dialogue, challenge and Scaffolding, Constructivist Pedagogy

Unit- V School : The Site of Curriculum Engagement

- Role of School Philosophy, Vision, Mission (and organization) in creating a context for transacting the Curriculum.
- Role of Infrastructure, Support Material in Teaching and Learning: Classroom seating Arrangement, Library, Laboratory, Playground, Canteen etc.
- School Culture and Organizational ethos as the context for Teachers's Work.
- Teacher's role and Support is " Developing Curriculum, Transactiong Curriculum and Researching Curriculum": realities and expectations.

Test Assignment:-

1. Class Test — 10 Marks
2. Project [illegible] the following — 20 Marks
   - Seminars discussions, mock appraisals, group work, field works,
   - Projects and analytical reading of articles, policies, documents from key practitioners and Journals like Studies in Education.
   - Review of a text book of any school subject.
   - Preparation of Curriculum Handbook

References-

1. Aggrawal, J.C. (2006). Knowledge Commission - 2006: Major Observation and Recommendation, Educational Reforms in India for the 21st Century. New Delhi, Shipra Publications.
2. Ba[illegible] (1992). Principles of Curriculum Reconstruction. New Delhi, Kanishka Publishers.
3. [illegible] (2006). Policies, Growth and Issues in Education. New Delhi

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R.Lal Book Depot.

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5. [redacted] (2003). [redacted] Education Technology. (Reprint Addition 2013)

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8. Soti and sharma, [redacted] Eminent Educational Thikers of India, Agra R.S.A. [redacted]

9. www. [redacted]

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11. www.takingglobal.org/expres/article.html?cid-178

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B.Sc. B.Ed - 03

PART – II

Learning and Teaching

MARKS -100

Objectives

After completing this course the student will be able:-

1. To get acquainted with the concept, principles and nature of teaching and learning.
2. To understand the different learning styles based on the difference of learners.
3. To study the relationship between teaching and learning and the factors which influence learning
4. To make use of modern information and communication technology to improve teaching-learning process.
5. To understand learning as a process of communication and be aware of various resources available for making it effective.
6. To study and analyze the socio cultural factors influencing cognition and learning.
7. To study and understand learning in constructivist perspective.
8. To get acquainted with professional ethics of teaching profession.
9. To study the new trends and innovations involved in teaching learning process with professional ethics.

Unit I – Learning and Teaching Process

- Teaching: Meaning, Nature, Principle, Levels, Phases and maxims of teaching. Difference of training and instruction from teaching.
- Learning : Meaning, Nature, Factors affecting learning and types of learning
- Relationship between teaching and learning, Resource and their development for promoting teaching – learning process.

Unit II – Source of Effective Teaching Learning

- Effective teaching: Meaning, component and parameters of effective teaching, classroom instruction strategies, Teacher behavior and classroom climate. (Flander's interaction analysis system)
- Instructional objectives in terms of Bloom's taxonomy.

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- Programming Learning: Concept, principles and types of programme learning.
- Concept of micro teaching, various teaching skills.

Unit III – Educational Technology

- [illegible]ational Technology: Meaning, [illegible]nce and Approaches.
- [illegible]f teaching: Meaning, Assumptions and Fundamental elements of a model of a teaching [illegible]n's inquiry training model.
- Communication: Concept, Elements and Communication skills, Teaching Learning process as the communication.

Unit IV – New Trends in teaching learning due to technological innovation

- Analysis and organisation learning in diverse class room: Issues and concerns.
- Team Teaching, Panel discussion, Conference, Symposium, Workshop, Cooperative learning, Group discussion, Brain storming- issues and concerns with respect to organise teaching and learning process in a classroom such as study habits, self learning, learning skills

Unit V Teaching as profession:

- Ethics of teaching, professional growth of a teacher
- [illegible]ships and strength of a teacher to face the challenges in present Era.
- [illegible]nce of reorientation and training programmes for pre-service and In-service [illegible]

Test and Assignment:-

1. Class Test 10 MARKS
2. Any One 10 MARKS

- Preparation and practical implication of at least two technical learning resources (transparencies, Power Point Slides, Animated Videos)
- Identify the learning need of the learner in diverse class room with regard to their abilities, learning styles, socio cultural difference, learning difficulties and their implication for class room teaching.
- [illegible]tify the professional skills for tea[illegible] and report any two programmes for [illegible]fessional development of teaching organized by the school/ training college/ any [illegible] agencies.

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- Conduct and Interview of any two students with multilingual background and face the problems in teaching learning process.

REFERENCES:

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2. Berk Laura (2007), " Child Development"; Prentice Hall of India, New Delhi.
3. Biehler Robert and Snowman Jack(1991), " psychology Applied to Teaching"; Houghton Mifflin company, Boston.
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6. Erickson Marian (1967), "The Metally Retarded Child in the classroom"; The macmillan company
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8. Goleman Daniel (2007), " Social Intelligence"; Arrow Books, London.
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11. [illegible] K. (1993), "Advanced Educational Psychology" Prentice Hall of India Pvt. Ltd., New Delhi
12. National Curriculum Framework 2005, N.C.E.R.T , New Delhi.
13. Osborn Alex (1971), "Your Creative Power"; Saint Paul Society, Allahabad, India.
14. Pringle M.K. and Varma V.P.(Ed) (1974), "Advances in Educational Psychology" University & London Press, London
15. Shaffer David(1999), "Social and Personality Development" Wadsworth Thomson Learning, U.S.A.
16. Sharma Tara Chand (2005), "Reading Problems of Learners "; Sarup and Sons. New Delhi

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17. Sousa David (2001), " How The Brain Learns"; Cowin Press, Inc. A Sage Publication Company, California.

B.Sc. B.Ed

PART- II

PEACE EDUCATION

OBJECTIVES:- MARKS-100

The course will enable the student teachers –

- To understand the concept of peace education.
- To acquire the knowledge about peaceful mind makes peaceful world.
- To understand the theory and practice of peace education
- To understand the philosophical thoughts for peace.
- To promote awareness about the existence of Conflicting relationships between people, within and between nations and between nature and humanity.
- To create frameworks for achieving Peaceful and Nonviolent societies.

UNIT-1 Concept of Peace

- Negative peace and Positive peace,
- Negative Peace - Peace as absence of war and abolition of war, as the minimization and elimination of violence, as removal of structural violence, Peace with Justice, Peace and Nonviolent liberation technique (Satyagraha) and Disarmament.
- Positive peace: Positive Interpersonal relations, Peaceful resolution of Conflict, Peace and Development, Alternative defense, living with nature and preserving Life and Eco system and Holistic Inner and Outer Peace.

Unit -2: Introduction of Peace Education

- Meaning, Concept, need, aims and objectives of Peace Education.
- As a universal value

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- Role of Social Agencies: Family, Religion, Mass Media, Community, School, NGO's, Government Agencies in promoting peace education.
- Current Status of Peace Education at Global Scenario.

Unit 3- Basis of Peace Education

- Skills required for Peace Education (WHO)
- of Peace Education- Conflict management , Conservation of Environment
- Challenges to Peace- Stress, Conflict, Crimes, Terrorism, Violence and Modernization.
- Strategies and Methods of teaching Peace Education- Meditation, Yoga , Dramatization , Debate and etc.

UNIT 4.Effective Teaching of Peace

- Peace Education for Life and Life long education, Peace Education and Removing the Bias towards Violence
- Model of integrated Learning –Cooperative Learning, Group Discussion, Project Work, Role Play, Story Telling, Rational Analytic Method – Case Analysis and Situation analysis,
- Research, International classroom, International Parliament, Peace Awards, techniques, mechanisms and institutions for building up peace and Engaging students in Peace Process.

Unit 5- Transacting Peace Education & Role of Social Agencies:

- Integration of Peace Education through curricular and co-curricular activities
- Programmes for Promoting Peace Education –UNESCO
- Addressing challenges to peace in Multicultural Society.
- Role of Great personalities in promoting Peace : Gautam Buddha, M.K. Gandhi, Nelson Mandela, Mother Teresa

Tasks and Assignments

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1. Class Test 10 marks

2. Any one 10 Marks

- Prepare a Role Play of Great Personalities who worked/ contributed towards Peace.
- Organize an activity in schools to promote Peace.
- Write a report on Gandhi and Peace.
- Write about the contribution of any two Noble prize winners for Peace.
- Prepare an album of Indian Philosophers and write their thoughts on peace.

REFERENCES :-

1. Adams.D (Ed) (1997) UNESCO and a culture of Peace: Promoting a Global Movement. Paris UNESCO.
2. Aber,J.L. Brown, J.L.A.Henrich, C.C.(1999) Teaching Conflict Resolution: An effective.
3. Dr.Haseen Taj (2005) National Concerns and Education, Neelkamal Publications.pvt.Ltd
4. Dr. Haseen Taj (2005) Current challeges in Education, Neelkamal Publications.pvt.Ltd
5. Mahesh Bhargava and Haseen Taj (2006) Glimpses of Higher Education. Rakhi Prakashan, Agra-2
6. Wttp://www.un.org/cyberschoolbus/peace/content.htm.

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CHEMISTRY

Scheme:

Max Marks: 150

	Duration (hrs.)	Max. Marks	Min. Pass Marks
Pa	3	33	
Pa	3	33	36
P	3	34	
	6	50	18

Note: Ten (10) questions are to be set taking two (02) questions from each unit. Candidates have to answer any 5 questions selecting at least one question from each unit.

Paper-I: Inorganic Chemistry
(2 hrs or 3 periods/week)

Unit-I

Chemistry of Elements of First Transition Series:
Characteristic properties of d-block elements. Properties of the elements of the first transition series, their binary compounds and complexes illustrating relative stability of their oxidation-states, coordination number and geometry.

Chemistry of Elements of Second and Third Transition Series:
General characteristics, comparative treatment with their 3d-analogues in respect of ionic radii, oxidation states, magnetic behaviour, spectral properties and stereochemistry.

Unit-II

Co[illegible]on Compounds:
W[illegible]dination theory and its experimental verification, effective atomic number concept, chel[illegible] nomenclature of coordination compounds, isomerism in coordination compounds, valence bond [illegible] of transition metal complexes.

Unit-III

Chemistry of Lanthanide and Actinide Elements:
Electronic structure, oxidation states, ionic radii and lanthanide contraction, complex formation, occurrence and isolation of lanthanide compounds.
General features, chemistry of separation of Np, Pu and Am from U, electronic configuration, oxidation states, magnetic properties, complexation behavior, comparison of lanthanides and actinides, super heavy elements.

Unit IV

Oxidation and Reduction:
Use of [illegible] Potential data, analysis of [illegible]ic redox stability in water, Frost, Latimer and Pourbaix diagrams, Application of redox [illegible] extraction of elements.

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Unit-V

Acids and Bases:

Theories: Arrhenius, Bronsted-Lowry, Lux-Flood, Solvent system concept and Lewis concept of acids and bases.

Non-aqueous Solvents:

Physical properties of a solvent, types of solvents and their general characteristics, reactions in non-aqueous solvents with reference to liquid NH_3 and liquid SO_2

Paper II: Organic Chemistry

(2 Hrs. or 3 periods/week)

Unit-I

Electromagnetic Spectrum: An Introduction

Absorption Spectroscopy

Ultraviolet (UV) spectroscopy - Absorption laws (Beer-Lambert Law), molar absorptivity, presentation and analysis of UV spectra, types of electronic transitions, effect of slovents on transitions, effect of conjugation. Concept of chromophore and auxochrome. Bathochromic, hypsochromic, hyperchromic and hypochromic shifts. UV spectra of conjugated dienes and enones.

Infrared (IR) spectroscopy - Molecular vibrations, Hook's law, selection rules, intensity and position of IR bands, measurement of IR spectrum, fingerprint region, characteristics absorption of various functional groups and interpretation of IR spectra of simple organic compounds.

Unit-II

Alcohols: Classification and nomenclature

Monohydric alcohols - Methods of formation by reduction of aldehydes, ketones, carboxylic acids and esters. Hydrogen bonding. Acidic nature. Reactions of alcohol with mechanism.

Dihydric alcohols - methods of formation, chemical reactions of vicinal glycols, oxidative cleavage [Pb(OAc)$_4$ and HIO_4] and pinacol-pinacolone rearrangement

Trihydric alcohols: Methods of formation, chemical reactions of glycerol

Phenols

Nomenclature, structure and bonding. Preparation of Phenols. Physical properties and acidic character. Comparative acidic strength of alcohols and phenols. Reactions of phenols-electrophilic aromatic substitution, acylation and carboxylation. Mechanisms of Fries rearrangement, Claisen rearrangement, Gattermann synthesis, Hauben-Hoesch reaction, Lederer-Manasse reaction and Reimer-Tiemann reaction

Ethers and Epoxides

Methods of formation, physical properties, Chemical reactions - cleavage and autooxidation, Zeisel's method

Synthesis of Epoxides. Acid and base catalysed ring opening of epoxides, orientation of epoxide

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ring opening reactions of Grignard and organolithium reagents with epoxides.

Unit-III

Aldehydes and Ketones

Structure of the carbonyl group. Syntheses of aldehydes from acid chlorides, synthesis of aldehydes and ketones using 1,3-dithianes, syntheses of ketones from nitriles and from carboxylic acids. Physical properties.

Mechanism of nucleophilic additions to carbonyl group with particular emphasis on benzoin, aldol, Perkin and Knoevenagel condensations. Condensation with ammonia and its derivatives. Wittig reaction. Mannich reaction. Oxidation of aldehydes, Baeyer-Villiger oxidation of ketones. Cannizzaro reaction. MPV (Meerwein-Pondrof-Verley), Clemmensen, Wolff-Kishner, $LiAlH_4$ and $NaBH_4$ reductions. Halogenation of enolizable ketones. Use of acetals and 1,3-dithiane as protecting groups.

Unit-IV

Carboxylic Acids

Structure and bonding, physical properties, acidity of carboxylic acids, effects of substituents on acid strength. Preparation of carboxylic acids. Reactions of carboxylic acids, Hell-Volhard-Zelinsky reaction. Reduction of carboxylic acids, mechanism of decarboxylation.

Methods of formation and chemical reactions of halo acids. Hydroxy acids - malic, tartaric and citric acids.

Dicarboxylic acids: methods of formation and effect of heat and dehydrating agents (succinic, glutaric and adipic acids).

Carboxylic Acid Derivatives

Structure, nomenclature and synthesis of acid chlorides, esters, amides and acid anhydrides. Relative stability of acyl derivatives. Physical properties, interconversion of acid derivatives by nucleophilic acyl substitution.

Preparation of carboxylic acid derivatives, chemical reactions, mechanisms of esterification and hydrolysis (acidic and basic).

Unit-V

Organic Compounds of Nitrogen

Preparation of nitroalkanes and nitroarenes. Chemical reactions of nitroalkanes. Mechanisms of nucleophilic substitution in nitroarenes and their reductions in acidic, neutral and alkaline media. Picric acid.

Amines: Structure, nomenclature and preparation of alkyl and aryl amines (reduction of nitro compounds, nitriles), reductive amination of aldehydic and ketonic compounds. Physical properties, stereochemistry of amines. Separation of a mixture of primary, secondary and tertiary amines. Structural features effecting basicity of amines. Amine salts as phase-transfer catalysts. Gabriel-phthalimide reaction and Hoffmann bromamide reaction with mechanism.

Reactions of amines, electrophilic aromatic substitution in aryl amines, reactions of amines with nitrous acid. Diazonisation and mechanism. Synthetic transformations of aryl diazonium salts, azo coupling and its applications.

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Paper III : Physical Chemistry
(2 Hrs. or 3 periods/week)

UNIT-I

Thermodynamics - I

Definition of Thermodynamic Terms: System, surroundings, etc. Types of systems, intensive and extensive properties. State and path functions and their differentials. Thermodynamic process, concept of heat and work.

First Law of Thermodynamics : Statement, definition of internal energy and enthalpy, heat capacities, relation between heat capacities at constant volume and pressure and their relationship. Joule's law, Joule-Thomson coefficient and inversion temperature. Calculation of w, q, dU & dH for the expansion of ideal gases under isothermal and adiabatic conditions for reversible process

Thermochemistry : Standard state, standard enthalpy of formation, Hess's law of heat summation and its applications. Heat of reaction at constant pressure and at constant volume. Enthalpy of neutralization. Bond dissociation energy and its calculation from thermo-chemical data, temperature dependence of enthalpy, Kirchhoff's equation.

UNIT-II

Thermodynamics –II

Second Law of Thermodynamics : Need for the law, different statements of the law. Carnot cycle and its efficiency, Carnot-Theorem. Thermodynamic scale of temperature.

Concept of Entropy : Entropy as a state function, entropy as a function of V&T, entropy as a function of P&T, entropy change in physical change. Clausius inequality and entropy as a criteria of spontaneity and equilibrium. Entropy change in ideal gases and mixing of gases.

Third Law of Thermodynamics : Nernst heat theorem, statement and concept of residual entropy, evaluation of absolute entropy from heat capacity data. Gibbs and Helmholtz functions: Gibbs function (G) and Helmholtz function (A) as: thermodynamic quantities. A & G as criteria for thermodynamic equilibrium and spontaneity, their advantage over entropy change. Variation of G and A with P, V and T.

Chemical Equilibrium:

Equilibrium constant and free energy. Thermodynamic derivation of law of mass action. Le Chatelier principle. Reaction Isotherm and reaction isochore. Clapeyron equation and Clausius-Clapeyron equation, applications.

UNIT-III

Phase Equilibrium: Statement and meaning of the terms phase, component and degrees of freedom, derivation of Gibbs phase rule, phase equilibria of one component system - water, CO_2 and sulphur systems.

Phase equilibria of two component system - solid-liquid equilibria, simple eutectic Bi-Cd, Pb-Ag system, desilverization of lead.

Solid solutions: compound formation with congruent melting point (Mg-Zn) and incongruent melting point ($NaCl-H_2O$) System. Freezing mixtures acetone-dry ice.

Liquid-Liquid mixtures: Ideal liquid mixtures, Raoult's and Henry's law. Non ideal system - azeotropes, HCl-H_2O and ethanol-water systems. Partially miscible liquids: phenol-water, lower and upper consolute temperature, effect of impurity on consolute temperature. Nernst distribution law, thermodynamic derivation, applications.

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UNIT-IV

Electrochemistry – I

Electrical transport-conduction in metals and in electrolyte solutions, specific conductance and equivalent conductance, measurement of equivalent conductance, variation of equivalent and specific conductance with dilution.

Migration of ions and Kohlrausch law, Arrhenius theory of electrolyte dissociation and its limitations, weak and strong electrolytes. Ostwald's dilution law, its uses and limitations. Debye-Hückel-Onsager's equation for strong electrolytes (elementary treatment only). Transport number, definition and determination by Hittorf's method and moving boundary method.

Applications of conductivity measurements:

Determination of degree of dissociation, determination of K_a of acids, determination of solubility product of sparingly soluble salt, conductometric titrations.

UNIT-V

Electrochemistry –II

Types of reversible electrodes - Gas-metal ion, metal-metal ion, metal-insoluble salt anion and redox electrodes, electrode reactions, Nernst equation, derivation of cell E.M.F. and single electrode potential, standard hydrogen electrode, reference electrodes, standard electrode potential, sign conventions, electrochemical series and its significance.

Electrolytic and Galvanic cells - reversible and irreversible cells, conventional representation of electrochemical cells.

EMF of a cell and its measurements. Computation of cells EMF. Calculation of thermodynamic quantities of cell reactions, (ΔG, ΔH and K), polarization, over potential and hydrogen overvoltage.

Concentration cell with and without transport, liquid junction potential, application of concentration cells. Valency of ions, solubility product and activity coefficient, potentiometric titrations.

Definition of pH and pK_a, determination of pH using hydrogen quinhydrone and glass electrodes, by potentiometric methods.

Suggested Books:

- Principles of Physical Chemistry, B. R. Puri, Sharma and M. S. Pathania.
- Text Book of Physical Chemistry, K. L. Kapoor.
- A Text Book of Physical Chemistry, Kundu and Jain.
- Elements of Physical Chemistry, P. W. Atkins, Oxford.
- University General Chemistry, C. N. R. Rao, Mac Millan.

Chemistry Practical – I Laboratory Course-II

(4 hrs or 6 periods / week)

Inorganic Chemistry

(i) Preparation of Standard Solutions

Dilution – 0.1 M to 0.001 M solutions

(ii) Volumetric Analysis

(a) Determination of acetic acid in commercial vinegar using NaOH

(b) Determination of alkali content in antacid tablet using HCl

(c) Estimation of calcium content in chalk as calcium oxalate by permanganometry

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(d) Estimation of hardness of water by EDTA
(e) Estimation of ferrous and ferric by dichromate method
(f) Estimation of copper using thiosulphate

(iii) **Gravimetric Analysis**
(a) Cu as CuSCN
(b) Ni as Ni (dimethylglyoxime)

Organic Chemistry

(i) **Laboratory Techniques**

A. Thin Layer Chromatography
Determination of R_f values and identification of organic compounds.
Separation of green leaf pigments (spinach leaves may be used).
Preparation and separation of 2,4-dinitrophenylhydrazones of acetone, 2-butanone, hexan-2-one and hexan-3-one using toluene and light petroleum (40-60) solvent system.
(c) Separation of a mixture of dyes using cyclohexane and ethyl acetate (8.5 : 1.5)

B. Paper Chromatography : Ascending and Circular
Determination of R_f values and identification of organic compounds.
(a) Separation of mixture of phenylalanine and glycine. Alanine and aspartic acid. leucine and glutamic acid. Spray reagent – ninhydrin.
(b) Separation of a mixture of DL – alanine, glycine and L-Leucine using n-butanol: acetic acid: water (4:1:5), Spray reagent-ninhydrin.
(c) Separation of monosaccharides a mixture of D- galactose and D-Fructose Using n- butanol : acetone : water (4:5:1) Spray reagent -aniline hydrogen phthalate.

(ii) Qualitative Analysis
Identification of two organic compounds (one solid and one liquid) through the functional group analysis. determination of melting point. boiling point and preparation of suitable derivatives.

Physical Chemistry

(i) Transition Temperature
Determination of the transition temperature of the given substance by thermometric / dilatometric method (e.g. $MnCl_2.4H_2O$, $SrBr_2.2H_2O$)

(ii) Thermochemistry
a) To determine the solubility of benzoic acid at different temperatures and to determine ΔH of the dissolution process.
b) To determine the enthalpy of neutralization of a weak acid/ weak base versus strong base/ strong acid and determine the enthalpy of ionization of the weak acid / weak base.
c) To determine the enthalpy of solution of solid calcium chloride and calculate the lattice energy of calcium chloride from its enthalpy data using Born-Haber cycle.

(iii)Phase Equilibrium :
a) To study the effect of a solute (e.g. NaCl, succinic acid) on the critical solution temperature of two partially miscible liquids (e.g. phenol-water system) and to determine the concentration of that solute in the given phenol water system.

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b) To construct the phase diagram of two components (e.g. diphenylamine-benzophenone) system by cooling curve method.

(iv) **Distribution law**

a) To study the distribution of iodine between water and CCl_4.

b) To study the distribution of benzoic acid between benzene and water.

(Instructions to [illegible])

Chemistry Practical

Max. Marks: 50 Duration of Exam: 5 hrs. Minimum Pass Marks: 18

Inorganic Chemistry

Ex. 1 Volumetric Analysis

or

Gravimetric Analysis as mentioned in the syllabus 16

Organic Chemistry

Ex. 2 Identification of two organic compounds (one solid and one liquid) through the functional group analysis, determination of melting point, boiling point and preparation of suitable derivatives.

or

Perform one experiment out of the experiments on thin layer and paper chromatography given in syllabus. 12

Physical Chemistry

Ex. 3 Perform one of the physical chemistry experiments as mentioned in the syllabus. 12

Ex. 4 Viva-voce 5

Ex. 5 Record 5

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Books Recommended for Theory Courses

1. Advanced Inorganic Chemistry F.A. Cotton, G. Wilkinson and P.L. Gaus. Wiley
2. Concise Inorganic Chemistry, J.D. Lee. ELBS
3. Concepts of Models of Inorganic Chemistry B. Douglas, D. McDaniel and J. Alexander. John Wiley
4. Inorganic Chemistry. D.F. Shriver P.W. Atkins and C. H. Langford. Oxford.
5. Inorganic Chemistry. W.W. Porterfield Addison Wesley
6. Inorganic Chemistry. A.G. Sharpe. ELBS
7. Inorganic Chemistry. G.L. Miessler and D.A. Tarr. Prentice Hall.
8. Organic Chemistry, Morrison and Boyd. Prentice Hall.
9. Organic Chemistry. I.G. Wade Jr. Prentice Hall
10. Fundamentals of Organic Chemistry, Solomons. John Wiley

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11. Organic Chemistry Vol. I, II, III S.M. Mukherji, S.P. Singh and R.P. Kapoor, Wiley Eastern Ltd. (New Age International)
12. Organic Chemistry. F.A. Carey, McGraw Hill. Inc.
13. Introduction to Organic Chemistry. Streitwieser. Heathcock and Kosover. Macmilan.
14. Physical Chemistry. G.M. Barrow. International Student Edition. McGraw Hill.
15. Basic Programming with Application, V.K. Jain. Tata McGraw H ill.
16. Computers and Common Sense. R. Hunt and Shelly. Prentice Hall.
17. University General Chemistry. C.N.R. Rao, Macmillan.
18. Physical Chemistry. R.A. Alberty, Wiley Eastern Ltd.
19. The Elements of Physical Chemistry, P.W. Atkins. Oxford.
20. Physical Chemistry Through problems, S.K. Dogra and S. Dogra. Wiley Eastern Ltd.

B. Recommended (Laboratory Courses)

1. Vogel's Qualitative Inorganic Analysis, revised. Svehla. Orient Longman.
2. Vogel's Textbook of Quantitative Inorganic Analysis (revised). J. Bassett. R.C. Dene0y. G.H. Jeffery and J. Mendham. ELBS.
3. Standard Methods of Chemical Analysis. W.W. Scott. The Technical Press.
4. Experimental Inorganic Chemistry, W.G. Palmer. Cambridge.
5. Handbook of preparative Inorganic Chemistry. Vol I & II, Braver. Academic Press.
6. Inorganic Synthesis. McGraw Hill.
7. Experimental Organic Vol I & II, P.R. Singh, D.S. Gupta and K.S. Bajpai, Tata McGraw Hill.
8. Laboratory manual in Organic Chemistry, R.K. Bansal, Wiley Eastern.
9. Vogel's Textbook of Practical Organic Chemistry. RS. Furniss. Hannaford, V. Rogers. P.W.G. Smith and A.R. Tatchell, ELBS.
10. Experiments in General Chemistry, C.N.R. Rao and U.C. Agarwal, East-West Press.
11. Experiments in Physical Chemistry. R.C.Das and B. Behra. Tata McGraw Hill
12. Advanced Practical Physical Chemistry, J.B. Yadav. Goel Publishing House.
13. Advanced Experimental Chemistry, Vol. I-Physical. J.N. Gurtii and R. Kapoor. S. Chand & Co.
14. Advanced Experiments in Physical Chemistry. Mukherjee. J.N. Ghjose& Sons
15. Experiments in Physical Chemistry. J.C. Ghosh. Bharati Bhavan.

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BOTANY

Scheme

Max. Marks: 100

Paper I [illegible] hrs duration Max. Marks 33

Paper II [illegible] hrs duration Max. Marks 33

Practical Exam Marks 18 4 hrs. duration Max. Marks 34

Duration of examination of each theory paper- Max. Marks 50

Duration of examination of practicals- 3 hours
4 hours

Note

1. There will be 5 questions in each paper. All questions are compulsory. Candidate has to answer all questions in the main answer book only.
2. Q.No. 1 will have 18 very short answer type Questions (not more than 20 words) of half marks each covering entire syllabus.
3. Each paper is divided into four units. There will be one question from each unit. These Q.No. 2 to 5 will have internal choice

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PAPER-I

Molecular Biology and Biotechnology

hrs week)

Unit-I

Genetic Material: Biological che[illegible] and phy[illegible] of heredity material. Structure of DN[illegible] mRNA tRNA [illegible] Watson and Crick model of DNA. Nucleosome mo[illegible]

DN[illegible]ion: Meselson Stahl experiment of semiconservative replication of DNA; RNA Pri[illegible]-fragments. polymer[illegible] DNA-Protein interactions.

Prelimi[illegible] DNA damage and repair.

Unit-2

Central dogma of life. **Transcription in eukaryotes: role of promoter, gene.** pre mRNA synthesis. pre mRNA processing. capping. splicing and polyadenylation.

Translation genetic code codon translation. elongation and termination.

Regulation of gene expression in prokaryotes and eukaryotes: Negative and positive control. attenuation and antitermination Reverse transcriptase and its application.

Unit-3

Biotechnology [illegible]efinition: Basic aspects of Plant tissue culture, basal medium: media preparation and aseptic culture technique. Concept of cellular totipotency: Callusing. Differentiation and morphogenesis. Micropropagation; Tissue culture and its applications Basic concept of protoplast culture. Anther culture. Embryo culture and their applications.

Unit-4

Recombinant DNA technology, Tools and techniques used in rDNA technology - Restriction enzymes, [illegible] transfer Bacteriophage, plasmids, cosmids and Artificial chromosome cDNA technology, gene amplification. Polymerase chain reaction. Application of PCR technique DNA fingerprinting and its uses Application of Biotechnology and Transgenic plants

Practicals

1. [illegible]

2 [illegible]

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2. *Media preparation*
3. *Aseptic culture technique*
4. *Explant culture-shoot tip, nodal segment*
5. *DNA isolation from plant parts*
6. *Gel electrophoresis technique*

1. [illegible] PS. (2012). Cell and Molecular Biology. Rastogi Publications, Meerut

2. [illegible]org OL and Philips GC (1995). Plant Cell, Tissue and Organ culture [illegible]

3. Dnyansagar, VR. (1986). Cytology and Genetics, Tata McGraw-Hill Pub. Co. Ltd. New Delhi.

4. Verma, PS. and Agarwal, VK. (2012). Cell Biology, Genetics, Molecular Biology, Evolution and Ecology. S. Chand and Co. Ltd. New Delhi.

5. Alberts, B., Bray, DJ, Raff, M Roberts, K. and Wasson, LD. (2001). Molecular Biology of Cell. Garland Publishing Co., Inc. New York

6. Micklos DA Freyer, GA and Crotts DA (2003). DNA Science a first course (Second Ed.). Cold Spring Harbor Laboratory Press, NY USA.

7. Razdan, MK (1993) An Introduction to Plant [illegible] Culture. Oxford & IBH Publishing Co. Pvt. Ltd. New Delhi.

8. [illegible]chas, AF. (1988). Handbook [illegible] tissue culture. Publication & Information CSIR, New Delhi.

9. Purohit, SS. and Mathur, SK [illegible] biotechnology fundamentals and applications. Agro Botanical Publishers, Bikaner

10. Rana, SVS. (2012). Biotechniques theory & practice (Third Ed.). Rastogi Publications, Meerut

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Paper-II

PLANT PHYSIOLOGY AND BIOCHEMISTRY

(2 hrs /week)

Unit-1

Water: Structure, physicochemical properties, importance to plant life, concept of water potential. Absorption and transport of water. Ascent of sap, transpiration, guttation, stomatal movement, factors affecting transpiration

Mineral nutrition: Essential macro and micro nutrients; their uptake, hydroponics-and nutrient requirements, deficiency and toxicity symptoms.

Translocation of organic substances. Mechanisms of phloem transport, factors regulating the translocation of nutrients.

Unit-2

Photosynthesis: Pigments, Photosynthetic apparatus, light reaction, photo system I & II, Z scheme, photophosphorylation, C_3 (Calvin cycle), C_4 cycle, and factors affecting the photosynthesis.

Respiration: Aerobic and anaerobic respiration: RQ (Respiratory Quotient), Kreb's cycle, electron transport system, oxidative phosphorylation, and factors affecting the process. Fermentation.

Unit-3

Carbohydrates: Introduction, importance, nomenclature, classification, molecular structure & function of mono, di & polysaccharides, their properties, glycosidic linkages and glycoprotein.

Proteins: Amino acids-structure, electrochemical properties, peptide bonds, chemical bonds and secondary structure and classification of proteins, physical and chemical properties.

Enzymes: Structure, nomenclature & classification of enzyme. Characteristics of enzymes, mechanism of action, multi-enzyme system, regulation of enzyme activity.

Lipids: Importance of fatty acids (saturated and unsaturated), Alpha and Beta oxidation.

Brief introduction and application of secondary metabolites.

Unit-4

Phases of growth and development. Seed dormancy and germination, plant movement, Biological clock their regulatory factors.

Photoperiodism & Vernalisation physiological and mechanism of action, concept of florigen and phytochrome.

Plant hormones: auxins, gibberellins, cytokinins, ethylene and ABA: discovery & physiological effects.

Suggested Readings

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2 Paraekar A. N. and Bhatia K. N.: Plant physiology. Trueman Book Company, 1985.
3 [illegible] K.: Fundamentals of plant physiology. S. Chand & Company Ltd., [illegible]
4 [illegible] S. K. and Verma, M.: A textbook of plant physiology, biochemistry and biotechnology. S. Chand Ltd., 2000.
[illegible] V.: Textbook of plant physiology. ANE Books India, 2007
[illegible] P. and Srivastava, S. K.: Textbook of plant physiology. Kalyani [illegible] 982

Practical Exercises:

1. To determine the osmotic potential of vacuolar sap by plasmolytic method.
2. To study the permeability of plasma membrane using different concentrations of organic solvents.
3. To study the effect of temperature of permeability of plasma membrane.
4. To separate chloroplast pigments by solvent method.
5. To separate chloroplast pigments using paper chromatography.
6. To separate amino acids in a mixture by paper chromatography.
7. To prepare the standard curve of protein.
8. To demonstrate the tests for proteins in the unknown samples.
9. To demonstrate the enzyme activity - Catalase, peroxidase and amylase
10. To demonstrate the tests for different types of carbohydrates and lipids.
11. Bioassay of growth hormone (auxin, cytokinin, gibberellin)
12. Demonstration of phenomenon of osmosis by use of potato osmometer
13. To demonstrate root pressure
14. To demonstrate rate of transpiration by use of potometers.
15. Photosynthesis by inverted funnel method.
16. To demonstrate anaerobic and aerobic respiration
17. R.Q. by Ganong's respirometer
18. Measurement of growth using auxanometer.

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Paper III
Pteridophytes, Gymnosperms & Palaeobotany
(2 hrs./week)

Unit-1

General characters of Pteridophytes. Classification (G.M. Smith). Distribution and alternation of generation. Stelar system in Pteridophytes. Eusporangiate and leptosporangiate development of sporangia. Homospory, and Heterospory. Economic importance of Pteridophytes.

Unit-2

Morphology, anatomy and reproduction of *Psilotum, Selaginella, Equisetum* and *Marsilea*.

Characteristics of Gymnosperms, distribution and classification (K.R.Sporne).

Unit-3

Morphology, anatomy, reproduction and life cycle of *Cycas, Pinus* and *Ephedra*. Economic importance of Gymnosperms.

Unit-4

Process of fossilization, types of fossils, techniques of study of fossils. Geological time scale. Primitive land plant: *Rhynia*. Fossil Pteridophytes: reconstructed plants-Lepidodendron and Calamites. Fossil Gymnosperm: *Williamsonia*.

Suggested Laboratory Exercises

- Study of external morphology, anatomy of vegetative and reproductive parts of *Psilotum, Selaginella, Equisetum* and *Marsilea*
- Study of external morphology, anatomy of vegetative and reproductive parts of *Cycas, Pinus* and *Ephedra*
- Study of fossils and slides of fossils.
- Preparation of charts of Geological time scale

Suggested Readings

Bold, H.C., Alexopoulos, C.J. and Delevoryas, T. (1987). Morphology of Plant and Fungi (5th). Harper and Row, New York.

Eames, A.J. and MacDaniels, L.H. (1953). An Introduction to Plant Anatomy. Tata McGraw-Hill Publishing Co. Ltd., New Delhi.

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Sharma, O.P. Pteridophytes 2000. Today and Tomorrow Publications.

Sarabhai, R.C. and Saxena, R.C.1990. A text book of Botany. Rastogi Publications, Meerut.

Sporne, K.R. 2002. The Morphology of Gymnospenns. B.I. Pub Pvt. Ltd., Mumbai, Kolkata. Delhi

Vasishta, P.C. 2002. Pteridophytes S. Chand & Co.New Delhi

Wilson, N.S. and Rajendra, G.W. 1995. Palaeobotany and Evolution of Plants. (2nd Ed.). Cambridge University Press. U.K.

Singh, Pandey, P.C. & Jain, D.K.2011. A text book of Botany (IV Ed). Rastogi Publications, Meerut.

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BOTANY PRACTICAL EXA[illegible] S[illegible]

SKELETON PAPER

M[illegible]

TIME: 4 Hours

S.No.	Practical	Regular	Ex NC
1(a)	[illegible] on the Tissue culture or Biotechnology [illegible]	5	5
1(b)	Exercise based on molecular biology	5	5
2	Perform the given physiological experiment and write the principle, procedure, results based on observations and precautions involved.	7	7
3	Perform the bio-chemical test of the given sample and discuss the observation giving reasons.	3	3
4	Make a suitable preparation of material "A" (Pteridophyte) (vegetative/reproductive part). Draw a labelled sketch. Identify giving reasons.	5	5
5	Make a suitable preparation of material "B"(Gymnosperm) (vegetative/reproductive part). Draw a labelled sketch. Identify giving reasons.	5	5
6	[illegible]ement upon spots (1-5)	10	15
7	[illegible]va-Voce	5	5
8	[illegible]ctical record	5	-
	TOTAL	50	50

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Zoology

Scheme:
Max Marks: 100

Min. Marks: 36

Paper I	: 3 Hrs duration	33 Marks
Paper II	: 3 Hrs duration	33 Marks
Paper III	: 3 Hrs duration	34 Marks
Practical	: 4 Hrs duration	50 Marks

NOTE:

1. There will be two parts of every theory question paper with a total duration of 3 hours. First part of question paper will comprise of question No. 1 containing 9 (Paper I & II) or 10 (Paper III) very short answer (Maximum 25 words) type questions, each of 1 mark. This part is compulsory to attempt. Questions should be evenly distributed covering entire *syllabus*.
   Second part of question paper will be of long answer type questions having three sections. There will be total 9 questions (Q. No. 2 to 10) in this part, *i.e.*, three from each unit /section out of which candidate will be required to attempt any 4 questions selecting at least one question from each unit/section. Each question will carry 6 marks.
2. The candidate has to answer all questions in the main answer book only.

PAPER – I:
STRUCTURE AND FUNCTION OF INVERTEBRATE TYPES

NOTE:

1. There will be two parts of this theory question paper with a total duration of 3 hours. First part of question paper will comprise of question No. 1 containing 9 very short answer (Maximum 25 words) type questions, each of 1 mark. This part is compulsory to attempt. Questions should be evenly distributed covering entire syllabus.
   Second part of question paper will be of long answer type questions having three sections. There will be total 9 questions (Q. No. 2 to 10) in this part, *i.e.*, three from each unit /section, out of which candidate will be required to attempt any 4 questions selecting at least one question from each unit/section. Each question will carry 6 marks.
2. The candidate has to answer all questions in the main answer book only.

Section – A

Habit, Habitat, Morphology, Structure, Organs and Systems (Locomotion, Digestive, Circulatory, Respiratory, Excretory, Nervous &Reproductive), Life Cycle, *Affinities and *Adaptations

Note :* indicates whenever required.

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[redacted]hemon(Indian Fresh water Prawn), Scorpion, Periplaneta, Grasshopper, Apis.
Onychophora : Peripatus.

Section – B

Habit, Habitat, Morphology, Structure, Organs and Systems (Locomotion, Digestive, Circulatory, Respiratory, Excretory, Nervous &Reproductive), Life Cycle, *Affinities and *Adaptations.

Note :* **indicates whenever required.**

Mollusca: Pila, Unio, Sepia
Echinodermata: Asterias, Echinus, Cucumaria.
Hemichordata: Balanglossus and its phylogenetic significance

[redacted]

[redacted]brate Adaptations

1. Salient features of Hemichordata.
2. *Evolution of canal* system of sponges.
3. Parasitic adaptations in Helminthes.
4. [redacted]cial organization in termites and honey bees.
5. Direct and indirect development of insects.
6. [redacted]ter vascular system of starfish.
7. Crustacean larvae & mouth parts of insects.
8. Parasitism in Crustacea.

PAPER – II:
ANIMAL PHYSIOLOGY AND BIOCHEMISTRY

NOTE:

1. There will be two parts of this theory question paper with a total duration of 3 hours. First part of question paper will comprise of question No. 1 containing 9 very short answer (Maximum 25 words) type questions, each of 1 mark. This part is compulsory to attempt. Questions should be evenly distributed covering entire syllabus. Second part of question paper will be of long answer type questions having three sections. There will be total 9 questions (Q. No. 2 to 10) in this part, *i.e.*, three from each unit /section, out of which candidate will be required to attempt any 4 questions selecting at least one question from each unit/section. Each question will carry 6 marks.
2. [redacted] candidate has to answer all questions in the main answer book only.

[redacted]

A[redacted]hysiology with special reference to mammals

1. [redacted]logy of digestion: Various types of digestive enzymes and their digestive action in the alimentary canal.
2. [redacted]logy of blood circulation: Composition and functions of blood; mechanism of blood clotting: heart beat; cardiac cycle; blood pressure; body temperature regulation.
3. Physiology of respiration: Mechanism of breathing: exchange of gases: transportation of oxygen and carbon dioxide in blood: regulation of respiration.

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Physiology of excretion: Kinds of nitrogenous excretory end products (ammonotelic, uricotelic and ureotelic); role of liver in the formation of these end products. Functional architecture of mammalian kidney tubule and formation of urine; hormonal regulation of water and electrolyte balance (Homeostasis).

Section - B

Regulatory aspects of Animal Physiology

1. Physiology of nerve impulse and reflex action: Functional architecture of a neuron, origin and propagation of nerve impulse, synaptic transmission, reflex arc.
2. Physiology of muscle contraction: Functional architecture of skeletal muscles; chemical and biophysical events during contraction and relaxation of muscle fibers.
3. Types of endocrine glands, their secretions and functions: Pituitary, adrenal, thyroid, pancreas, testis and ovary.
4. Physiology of Reproduction: Hormonal control of male and female reproduction, implantation, parturition and lactation in mammals.
5. Preliminary idea of neurosecretion, hypothalmic control of pituitary function.

Section - C

Biochemistry

1. Carbohydrates: Structure, function and significance; oxidation of glucose through glycolysis, Kreb's cycle and oxidative phosphorylation; interconversion of glycogen and glucose in liver; role of insulin and glucagon.
2. Proteins : Structure, function and significance, essential and non-essential amino acids, transformation of amino acids: deamination, transamination, decarboxylation. Synthesis of *protein and urea, fate of ammonia* (Ornithine cycle), fate of carbon skeleton.
3. Lipids: Structure, function and significance; Beta-oxidative pathway of fatty acids; brief account of biosynthesis of triglycerides. Cholesterol and its metabolism.

Paper – III:
Immunology, Microbiology & Biotechnology

NOTE:

1. There will be two parts of this theory question paper with a total duration of 3 hours. First part of question paper will comprise of question No. 1 containing 10 very short answer (Maximum 25 words) type questions, each of 1 mark. This part is compulsory to attempt. Questions should be evenly distributed covering entire syllabus.
   Second part of question paper will be of long answer type questions having three sections. There will be total 9 questions (Question 2 to 10) in this part, *i.e.*, three from each unit /section, out of which candidate will be required to attempt any 4 questions selecting at least one question from each unit/section. Each question will carry 6 marks.
2. Candidate has to answer all questions in the main answer book only.

Section - A

Immunology

1. Immunology: Definition, types of immunity: innate and acquired; humoral and mediated, Organs of immune system.
2. Antigen and antibody: Antigenicity of molecules, haptens, antibody types.

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4. Antigen-Antibody reactions: Precipitation reaction, agglutination reaction, neutralizing reaction, complement and lytic reactions and phagocytosis.
4. Immunity Regulating Cells: Macrophages, lymphocytes (B and T-Types) T-helper cells, T-Killer cells, plasma cells and memory cells.
5. Mechanism of humoral or antibody mediated immunity and cell mediated immunity.

Section - B

Microbiology

1. Brief introduction to the History of Microbiology: Work of Anatony Van Leeuwenhoek, theory of spontaneous generation, germ theory of fermentation and disease: Works of Louis Pasteur, John Tyndall, Robert Koch and Edward Jenner.
2. The Prokaryota (Bacteria) : Structural organization:
   (i) Size, shapes and patterns of arrangement.
   (ii) Structural organization: Slime layer (capsule), cell envelopes: cytoplasmic membrane (inner membrane). Cell wall (outer membrane) of Gram- negative and Gram-positive bacteria; mesosmes; cytoplasmic organization; cell projections: flagella and cilia.
3. Genetic material of Bacteria: Chromosome, replication of bacterial DNA.
4. Reproduction in Bacteria: Asexual reproduction, binary fission, budding, endospore formation, exospores and cyst formation; sexual reproduction, conjugation.
5. Microbial Nutrition : Culture of bacteria
   a. Carbon and energy source
   b. Nitrogen and minerals
   c. Organic growth factors
   d. Environmental factors : Temperature and pH
6. Bacteria of Medical Importance:
   (i) Gram-Positive
      a. Cocci: *Staphylocci, Streptococci*
      b. Bacilli: *Diptheria, Tetanus.*
   (ii) Gram-Negative
      a. Cocci: *Gonnorhea, Meningitis*
      b. Bacilli: Diarrhoea
   (iii) Mycobacteria: Tuberculosis, Leprosy

Section - C

Biotechnology

1. Definition, history, scope and application of biotechnology, major areas of biotechnology (microbial, plant and animal biotechnology).
2. Vectors for gene transfer.
3. Basic concepts of animal cell, tissue, organ and embryo culture.
4. Genetic engineering (outline idea only), applications of genetic engineering, hazards and regulations.
5. Protoplast fusion in prokaryotes and eukaryotes.
6. Recombinant DNA technology, hybridomas and their applications, PCR, DNA finger printing, DNA foot printing, RFLP, RAPD & AFLP, Human genome project.
7. Monoclonal antibodies and their applications.
8. Brief account of cloning: its advantages and disadvantages.
9. Biotechnology in medicine (outline idea only), antibiotics, vaccines, enzymes, vitamins, artificial blood.

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Environmental Biotechnology (outline idea only): Metal and petroleum recovery, pest control, waste water treatment.

II. Food, drink and dairy biotechnology (outline idea only): Fermented food production; dairy products, wine, beer, vinegar and food preservation.

B.Sc. B.Ed : PART-II

Practical - Zoology

Min. Marks: 18 **4 Hrs. / Week** **Max. Marks: 50**

I. Study of Museum Specimens:

Onychophora	:	*Peripatus*
Arthropoda	:	*Limulus*, Spider, Scorpion, Centipede, Millipede, *Lepas*, *Balanus*, *Squilla*, *Eupagurus*, Crab, *Mantis*, Honey-bee, (queen, king, worker) Locust, Silkworm Moth, Beetle, White grub.
Mollusca	:	*Chiton*, *Aplysia*, *Cypraea*, *Mytilus*, Pearl *Oyster*, *Dentalium*, *Loligo*, *Nautilus*.
Echinodermata	:	*Pentaceros*, *Echinus*, *Ophiothrix*, *Cucumaria*, *Antendon*.
Hemichordata	:	*Balanoglossus*.

II. Study of Microscopic Slides:

Arthropoda	:	V.S. of integument (cuticle): *Pediculus*, Bedbug, Termite and its castes, *Cyclops*, *Daphnia*, crustacean larvae (Nauplius, Metanauplius, Zoea, Mysis, Megalopa, Phyllosoma), statocyst of prawn.
Mollusca	:	V.S. of shell, T.S. gill of *Pila*, T.S of gill of Unio, Glochidium larva.
Echinodermata		Larval forms

III. Anatomy:

Prawn/Squilla : External features, appendages, alimentary canal and nervous system; Hastate Plate

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: External features, pallial organs and nervous system; osphradium, radula.

IV. Study of the Following Through Permanent Slide Preparation:

(i) Study of different cell types -Blood smear (Wrights or Leishman stain).
(ii) Ospharadium, gill lamella and radula of pila.
(iii) Statocyst and Hastate plate of Prawn/Squilla

V. Microbiology Immunology and Biotechnology:

1. Preparation and use of culture media for microbes.
2. Study of microbes in food materials like curd, etc (Gram +ve & Gram-ve bacteria, Aspergillus, Mucor, Rhizopus, Penicillium, Alternaria and Fusarium).
3. Educational tour to any Microbiology laboratory/ Dairy/ Food processing factory/ Distillery. Collection of material may also be encouraged wherever possible. Candidates are required to submit a detailed report of the visit.
4. Antigen-antibody reactions-precipitation, agglutination.

VI. Animal Physiology:

1. Counting of red and white blood cells in the given blood sample.
2. Estimation of hemoglobin in the given blood sample.
3. Estimation of haematocrit value (PCV) in the given blood sample.
4. Demonstration of enzyme activity (catalase) in liver.
5. Study of salivary digestion of starch and the effect of heat and alcohol on salivary digestion of starch.
6. Study of histological structure of major endocrine glands of mammals.

VII. Biochemistry:

1. Detection of protein, carbohydrate and lipid in the animal tissue/food samples.
2. Identification of different kinds of mono-, di- and poly-saccharides in the given food samples.
3. Circular Paper chromatography of dyes/amino acids.

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B.Sc. Part – II

Scheme of Practical Examination Distribution of Marks

Time: 4 Hrs. Min. Pass Marks. : 18 Max. Marks: 50

		Regular	Ex. /N.C. Students
1.	Anatomy (any system)	6	5
2.	Permanent Preparation	4	6
3.	Exercise in Microbiology/immunology/Biotechnology	4	6
4.	Exercise in Animal Physiology	5	6
5.	Exercise in Biochemistry	5	6
6.	Identification and comments on Spots (1 to 8)	16	16
7.	Viva Voce	5	5
8	Class Record	5	-
		50	50

Notes:

1. Anatomy: Study of systems of the prescribed types with the help of dissection.
2. With reference to microscopic slides, in case of non-availability, the exercise should be substituted with diagrams/ photographs.
3. Candidates must keep a record of all work done in the practical class and submit the same for inspection at the time of the practical examination.
4. Breeding material for permanent preparations would be as per the syllabus or as available through collection and culture methods.
5. It should be ensured that animals used in the practical exercises are not covered under the wild life act 1972 and amendments made subsequently.

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Recommended Books:

1. Barnes R. D: Invertebrate Zoology. W. B. Saunders, 1969.
2. Barrington EJW: Invertebrate Structure and Function. 2nd edition John Wiley & Sons, Inc., 1978.
3. Barrington EJW: The Biology of Hemichordata and Protochordata. Oliver & Boyd, London 1965.
4. Barrett KE, Barman SM, Boctano, S and Brooks HL. Ganongs: Review of Medical Physiology. 24th edition Mc Graw Hill Education India Pvt. Ltd., 2012.
5. Berril NJ: The Tunicates. The Roy Society, London.
6. Brusca RG and Brusca GJ: Invertebrates. 2nd edition Sinauer/Panima Books, 2003.
7. Cooper GM and Hausman RE: The Cell: A Molecular Approach. 6th edition ASM Press Washington, DC/ Sinauer/Panima Books, 2013.
8. Conn EE. Stumpf PK, Bruening G, Doi, RH: Outline of Biochemistry. 5th edition. John Wiley & Sons, 1987.
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15. Glick BR, Paeternak JJ: Molecular Biotechnology, 4th edition ASM Press, 2010.
16. Goldsby RA, Kindt TJ and Osborne BA: Kuby Immunology. WH Freeman and Co., New York, 2002.
17. Grant: Biology of Developmental System
18. Gupta PK. Genetics: Classical to Modern. Rastogi Publications, 2007.
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23. Karp G; Cell & Molecular Biology: Concepts and Experiments. 7th edition John Wiley & Sons, Inc., 2013.
24. Kotpal RL: Modern Text Book of Zoology: Invertebrates. Rastogi Publications, 2012.
25. Lal SS: Practical Zoology Invertebrate. 11th revised edition Rastogi Publications, 2014.
26. Lehninger AL: Biochemistry. 2nd edition Kalyani Publishers, 1991.
27. Lal SS: Practical Zoology Invertebrate. 11th revised edition, Rastogi Publications, 2014.
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Nelson DL and Cox MM: Lehninger Principles of Biochemistry. 5th edition W. H. Freeman, 2008.
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35. Old RW and Primrose SB: Principles of Gene Manipulation: An Introduction to Genetic Engineering. University of California, 1980.
36. Sastry KV: Animal Physiology and Biochemistry. 2nd edition Rastogi Publications. 2014-15.
37. Vander AJ, Sheerman J, Liciano D: Human Physiology: The Mechanics of Body Function. Mc Graw Hill Co., New York, 1998.
38. Verma PS and Jordan EL: Invertebrate Zoology. S Chand & Co. Ltd. New Delhi. 2001.
39. Verma PS, Tyagi BS, Agarwal VK: Animal Physiology. 6th edition S. Chand& Co.. 2004.
40. Voet D and Voet JG: Biochemistry. 4th edition, John Wiley & Sons, Inc., 2011.
41. Voet D and Voet JG: Biochemistry. John Wiley & Sons, New York, 1990.
Verma PS: A Manual of Practical Zoology: Invertebrates. S. Chand & Co. Ltd. New Delhi. 1971.
Voet D and Voet JG: Biochemistry, 4th edition, John Wiley & Sons Inc., 2011.
Wake MH: Hyman's Comparative Vertebrate Anatomy. 3rd edition University of Chicago Press Ltd., London, 1992.

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Scheme :

Max. Marks: 100

Min. Pass Marks: 36

Paper I	3 hrs. duration	Max. Marks: 33	Min. Pass marks 12
Paper II	3 hrs. duration	Max. Marks: 33	Min. Pass marks 12
Paper III	3 hrs. duration	Max. Marks: 34	Min. Pass marks 12
Practical	5 hrs. duration	Max. Marks: 50	Min. Pass marks 18

Paper-I : Thermodynamics and Statistical Physics

Work Load: 2 hrs. Lecture /week

Examination Duration: 3 Hrs.

Scheme of Examination: First question will be of nine marks comprising of six parts of short answer type with answer not exceeding half a page. Remaining four questions will be set with one from each of the unit and will be of six marks each. Second to fifth question will have two parts namely (A) and (B) each carrying 3 marks. Part (A) of second to fifth question shall be compulsory and Part (B) of these questions will have internal choice.

Unit-1

Thermal and adiabatic interactions: Thermal interaction; Zeroth law of thermodynamics; System in thermal contact with a heat reservoir (canonical distribution); Energy fluctuations; Entropy of a system in a heat bath; Helmholtz free energy; Adiabatic interaction and enthalpy; General interaction and first law of thermodynamics; Infinitesimal general interaction; Gibb's free energy; Phase transitions; Clausius Clapeyron equation; Vapour pressure curve; Heat engine and efficiency of engine, Carnot's Cycle; Thermodynamic scale as an absolute scale; Maxwell relations and their applications.

Unit-2

Production of low temperatures and applications: Joule Thomson expansion and J-T coefficients for ideal as well as Vander Waal's gas, porous plug experiment, temperature inversion, Regenerative cooling, Cooling by adiabatic expansion and demagnetization; Liquid Helium, He I and He II superfludity, Refrigeration through Helium dilution, Quest for absolute zero, Nernst heat theorem

The distribution of molecular velocities: Distribution law of molecular velocities, most probable, average and r.m.s velocities; Energy distribution function; effusion and molecular beam; Experimental verification of the Maxwell velocity distribution; The principle of equi-partition of energy.

Transport phenomena: Mean free path, distribution of free paths, coefficients of viscosity, thermal conductivity, diffusion and their interaction.

Unit-3

Classical Statistics: Validity of Classical approximation; Phase space, micro and macro states, Thermodynamic probability, relation between entropy and thermodynamic probability; Ideal gas, Barometric equation; Specific heat capacity of diatomic gas, Heat [illegible]

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Unit-4

[redacted]: Black body radiation and failure of classical statistics; Postulates of [redacted] statistics, indistinguishability, wave function and exchange degeneracy, a priori-probability, [redacted] system statistics and distribution function; Planck distribution function and radiation formula, Fermi-Dirac statistics and its distribution function, contact potential, thermionic emission, Specific heat anomaly of metals; Nuclear spin statistics (para- and ortho-hydrogen).

Paper- II: Mathematical Physics and Special Theory of Relativity

Work Load: 2 hrs. Lecture /week

Examination Duration: 3 Hrs.

Scheme of Examination: First question will be of nine marks comprising of six parts of short answer type with answer not exceeding half a page. Remaining four questions will be set with one from each of the unit and will be of six marks each. Second to fifth question will have two parts namely (A) and (B) each carrying 3 marks. Part (A) of second to fifth question shall be compulsory and Part (B) of these questions will have internal choice.

UNIT-1

[redacted] curvilinear coordinate system, scale factors, expression for gradient, divergence, curl [redacted] their application to Cartesian, circular cylindrical and spherical polar coordinate.

[redacted] transformation and Jacobian, transformation of covariant, contra-variant and mixed [redacted] Addition, multiplication and contraction of tensors; Metric tensor and its use in [redacted] of tensors.

Dirac delta function and its properties.

UNIT-2

Lorentz transformation, Length Contraction, Time Dilation, Mass variation, rotation in space-time like and space like vector, world line, macro-causality.

Four vector formulation, energy momentum four vector, relativistic equation of motion, invariance of rest mass, orthogonality of four force and four velocity, Lorentz force as an example of four force, transformation of four frequency vector, longitudinal and transverse Doppler's effect.

Transformation between laboratory and center of mass system, four momentum conservation, kinematics of decay products of unstable particles and reaction thresholds; Pair production, inelastic collision of two particles, Compton effect.

UNIT-3

(a) Transformation of electric and magnetic fields between two inertial frames. Electric field measured in moving frames. Electric field of a point charge moving with constant velocity.

(b) The second order linear differential equation with variable coefficient and singular points. [redacted] solution method and its application to [redacted]'s, Legendre's and Laguerre's differential equations; Basic properties like orthogonality, recurrence relation graphical representation and generating function of Hermite, Lagendre and Leguerre functions (simple applications)

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UNIT-4

[redacted] separational variables and its application to following boundary value problems (i) Laplace equation in three dimensional Cartesian coordinate system-line charge between two earthed [redacted] (ii) Helmholtz equation in circular cylindrical coordinates-cylindrical resonant cavity. (iii) Wave equation in spherical polar coordinates-the vibrations of a circular membrane. (iv) Diffusion equation in two dimensional Cartesian coordinate system heat conduction in a thin rectangular plate. (v) Laplace equation in spherical coordinate system-electric potential around a spherical surface.

Paper III: Electronics and Solid State Devices

Work Load: 2 hrs. Lecture /week

Examination Duration: 3 Hrs.

Scheme of Examination: First question will be of ten marks comprising of five parts of short answer type with answer not exceeding half a page. Remaining four questions will be set with one from each of the unit and will be of six marks each. Second to fifth question will have two parts namely (A) and (B) each carrying [redacted] Part (A) of second to fifth question shall be compulsory and Part (B) of these questions will have internal choice.

Unit 1: Circuit [redacted] and PN junctions

[redacted] analysis: Networks- some important definitions, loop and nodal equation based on D.C. [redacted] circuits (Kirchhoffs Laws), four terminal network: Ampere volt conventions, open, circuit and hybrid parameters of any four terminal network, Input, output and mutual impendence for an active (with termina) *network. Various circuit theorems: Superposition, Thevenin, Norton,* reciprocity, compensation, maximum power transfer and Miller theorems.

PN Junction: Charge densities in N and P materials; Conduction by drift and diffusion of charge carriers. PN diode equation; capacitance effects.

Unit 2: Rectifiers and transistors

Rectifiers: Basic idea of Half-wave, full wave and bridge rectifier calculation of ripple factor, efficiency and regulation. Filters: series inductor, shunt capacitor, L section and π-section filters. Voltage regulation. Voltage regulation and voltage stabilization by Zener diode, voltage multiplier

Transistors: Notations and volt-ampere characteristics for bipolar Junctions transistor. Concept of load line and operating point Hybrid parameters. CB, CE, CC configurations. Junction field effect transistor (JEFT) and metal oxide semiconductor filed effect transistor (MOSFET). Circuit symbols, biasing and volt-ampere characteristics, source follower operation of FET as variable voltage resister

Unit 3: Transistor biasing and amplifiers

Transistor biasing: Need of bias and stability of [redacted] factors, and various types of bias [redacted] thermal bias stability: fixed bias, collector to base feedback bias and four resistor

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ers: Analysis of transistor amplifier using hybrid parameters and its gain-frequency response. Analysis of Cascade amplifiers, direct coupled and R.C coupled amplifiers, Amplifier feedback: concept of feedback, positive and negative feedback, voltage and current feedback circuits. Advantage of negative feedback: Stabilization of gain; effect of negative feedback on output and input resistance, reduction of nonlinear distortion, effect on gain - frequency response

Unit 4: Oscillators and Logic Circuits

Oscillators criteria for self-excited and self-sustained oscillation, circuit requirement for build-up of oscillation. Basic transistor oscillator circuit and its analysis. Colpitt's and Hartely oscillators, R C Oscillators

Logic circuits: Logic fundamentals. AND, OR, NOT, NOR, NAND, XOR gates, Boolean algebra, De Morgan's theorem, positive and negative logic, logic gates circuit realization using DTL and TTL logic, simplification of Boolean expressions

Reference Books:-

1. John D. Ryder, Electronic Fundamentals and Application, Prentice Hall of India Pvt. Ltd., New Delhi.
2. John D. Ryder, Engineering Electronics, McGraw Hill Book Company, New Delhi.
3. Jacob Millman and Christosc Haikias, Integrated Electronics, Analog and Digital Circuits and systems: McGraw- Hill Ltd. (1972).
4. Albert Paul Malvino. Digital Computer Electronics, Tata McGraw- Hill Pub. Co. Ltd., New Delhi (1983).
5. Kumar & Gupta, Hand book of Electronics.
6. S.K. Mithal, Hand Book of Electronics.
7. S.K. Mithal, Electronics Devices and Applications.
8. K.P. Jain, Digital Electronics.

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7. G.K. Mithal, Electronics Devices and Applications.
8. R.P. Jain, Digital Electronics.

PRACTICAL

Teaching : 4 hrs/week

Practical One Paper — 5 hrs. duration

Min Pass Marks : 18 — Max. Marks : 50

Note : Total number of experiments to be performed by the students during the session should be 16 selecting any 8 from each section.

Section-A

1. Study of dependence of velocity of wave propagation on line parameter using torsional wave apparatus.
2. Study of variation of reflection coefficient with nature of termination using torsional wave apparatus.
3. Using platinum resistance thermometer find the melting point of a given substance.
4. Using Newton's rings method find out the wave length of a monochromatic source and find the refractive index of liquid.
5. Using Micheloson's interferometer find out the wavelength of given monochromatic source (Sodium Light)
6. To determine dispersive power of prism.
7. To determine wave length of sodium light using grating.
8. To determine wave length of sodium light using Biprism.
9. Determine the thermodynamic constant $\gamma = \frac{C_p}{C_v}$ using Clement's & Desorme's method.
10. To determine thermal conductivity of a bad conductor by Lee's method.
11. Determination of ballistic constant of a ballistic galvanometer.
12. Study of variation of total thermal radiation with temperature.

Section-B

1. Plot thermo emf versus temperature graph and find the neutral temperature (Use sand bath).
2. Study of power supply using two diode bridge rectifier with various filter circuits.

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3. Study of half wave rectifier using single diode and application of L and π section filters.
4. To study characteristics of a given transistor PNP/NPN (common emitter, common base and common collector configurtainos).
5. Determination of band gap using a junction diode.
6. Determination of power factor (cos θ) of a given coil using CRO.
7. Study of single stage transistor audio amplifier (variation of gain with frequency).
8. To determine η/m by Thomson's method.
9. Determination of velocity of sound in air by standing wave method using speaker, microphone and CRO.
10. Measurement of inductance [illegible] by Anderson's bridge.
11. Measurement of capacitance and dielectric constant of a liquid and gang condenser by de Sauty bridge.

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MATHEMATICS

Teaching : 3 Hours per Week per Theory Paper.
2 Hours per Week per Batch for Practical
(20 candidates in each batch)

Examination:

		Min.Pass Marks	Max. Marks
Scheme:	**Science – 54**		**150**
		Duration	**Max.Marks**
Paper – I	**Real Analysis and Metric Space**	**3 hrs.**	**40 (Science)**
Paper – II	**Differential Equations**	**3 hrs.**	**40 (Science)**
Paper – III	**Numerical Analysis and Vector Calculus**	**3 hrs.**	**40 (Science)**
Practical	**Numerical Methods**	**2 hrs.**	**30 (Science)**

Note:

1. Common paper will be set for both the Faculties of Social Science and Science. However. the marks obtained by the candidate in the case of Faculty of Social Science will be converted according to the ratio of the maximum marks of the papers in the two Faculties.

2. Each candidate is required to appear in the Practical examination to be conducted by internal and external examiners. External examiner will be appointed by the University and internal examiner will be appointed by the Principal in consultation with Local Head/Head, Department of Mathematics in the college.

3. An Internal/external examiner can conduct Practical Examination of not more than 100 (Hundred) Candidates. (20 candidates in each batch)

4. Each candidate has to pass in Theory and Practical examinations separately.

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Paper – I: Real Analysis and Metric [illegible]
Teaching : 3 Hours per Week
Duration of Examination : 3 Hours **Max. Marks: 40 (Science)**

Note: This paper is divided into FIVE Units. TWO questions will be set from each Unit. Candidates are required to attempt FIVE questions in all taking ONE question from each Unit. All questions carry equal marks.

Unit 1: Real numbers as complete ordered field. Limit point. Bolzano-Weierstrass theorem. Closed and Open sets. Union and Intersection of such sets. Concept of compactness. Heine-Borel theorem. Connected sets.
Real sequences- Limit and Convergence of a sequence. Monotonic sequences.

Unit 2: Cauchy's sequences. Subsequences. Cauchy's general principle of convergence. Properties of continuous functions on closed intervals. Properties of derivable functions. Darboux's and Rolle's theorem.

Unit 3: Notion of limit, continuity and differentiability for functions of two variables. Riemann integration – Lower and Upper Riemann integrals, Riemann integrability, Mean value theorem of integral calculus, Fundamental theorem of integral calculus.

Unit 4: Functions of bounded variations. Sequence and series of functions – Pointwise and Uniform convergence, Cauchy's criterion, Weierstrass M-test, Abel's test, Dirichlet's test for uniform convergence of series of functions, Uniform convergence and Continuity of series of functions, Term by term differentiation and integration.

Unit 5: Metric space – Definition and examples. Open and Closed sets. Interior and Closure of a set, Limit point of a set.
Subspace of a metric space, Product space, Continuous mappings, Sequence in a metric space, Cauchy sequence.

Reference Books:

1. Shanti Narayan and M.D. Raisinghania. Elements of Real Analysis. S. Chand & Co., N.D., 2008.
2. S. Kumaresan. Topology of Metric Spaces. Narosa Publishing House. Second Edition 2011.
3. K.A. Ross, Elementary Analysis: The Theory of Calculus. Undergraduate Texts in Mathematics. Springer (SIE). Indian reprint, 2004.
4. R.G. Bartle D.R. Sherbert, Introduction to Real Analysis (3rd edition), John Wiley and Sons (Asia) Pvt. Ltd., Singapore, 2002.
5. Charles G. Denlinger, Elements of Real Analysis, Jones and Bartlett (Student Edition),2011.
6. G. F. Simmons, Introduction to Topology and Modern Analysis, Mcgraw-Hill, Edition 2004.
7. T.M.Apostol, Mathematical Analysis, Narosa Pub. House, N.D., 2000.
8. R.R.Goldberg, Real Analysis, Oxford & IBH Pub. Co., N.D. 1999.

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Paper – II: Differential Equations
Teaching : 3 Hours per Week
Duration of Examination : 3 Hours **Max. Marks: 40 (Science)**

Note: This paper is divided into FIVE Units. TWO questions will be set from each Unit. Candidates are required to attempt FIVE questions in all taking ONE question from each Unit. All questions carry equal marks.

Unit 1: Degree and order of a differential equation. Equations of first order and first degree. Equations in which the variables are separable. Homogeneous equations and equations reducible to homogeneous form. Linear equations and equations reducible to linear form. *Exact differential equations and equations which can be made exact.*

Unit 2: First order but higher degree differential equations solvable for x,y and p. Clairaut's form and singular solutions with Extraneous Loci. Linear differential equations with constant coefficients. Complimentary function and Particular integral.

Unit 3: Homogeneous linear differential equations. Simultaneous differential equations. Exact linear differential equations of nth order. Existence and uniqueness theorem.

Unit 4 : Linear differential equations of second order. Linear independence of solutions. Solution by transformation of the equation by changing the dependent variable/the independent variable, Factorization of operators, Method of variation of parameters, Method of undetermined coefficients.

Unit 5: Partial differential equations of the first order. Lagrange's linear equation. Charpit's general method of solution. Homogeneous and non-homogeneous linear partial differential equations with constant coefficients. Equations reducible to equations with constant coefficients.

Reference Books:

1. M.D. Raisinghania, Ordinary and Partial Differential Equations, S. Chand & Co., 2003.
2. M.Ray, A Text Book on Differential Equations, Students and Friends Co., Agra, 1998.
3. E.A. Codington, An Introduction to Ordinary Differential Equations, Prentice Hall of India, 1961.
4. R.S. Senger, Ordinary Differential Equations with Integration, Prayal Publ. 2000.
5. D.A. Murray, Introductory Course in Differential Equations, Orient Longman (India), 1967.
6. Frank Ayres, Theory and Problems of Differential Equations, TMH, 2002.
7. I.N. Snedon, Elements of Partial Differential Equations, TMH, 2001.

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Paper – III: Numerical Analysis and Vector Calculus
Teaching : 3 Hours per Week
Duration of Examination : 3 Hours **Max. Marks: 40 (Science)**

Note: (i) This paper is divided into FIVE Units. TWO questions will be set from each Unit. Candidates are required to attempt FIVE questions in all taking ONE question from each Unit. All questions carry equal marks.
(ii) Non-Programmable Scientific Calculators are allowed.

Unit 1: Differences. Relation between differences and derivatives. Differences of a polynomial. Newton's formulae for forward and backward interpolation. Divided differences. Newton's divided difference. Lagrange's interpolation formula.

Unit 2: Central differences.Gauss's, Stirling's and Bessel's interpolation formulae. Numerical Differentiation. Derivatives from interpolation formulae. Numerical integration. Derivations of general quadrature formulas. Trapazoidal rule. Simpson's one-third. Simpson's three-eighth and Gauss's quadrature formulae.

Unit 3: Relation between the roots and coefficients of general polynomial equation in one variable, transformation of equations, Descarte's rule of signs, solution of cubic equations by Cardon's method, biquadratic equations by Ferari's method.
Numerical solution of Algebraic and Transcendental equations, Bisection method, Secant method, Regula-Falsi method, Iteration method, Newton- Raphson Method (derivation of formulae and rate of convergence only).

Unit 4: Gauss elimination and Iterative methods (Jacobi and Gauss Seidal) for solving system of linear algebraic equations, Partial Pivoting method, ill conditioned systems, Numerical solutions of ordinary differential equations of first order with initial condition using Picard's, Euler and modified Euler's method.

Unit 5: Scalar and Vector point functions. Differentiation and integration of vector point functions. Directional derivative. Differential operators. Gradient, Divergence and Curl. Theorems of Gauss, Green, Stokes (without proof) and problems based on these theorems.

Reference Books:

1. H.C. Saxena, Calculus of Finite Differences and Numerical Analysis, S.Chand & Co., N.D., 1986.
2. Shanti Narayan and J.N. Kapur, A Text Book of Vector Calculus, S.Chand, 1966.
3. Murray R. Spiegel, Vector Analysis, McGraw-Hill, 1959.
4. B. Bradie, A Friendly Introduction to Numerical Analysis, Pearson Education, India, 2007.
5. C. F. Gerald and P. O. Wheatley, Applied Numerical Analysis, Pearson Educatioh, India,7th edition, 2008.
6. C.F. Gerald, P.O. Wheatley, Applied Numerical Analysis, Addison-Wesley, 1998

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Practical: Numerical Methods
Teaching: 2 Hours per Week per Batch

Examination: **Duration: 2 Hours**

Scheme	Science
Max.Marks	30
Min.Pass Marks	10

Distribution of Marks:
Two Practicals one from each group

10 Marks each	=	20 Marks (13 Marks each)	26
Practical Record	=	05 Marks	07
Viva-voce	=	05 Marks	07
Total Marks	=	30 Marks	40

Group A: Numerical integration using Trapezoidal and Simpson's rules.Numerical solution of Algebraic and Transcendental equations using
(i) Bisection method, (ii) Secant method (iii) Regula-Falsi method (iv) Iteration method. (v) Newton- Raphson Method.
Group B: Numerical Solution of system of linear equations by Gauss elimination, Jacobi and Guass-Seidel methods. Solution of linear differential equations of first order and first degree with initial and boundary condition using modified Euler's method. Runge-Kutta Fourth order method.

Note:

1. Problems will be solved by using Scientific Calculators (non-Programmable)
2. Candidates must know about all functions and operations of Scientific Calculator.
3. Each Candidate (Regular/Non-Collegiate) has to prepare his/her practical record.
4. Each Candidate has to pass in Practical and Theory examinations separately.

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