



UNIVERSITY OF RAJASTHAN JAIPUR

FACULTY OF EDUCATION

SYLLABUS

INTEGRATED PROGRAMME OF

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

Annual Scheme

**Academic Session 2020-21
Examination B.Sc.-B.Ed. Part – I (2021)**

Poo Jain
Dy. Registrar (Acad.)
University of Rajasthan
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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 University headquarter Jaipur only and not any other place.

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B.Sc B.Ed PART - I

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PAPER 03 -CONTEMPORARY INDIA AND EDUCATION (COMPULSORY PAPER)

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OPTIONAL PAPER (GROUP - B) 05, 06, & 07 (Opt three content based papers)

- I. CHEMISTRY
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- III. ZOOLOGY
- IV. PHYSICS
- V. MATHEMATICS

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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 the 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. Ability to access the all round development of pupils and to maintain a cumulative record.
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.
- iii) Third Year B.Sc.B.Ed.
- iv) Final Year B.Sc.B.Ed.

Duration of the Course - Four Years

Examination after each session in theory papers

Scheme of Examination against each subject separately.

Compulsory Papers*:

Year	Subject/Paper No.	Paper
I st Year	01	Gen. English
II nd Year	08	Gen. Hindi
III rd Year	16	Elementary Computer Application (ICT)
IV th Year	25	Environmental Studies

*ELIGIBILITY CRITERION ON PASSING MARKS BUT MARKS SHALL NOT BE INCLUDED IN DIVISION.

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Group – A: - Subject Specialisation :

Year	Subject/Paper No.	Paper
I st Year	04	Instructional System & Educational
II nd Year	11	Peace Education
III rd Year	18	Guidance and Counselling in School
IV th Year	28	Physical Education & Yoga

Group-B: Content of Science Subject: - A Student has to opt any three optional subject (papers) from group B paper no. 05,06,07 1st year 12,13,14,2nd year 19,20,21 3rd year in 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 Subject22/31: Pedagogy of a School Subject 3rd Year and 4th 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

- ❖ In all the years the student has to study a minimum of 07subjects(1-7) in 1st year, 7 subjects + practicum (8-15) in 2ndYear.7subjects + practicum & final lesson (16-24) in 3rd Year and 7 subjects + practicum & final lesson (25-33) in 4th Year(Total 33Subjects).

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- ❖ Each theory paper will carry 100 marks and content base paper 05,06,07, 1st, 12,13,14 2nd, 19,20,21 3rd year (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. 1st Year

Theory Paper	Course Code	Title of the Paper	Evaluation			Total
			External	Internal	Practical	
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
IV	B.Sc.-B.Ed. 04 (G-A)	Instructional System & Educational Evaluation	80	20	-	100
V	B.Sc.B.Ed 05	Content (Select any Three)				
VI	06	1. Chemistry(I,II,III)	33+33+34		50	150
&	&	2. Botany (I,II,III)	33+33+34		50	150
VII	07	3. Zoology(I,II,III)	33+33+34		50	150
	(G-B)	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. 2nd Year

Theory Paper	Course Code	Title of the Paper	Evaluation			Total
			External	Internal	Practical	
I	B.Sc.B.Ed. 08	Gen. Hindi(Compulsory)*	100	-	-	100
II	B.Sc.B.Ed. 09	Knowledge and curriculum	80	20	-	100
III	B.Sc.B.Ed. 10	Learning and Teaching	80	20	-	100
IV	B.Sc.B.Ed. 11 (G-A)	Peace Education	80	20	-	100
V	B.Sc.B.Ed. 12	Content (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)				
VI	13		33+33+34		50	150
&	&		33+33+34		50	150
VII	14		33+33+34		50	150
	(G-B)		33+33+34		50	150
			40+40+40		30	150
Practicum	B.Sc.B.Ed. 15	OPEN AIR / SUPW 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.3rd Year

Theory Paper	Course Code	Title of the Paper	Evaluation			Total
			External	Internal	Practical	
I	B.Sc.B.Ed. 16	Elementary Computer Application (ICT) (Compulsory)*	60	-	40 (30+10)	100
II	B.Sc.B.Ed. 17	Language Across the Curriculum	80	20	-	100
III	B.Sc.B.Ed. 18 (G-A)	Guidance and Counseling in School	80	20	-	100
IV V & VI	B.Sc.B.Ed. 19 20 & 21 (G-B)	Content (Select any Three) <ol style="list-style-type: none"> 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
VII	B.Sc.B.Ed. 22	Pedagogy of a School Subject (Candidate should opt any two school subject from the following i.e. one school subject for part - 3 and other school subject for Part - 4) <ol style="list-style-type: none"> 1. Chemistry 2. Biology 3. Physics 4. Mathematics 5. General Science 	80	20		100
Practicum	B.Sc.B.Ed. 23	Special Training Programme (School Internship) <ul style="list-style-type: none"> • Micro Teaching • Practice Lesson • Observation Lesson • Technology Based Lesson • Criticism Lesson 			10 50 05 05 20 10	100

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		• Attendance /Seminar/ Workshop				
Practical	B.Sc.B.Ed. 24	Final Lesson	100			100
						950

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Four Years Integrated Course Scheme of B.Sc.B.Ed.4th Year

Theory Paper	Course Code	Title of the Paper	Evaluation			Total
			External	Internal	Practical	
I	B.Sc .B.Ed. 25	Environmental Studies (Compulsory)*	100	-	-	100
II	B.Sc.B.Ed. 26	Creating and inclusive school	80	20	-	100
III	B.Sc.B.Ed. 27	Understanding Disciplines and Subject	80	20	-	100
IV	B.Sc .B.Ed. 28 (G-A)	Physical Education & Yoga	80	20	-	100
V	B.Sc .B.Ed. 29	Gender, School and Society	80	20	-	100
VI	B.Sc .B.Ed. 30	Assessment for Learning	80	20	-	100
VII	B.Sc. B.Ed. 31	Pedagogy of a School Subject (Candidate should opt any two school subject from the following i.e. one school subject for part - 3 and other school subject for Part - 4) 1. Chemistry 2. Biology 3. Physics 4. Mathematics 5. General Science	80	20	-	100

Practicum	B.Sc.B.Ed. 32	School Internship 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
Practical	B.Sc.B.Ed. 33	Final Lesson	100		100
					800

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

Compulsory Papers*

Year	Subject/Paper No.	Paper
Ist Year	01	Gen. English
II Year	08	Gen. Hindi
III Year	16	Computer Application (ICT)
IV Year	25	Environmental studies

Compulsory Paper

Year	Subject/Paper No.	Paper
I st Year	02 03	Childhood and Growing Up Contemporary India and Education
II nd Year	09 10	Knowledge and curriculum Learning and Teaching
III rd Year	17	Language Across the Curriculum
IV th Year	26 27 29 30	Creating and inclusive school Understanding Disciplines and Subject Gender, School and Society Assessment for Learning

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Dr. B. K. Sharma (Acad.)
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Group – A: - Subject Specialisation :

Year	Subject/Paper No.	Paper
I st Year	04	Instructional System & Educational
II nd Year	11	Peace Education
III rd Year	18	Guidance and Counselling in School
IV th Year	28	Physical Education & Yoga

Group B: (Select any three): Content of Science Subject: - A Student has to opt any three optional subject (papers) from group B paper no. 05,06,07 1st year 12,13,14,2nd year 19,20,21 3rd year in which two must be the school teaching subjects.

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

Group C: Pedagogy of School Subject 22/31 : Pedagogy of a School Subject III Year and IV 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

- ❖ In all the years the student has to study a minimum of 07 subjects (1-7) in 1st year, 7 subjects + practicum (8-15) in 2nd Year. 7 subjects + practicum & final lesson (16-24) in 3rd Year and 7 subjects + practicum & final lesson (25-33) in 4th Year (Total 33 Subjects).
- ❖ Each theory paper will carry 100 marks and content base paper 05, 06,07, 1st, 12,13,14 2nd, 19,20,21 3rd year (G-B) will carry 150 marks. (With practical part). Distribution of marks in mathematics is according to their marking scheme in page no.7.

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Dr. B. S. Jaiswal (Acad.)
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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	Subjects	Marks
I Year	7 Subjects +Practical(1-7)	600 +150= 750
II Year	7 Subjects +Practical+Practicum(8-15)	600 +150+100= 850
III Year	7 Subjects +Practical + Practicum +Final Lesson (16-24)	600 +150+ 100 +100= 950
IV Year	7 Subjects + Practicum +Final Lesson	600+ 100 +100= 800
Total	33Papers	2400 +550+200+200= 3350

O. 321 The objectives of the practical work prescribed for the Integrated Programme of B.Sc.B.Ed. 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. Arouse the curiosity and interest of the pupils and secure their active participation in the educative process.
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.

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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 22&31 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. Black-board 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.

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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.
- iii. Student will choose three content based paper from group B and he or she will study the same paper in all the three years I, II and III year.
- iv. A student should opt at least two different pedagogy of school teaching subjects in III year and IV year.

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 1st 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 1 or/ part 2 the theory of education may present themselves for re-examination there in at a 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 reappear in the examination in the immediately following year in the paper in which

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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.326 A: 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;

Part I- Main theory papers at **B.Sc.B.Ed. I**, In Integrated B.Sc.B.Ed IPaper nos. are 02, 03 & 04 in each session are of three hours carrying 100 marks (80 for theory + 20 for sessional) each. Compulsory paper* 01 of 100 marks and optional Paper 05, 06, 07, 1st, 12, 13, 14 2nd, 19, 20, 21 3rd year (G-B). in 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.

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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.
4. 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).
8. 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:

- (1) 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 School Internship).
- (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-
 - ❖ 40 percent marks in the external examination.
 - ❖ 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.

Prof. K. K. Verma
Dean (Acad.)
University of Rajasthan
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B.Sc. B.Ed. I YEAR
GENERAL ENGLISH

Duration : 3hrs.

Max. Marks: 100

Minimum Pass Marks: 36

The syllabus aims at achieving the following objectives:

1. Introducing students to phonetics and enabling them to consult dictionaries for correct pronunciation. (sounds and word stress)
2. Reinforcing selected components of grammar and usage.
3. Strengthening comprehension of poetry, prose and short-stories.
4. Strengthening compositional skills in English for paragraph writing, CVs and job applications.;

The Pattern of the Question Paper will be as follows:

Unit A: Phonetics Symbols and Translation (20 marks)

(10 periods)

- I. Phonetic Symbols and Transcription of Words (05)
- II. Translation of 5 Simple sentences from Hindi to English (05)
from English to Hindi (05)
- III. Translation of (05) Words from Hindi to English (2½)
From English to Hindi (2½)

Unit B: Grammar and Usage

(25marks)

(10 priods)

- I. Elements of a Sentence (05)
- II. Transformation of Sentence (05)
 - a. Direct and Indirect Narration
 - b. Active and Passive Voice
- II Modals (05).
- III Tense (05)

IV Punctuation of a Short Passage with 10 Punctuation Marks (05)

(As discussed in Quirk and Greenbaum)

Unit C: Comprehension

(25 marks)

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Following Essays and Stories in *Essential Language Skills* revised edition, compiled by Macmillan for University of Rajasthan General English B.A/ B.com / B.Sc.

Candidates will be required to answer 5 questions of two lines each to be answered out of 10 questions. There would be two questions from the prescribed text. (10)

Sujata Bhatt Voice of the Unwanted Girl

Ruskin Bond Night Train for Deoli

M.K. Gandhi The Birth of Khadi

J.L. Nehru A Tryst with Destiny

A.P.J. Abdul Kalam Vision for 2020

The candidates will be required to answer 5 questions from the given unseen passage. (10)

One vocabulary question of 10 words from the given passage. (5)

Unit D: Compositional Skills (30 marks)

(15 periods)

- I. Letters-Formal and informal (10)
- II. CV's Resume and job Applications and Report (10)
- III. Paragraph Writing (10)

Recommended Reading

Sasikumar, V, Dutta and Rajeevan, A Course in Listening and Speaking-I Foundation Books. 2005

Sawhney, Panja and Verma eds. English At the Workplace, Macmillan 2003.

Singh, R.P. Professional Communication. OUP. 2004

Judith, Leigh. C.Vs and Job Applications. OUP. 2004

Arthur Waldhorn and Arthur Zeiger, English Made Simple. Upa and Co.

Gunasekared. A Foundation English Course for Undergraduate Book I, CIEFL, Hyderabad.

Quirk and Greenbaum: A University Grammar of English Longman, 1973

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B.Sc.B.Ed PART - I - 02

Childhood and Growing up

Marks -100

Objectives:

After completing the course the students will be able:-

1. To develop an understanding of the basic concepts, methods and principles of psychology.
2. To develop an understanding of the nature and process of development.
3. To understand the different periods of life with Psycho-Social Perspective.
4. To develop an understanding of the nature and process of learning in the context of various learning theories and factors.
5. To understand the critical role of learning Environment.
6. To acquaint them with various Psychological attribute of an individual.
7. To reflect on the changing roles of children in contemporary society.

Unit I: Role of psychology to understand the child

- Psychology: Meaning, nature & branches of psychology,
- Methods of psychology: case study and experimental, Edu. Psychology;
- Meaning, nature, scope, educational implication of psychology in new Era,
- Child psychology; meaning, concept

Unit II: Multi dimensional development

- Growth and development- concept, stages principles, dimensions, Factors in influencing development- genetic, biological, environmental and physical
- Theories of development :
 - a) Piaget's vgotsky cognitive development
 - b) Freud's psycho- sexual development
 - c) Erikson's psycho social development
 - d) Gessel's maturation theory

Unit 3: Child Growing up

- Childhood: Meaning, concept and characteristics, effects of family, schools, neighbourhood and community on development of a child

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- Adolescence: meaning, concept, characteristics, effects of family, school, peer group, social climate and social media.
- Personality: concept and nature, theories of personality with special reference to (Garden Allport, Psycho analytical theory, Jungs Theory) assessment of personality
- Individual differences: concept, areas (With Special Educational needs-Concept) and educational implication.
- Stress: meaning, types consequences of stress and stress managment.

Unit 4: Learning to Learn

- Concept and beliefs about learning:-Defining misconception, Brain's role in learning
- Memory and forget, Behaviouristic learning theories (Thorndike, Skinner, Pavlov),Gestalt, Cognitive, Types of learning by Gagne.
- Motivation:-Concept and Maslow's Hierarchy need theory, Creating and maintaining a productive Classroom Environment-Dealing with misbehaviour

Unit 5:Psychological Attributes of an individual

- Intelligence - Meaning, Types of intelligence - Social, Emotional and Spiritual Intelligence, theory of intelligence, Gardner's Multi intelligence theory, Measurement of intelligence
- Creativity - Meaning, Components, ways of enhancing creativity, relation with intelligence and other factors, Measurement of creativity
- Socialization - Process of Socialization - Group dynamics - Theory of Kurt lewin's, Leadership and its styles (Kimble young), social prejudice
- Mental Health - Common problems related to child - Attention deficit hyperactivity disorder (ADHD), depression, Learning disabilities, dealing with a problematic child.

Test and Assignment:-

- Class Test 10 Marks
 - Project (Any one of the following) 10 Marks
1. Comparative study of developing pattern's of children with reference to different in SES.
 2. Collecting and analyzing statistics on the girl child with reference to gender ratio.
 3. Write the adminstration, scoring, interpretation and conclusion of any one test by psychological experiment on learning/span of attention/memory/intelligence test.

References:

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1. Agarwal, Reetu, Shukla Geeta (2014). Bal Vikas evam Manovigyan, Rakhi Prakashan, Agra
2. Aggarwal, J.C., (1981). Essential of Educational Psychology, Delhi, Doaba Book
3. Arora, Dr. Saroj, Bhargava, Rajshri (2014). Bal Manovigyan, Rakhi Prakashan, Agra
4. Bigge, M.L. (1982). Learning Theories for Teachers. New York: Harper and Row
5. B.P. (2000). Personality theories, Bosten: Allyn and Bacon House.
6. Chauhan, S.S. (2001). Adanaced educational psychology, New Delhi: Vikas Publishing House.
7. Diane E. Papalia, Sally Wendkos olds, Ruth Durkin Feldman, Ninth Edition, Human Development, Tata Mcgraw Hill Publishing company Limited, New Delhi.
8. Helen Bee Denise Boyd, First Indian Reprint 2004. The Developing Child, Published by Pearson Education Pre. Ltd., Indian Branch Delhi, India
9. Jack Snooman, Robert Biehler Ninth Edition. Psychology Applied to Teaching, Houghton Mifflin Company, Bosten New York (<http://www.coursewise.com>)
10. Ormrod Ellis Jenne, Third Edition, Educational Psychology Developing Learners Multimedia Edition (<http://www.prenhall.com/ormrod>)
11. Sarswat Kuldeep (2015). Bal Vikas evam Bachpan, Published by Rakhi Prakashan, Agra
12. Woolfolk, A. (2004). Educational Psychology published by Dorling Kindersley (India) Pvt. Ltd., Licensees of Pearson Education in South Asia.

B.Sc. B.Ed PART - I - 03

Contemporary India and Education

MARKS-100

Objectives:-

After completing the course the students will be able to :

1. To promote reflective thinking among students about issues of education related to contemporary India.
2. To develop an understanding of the trends, issues and challenges faced by contemporary education in India.
3. To appreciate the developments in Indian education in the post independence era.

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4. To understand the Commissions and committees on education constituted from time to time.
5. To understand issues and challenges of education and concern for the underprivileged section of the society.
6. To develop awareness about various innovation practices in education.
7. To develop and understanding of self teaching technical devices.
8. To understand the constitutional values and provisions for education.

Course Content

Unit I Education as an Evolving Concept

- Education: Meaning, concept and nature, Ancient to present education as an organized and institutionalized form, formal and state sponsored activities.
- Aims of Education: Historicity of aims of Education, changing aims of education in the context of globalization, sources of aims of Education, influence of aims of education on the curriculum and transactional strategies. Idea of educational thinkers such as Aurobindo, Krishnamurthy, Friere and Illich.

Unit – II: Issues and Challenges

- Diversity, Inequality, Marginalization:- Meaning, Concept, Levels with special reference to Individual, Region, Language, Caste, Gender.
- Role of education in multicultural and multilingual society for Equalization and Improvement of Marginalization groups.
- Hindrances of Education in India: Quality, Facilities, Access, Cost, Political unwillingness, Youth unsatisfaction, Moral Crisis.

Unit – III: Constitution and Education

- Study of the Preamble, fundamental rights and duties of citizens, Directive Principles for state and constitutional values of Indian Constitution.
- Constitutional provisions for education and role of education in fulfillment of the constitutional promise of Freedom, Equality Justice, Fraternity.
- Education and politics, Constitutional vision related to aims of education, Peace Education, Role of Education, School and Teachers as agents for Imparting Culture, Education and Development. Education and Industrialization.

Unit – IV: Programme and Policies

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- Overview the development of education system in India from 1948 to 2010 University Education Commission-1946-48, Secondary Education Commission-1952-53, Indian Education Commission- 1964-66, National Education Policy- 1986
- Rammurthy Committee (1990), Yashpal Committee Report (1993) Revised National Education Policy (1992) NCF-2005, NKC-2006, NCFTE- 2009, RTE-2010.
- SSA, MLL, RMSA, CCE, Navodaya Vidyalaya, Kasturba Gandhi Balika Vidyalaya, Model School.

Unit – V: Innovative Practices

- Concept, Need of innovation in view of technological and social change, Obstacles in innovation, Role of Education in bringing innovations,
- Education through interactive mode of teaching: Computer, Internet, Tally and Video-Conferencing, Edu-set Smart Class Room
- Yoga Education, Life Skill Education, Education and Competence in life regarding Social inclusion.

Test and Assignments :-

1. Class Test 10 marks
2. Any one of the following: - 10 marks
 - Debate or Organize a one day discussion on the topic related to the subject and submit a report.
 - Critical appraisal on the report or recommendations of any commission and committee.
 - Organize collage, Poster Making activity in your respective institution.
 - Collection of at least three handouts of related topics of the subject.

REFERENCES :-

1. Agnihotri, R. (1994) Adhunik Bhartiya Shiksha Samasyaye Aur Samadhan, Jaipur: Rajasthan Hindi Granth Academy
2. Agrawal, J.C: Land Marks in the History of Modern Indian Education, New Delhi 2. Brubecher, John.S: A History of the Problems of Education
3. Altekar, A. S.(1992) Education in Ancient India, Varanasi: Manohar Prakashan
4. Dev, A.,Dev, T.A.,Das,S. (1996) Human Rights a Source Book, New Delhi, NCERT, Pp. 233.

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5. Dubey, S.C. (1994) Indian Society, New Delhi, NBT, Pp.
6. Education and National Development: Report of the Kothari Commission on Education, New Delhi, 1966.
7. अग्निहोत्री, रवीन्द्र : आधुनिक भारतीय शिक्षा समस्याएँ और समाधान, राजस्थान हिन्दी ग्रंथ अकादमी।
8. Gore. M. S. (1982) Education and Modernization in India, Jaipur: Rawat Publications
9. Ghosh, S.C. (1995) The History of Education in Modern India (1757- 1986), New Delhi : Orient Longman Ltd.
10. J.F. Brown: Educational Sociology
11. Kabir, H. (1982) Education in New India, London: George Allen an Unwin.
12. Kashyap Subhash C., Our constitution: An Introduction to India's constitution and constitutional laws, National Book Trust India, 2011.
13. Keay, F.E: Indian Education in Ancient and later Times
14. M.N. Srinivas: Social Change in Modern India
15. Mookerji, R. K. (1947) Ancient Indian Education (Brahmanical and Buddhist), London: Mac Milan and Co. Ltd.
16. Mookerji, R.S: Ancient Indian Education
17. Naik, J. P., Nurullah, S.(1974) A Student's History of Education in India, (1800-1973), New Delhi : Orient Longman Ltd.
18. Nayar, P. R. Dave, P.N. Arora, K. (1983) The Teacher and Education in Emerging Indian Society, New Delhi: Orient Longman Ltd
19. National Curriculum Framework. (2005).
20. National curriculum Framework for teacher education (2004).
21. Rama Jois, M. (1998) Human Rights and Indian Values, New Delhi: N.C.T.E.
22. Rusk, R. R. (Scotland, J. Revised) (1979) Doctrines of the Great Educators, Delhi, Dublin, New York: The Mac Milan Press Ltd.,
23. Saiyidain. K.G. (1966) The Humanist Tradition in Indian Education Thought, New Delhi: Aria Publishing House
24. Shukla, R.P. (2005). Value Education and Human Rights, New Delhi: Samp & Sons.
25. Varghese, A. (2000) Education for the Third Millennium, Indore: Satprachar Press
26. अल्तेकर, अ.स. : प्राचीन भारतीय शिक्षा पद्धति।

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27. ओड, एल. के. : शिक्षा के नूतन आयाम, राजस्थान हिन्दी ग्रंथ अकादमी, जयपुर।
28. गुप्ता, एस. पी एवं अलका गुप्ता : भारत में शिक्षा प्रणाली का विकास, शारदा पुस्तक प्रकाशन, इलाहाबाद।
29. रावत, प्यारे लाल : भारतीय शिक्षा का इतिहास, आगरा।
30. जोशी, सुषमा : भारत में शिक्षा प्रणाली का विकास एवं समस्याएं, शारदा पुस्तक भवन, इलाहाबाद।
31. लाल रमन बिहारी : भारतीय शिक्षा और उसकी समस्याएं, रस्तोगी पब्लिकेशन्स, मेरठ।
32. साथिन संदर्भ सामग्री पुस्तिका : महिला एवं बाल विकास विभाग, राज, सरकार, जयपुर।

B.Sc.B.EdPART-I -04

INSTRUCTIONAL SYSTEM AND EDUCATIONAL EVALUATION

Objectives:

Marks : 100

This course will enable the student teacher to:

- Explain the need, importance and characteristics of educational evaluation.
- Describe the approaches to educational evaluation.
- Discuss the role of educational evaluation in Teaching - Learning Process.
- Explain the nature of tools and techniques of educational evaluation.
- Describe the need and importance of psychological testing.
- Explain the nature of learners' evaluation and need for continuous comprehensive educational evaluation in schools.

Unit I: Instructional System

- Educational Objectives and instructional objectives.
- Relationship between educational objectives and instructional objectives
- Classification of educational objectives (Cognitive, affective and psycho motor)
- Functioning of educational objectives
- Usefulness of the taxonomical classification.

Unit II: Need, importance and characteristics

- Teaching Learning process and role of evaluation
- Need and importance of Evaluation
- Definition of Evaluation
- Evaluation, Assessment and Measurement.
- Characteristics of good evaluation.

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Unit III: Approaches to Evaluation

- Formative evaluation and summative evaluation
- Difference between summative and formative evaluation
- External evaluation and internal evaluation, advantages and disadvantages,
- Norm referenced evaluation
- Criterion referenced evaluation.

Unit IV: Role of Evaluation in Teaching-Learning Process.

- The relationship between instructional objectives, entering behavior, learning experiences and Performance assessment.
- Diagnosis to over come deficiency in learning.
- Importance of results of evaluation to students, teachers, institutions with special reference to help in determining the effectiveness of a course, programme and functioning of a school.

Unit V: Nature of tools and techniques of evaluation

- Nature of test and Purposes of testing with reference to:
- Instructional purpose b) Guidance purpose c) Administrative purpose
- Administration of Test and Interpreting test result.
- Meaning of Norms, types of Norms, age, Grade, Percentile and standard score. 4. Norms and interpretation of test scores.
- Concept of grade system. Absolute grading, comparative grading and its advantages and disadvantages.

Test and Assignments - 20 marks

One class Test - 10 marks

Practical (any one) 10 marks

1. Develop a portfolio for assessment of 2 school students
2. Prepare an advanced tool for evaluation
3. Develop a tool for self-assessment.
4. Develop an achievement test and its blue print.

References:

1. Anastasi, Anne, (1976), Psychological Testing, 4m ed., New York; Macmiflan Publishing Co. Inc.

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2. Bertrand, Arthur and Cebula, Joseph P., (1980) : Tests, Measurement and Evaluation, A Developmental Approach, Addison-Wesley, U.S.A.
3. Bloom, Benjamin S., Et.al., (1971): Handbook on formative and Summative Evaluation in Student Learning, McGraw Hill, USA.
4. Ebel, Robert, L. (1996) : Measuring Educational Achievement, Prentice-Hall of India, New Delhi.
5. Ferguson, G A (1974), "Statistical Analysis in Psychology and Education", McGraw Hill Book Co., New York,
6. Freeman, Frank S., (1962), Theory and Practice of Psychological Testing, New Delhi, Oxford and IBH Publishing Co.
7. Guilford, J.P. (1965), Fundamental Statistics in Psychology and Education, McGraw Hill Book Company, New York.
8. Khan, Mohd, Arif, (1995): School Evaluation, Ashish Publishing House, New Delhi.
9. Noll, V .C (1957). Introduction to Educational Measurement, Houghton Mifflin Company, Boston.
10. Nunnally, Jume, (1964), Educational Measurement & Evaluation, New York; McGraw Hill Book Company.

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CHEMISTRY

Scheme:

Max Marks: 150

	Duration (hrs.)	Max. Marks	Min. Pass Marks
Paper I	3	33	
Paper-II	3	33	36
Paper-III	3	34	
Practical	5	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.

CH-101 Paper I : Inorganic Chemistry

(2 hrs or 3 periods/ week)

Unit-I

Ionic Solids: Ionic structures, radius ratio effect and coordination number, limitation of radius ratio rule, lattice defects, semiconductors, lattice energy and Born Haber cycle, solvation energy and solubility of ionic solids, polarizing power and polarisability of ions, Fajan's rule.

Metallic bond: free electron, valence bond and band theories.

Weak Interactions: Hydrogen bonding, vander Waals forces.

Unit-II

Covalent Bond: Valence bond theory and its limitations, directional and shapes of simple inorganic molecules and ions. Valence shell electron pair repulsion (VSEPR) theory to NH_3 , H_3O^+ , SF_6 , ClF_3 , ICl_2 , H_2O .

Molecular Orbital Theory: homonuclear and heteronuclear (CO and NO) diatomic molecules. Multicenter bonding in electron deficient molecules, bond strength and bond energy, percentage ionic character from dipole moment and electronegativity difference.

Unit-III

s-Block Elements: Comparative study, diagonal relationships, salient features, of hydrides, solvation and complexation tendencies including their function in biosystems, an introduction to alkyls and aryls.

Periodicity of p-block elements: Periodicity in properties of p-block elements with special reference to atomic and ionic radii, ionization energy, electron affinity, electronegativity, diagonal relationship, catenation.

UNIT-IV

Some Important Compounds of p-block Elements: Hydrides of boron, dihorane and higher boranes, borazine, borohydrides, fullerenes, carbides, fluorocarbons, silicates (structural principle), tetrasulphur tetranitride, basic properties of halogens, interhalogens and polyhalides.

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Chemistry of Noble Gases: Chemical properties of the noble gases, chemistry of Xenon, structure and bonding in Xenon compounds.

Unit- V

Nuclear Chemistry: Fundamental particles of nucleus (nucleons); Concept of nuclides and its representation; Isotopes, Isobars and Isotones (with specific examples); Forces operating between nucleons (n-n, p-p, & n-p); Qualitative idea of stability of nucleus (n/p ratio).

Radiochemistry: Natural and artificial radioactivity; Radioactive disintegration series; Radioactive displacement law; Radioactivity decay rates; Half life and average life; Nuclear binding energy, mass defect and calculation of defect and binding energy; Nuclear reactions, Spallation, Nuclear fission and fusion.

CH-102 Paper II : Organic Chemistry (2 hrs or 3 periods / week)

Unit-I

Mechanism of Organic Reactions: Homolytic and heterolytic bond cleavage; Types of reagents, electrophiles and nucleophiles. Reactive intermediates - carbocations, carbanions, free radicals, carbenes, arynes and nitrenes (with examples). Types of organic reactions. Factors considerations. Methods of determination of reaction mechanism (product analysis, intermediates, isotope effects, kinetic and stereochemical studies).

Unit-II

Stereochemistry of Organic Compounds: Concept of isomerism, Types of isomerism, Difference between configuration and conformation, Flying wedge and Fischer projection formulae.

Optical Isomerism: Elements of symmetry, molecular chirality, enantiomers, stereogenic centre, optical activity. Properties of enantiomers, chiral and achiral molecules with two stereogenic centres. Diastereomers, threo and erythro isomers, meso compounds. Resolution of enantiomers. Inversion, retention and racemization (with examples).

Relative and absolute configuration, sequence rules, D/L and R/S systems of nomenclature.

Geometric Isomerism: Determination of configuration of geometric isomers - cis/trans and E/Z systems of nomenclature. Geometric isomerism in oximes and alicyclic compounds.

Conformational Isomerism: Newman projection and Sawhorse formulae, Conformational analysis of ethane, n-butane, cyclohexane.

Unit-III

Alkanes and Cycloalkanes: IUPAC nomenclature of branched and unbranched alkyl group, classification of carbon atoms in alkanes. Methods of formation (with special reference to Kolbe reaction, Kolbe reaction, Corey-House reaction and decarboxylation of carboxylic acids). Physical properties and chemical reactions of alkanes. Mechanism of free radical halogenation, orientation, reactivity and selectivity. Cycloalkanes - nomenclature, methods of formation, chemical reactions. Baeyer's strain theory and its limitations. Theory of strainless rings.

Alkenes, Cycloalkenes, Dienes and Alkynes: Methods of formation, mechanisms of dehydration of alcohols and dehydrohalogenation of alkyl halides. Regioselectivity in alcohol dehydration - the Saytzeff rule, Hoffmann elimination. Physical properties and relative stabilities

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Alkenes: Chemical reactions of alkenes - mechanisms involved in hydrogenation, electrophilic and free radical additions. Markownikoff's rule, hydroboration-oxidation, oxymercuration-reduction. Epoxidation, ozonolysis, hydration, hydroxylation and oxidation with KMnO_4 . Polymerization of alkenes. Substitution at the allylic and vinylic positions of alkenes. Classification and Nomenclature of isolated, conjugated and cumulated dienes. Structure of allenes and butadiene. Methods of formation, properties, Chemical reactions - 1,2- and 1,4-additions, Diels-Alder reaction and polymerization. Structure and bonding in alkynes. Methods of formation. Chemical reactions - acidity of alkynes; mechanism of electrophilic and nucleophilic addition reactions; hydroboration-oxidation; metal-ammonia reduction, oxidation and polymerization.

Unit-IV

Arenes and Aromaticity: Nomenclature of benzene derivatives. The aryl group, aromatic nucleus and side chain. Structure of benzene: molecular formula and Kekule structure. Stability and carbon-carbon bond lengths of benzene, resonance structure, MO diagram. Aromaticity: the Huckle rule, aromatic ions - three to eight membered.

Aromatic electrophilic substitution: General pattern of the mechanism, role of π -complexes. Mechanism of nitration, halogenation, sulphonation, mercuration, Friedel-Crafts reactions and chloromethylation. Energy profile diagrams. Activating and deactivating substituents. Directive influence - orientation and ortho/para ratio. Side chain reactions of benzene derivatives. Birch reduction.

Unit-V

Alkyl and Aryl Halides: Methods of formation of alkyl halides, chemical reactions. Mechanisms of nucleophilic substitution reactions of alkyl halides $\text{S}_\text{N}2$ and $\text{S}_\text{N}1$ reactions with energy profile diagrams.

Polyhalogen compounds: Chloroform, carbon tetrachloride.

Methods of formation of aryl halides, nuclear and side chain reactions. The addition-elimination and the elimination-addition mechanisms of nucleophilic aromatic substitution reactions. Relative reactivities of alkyl, allyl, vinyl and aryl halides.

CH-103 Paper III: Physical Chemistry (2 hrs. or 3 Periods/week)

UNIT-I

Mathematical Concepts: Logarithmic relations, curve sketching, linear graphs and calculations of slopes, differentiation of functions like k_x , e^x , x^a , $\sin x$ and $\log x$; maxima and minima, partial differentiation and reciprocity relations, integration of some useful/relevant functions, permutations and combinations, factorials, probability.

Liquid State: Intermolecular forces, structure of liquids (a qualitative description). Structural differences between solids, liquids and gases. Liquid crystals: Difference between liquid crystal, solid and liquid. Classification, structure of nematic and cholestric phases. Thermography and seven segment cell.

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UNIT- II

Gaseous States: Postulates of kinetic theory of gases, deviation from ideal behavior, van der Waals equation of state.

Critical Phenomenon: PV isotherms of real gases, continuity of states, the isotherms of van der Waals equation, relationship between critical constants and van der Waals constants, the law of corresponding states, reduced equation of state.

Molecular velocities: Root mean square, average and most probable velocities. Qualitative discussion of the Maxwell's distribution of molecular velocities, collision number, mean free path and collision diameter. Liquification of gases (based on Joule-Thomson effect.)

UNIT- III

Solid State: Definition of space lattice, unit cell.

Laws of crystallography- (i) Law of constancy of interfacial angles (ii) Law of rationality of indices (iii) Law of symmetry. Symmetry elements in crystals.

Basic concept of X-ray diffraction by crystals. Derivation of Bragg's equation. Determination of Crystal structure of NaCl and CsCl (Laue's method and powder method), band theory of solids. Defects in solids

UNIT IV

Colloidal State: Definition of colloids, classification of colloids.

Solids in liquids (sols) properties- kinetic, optical and electrical, stability of colloids. Protective action, Hardy-Schulze law, gold number.

Liquids in solids (gels): classification, preparation and properties, inhibition, general applications of colloids.

Liquids in liquids (emulsions): types of emulsions, preparation. Emulsifier.

UNIT V

Chemical Kinetics: Chemical kinetics and its scope, rate of a reaction, factors influencing the rate of a reaction, concentration, temperature, pressure, solvent, light, catalyst. Concentration dependence of rates, mathematical characteristics of simple chemical reactions - zero order, first order, second order, pseudo order, half-life and mean-life. Determination of the order of reactions - differential method, method of integration, method of half-life period and isolation method.

Radioactive decay as a first order phenomenon.

Experimental methods of chemical kinetics: conductometric, potentiometric, optical methods, polarimetry and spectrophotometry. Theories of chemical kinetics. Effect of temperature on rate of reaction, Arrhenius equation, concept of activation energy.

Simple collision theory based on hard sphere model transition state theory (equilibrium hypothesis). Expression for the rate constant based on equilibrium constant and thermodynamic aspects.

Practical: CH -104: Laboratory Course -I

(4 hrs or 6 periods / week)

INORGANIC CHEMISTRY

Separation and identification of six radicals (3 cations and 3 anions) in the given inorganic mixture including special combinations.

ORGANIC CHEMISTRY

Laboratory Techniques

- (a) Determination of melting point (naphthalene, benzoic acid, urea, etc.); boiling point (methanol, ethanol, cyclohexane, etc.); mixed melting point (urea-cinnamic acid, etc.).
- (b) Crystallization of phthalic acid and benzoic acid from hot water, acetanilide from boiling water, naphthalene from ethanol etc.; Sublimation of naphthalene, camphor, etc.

Qualitative Analysis

Element Detection (N, S and halogens). Functional group determination (unsaturation, phenolic, alcoholic, carboxylic, carbonyl, ester, carbohydrate, amine, amide, nitro) in simple organic solids and liquids.

PHYSICAL CHEMISTRY

(One of the following experiments should be given in the examination)

(i) Chemical Kinetics:

- (a) To determine the specific reaction rate of the hydrolysis of methyl acetate/ethyl acetate catalyzed by hydrogen ions at room temperature.
- (b) To study the effect of acid strength on the hydrolysis of an ester.
- (c) To compare the strengths of HCl and H_2SO_4 by studying the kinetics of hydrolysis of ethyl acetate.
- (d) To study kinetically the reaction rate of decomposition of iodide by H_2O_2 .

(ii) Viscosity, Surface Tension:

- (a) To determine the viscosity/surface tension of a pure liquid (alcohol etc.) at room temperature, (using the Ostwald viscometer/stegmometer).
- (b) To determine the percentage composition of a given binary mixture by surface tension method (acetone & ethyl methyl ketone).
- (c) To determine the percentage composition of a given mixture (non-interacting systems) by viscosity method.
- (d) To determine the viscosity of amyl alcohol in water at different concentration and calculate the excess viscosity of these solutions.

(Instructions to the Examiners)

CHFY 104: Chemistry Practical (Pass course)

Max. Marks: 50	Duration of Exam: 5 hrs.	Minimum Pass Marks: 18
Inorganic Chemistry		
Ex.1 Separation and identification of 3 cations and 3 anions in the mixture		5
Organic Chemistry		
Ex.2 Laboratory Techniques		3
Ex.3 Qualitative Analysis		3
Detection of element and detection of functional group		10
Physical Chemistry		
Ex.4 Perform one of the experiments mentioned in the syllabus.		12
Ex.5 Viva-voce		5
Ex.6 Record		5
Total		50

BOTANY

Scheme

Min. Pass Marks: 36

Paper I

3 hrs. Duration

Max Marks: 100

Paper II

3 hrs. Duration

Max Marks 33

Paper III

3 hrs. Duration

Max Marks 33

Practical Min. Marks: 18

4 hrs. duration

Max Marks 34

Max. Marks 50

Duration of examination of each theory paper-

3 hours

Duration of examination of practical's-

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
Cell Biology, Genetics and Plant Breeding
(2 hrs /week)

Unit-1

Cell organelles and Nuclear material: Ultrastructures and functions of different cell organelles (cell wall, plasma membrane, nucleus, mitochondria, chloroplast, ribosome, peroxisomes, Lysosome, Golgi bodies and Endoplasmic Reticulum). Chromatin structure & Chromosome organization: eukaryotic and prokaryotic. Chromosome morphology; specialized types of chromosomes (Sex chromosomes, lampbrush Chromosome, Polytene chromosome); transposons.

Unit-2

Cell divisions: Cell cycle, mitosis: stages, structure and functions of spindle apparatus; anaphase chromosome movement; Meiosis: its different stages- Meiosis I, Meiosis II, synaptonemal complex, chiasmata formation and crossing over.

Basis of genetic material: Griffith's transformation experiment and The Hershey and Chase blender experiment to demonstrate DNA as the genetic material. Concept of Gene: *Neurospora* genetics: one gene one enzyme hypothesis;
An idea about Prokaryotic and eukaryotic structure of gene – operon concept, exons and introns.

Extra nuclear genome: mitochondrial and Chloroplast genome, plasmids;

Chromosomal aberrations: Deletion, duplication, translocation, inversion, Aneuploidy and polyploidy.

Unit-3

Genetic inheritance: Mendel's laws of inheritance and their exceptions; allelic interactions (complete and co-dominance, lethality) and non-allelic interactions (complementary genes, epistasis and duplicate genes). Quantitative inheritance : grain color in wheat, corolla length in *Antirrhinum* and *tabacum*.

Cytoplasmic inheritance: maternal influence, shell coiling in snails, Kappa particles in *Paramecium*, Multiple allelism : ABO blood groups in men

Unit-4

Plant Breeding : Introduction and objectives of plant breeding; general methods of plant breeding- in self-pollinated, cross-pollinated and vegetatively propagated crop plants :Introduction and acclimatization, selections, hybridizations, hybrid vigour and inbreeding depression. Role of mutation and polyploidy in plant breeding. Famous Indian and international plant breeders and their contribution. National and International agricultural research institutes.

Plant breeding work done on wheat and rice in India, Green revolution

Suggested Laboratory Exercises.

- Study of cell structure from Onion, *Hydrilla* and *Spirogyra*.
- Study of cyclosis in *Tradescantia* spp.
- Study of plastid for pigment distribution in *Lycopersicon*, *Cassia* and *Capsicum*.
- Study of electron microphotographs of eukaryotic cells for various cell organelles.
- Study of electron microphotographs of virus, bacteria and eukaryotic cells for comparative study of cellular organization.
- Study of different stages of mitosis and meiosis in root-tip cells and flower buds respectively of onion.
- To solve genetic problems based upon Mendel's laws of inheritance: Monohybrid, Dihybrid, Back cross and test cross.
- Permanent slides/photographs of different stages of mitosis and meiosis, sex chromosomes, polytene chromosome and salivary gland chromosomes.
- Emasculation, bagging & tagging techniques
- Cross pollination techniques

Suggested Readings:

- Choudhary, H.K. (1989). Elementary Principles of Plant Breeding. Oxford and IBM Publishing Co., New Delhi.
- Gupta, P.K. (2009). Cytology, Genetics, Evolution, and Plant Breeding, Rastogi Publications, Meerut.
- Miglani, C.S. (2000). Advanced Genetics, Narosa Publishing House, New Delhi.
- Russel, P.I. (1998). Genetics. The Benjamin/Cummings Publishing Co., Inc. U.S.A.
- Shukla, R.S. and Chandel, P.S. (2000). Cytogenetics, Evolution and Plant Breeding, S. Chand & Co. Ltd., New Delhi.
- Singh, R.B. (1999). Text Book of Plant Breeding, Kalyani Publishers, Ludhiana.
- Dnyansagar, V.R. (1986). Cytology and Genetics, Tata McGraw-Hill Pub. Co. Ltd. New Delhi.
- Roy, S.C. and De, K.K. (1999). Cell Biology, New Central Book Agency (P) Ltd. Calcutta.

Verma, P.S. and Agarwal, V.K. (2012). Cell Biology, Genetics, Molecular Biology, Evolution and Ecology, S. Chand and Co. Ltd. New Delhi

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Paper II

Microbiology, Mycology and Plant Pathology

(2 hrs /week)

Unit-1

Microbiology: Meaning and Scope, history and development in the field of microbiology. Concept of quorum sensing and biofilm

Eubacteria: general account, occurrence, morphology (structure, shapes), flagella, nutritional types, endospore, reproduction (binary fission, transformation, conjugation, transduction), economic and biological importance.

Mycoplasma: occurrence, morphology, reproduction and importance.

Unit-2

Virus: General characteristics and importance. Structure of TMV and Pox virus, Structure and multiplication of Bacteriophage.

Fungi: General characters, occurrence, thallus organization, reproduction, economic importance. Classification of fungi (Alexopoulos and Ainsworth's).

Plant diseases: Biotic and abiotic diseases, important symptoms caused by fungi, bacteria, viruses and MLOs (blights, mildews- downy and powdery, rusts, smuts, canker, mosaic, little leaf, galls etc.).

Unit-3

Brief account, structure, importance and life history and/or disease cycle and control of the following:

Albugo and white rust; *Sclerospora* and Downy mildew/Green ear disease of Bajra; *Aspergillus*, *Claviceps* and Ergot; *Peziza*.

Unit-4

Brief account, structure, importance and life history and/or disease cycle and control of the following:

Puccinia and Black rust of wheat; *Ustilago* and loose smut of wheat and covered smut of barley; *Agaricus*, *Alternaria* and early blight of potato

Suggested Laboratory Exercises:

1. Study of bacteria using curd or any other suitable material, Gram's staining of bacteria.
2. Study of Mycoplasma, TMV, Poxvirus, bacteriophage (photographs/ 3-D models)
3. Study of symptoms of plant diseases: Downy mildew of Bajra, Green ear of bajra, Powdery mildew, mosaic of bhindi

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4. Study of specimen, permanent slides and by making suitable temporary slides: *Albugo*- white rust; *Sclerospora*- downy mildew, green ear; *Aspergillus*, *Claviceps*- ergot; *Ustilago*- loose smut of wheat, covered smut of barley, *Puccinia*- Black rust of wheat; *Agaricus*; *Peziza* and *Alternaria*- early blight of potato. *Visit a local Botanical Garden / A.R.L. of study of plant in farms field / Agricultural Stations.*
5. Media preparation: potato dextrose agar, Nutrient agar
6. Culture techniques of fungi and bacteria.

Suggested Books:

- Alexopoulos, C.J. and Mims, C.W.: Introductory Mycology, John Wiley and Sons, New York. 2000
- Dube, H.C.: Fungi, Rastogi Publication, Meerut, 1989.
- Sarabhai, R.C. and Saxena, R.C.: A text book of Botany, Rastogi Publication, Meerut, 1990.
- Sharma, O.P.: Fungi, Today and Tomorrow Printers and Publishers, New Delhi, 2000.
- Vashista, B.R. Botany for Degree Students-Fungi, S. Chand & Co., New Delhi, 2001.
- Bilgrami, K.S. and Dube, H.C.: A text book of Modern Plant Pathology, Vikas Publications, New Delhi 2000.
- Biswas, S.B. and Biswas, A.: An Introduction to Viruses, Vikas Publications, New Delhi. 2000.
- Clifton, A.: Introduction of Bacteria, McGraw Hill Co. Ltd., New York, 1985.
- Madahar, C.L.: Introduction of Plants Virus, S. Chand and Co., New Delhi, 1978.
- Palzar M.J Jr. Chan, E.C.S. and Krieg, N.R.: Microbiology, McGraw Hill Edu. Pvt. Ltd., London 2001.
- Purohit, S.S.: Microbiology, Agro. Bot. Publication, Jodhpur 2002.
- Sharma, P. D.: Microbiology and Pathology, Rastogi Publication, Meerut, 2003.
- Singh, V. and Srivastava V.: Introduction of Bacteria, Vikas Publication, 1998.
- Cappuccino, J. and Sherman, N.: Microbiology: A Laboratory Manual (10th Ed.), Benjamin Cummings, 2013.
- Aneja, K.R.: Experiments in Microbiology, Plant Pathology and Biotechnology New Age International (P) Ltd., Publishers, New Delhi 2003.
- Mehrotra, R.S. and Aggarwal, Ashok: Plant pathology, Tata McGraw-Hill Education, 2003.

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Paper III
Algae, Lichens and Bryophyta
(2 hrs/week)

Unit-1

General characters, Classifications (Smith). Diverse Habitat. Range of thallus structure, photosynthetic pigments and food reserves. Reproduction (Vegetative, Asexual, Sexual). Types of the life cycle: Economic importance.

Unit-2

Type Studies

Cyanophyceae - *Oscillatoria*, *Nostoc*

Chlorophyceae - *Volvox*, *Chara*

Xanthophyceae - *Vaucheria*

Phaeophyceae - *Ectocarpus*

Rhodophyceae - *Polysiphonia*

Unit-3

General characters, Origin, and evolution of Bryophyta. Classification (Eichler); Habitat, Range of thallus structure, Reproduction (Vegetative and Sexual); Alternation of generations; Economic importance.

Type Studies: Hepaticopsida - *Riccia*, *Marchantia*

Unit-4

Type Studies: Anthocerotopsida - *Anthoceros*, Bryopsida - *Funaria*

Lichens - General characters, habitat, Structure, reproduction and economic and Ecological importance of lichens.

Suggested Laboratory Exercises

- 1 Study of class work material by making suitable temporary slides and study of permanent slides of *Oscillatoria*, *Nostoc*, *Volvox*, *Chara*, *Vaucheria*, *Ectocarpus*, *Polysiphonia*.
- 2 Study of external morphology and preparation of suitable sections of vegetative/reproductive parts of *Riccia*, *Marchantia*, *Anthoceros*, *Funaria*.
- 3 Study of lichens.

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Suggested Readings

- Bold, H.C. Alexopoulos, C.J. and Delevoryas, T. Morphology of Plant and Fungi (4th Ed.) Harper & Foul Co., New York, 1980.
- Ghemawat, M.S., Kapoor, J.N. and Narayan, H.S. A text book of Algae, Ramesh Book Depot, Jaipur, 1976.
- Gilbert, M. Smith: Cryptogamic Botany, Vol. I & II (2nd Ed.) Tata McGraw Hill. Publishing Co. Ltd. New Delhi, 1985.
- Kumar, H.D.: Introductory Phycology, Affiliated East—West Press, Ltd. New York, 1983.
- Puri, P.: Bryophytes, Atmaram & Sons. Delhi, Lucknow, 1985.
- Sarabhai, R.C. and Saxena, R.C.: A text book of Botany. Vol I & II, Ratan Prakashan Mandir, Meerut, 1980.
- Singh, V., Pande, P.C. and Jain, D.K.: A text book of Botany, Rastogi, & Co., Meerut, 2001.
- Vashista, B.R.: Botany for Degree Students (Algae, Bryophytes) S. Chand & Co., New Delhi, 2002.

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BOTANY PRACTICAL EXAMINATION B. Sc PART-I

SKELETON PAPER

M.M. 50

TIME 2 HRS

S.No.	Practical	Regular	ANC
1(a)	Prepare the acetocarmine stained slide of the material "A" provided to you. Draw a well labelled diagram of any one stage of nuclear division. Identify it giving reasons.	5	5
1(b)	Comment and solve the problem on Genetics allotted to you along with reasons.	5	5
2	Make suitable stained glycerine-preparation of any one alga from the given mixture "B". Draw its labelled diagrams; assign it to its systematic position giving reasons.	5	5
3	Make suitable preparation of the reproductive structure of material "C" (Fungi). Draw labelled diagrams. Identify giving reasons.	5	5
4	Make suitable stained preparation of material "D" (Bryophyta (vegetative/ reproductive). Draw labelled diagrams. Identify giving reasons.	5	5
5	One Microbiology experiment for comments. Or Gram's staining.	5	5
6	Comment upon spots (1-5)	10	
7	Viva-Voce	5	
8	Practical record	5	
	TOTAL	50	50

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ZOOLOGY

B.Sc.-B.Ed.(Part-I) 2021

Scheme:

Max. Marks: 100

Min. Pass Marks: 36

Paper I	: 3 Hrs duration	33 Marks
Paper II	: 3 Hrs duration	33 Marks
Paper III	: 3 Hrs duration	34 Marks
Practicals	: 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 the 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: Z-101 DIVERSITY OF ANIMALS Section – A

Biosystematics and Taxonomy

1. General principles of taxonomy, concept of five kingdom scheme, international code of nomenclature, cladistics, molecular taxonomy.
2. Concept of Protozoa and Metazoa, and levels of organization.
3. Taxonomy and basis of classification of non-chordata and chordata: symmetry, coelom, segmentation and embryogeny.
4. Detailed classification of Non- chordata and Chordata (up to suborders with examples).

Section – B

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

Note : * indicates wherever required

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1. **Protozoa**
:Amoeba,Entamoeba,Paramaecium,Euglena,Plasmodium,Trypanosoma and Leishmania.
2. **Porifera** : Sycon and Leucosolenia.
3. **Coelentrata**: Obelia and Aurelia.

Section -C

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

Note : * indicates wherever required

1. **Ctenophora** : Beroe
2. **Platyhelminthes** ; *Fasciola hepatica* and *Taenia solium*.
3. **Aschelminthes** : *Ascaris*, *Dracunculus* and *Wuchereria*.
4. **Annelida** : Neries and Leech.

PAPER - II: Z-102

CELL BIOLOGY AND GENETICS

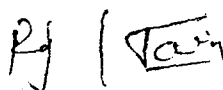
Section - A

Cell Biology

1. Introduction to cell: Morphology, size, shape, characteristics and structure of prokaryotic and eukaryotic animal cell; basic idea of virus and cell theory.
2. Cell membrane: Characteristics of cell membrane molecules, fluid-mosaic model of Singer and Nicholson, concept of unit membrane.
3. Cell membrane transport: Passive (diffusion and osmosis, facilitated, mediated) and active transport.
4. Cytoplasmic organelles:
 - (i) Structure and biogenesis of mitochondria; electron transport chain and generation of ATP molecules.
 - (ii) Structure and functions of endoplasmic reticulum, ribosome (prokaryotic and eukaryotic) and Golgi complex.
 - (iii) Structure and functions of lysosome, microbodies and centrioles.
 - (iv) Structure and functions of cilia, flagella, microvilli and cytoskeletal elements.

Section - B

1. **Nuclear Organization:**
 - (i) Structure and function of nuclear envelope, nuclear matrix and nucleolus.
 - (ii) Chromosomes: Morphology, chromonema, chromomeres, telomeres, primary and secondary constrictions, chromatids, prokaryotic chromosome.
 - (iii) Giant chromosome types: Polytene and Lampbrush.
 - (iv) Chromosomal organization: Euchromatin, heterochromatin and folded fiber model and nucleosome concept.


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2. **Nucleic Acids:**

- (i) DNA structure, polymorphism (A, B and Z types) and replication (semi conservative mechanism) experiments of Messelson and Stahl: elementary idea about polymerases, topoisomerases, single strand binding proteins, replicating forks (both unidirectional and bidirectional), leading and lagging strands, RNA primers and Okazaki fragments, elementary idea about DNA repair.
 - (ii) RNA structure and types (mRNA, rRNA and tRNA) and transcription.
3. **Genetic code and translation:** Triplet code, characteristics of triplet code, protein synthesis (translation).
4. **Cell in reproduction:**
- (i) Interphase nucleus and cell cycle: S, G-1, G-2 and M phase.
 - (ii) Mitosis: Different stages, structure and function of spindle apparatus; anaphasic movement.
 - (iii) Meiosis: Different stages, synapses and synaptonemal complex, formation of chiasmata and significance of crossing over.

Section – C

Genetics

1. Mendelism: Brief history of genetics and Mendel's work; Mendelian laws, their significance and current status, chromosomal theory of inheritance.
2. Chromosomal mutations: Classification, translocation, inversion, deletion and duplication; Variations in chromosome numbers; haploidy diploidy, polyploidy, aneuploidy, euploidy and polysomy.
3. Linkage and crossing over, elementary idea of chromosome mapping.
4. Genetic interaction: Supplementary genes, complementary genes, duplicate genes, epistasis, inhibitory and polymorphic genes.
5. Multiple gene inheritance: ABO blood groups and Rh factor and their significance.
6. Cytoplasmic inheritance.
7. Sex determination in *Drosophila* and man, pedigree analysis.
8. Genetic disorders: Down's, Turner's and Klinefelter's syndromes, color blindness, Hemophilia, Phenylketonuria.
9. Concept of gene: Recon, muton and cistron.

PAPER – III: Z-103

GAMETE AND DEVELOPMENTAL BIOLOGY

Section – A

Developmental Biology: Scope and Early Events

1. Historical review, types and scope of embryology.
2. Gametogenesis:
 - (i) Formation of ova and sperm.
 - (ii) Vitellogenesis.
3. Fertilization: Activation of ovum, essence of activation: Changes in the organization of the egg cytoplasm.
4. Parthenogenesis.

Section – B

Developmental Biology: Pattern and Processes

1. Cleavage: Definition, planes and patterns of cleavage among non chordates and chordates, significance of cleavage, blastulation and morulation.
2. Fate maps, morphogenetic cell movements, significance of gastrulation.
3. Embryonic induction, primary organizer, differentiation and competence.
4. Development of chick up to 96 hours stage.
5. Embryonic adaptations:
 - (i) Extra embryonic membranes in chick, their development and functions.
 - (ii) Placentation in Mammals: Definition, types, classification on the basis of morphology and histology, functions of placenta.
 - (iii) Paedogenesis and neoteny.

Section – C

Dimensions in Developmental Biology

1. Regeneration.
2. Various types of stem cells and their applications.
3. Cloning of animals:
 - (i) Nuclear transfer technique.
 - (ii) Embryo transfer technique.
4. Teratogenesis (Genetic and Induced).
5. Biology of aging.
6. Cell death.

B.Sc.-B.Ed.(Part-I) 2021

Practical – Zoology

Min. Marks: 18

4 Hrs. / Week

Max. Marks: 50

I. Microscopic Techniques:

1. Organization and working of Optical Microscope: Dissecting and compound microscopes.
2. General methods of microscopic slide preparations: Narcotization; fixing and preservation; washing; staining; destaining; dehydration; clearing and mounting.
3. General idea of composition, preparation and use of:
 - (i) Fixatives: Formalin, Bouin's fluid.
 - (ii) Stains: Aceto-carmine, Aceto-orcein, Haematoxylin, Eosin.
 - (iii) Common reagents: Normal saline, Acid water, Acid alcohol and Mayer's albumin.
4. Collection and Culture Methods:
 - (i) Collection of animals from their natural habitat during field trips such as *Amoeba*, *Paramecium*, *Euglena*, *Daphnia*, *Cyclops*, etc.
 - (ii) Culture of *Paramecium* in the laboratory and study of its structure, life – processes and behavior in live state.

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II. Study of Microscopic Slides and Museum Specimens:

Protozoa: *Amoeba*, *Euglena*, *Trypanosoma*, *Giardia*, *Entamoeba*, *Elphidium* (*Polystomella*), *Foraminiferous* shells, *Monocystis*, *Plasmodium*, *Paramecium*, *leishmania*, *Paramecium* showing binary fission and conjugation, *Opalina*, *Nyctotherus*, *Balantidium*, *Vorticella*.

Porifera: *Leucosolenia*, *Euplectella*, *Spongilla*, T. S. Sycon, Spicules, Spongin fibers, Gemmules.

Coelenterata: *Millepora*, *Physalia*, *Velella*, *Aurelia*, *Alcyonium*, *Gorgonia*, *Pennatula*, Sea anemone, Stone corals, *Obelia* colony and medusa.

Ctenophora: Any Ctenophore

Platyhelminthes : *Taenia*, *Planaria*, *Fasciola* (WM), T. S. body of *Fasciola*, *Miracidium*, Sporocyst, Redia and Cercaria Larvae of *Fasciola*, *Scolex*, T. S. mature proglottid of *Taenia*, gravid proglottid, *Cysticercus* larva.

Aschelminthes : *Ascaris*, *Wuchereria*, *Dracunculus*

Annelida : *Neries*, *Heteroneries*, *Arenicola*, *Aphrodite*, *Chaetopterus*, *Tubifix*, *Glossiphonia*, *Pontobdella*, *Polygordius*.

III. Anatomy:

Earthworm: External features, general viscera, alimentary canal, reproductive system and nervous system.

Leech: External features, alimentary canal, reproductive and nervous system.

IV. Study of the Following Through Permanent Slide Preparation: *Paramecium*, *Euglena*, *Foraminiferous* shells, *Sponge* spicules, *Spongin* fibres, *Gemmule*, *Hydra*, *Obelia* colony and *Medusa*; *Parapodium* of *Nereis* and *Heteronereis*.

V. Exercises in Cell Biology:

1. Squash preparation for the study of mitosis in onion root tip, permanent slides of mitosis (all stages).
2. Squash preparation for the study of meiosis in grasshopper or cockroach testes, permanent slide of meiosis (all stages).
3. Study of giant chromosomes in salivary glands of *Chironomous* or *Drosophila* larva.
4. Study of cell permeability using mammalian R.B.C.

VI. Exercises in Genetics:

A. Study of *Drosophila*:

1. Life cycle and an idea about its culture
2. Identification of male and female
3. Identification of wild and mutants (yellow body, ebony, vestigial wing and white eye)
4. Study of permanent prepared slides: Sex comb and salivary gland chromosomes.

B. Numerical problems based on monohybrid and dihybrid cross.

C. Identification of blood groups (A, B, AB, O & Rh factor)

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VII. Developmental Biology:

1. Study of development of frog/toad with the help of Charts/Slides/Models:
 - (i) Eggs, cleavage, blastula, gastrula, neurula, tail-bud, hatching, mature tadpole larvae, metamorphic stages, toadlet / froglet.
 - (ii) Histological slides: Cleavage, blastula, gastrula, neurula and tail-bud stage.
2. Study of development of chick with the help of whole mounts/Charts/Slides/Models
 - (i) 18 hrs, 21 hrs, 24 hrs, 33 hrs, 48 hrs, 72 hrs and 96 hrs of incubation.
 - (ii) Primitive streak stage in living embryo, if possible, after removal of the blastoderm from the egg.
 - (iii) Study of the embryo at various stages of incubation *in vivo* by making a window in the egg-shell may also be demonstrated.
 - (iv) Study of various foetal membranes in a 10-12 day old chick embryo.

B.Sc.-B.Ed. Part - I**Scheme of Practical Examination and Distribution of Marks**

Time: 4 Hrs.

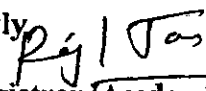
Min Pass Marks: 18

Max. Marks: 50

	Regular	Ex. /N.C. Students
1. Anatomy (any system)	6	5
2. Permanent Preparation	4	7
3. Cell Biology and Genetics	4+4	6+6
4. Developmental Biology	6	5
5. Identification and comments on Spots (1 to 8)	16	16
6. Viva Voce	5	5
7. 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. The candidates may be asked to write detailed methodology wherever necessary and separate marks may be allocated for the same.
5. Mounting material for permanent preparations would be as per the syllabus or as available through collection and culture methods.
6. 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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B.Sc. Part I (Pass Course)

I. PHYSICS

Max. Marks: 100

Scheme :

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 : Mechanics & Oscillations

Work Load: 2 hrs. Lecture /week

Examination Duration: 3 Hrs.

Scheme of Examination: First question will be of nine marks comprising one part 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 - I:

Physical Law and frame of Reference

- Inertial and non-inertial frames, Transformation of displacement, velocity, acceleration between different frames of reference involving translation. Galilean transformation and invariance of Newton's laws.
- Coriolis Force: Transformation of displacement, velocity and acceleration between rotating frame, Pseudo forces, Coriolis force, Motion relative to earth, Foucault's pendulum.
- Conservative Forces: Introduction about conservative and non-conservative forces, Rectilinear motion under conservative forces, Discussion of potential energy curve and motion of a particle.

Unit - II:

Centre of Mass

Introduction about Centre of Mass, Centre of Mass Frame: Collision of two particles in one and two dimensions (elastic and inelastic), Slowing down of neutrons in a moderator, Motion of a system with varying mass, Angular momentum concept, conservation and charge particle scattering by a nucleus.
Rigid body

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Equation of a motion of a rotating body, Inertial coefficient, Case of J not parallel to ω , Kinetic energy of rotation and idea of principal axes, Precessional motion of a spinning top.

Unit - III:

Motion under Central Forces

Introduction about Central Forces, Motion under central forces, Gravitational interaction, Inertia and gravitational mass, General solution under gravitational interaction, Kepler's Laws, Discussion of trajectories, Cases of elliptical and circular orbits, Rutherford scattering.

Damped Harmonic Oscillations

Introduction about oscillations in a potential well, Damped force and motion under damping, Damped Simple Harmonic Oscillator, Power dissipation, Anharmonic oscillator and simple pendulum as an example.

Unit - IV:

Driven Harmonic Oscillations

Driven harmonic oscillator with damping, Frequency response, Phase factor, Resonance, Series and parallel of LCR circuit, Electromechanical analogy, Galvanometer.

Coupled Oscillations

Equation of motion of two coupled Simple Harmonic Oscillators, Normal modes, motion in mixed modes, Transition behavior, Dynamics of a number of oscillators with neighbor interactions.

Text books:

- Mechanics (SI), Charles Kittel
- Introduction to Classical mechanics, TMH
- The Physics of Waves & Oscillations, Bajaj
- H. Goldstein, Classical mechanics.
- L.N. Hand, J.D. Finch, Analytical mechanics (Cambridge, 1998).
- L. Landau, E. Lifshitz, Mechanics.

Paper - II (Electromagnetism)

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.

Raj (Taj)
Dy. Registrar
(Academic)
University of Rajasthan
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Unit I: Scalar and Vector Fields

Concept of Field, Scalar and Vector Fields, Gradient of scalar field, Physical significance and formalism of Gradient, Divergence and Curl of a vector field Cartesian co-ordinates system, Problems based on Gradient, Divergence and curl operators. Concept of Solid angle, Gauss divergence and Stoke's theorem. Gauss law from inverse square law. Differential form of Gauss law,

Electric Field and Potential Energy

Invariance of Charge, Potential energy of system of (i) Discrete N-charges (ii) Continuous charge distribution. Energy required to build a uniformly charged sphere, classical radius of electron, Electric field due to a short electric dipole, Interaction of electric dipole with external uniform and non uniform electric field, potential due to a uniformly charged spherical shell.

Poisson's and Laplace equations in Cartesian co-ordinates and their applications to solve the problems of electrostatics.

Electric field measured in moving frames, Electric field of a point charge moving with constant velocity.

Unit II: Electric field in matter

Multipole expansion, definition of moments of charge distribution, Dielectrics, Induced dipole moments, polar non polar molecules, Free and bound charges, Polarization, Atomic polarizability, electric displacement vector, electric susceptibility, dielectric constant, relation between them.

Electric potential and electric field due to a uniformly polarized sphere (i) outside the sphere (ii) at the surface of the sphere (iii) inside the sphere, Electric field due to a dielectric sphere placed in a uniform electric field (a) outside the sphere (b) inside the sphere, Electric field due to a charge placed in dielectric medium and Gauss law, Clausius-Mossotti relation in dielectrics.

Unit III: Magnetostatics and Magnetic field in matter

Lorentz force, properties of magnetic field, Ampere's law, field due to a current carrying solid conducting cylinder (a) outside (b) at the surface and (ii) inside the cylinder. Ampere's law in differential form, Introduction of Magnetic Vector potential, Poisson's equation for vector potential, Deduction of Bio-Savart law using Magnetic Vector potentials, Differential form of Ampere's law.

Atomic magnet, Gyromagnetic ratio, Bohr-magneton, Larmor frequency, induced magnetic moment and dia-magnetism, spin magnetic moment, para- and ferro-magnetism, Intensity of Magnetization, Magnetic permeability and Susceptibility, free and bound current densities, Magnetic field due to a uniformly magnetized material and Non-uniformly magnetized material.

Unit IV: Maxwell's Equations and Electromagnetic waves

Displacement current, Maxwell's Equations, Electromagnetic waves, Electromagnetic waves in an Isotropic medium, Properties of electromagnetic waves, Energy density of Electromagnetic waves, Poynting vector, Radiation pressure of free space, Electromagnetic waves in Dispersive medium, Spectrum of Electromagnetic waves.

References :

1. Electricity & Magnetism ; A.S. Mahajan & Abbas A. Rangwala, Tata McGraw-Hill
2. Introduction to Electrodynamics ; David J. Griffith, Prentice Hall
3. Berkley Physics Course , Vol. II
4. Fundamental University Physics Vol II : Fields and Waves ; M. Alonso and E.J. Finn: Addison-Wesley Publishing Company.

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2. Introduction to Electrodynamics : David J. Griffith. Prentice Hall

3. Berkeley Physics Course : Vol II

4. Fundamental University Physics Vol II : Fields and Waves : M. Alonso and E.J. Finn;
Addison-Wesley Publishing Company.

Paper III.
OPTICS

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 Interference:

Concept of Spatial and Temporal Coherence, coherence length, coherence time, Definition and propagation of a wave front Huygen's principle of secondary wavelets, Young's Double slit experiment. Types of interference, interference by division of wavefronts: Fresnel's Biprism. Measurement of wavelength λ and thickness of a thin transparent sheet, Interference by division of amplitude: Interference in thin films of constant thickness in transmitted and reflected waves. Interference produced by a wedge shaped film, Newton's rings, Determination of wavelength λ and refractive index μ by Newton's Rings: fringes of equal inclination (Haidinger fringes) and equal thickness (Fizeau fringes), Michelson's Interferometer, shape of fringes, Measurement of wavelength, difference between two spectral lines and thickness of a thin transparent sheet.

Unit - 2 Diffraction:

Fresnel's diffraction, Half period zones, Fresnel's diffraction at a circular aperture, slit and a rectangular slit, Zone plate, Multiple foci of zone plate, comparison between zone plate and convex lens, Fraunhofer diffraction by single slit and a circular aperture, Fraunhofer diffraction by N parallel slits with two slits as a special case, Missing order, Plane diffraction grating and its use in determining wavelength, Dispersion by a grating, Rayleigh's criterion of resolution, Resolving power of a Telescope and a Grating.

Unit - 3 Polarization:

Polarization. (i) Plane polarized light (ii) Circularly polarized light and (iii) Elliptically Polarized light. Production of Plane polarized light: (i) by reflection (ii) by refraction (iii) by

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double refraction and (iv) by dichroism (Polaroid). Identification of polarized light. Huygen's theory of double refraction. Production of Circularly and Elliptically Polarized light. Quarter-wave and half wave plates. Analysis of polarized light. Optical activity. Laws of optical Activity. Fresnel's explanation of optical activity. Experimental verification of Fresnel's theory. Specific rotation. Polarimeter. Types of Polarimeter: (i) Laurent's half shade polarimeter and (ii) Biquartz polarimeter.

Unit - 4: Quantum Optics & Photonics

- (i) **Laser:** Spontaneous and stimulated emission, Einstein's A & B coefficients, Energy density of radiation as a result of stimulated emission and absorption, population inversion, Methods of optical pumping, energy level schemes, He-Ne, Ruby, CO_2 lasers.
- (ii) **Holography:** Basic concepts of Holography, principle of holography. Theory, construction and reconstruction of image, application of holography.
- (iii) **Fiber Optics:** Introduction of Optical Fiber, Necessity of Cladding, Optical fiber system, optical fiber cable. Total internal Reflection, Explanation of Propagation of light through an optical fiber.

Reference:

1. Optics by Brij Lal & Subramaniam, S. Chand.
2. Optics by D. P. Khandelwal.
3. Principles of optics by B. K. Mathur.
4. Introduction to Modern Optics by A. K. Ghatak.
5. An introduction to Modern Optics by G. R. Fowles.
6. Essentials of Lasers by Allen.

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Practical

Work Load: Four hours laboratory work per week

Examination Duration: Four hours

Minimum Experiments: Total sixteen taking eight from each section.

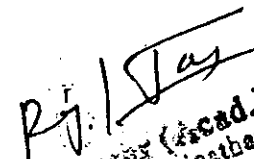
The colleges are free to set new experiments of equivalent standard. This should be intimated and approved by the Convener, Board of Studies before the start of academic session. It is binding on the college to have experimental set up of at least sixteen experiments listed below (8 from each section). In case number of experiment performed by the student is less than sixteen, his marks shall be scaled down in final examination on pro rate basis. Laboratory examination paper will be set by the external examiner by making pairs of experiments taking one from each section out of sixteen or more experiments available at the center. Different combinations shall be given for different batch.

Section A

1. To study the variation of power transfer by two different loads by a DC source and to verify maximum power transfer theorem.
2. To study the variation of charge and current in a RC circuit with a different time constant (using a DC source).
3. To study the behavior of a RC circuit with varying resistance and capacitance using AC mains as a power source and also to determine the impedance and phase relations.
4. To study the rise and decay of current in an LR circuit with a source of constant emf.
5. To study the voltage and current behavior of an LR circuit with an AC power source. Also determine power factor, impedance and phase relations.
6. To study the characteristics of a semi-conductor junction diode and determine forward and reverse resistances.
7. To study the magnetic field along the axis of a current carrying circular coil. Plot the necessary graph and hence find radius of the circular coil.
8. To determine the specific resistance of a material and determine difference between two small resistance using Carey Fosters Bridge.
9. To convert a galvanometer into a ammeter of a given range.
10. To convert a galvanometer into a voltmeter of a given range.

Section B

1. To study the random decay and determine the decay constant using the statistical board.
2. Using compound pendulum study the variation of time period with amplitude in large angle oscillations.
3. To study the damping using compound pendulum.


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4. To study the excitation of normal modes and measure frequency splitting using two coupled oscillators.
5. To study the frequency of energy transfer as a function of coupling strength using coupled oscillators.
6. To study the viscous fluid damping of a compound pendulum and determining damping coefficient and Q of the oscillator.
7. To study the electromagnetic damping of a compound pendulum and to find the variation of damping coefficients with the assistance of a conducting lamina.
8. To find J by Callender and Barne's Method.
9. To determine Young's modulus by bending of beam.
10. To determine Y, σ and η by Searle's method.
11. To ensure Curie temperature of Monel alloy.
12. To determine modulus of rigidity of a wire using Maxwell's needle.
13. Study of normal modes of a coupled pendulum system. Study of oscillations in mixed modes and find the period of energy exchange between the two oscillators.
14. To study variation of surface tension with temperature using Jaeger's method.
15. To study the specific-rotation of sugar solution by polarimeter.

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MATHEMATICS**B.Sc.-B.Ed. Part-I Examination-2024**

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

Examination Scheme :		Min.Pass Marks	Max. Marks
Science –		54	150
Arts –		72	200
		Duration	Max.Marks
Paper – I	Discrete Mathematics	3 hrs.	40 (Science) 53 (Arts)
Paper – II	Calculus	3 hrs.	40 (Science) 53 (Arts)
Paper – III	Analytic Geometry and Optimization Theory	3 hrs.	40 (Science) 54 (Arts)
Practical	Optimization Techniques	2 hrs.	30 (Science) 40 (Arts)

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

Paper – I: Discrete Mathematics

Teaching : 3 Hours per Week

Max. Marks: 40 (Science)

Duration of Examination : 3 Hours

53 (Arts)

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.

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Unit 1 : Sets, Cardinality, Principal of inclusion and exclusion, Mathematical induction, Relations and Functions, Binary relations, Equivalence relations and partitions, Partial order relations and Lattices, Chains and Anti-chains. Pigeon hole principle.

Unit 2: Boolean Algebra- Lattices and Algebraic structure, Duality, Distributive and Complemented Lattices, Boolean Lattices, Boolean functions and Boolean expression.

Fundamental theorem of arithmetic, Divisibility in \mathbb{Z} , Congruence's, Chinese remainder theorem, Euler's functions, Primitive roots.

Unit 3: Logic and propositional calculus, Simple and compound propositions, Basic logical operations, Truth tables, Tautologies and contradictions, Propositional functions, Quantifiers. Discrete numeric functions, Generating functions, Recurrence relations and Recurrence algorithms, Linear recurrence relation with constant coefficients and their solutions, Total solutions, Solution by the method of generating functions.

Unit 4: Basic concepts of graph theory, Types of graph (Connected Graphs, Regular graphs, Planar graphs), walk, Paths & Circuits, Shortest path problem. Operations on graphs (union, join, products)

Unit 5: Matrix representation of graphs, Adjacency matrices, Incidences matrices, Tree, Spanning tree, Minimum spanning tree, Distance between vertices, Center of tree, Binary tree, Rooted tree. Hamiltonian and Eulerian graphs

Reference Books:

1. K.H. Rosen, Discrete Mathematics and it's Applications, McGraw Hill, 1999.
2. N.L. Biggs, Discrete Mathematics, Oxford Science Publication, 1985.
3. C.L. Liu and D.P. Mohapatra, Elements of Discrete Mathematics, Tata McGraw Hill, 2008.
4. T. Koshy, Discrete Mathematics with Applications, Academic Press, 2005.
5. N. Deo, Graph Theory, Prentice Hall of India, New Delhi, 2004.

Paper- II: Calculus

Teaching : 3 Hours per Week

Max. Marks: 40 (Science)

Duration of Examination : 3 Hours

53 (Arts)

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: Series – Infinite series and Convergent series. Tests for convergence of a series – Comparison test, D'Alembert's ratio test, Cauchy's n-th root test, Raabe's test, De-Morgan-Bertrand's test, Cauchy's condensation test, Gauss's test, (Derivation of tests is not required). Alternating series. Absolute convergence. Taylor's theorem. Maclaurin's theorem. Power series expansion of a function. Power series expansion of $\sin x$, $\cos x$, e^x , $\log_e(1+x)$, $(1+x)^n$.

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Unit 2: Derivative of the length of an arc. Pedal equations. Curvature – Various formulae, Centre of curvature and Chord of curvature. Partial differentiation. Euler's theorem for homogeneous functions. Chain rule of partial differentiation. Total differentiation, Differentiation of implicit functions.

Unit 3: Envelopes and evolutes, Maxima and Minima of functions of two variables. Lagrange's method of undetermined multipliers. Asymptotes. Multiple points. Curve tracing of standard curves (Cartesian and Polar curves).

Unit 4: Beta and Gamma functions, Reduction formulae (simple standard formulae), Double integrals in Cartesian and Polar Coordinates, Change of order of integration. Triple integrals. Dirichlet's integral.

Unit 5: Areas, Rectification, Volumes and Surfaces of solids of revolution.

Reference Books :

1. M. J. Strauss, G. L. Bradley and K. J. Smith, Calculus (3rd Edition), Dorling Kindersley (India) Pvt. Ltd. (Pearson Education), Delhi, 2007.
2. H. Anton, I. Bivens and S. Davis, Calculus (7th Edition), John Wiley and sons (Asia), Pt Ltd., Singapore, 2002.
3. G.B. Thomas, R. L. Finney, M. D. Weir, Calculus and Analytic Geometry, Pearson Education Ltd, 2003.

Paper-III: Analytic Geometry and Optimization Theory

Teaching: 3 Hours per Week

Max. Marks: 40 (Science)

Duration of Examination: 3 Hours

54 (Arts)

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: Polar equation of conics, Polar equation of tangent, normal and asymptotes, chord of contact, auxiliary circle, director circle of conics

Unit 2: Sphere, Cone.

Unit 3: Cylinder, Central Conicoids – Ellipsoid, Hyperboloid of one and two sheets, tangent lines and tangent planes, Direct sphere, Normals.

Unit 4: Generating lines of hyperboloid of one sheet and its properties. Reduction of a general equation of second degree in three-dimensions to standard forms.

Unit 5: The linear programming problem. Basic solution. Some basic properties and theorems on convex sets.. Fundamental theorem of L.P.P. Theory of simplex method only. Duality. Fundamental theorem of duality, properties and elementary theorems on duality only.

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Reference Books :

1. Hamdy A. Taha, Operations Research, An Introduction (9th edition), Prentice-Hall, 2010.
2. G. Hadley, Linear Programming, Narosa Publishing House, New Delhi, 2002.
3. R.J.T. Bell, Elementary Treatise on Co-ordinate geometry of three dimensions, Macmillan India Ltd., 1994.

Practical

Teaching: 2 hours per week per batch not more than 20 students

Examination:**Duration: 2 Hours**

Scheme	Science	Arts
Max.Marks	30	40
Min.Pass Marks	11	15

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

The paper will contain TWO practicals. The candidates are required to attempt both practicals.

Group A : Modelling of industrial and engineering problems into Assignment Problems and Transportation Problems and their solutions.

Group B : List of problems (with free and open source software tool Scilab)

- (i) Plotting the graphs of the following functions : ax , $\sqrt{ax+b}$, $|ax+b|$, $c \pm |ax+b|$, $x^{\pm n}$, $x^{1/n}$ ($n \in \mathbb{Z}$), e^{ax+b} , $\log(ax+b)$, $\sin(ax+b)$, $\cos(ax+b)$, $|\sin(ax+b)|$, $|\cos(ax+b)|$. Observe and discuss the effects of change in the real constant a , b and c on the graphs.
- (ii) Graphs of hyperbolic functions and inverse trigonometric functions.
- (iii) Plotting and analyzing the graphs of polynomials and their derivatives.
- (iv) Complex numbers: Operations like addition, subtraction, multiplication, division, Modulus and inbuilt functions conj, imag, imult, isreal, real.
- (v) Matrix operations: Addition, Multiplication, Inverse, Transpose, Determinant, Rank and inbuilt functions eye, ones, zeros. Solving the system of linear equations.
- (vi) Solution of linear programming problems by using inbuilt functions of Scilab.

Note:

1. For Group A : Problems will be solved by using Scientific Calculators (non-Programmable)
2. Each Candidate (Regular/non-Collegiate) has to prepare his/her practical record.
3. Each Candidate has to pass in Practical and Theory examination separately.

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UNIVERSITY OF RAJASTHAN JAIPUR

FACULTY OF EDUCATION

SYLLABUS

INTEGRATED PROGRAMME OF

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

Annual Scheme

**Academic Session 2020-21
Examination B.Sc.-B.Ed. Part – II (2021)**

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NOTICE

1. Change in syllabus/changes in 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 University head quarter Jaipur only and not any other place.

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B.Sc B.Ed PART - II

CONTENTS

SCHEME OF EXAMINATION

SYLLABUS

1. GENERAL HINDI (COMPULSORY PAPER)*
2. KNOWLEDGE AND CURRICULUM (COMPULSORY PAPER)
3. LEARNING AND TEACHING (COMPULSORY PAPER)
4. PEACE EDUCATION (GROUP - A)
5. OPTIONAL PAPER GROUP (GROUP - B)
 - I. CHEMISTRY
 - II. BOTANY
 - III. ZOOLOGY
 - IV. PHYSICS
 - V. MATHEMATICS


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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 the 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. Ability to access the all round development of pupils and to maintain a cumulative record.
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.
- iii) Third Year B.Sc.B.Ed.
- iv) Final Year B.Sc.B.Ed.

Duration of the Course - Four Years

Examination 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	Elementary Computer Application (ICT)
IV th Year	Environmental Studies

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Group – A: - Subject Specialisation :

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: Content of Science Subject: - A Student has to opt 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, 12 Paper in IIIrd Year and 7 Paper in IVth Year (Total 43 Papers).
- ❖ 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			Total
			External	Internal	Practical	
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 (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
						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			Total
			External	Internal	Practical	
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 (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 / SUPW 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			Total
			External	Internal	Practical	
I	B.Sc.B.Ed. 01	Elementary Computer Application (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 (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	08(a,b)	Pedagogy of a School Subject (Candidate should opt any two school subject from the following i.e. one school subject for part - 3 and other school subject for Part - 4) 1. Chemistry 2. Biology 3. Physics 4. Mathematics 5. General Science	80	20		100
Practicum		Special Training Programme • Micro Teaching • Practice Lesson • Observation Lesson • Technology Based			10 50 05 05	100

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		Lesson • Criticism Lesson • Attendance /Seminar/ Workshop			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			Total
			External	Internal	Practical	
I	B.Sc.B.Ed. 01	Environmental Studies (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
VIII	B.Sc.B.Ed. 08(a,b)	Pedagogy of a School Subject (Candidate should opt any two school subject from the following i.e. one school subject for part - 3 and other school subject for Part - 4) 1. Chemistry 2. Biology 3. Physics 4. Mathematics	80	20	-	100

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		5. General Science				
Practicum		1. Practice teaching		50		
		2. Block Teaching (Participation in School Activities Social Participation in Group)		20		
		3. Report of any feature of school / case study/action research		10		
		4. Criticism Lesson		20		100
		Final Lesson	100			100
						800

*ELIGIBILITY 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	Elementary Computer Application (ICT)
IV Year	Environmental Studies

Compulsory Paper

Year	Paper
I st Year	1. Childhood and Growing Up 2. Contemporary India and 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 Specialisation :

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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. Botany (I, II, III)
3. Zoology (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

- ❖ In all the subjects the student has to study a minimum of 12 papers in Ist year, 12 Paper in IInd Year. 12 Paper in IIIrd Year and 7 Paper in IVth Year (Total 43 Papers).
- ❖ 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 courses and scheme of study, titles of the papers, duration etc. for B.Sc-.B.Ed Courses are provided in Tables given below :-

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

O. 321 The objectives of the practical work prescribed for the Integrated Programme of B.Sc.B.Ed. 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. Arouse the curiosity and interest of the pupils and secure their active participation in the educative process.
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.

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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. Black-board 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.

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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.
- iii. To maintain same sequence of papers (G.A. - IVth, G.B. 05/06/07 papers (Ist, IInd & IIIrd year) and 8 a/b IIIrd year and IVth year) in the four years B.Sc.B.Ed itegrated course, paper no IIIrd in B.Sc.B.Ed IIIrd year and paper no VIIth in B.Sc.B.Ed IVth year were skipped.

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 1st 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.ScB.Ed examination in part 1or/ part 2 the theory of education may present themselves for re-examination there in at a 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 reappear 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

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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.326 A: 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;

Part I- Main theory papers at B.Sc.B.Ed. II, In Integrated B.Sc.B.Ed II Paper nos. are 02, 03 & 04 in each session are of three hours carrying 100 marks (80 for theory + 20 for sessional) each. Compulsory paper* 01 of 100 marks and optional Paper 05, 06, 07 (G-B). in 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.

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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.
4. 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.
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).
8. The board of Examination will consist of:
 - (a) The principal of the college concerned.

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(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:

(1) 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-

❖ 40 percent marks in the external examination.

❖ 40 percent marks in internal assessment.

(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%

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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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B.Sc.B.Ed Part - II

बी.एससी.,बी.एड.-01

सामान्य हिन्दी

पूर्णांक-100

न्यूनतम उत्तीर्णांक-36

नोट: 36 से कम अंकलानेपर छात्रोंको उत्तीर्ण नहीं किया जायेगा। इस प्रश्न-पत्र में प्राप्त अंकोंको श्रेणी निर्धारण हेतु नहीं जोड़ा जायेगा।

अंकविभाजन-प्रश्नपत्र में दो भाग होंगे- 1. साहित्य खण्ड 2. व्याकरण खण्ड। साहित्य खण्ड में दो भाग होंगे- गद्य भाग एवं पद्य भाग। प्रत्येक खण्ड के लिए 50 अंक निर्धारित हैं।

क दो व्याख्या पद्य से (प्रत्येक में विकल्प देना है) $5 \times 2 = 10$ अंक

ख दो व्याख्या गद्य से (प्रत्येक में विकल्प देना है) $5 \times 2 = 10$ अंक

ग आलोचनात्मक प्रश्नपद्य से (विकल्प देना है) $7\frac{1}{2} \times 2 = 15$ अंक

घ आलोचनात्मक प्रश्न गद्य से (विकल्प देना है) $7\frac{1}{2} \times 2 = 15$ अंक

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

गद्य भाग-

- | | | | |
|---------------------------|---|---|----------------------------------|
| 1. कहानी-प्रेमचन्द | -बड़े भाई साहब | } | कहानी |
| विजयदानदेथा-सिकंदर और कौआ | | | |
| 2. संस्मरण | -कन्हैयालाल मिश्र 'प्रभाकर' | | -बयालिस के ज्वार की उन लहरों में |
| 3. रेखाचित्र | -रामवृक्ष बेनीपुरी-रजिया | | |
| 4. विज्ञान | -गुणाकर मुले- | | शनिसबसे 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)

- कबीर - साखी सं. - गुरुदेव को अंग- 7, 12, 26, 30
सुमरन को अंग- 10, 17, 24, 26
विरह को अंग- 2, 6, 10, 18
- सूरदास सूरसागरसार - सं. डॉ. धीरेन्द्र वर्मा

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विनय भक्ति पद संख्या 21,33

गोकुललीला पद संख्या 55,58

वृन्दावलीलीला पद संख्या 10,28

उद्धवसंदेश पद संख्या 77,79

3. तुलसीदास —विनय पत्रिका, गीताप्रेस, गोरखपुर पद सं— 87,88,90,156,158

4. मीरां —पदावली सं. —नरोत्तमस्वामी पद सं. — 1,3,4,5,10

5. रहीम (दस दोहे) —रहीमग्रंथावलीसंपादकविद्यानिवासमिश्र, गोविन्दरजनीश(दोहावली)
186,191,211,212,,214,218,219,220,223,224

6. मैथिलीशरणगुप्त—मनुष्यता, हमराज्य लिए मरतेहैं (गीत—साकेत के नवमसर्ग से)

7. सुमित्रानन्दपन्त —नौकाविहार

8. सूर्यकान्त त्रिपाठीनिराला —वहतोडतीपत्थर

9. सच्चिदानन्दहीरानन्दवात्स्यायनअज्ञेय —हिरोशिमा

10. रामधारी सिंह दिनकर : —विपथगा, समर शेषहै।

खण्ड— 'ख'

व्याकरण/व्यावहारिकहिन्दी खण्ड

50 अंक

1. निबन्ध लेखन— शब्दसीमा 300 शब्द 8 अंक
2. कार्यालयीलेख— शासकीय—अर्द्धशासकीय पत्र,कार्यालय ज्ञापन,
विज्ञप्ति एवंकार्यालय आदेश, अधिसूचना, पृष्ठांकन4 × 2= 8 अंक
3. संक्षेपण— 4 अंक
4. पल्लवन 5 अंक
5. शब्दनिर्माणप्रविधि — उपसर्ग, प्रत्यय, संधि, समास5 अंक
6. शब्द शुद्धि एवंवाक्य शुद्धि 5 अंक
7. मुहावरे एवंलोकोक्ति 5 अंक
8. पारिभाषिक शब्दावली 5 अंक
9. शब्द के प्रकार—संज्ञा, सर्वनाम, विशेषण, क्रिया एवंक्रियाविशेषण 5 अंक

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Knowledge and Curriculum

Marks-100

Objectives

1. To create excellence in the educational system for facing the knowledge of challenges of the twenty first century.
2. To encourage the application of knowledge skills in the Indian educational institutions.
3. To enhance the quality of pre-service and in-service teacher training.
4. To realize the importance of curriculum modification.
5. To provide awareness and understanding of social environment.
6. To transform teacher- pupils in to a vibrant knowledge-based society.

Unit 1 : Concept of knowledge

- Meaning and Nature of knowledge
- Sources of attainment of knowledge in schools with special references of Society, Culture and modernity.
- Distinctions between Knowledge and Skill, Teaching and Training, Knowledge and information, Reason and belief.

UnitII Facts of Knowledge-

Different facts of knowledge and relationship such as- Local and Universal, Concrete and Abstract, Theoretical and Practical, School and Out of School, (With an emphasis on understanding special attributes of school knowledge)

Unit III : Concept of curriculum

- Meaning, Nature and Objectives of Curriculum, Need for curriculum in schools.
- Philosophical, Psychological, Sociological and Scientific basis of Education with reference of Gandhi, Tagore, Dewey and Plato.
- Difference between curriculum and syllabus.
- Factors Influencing curriculum.
- Various types of curriculum- Subject centered, Experience centered, Activity centered, Child centered, and Craft centered.

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Unit-IV Child's Construction of Knowledge

- Sources of Knowledge : Empirical knowledge Vs Revealed knowledge
- 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
- Concepts of Belief, Information, Knowledge and Understanding

Unit V Curriculum Planning and Transaction

- Construction of Curriculum
- Models of Curriculum Development given by Franklin Bobbit, Ralph Tyler, Hilda Taba and Philip Jackson
- Curriculum Transaction: Role of a teacher in knowledge Construction through Dialogue, Challenge and Feedback as a Critical Pedagogue.

Tasks and Assignments

1. Class Test 10 marks
2. Any one 10 Marks
 - How does school knowledge get reflected in the form of curriculum, syllabus and textbooks?
 - Review of a text book of any school subject.
 - Prepare a children's literature handbook.
 - Seminars discussions, movie appraisals, group work, field works

References-

1. Aggrawal, J.C. (2008). Knowledge Commission -2006: Major Observation and Recommendations, Educational Reforms in India for the 21st Century. New Delhi, Shipra Publication.
2. Balsara, M (1999). Principles of Curriculum Reconstruction. New Delhi, Kanishka Publication.

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3. Lal, R.B. and Palod S. (2015). Policy Framework and Issues in Education. New Delhi, R.Lal Book Depot.
4. Malareddy, M. and Ravishankar, S. (2003). Curriculum Development and Educational Technology. New Delhi, Sterling Publisher P. Ltd..
5. Mohanty, J. (2003). Modern Trends in Education Technology. (Reprint Addition 2013)
6. Prasad, Janardan and Kumar, Vijay (1997). Advanced Curriculum Construction. New Delhi, Kanishka Publication.
7. Ramesh Shukla (2005). Dictionary of Education (2005). New Delhi, A.P.H. Publishing Corporation.
8. Soti and Sharma, A. (2014). Eminent Educational Thinkers of India. Agra, R.S.A. International Publisher. Agra.
9. www.knowledgecommission.gov.in
10. www.ncert.nic.in
11. www.takingglobal.org/express/article.html?cid-178

B.Sc. B.Ed -03
Learning and Teaching

MARKS -100

Objectives:

After completing the course the students 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.

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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.
- Tradition and changes in view of the learning process a shift from teaching and learning.

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

Unit III – Educational Technology

- Educational Technology: Meaning, Importance and Approaches.
- Model of teaching: Meaning, Assumptions and Fundamental elements of a model of a teaching suchman'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 organization learning in diverse class room: Issues and concerns.
- Team Teaching Cooperative learning and E-learning, E-content, E-magazine, E-Journals, E-Library, Issues and concerns with regard to organize teaching, learning process in a diverse classroom with respect study habits, ability, giftedness and interest of the learner

Unit V Teaching as profession:

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- Ethics of teaching, professional growth of a teacher
- Teacher as a professional practitioner, identification of the performance, competency and commitment area for teacher.
- Need of Professional enrichment of teachers
- Professional ethics and its development

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.
 - Identify the professional skills for teachers and report any two programmes for professional development of teaching organized by the school/ training college/ any other agencies.
 - Conduct an Interview of any two students with multilingual background and identify the problems in teaching learning process.

REFERENCES:

1. Aggarwal J.C.(2004), " Educational Psychology", Vikas Publishing House Pvt. Ltd., New Delhi
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.
4. Buzan Tony (2003), "Brain Child"; Thorsons, An Imprint of Harper Collins, London.
5. Coleman Margaret (1996), " Emotional and Behavioral Disorders"; Allyn and Bacon, Boston.
6. Erickson Marian (1967), "The Metally Retarded Child in the classroom"; The macmillan company
7. Goleman Daniel(1995). "Emotional Intelligence"; Bantom Books, N.Y.
8. Goleman Daniel (2007), " Social Intelligence"; Arrow Books, London.

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9. Henson Kenneth (1999), "Educational Psychology For Effective Teaching"; Wadsworth Publishing Co. Belmont, California
10. Khandwala Pradip(1988), "Fourth Eye"; A. H. Wheeler, Allahabad.
11. Mangal S.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.
17. Sousa David (2001), " How The Brain Learns"; Cowin Press, Inc. A Sage Publication Company, California.

B.Sc. B.Ed -04 (G-A)

PEACE EDUCATION

OBJECTIVES:-

MARKS-100

The course will enable the student teachers to –

- 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 I 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,

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Peace with Justice, Peace and Nonviolent liberation technique (Satyagraha) and Disarmament.

- Positive peace: Peace as Love, Mutual Aid, 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 and need of Peace Education.
- As a universal value
- Aims and Objectives of Peace Education
- 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- Bases of Peace Education

- Becoming peace teacher-acquisition of knowledge, values and attitudes.
- Life Skills required for Peace Education (WHO)
- Areas 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 – Correcting Distortions.
- Model of integrated Learning – Transactional Modalities - Cooperative Learning, Group Discussion, Project Work, Role Play, Story Telling, Rational Analytic Method – Case Analysis and Situation analysis,
- Peace Research, International classroom, International Parliament, Peace Awards, Creating Models for Peace technology - development of new tools, 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
- Role of mass media in Peace Education
- Programmes for Promoting Peace Education –UNESCO

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- Addressing challenges to peace in Multicultural Society.
- Role of Religion in propagation of Peace. Nelson Mandela Mother-Theresa, Vivekananda, Gandhian Philosophy in promoting Peace Education. Role of Great personalities in promoting Peace.

Tasks and Assignments

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
6. Prakashan, Agra-2 7. Wtp://www.un.org/cyberschoolbus/peace/content.htm.

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CHEMISTRY

Scheme:

Max Marks: 150

	Duration (hrs.)	Max. Marks	Min. Pass Marks
Paper-I	3	33	
Paper-II	3	33	36
Paper-III	3	34	
Practical	5	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.

CH-201 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

Coordination Compounds:

Werner's coordination theory and its experimental verification, effective atomic number concept, chelates, nomenclature of coordination compounds, isomerism in coordination compounds, valence bond theory 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 Sp , Pu and Am from L ; electronic configuration, oxidation states, magnetic properties, complexation behavior, comparison of lanthanides and actinides, super heavy elements.

Unit-IV

Oxidation and Reduction:

Use of Redox Potential data, analysis of redox cycle, redox stability in water, Frost-Lummer and Pourbaix diagrams. Application of redox data in 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 .

CH-202 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 solvents 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 ($\text{Pb}(\text{OAc})_2$ 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, Gatterman synthesis, Hauben-Hoesch reaction, Lederer-Mannasse reaction and Reimer-Tiemann reaction

Ethers and Epoxides

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

Synthesis of epoxides. Acid and base catalyzed 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-Ponndorf-Verley), Clemmensen, Wolff-Kishner, LiAlH_4 and NaBH_4 reductions. Halogenation of enolizable ketones. Use of acetals and 1,3-dithiane as protecting group.

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 affecting 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. Diazotisation and mechanism. Synthetic transformations of aryl diazonium salts, azo coupling and its applications.

CH-203 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 capacity, 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, i.e. Chatelier's 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 degree 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 systems, 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, application.

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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-Huckel-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 a 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:

1. Principles of Physical Chemistry: B. R. Puri, Sharma and M. S. Pathania.
2. A Text Book of Physical Chemistry, V. S. Negi and S. C. Anand.
3. A Text Book of Physical Chemistry: Kundu and Jain.
4. The elements of Physical Chemistry, P. W. Atkins, Oxford.
5. University General Chemistry, C. N. R. Rao, Mac Millan.

CH- 204 Chemistry Practical (Pass course), 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 or calcium oxalate by permanganometric


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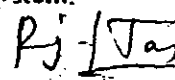
- (d) Estimation of hardness of water by EDTA
- (e) Estimation of ferrous and ferric by dichromate method
- (f) Estimation of copper using thiosulphate
- (iii) Gravimetric Analysis
 - (a) Cu as CuSCN
 - (b) Ni as Ni (dimethylglyoxime)

Organic Chemistry

- (i) Laboratory Techniques
 - A. Thin Layer Chromatography
 - Determination of R_f values and identification of organic compounds.
 - (a) Separation of green leaf pigments (spinach leaves may be used).
 - (b) 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
 - (a) Determination of the transition temperature of the given substance by thermometric/ dilatometric method (e.g. $\text{MnCl}_2 \cdot 4\text{H}_2\text{O}$ / $\text{SrBr}_2 \cdot 2\text{H}_2\text{O}$).
- (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 the Examiner)
B.Sc. Part II
CH- 204 Chemistry Practical (Pass course)

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

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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.

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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

50

Books Suggested (Theory Course)

1. Basic Inorganic Chemistry, F.A. Cotton, G. Wilkinson and P.L. Gaus, Wiley
2. Concise Inorganic Chemistry, J.D. Lee, ELBS
3. Concepts and 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, Solomon, 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, Macmillan.
14. Physical Chemistry, G.M. Barrow, International Student Edition, McGraw Hill.
15. Basic Programming with Application, V.K. Jain, Tata McGraw Hill.
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.

Books Suggested (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. Deneby, 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, Brauer, 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, R.S. 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. Gurti and R. Kapoor, S. Chand & Co.
14. Selected Experiments in Physical Chemistry, N.G. Mukerjee, J.N. Ghose & Sons.
15. Experiments in Physical Chemistry, J.C. Ghosh, Bharati Bhavan.

BOTANY

Scheme

Min. Pass Marks: 76

Paper I

3 hrs. duration

Max. Marks: 100

Paper II

3 hrs. duration

Max. Marks 33

Paper III

3 hrs. duration

Max. Marks 34

Practical Min. Marks: 18

4 hrs. duration

Max. Marks 50

3 hours

4 hours

Duration of examination of each theory paper-

Duration of examination of practicals-

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. Nos. 2 to 5 will have internal choice.

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PAPER-I
Molecular Biology and Biotechnology
(hrs week)

Unit-1

Genetic Material: Biological, chemical and physical nature of heredity material. Structure of DNA and RNAs (mRNA, tRNA and rRNA). Watson and Crick model of DNA. Nucleosome model.

DNA replication: Meselson - Stahl experiment of semiconservative replication of DNA; RNA Primers, Okazaki-fragments, polymerases, DNA-Protein interactions.

Preliminary account of 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), initiation, 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: history and definition. 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, Vectors for gene transfer Bacteriophage, plasmids, cosmids and Artificial chromosome. rDNA technology, gene amplification, Polymerase chain reaction, Application of PCR technique. DNA fingerprinting and its uses. Application of Biotechnology and Transgenic plants.

Practical Experiments

1. Elementary concepts of molecular biology and uses of various instruments in molecular biology. Demonstration of various molecular biology techniques like cloning, restriction enzyme digestion, electrophoresis, etc.
2. Molecular cloning of a DNA fragment into a plasmid vector.

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

Suggested Books

1. Gupta, P.K. (2012). *Cell and Molecular Biology*. Rastogi Publications, Meerut.
2. Gemborg, O.B. and Philips, G. (1995). *Plant Cell, Tissue and Organ culture*
3. Dnyansagar, V.K. (1986). *Cytology and Genetics*, Tata McGraw-Hill Pub. Co. Ltd. New Delhi.
4. Verma, P.S. and Agarwal, V.K. (2012). *Cell Biology, Genetics, Molecular Biology, Evolution and Ecology*. S. Chand and Co. Ltd. New Delhi.
5. Alberts, B., Bray, D.J., Raff, M., Roberts, K. and Wasson, L.D. (2001). *Molecular Biology of Cell*, Garland Publishing Co., Inc., New York.
6. Micklos, D.A., Freyer, G.A. and Crotty, D.A. (2003). *DNA Science a first course* (Second Ed.). Cold Spring Harbor Laboratory Press, NY, USA.
7. Razdan, M.K. (1993). *An Introduction to Plant Tissue Culture*. Oxford & IBH Publishing Co. Pvt. Ltd. New Delhi.
8. Mascarenhas, A.F. (1988). *Handbook of Plant tissue culture*. Publication & Information Div. ICAR, New Delhi.
9. Purohit, S.S. and Mathur, S.K. (1996). *Biotechnology fundamentals and applications*. Agro Botanical Publishers, Bikaner
10. Rana, S.V.S. (2012). *Biotechniques theory & practice* (Third Ed.). Rastogi Publications, Meerut.

Paper-II
PLANT PHYSIOLOGY AND BIOCHEMISTRY
(2 hrs /week)

Unit-1

Water: Structure, physico-chemical properties, importance to plant life, concept of water potential. Absorption and Transport of water: Ascent of sap, transpiration, Guttation, stomatal movement, factors affecting transpiration, Guttation.
Mineral Nutrition: Essential micro and macro nutrients; their uptake, hydroponics and nutrient requirement deficiency and toxicity symptoms.
Transport of organic substances: Mechanisms of phloem transport, factors regulating the translocations 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), Krebs 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 and polysaccharides, their properties, glycosidic linkages and glycoprotein.
Proteins: Amino acids-structure, electrochemical properties, peptide bonds, chemical bonds and nomenclature, 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: physiology and mechanism of action, concept of florigen and phytochrome.
Plant hormones: auxins, gibberellins, cytokinins, etc. and ABA: discovery & physiological effects.

Suggested Readings:

S. K. Saxena, Textbook of Plant Physiology, S. C. Sarma & Company, 1999

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2. Parashar, A. N. and Bhatia, K. N.: Plant physiology. Trueman Book Company, 1985.
3. Jain, A. K.: Fundamentals of plant physiology. S. Chand & Company Ltd., 2013.
4. Verma, S. K. and Verma, M.: A textbook of plant physiology, biochemistry and biotechnology. S. Chand Ltd., 2000.
5. Verma, A.: Textbook of plant physiology. ANE Books India, 2007.
6. Malik, C. P. and Srivastava, A. K.: Textbook of plant physiology. Kalyani Publication, 1982.

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, Moll's experiment.
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. Stear system in Pteridophytes. Eusporangiate and leptosporangiate development of Sporangia. Apogamy and Anisospory. 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:

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

Suggested Readings

Boyd, H.C., Alexopoulos, C. and Delsman, J. 1987 Morphology of Plant and Fungi (5th). Harper and Low Co. New York.

Garland, E.M. and Foster, A.S. 1968 Morphology and Evolution of Vascular Plants. W.H. Freeman and Company, New York.

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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.

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

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

Wison, N.S. and Rodewalt, G.W. 1993. Palaeobotany and Evolution of Plants. (2nd Ed.). Cambridge University Press, U.K.

Singh, V. Pandey, P.C. & Jain, D.K. 2013. A Text book of Botany (IV Ed). Rastogi Publications, Meerut.

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BOTANY PRACTICAL EXAMINATION B. Sc PART-II

SKELETON PAPER

M.M. 50

TIME: 4 Hours

S. No.	Practical	Regular	Ex NC
1(a)	Comment on the Tissue culture or Biotechnology technique	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	Comment upon spots (1-5)	10	15
7	Viva-Voce	5	5
8	Practical record	5	-
TOTAL		50	50

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ZOOLOGY**B. Sc.-B.Ed. (Part II) - 2024****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

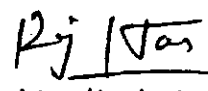
NOTE:

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: Z-201**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.

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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.

Arthropoda: Palaemon (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

Section - C

Invertebrate Adaptations

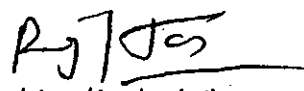
1. Salient features of Hemichordata.
2. Evolution of canal system of sponges.
3. Parasitic adaptations in Helminthes.
4. Social organization in termites and honey bees.
5. Direct and indirect development in insects.
6. Water vascular system of starfish.
7. Crustacean larvae & mouth parts of insects.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

PAPER – II: Z-202

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. The candidate has to answer all questions in the main answer book only.


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Section - A

Animal Physiology with special reference to mammals

1. Physiology of digestion: Various types of digestive enzymes and their digestive action in the alimentary canal.
2. Physiology 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.
4. 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, hypothalamic control of pituitary function.

Section-C

Biochemistry

1. Carbohydrates: Structure, function and significance; oxidation of glucose through glycolysis, Krebs'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: Z-203
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 (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

Immunology

1. Immunology: Definition, types of immunity: innate and acquired; humoral and cell mediated, Organs of immune system.
2. Antigen and antibody: Antigenicity of molecules, haptens, antibody types.
3. 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 Antony 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; mesosomes; 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: *Staphylococci, Streptococci*
 - b. Bacilli: *Diphtheria, Tetanus.*
 - (ii) Gram-Negative
 - a. Cocci: *Gonorrhea, 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.
10. Environmental Biotechnology (outline idea only): Metal and petroleum recovery, pest control, waste water treatment.
11. Food, drink and dairy biotechnology (outline idea only): Fermented food production; dairy products, wine, beer, vinegar and food preservation.

Practical - Zoology

Min. Marks: 18

4 Hrs. / Week

Max. Marks: 50

I. Study of Museum Specimens:

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

II. Study of Microscopic Slides:

Arthropoda	:	V.S. of integument (cuticle): <i>Pediculus</i> , Bedbug, Termite and its castes, <i>Cyclops</i> , <i>Daphnia</i> , crustacean larvae (Nauplius, Metanauplius, Zoea, Mysis, Megalopa, Phyllosoma), statocyst of prawn.
Mollusca	:	V.S. of shell, T.S. gill of <i>Pila</i> , 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
Pila	:	External features, pallial organs and nervous system; osphradium, radula.

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IV. Study of the Following Through Permanent Slide Preparation:

- (i) Study of different cell types -Blood smear (Wrights or Leishman stain).
- (ii) Osphradium, 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.

B.Sc.-B.Ed. (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. Mounting 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 McGraw 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/Panama Books, 2003.
7. Cooper GM and Hausman RE: The Cell: A Molecular Approach. 6th edition ASM Press Washington, DC/ Sinauer/Panama Books, 2013.
8. Conn EE, Stumpf PK, Bruening G, Doi, RH: Outline of Biochemistry. 5th edition. John Wiley & Sons, 1987.
9. De Robertis EDP and De Robertis Jr EMF: Cell and Molecular Biology. 8th edition Lippincot Williams & Wilkins, 2006.
10. David R, Burggren Wand French K: Eckert Animal Physiology. 5th edition W H Freeman & Company, New York, 2001.
11. Eckert R, Randail D. J. Burggren W, French K: Eckert Animal Physiology and Burggren WW & Co. Ltd., 1997.
12. Fox SI: Human Physiology. 8th edition McGraw Hill Education 2003:
13. Gardner EL, Simmons MJ and Snustad DP: Principles of Genetics 8th edition John Wiley & Sons, Inc., 2006.
14. Giese A. C: Cell Physiology. 4th Edition, Saunders, 1973.
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.
19. Hall JE: Guyton and Hall Textbook of Medical Physiology. 12th edition Saunders Publications, 2010.
20. Hill RW, Wyse GA, Anderson M: Animal Physiology. 3rd edition Sinauer Associates Inc. USA, 2012.
21. Hyman LH: The Invertebrates, Vol. 6, McGraw Hill.
22. Jordan EL and Verma PS: Invertebrate Zoology. S. Chand & Company Ltd., 2012.
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.
28. Lehninger AL: Biochemistry. Kalyani Publisher, 2008.
29. Lodish H, Berk A, Kaiser CA, Krieger M, Bertscher A, Ploegh H, Amon A, Scott M P. Molecular Cell Biology. 7th edition. Mac Millian High Education (International edition) England, 2013.
30. Meyers R. A: Molecular Biology and Biotechnology (A comprehensive Desk References John Wiley & Sons, 1995.
31. Murphy K: Janeway's Immunology. Garland Science; 8th edition, 2011.
32. Nelson DL and Cox MM: Lehninger Principles of Biochemistry. 5th edition W. H. Freeman, 2008.
33. Nelson DL and Cox MM: Lehninger Principles of Biochemistry. 6th edition W. H. Freeman, 2013.
34. Owen J, Punt J, Stranford S: Kuby Immunology. 7th edition WH Freeman & Co. Ltd., 2013.
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. McGraw 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.
42. Verma PS: A Manual of Practical Zoology: Invertebrates. S.Chand & Co. Ltd. New Delhi, 1971.
43. Voet D and Voet JG: Biochemistry. 4th edition, John Wiley & Sons Inc., 2011.
44. Wake MH: Hyman's Comparative Vertebrate Anatomy. 3rd edition University of Chicago Press Ltd., London, 1992.

B.Sc. Pt.-II

I. PHYSICS

Scheme :

Min. Pass Marks: 36

Max. Marks: 100

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, superfluidity, 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 equipartition 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; Monoatomic ideal gas, Barometric equation; Specific heat capacity of diatomic gas, Heat capacity of solids

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Unit-4

Quantum Statistics: Black body radiation and failure of classical statistics; Postulates of quantum statistics, indistinguishability, wave function and exchange degeneracy, a priori probability; Bose-Einstein statistics and its 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

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

Coordinate transformation and Jacobian, transformation of covariant, contra-variant and mixed tensor; Addition, multiplication and contraction of tensors; Metric tensor and its use in transformation 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, series solution method and its application to the Hermite's, Legendre's and Laguerre's differential equations; Basic properties like orthogonality, recurrence relation, graphical representation and generating function of Hermite, Legendre and Laguerre functions (simple applications)

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UNIT-4

Techniques of separation of variables and its application to following boundary value problems
(i) Laplace equation in three dimensional Cartesian coordinate system-line charge between two earthed parallel plates (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. Answer not exceeding half a page. Remaining four questions will be set with one from each of the units 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: Circuit analysis and PN junctions

Circuit analysis: Networks- some important definitions, loop and nodal equation based on D.C. and A.C. circuits (Kirchhoff's Laws). Four terminal network: Ampere volt conventions, open, close and hybrid parameters of any four terminal network, input, output and mutual impedance for an active four terminal 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 (JFET) and metal oxide semiconductor field effect transistor (MOSFET). Circuit symbols, biasing and volt-ampere characteristics, source follower operation of FET as variable voltage resistor.

Unit 3: Transistor biasing and amplifiers

Transistor biasing: Need of bias and stability of Q point, stability factors, and various types of bias circuits for thermal bias stability: fixed bias, collector to base feedback bias and four resistor bias

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Amplifiers: Analysis of transistor amplifiers using hybrid parameters and its gain-frequency response, basic idea of Cascade amplifiers, direct coupled and R.C. coupled amplifiers, Amplifier with 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 Hartley 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 DFL and FHL 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 Christos 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. G. K. Mithal, Hand Book of Electronics.
7. G. K. Mithal, Electronics Devices and Applications.
8. R. 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 of 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 Michelson'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 Clément's & Desormes'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 (U_{ss} and U_{ns}).
2. Study of power supply using two diodes/bridge rectifier with various filter circuits.

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Syllabus : B.Sc. Part-II

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 configurations).
5. Determination of band gap using a junction diode.
6. Determination of power factor ($\cos \theta$) of a given coil using CRO.
7. Study of single stage transistor audio amplifier (variation of gain with frequency).
8. To determine n/μ 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 of a coil by Anderson's Bridge.
11. Measurement of capacitance and dielectric constant of a liquid and gaseous condenser by de-Sauty bridge.

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MATHEMATICS**B.Sc.-B.Ed. Part-II 2021****Teaching : 3 Hours per Week per Theory Paper.****2 Hours per Week per Batch for Practical****Examination Scheme:**

Min.Pass Marks			Max. Marks
Science – 54			150
Arts – 72			200
		Duration	Max. Marks
Paper – I	Real Analysis	3 hrs.	40 (Science) 53 (Arts)
Paper – II	Differential Equations	3 hrs.	40 (Science) 53 (Arts)
Paper – III	Numerical Analysis	3 hrs.	40 (Science) 54 (Arts)
Practical		2 hrs.	30 (Science) 40 (Arts)

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

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Paper – I: Real Analysis

Teaching : 3 Hours per Week

Duration of Examination : 3 Hours

**Max. Marks: 40 (Science)
53 (Arts)**

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. Concept of compactness and connectedness. Heine-Borel theorem. Holder inequality & Minkowski inequality, Metric space – Definition and examples, Open and Closed sets, Interior and Closure of a set, Limit point of a set in metric space.

Unit 2: Real sequences- Limit and Convergence of a sequence, Monotonic sequences. Cauchy's sequences, Subsequences, Cauchy's general principle of convergence. Properties of continuous functions on closed intervals.

Unit 3: Properties of derivable functions, Darboux's and Rolle's theorem. Notion of limit, continuity and differentiability for functions of several variables. The directional derivative, the total derivative, expression of total derivative in terms of partial derivatives.

Unit 4: Riemann integration – Lower and Upper Riemann integrals, Riemann integrability, Mean value theorem of integral calculus, Fundamental theorem of integral calculus. Functions of bounded variations. Introduction, properties of functions of bounded variations, total variation.

Unit 5: 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.

Reference Books :

1. K.A. Ross, Elementary Analysis: The Theory of Calculus, Undergraduate Texts in Mathematics, Springer (SIE), Indian reprint, 2004.
2. R.G. Bartle D.R. Sherbert, Introduction to Real Analysis (3rd edition), John Wiley and Sons (Asia) Pvt. Ltd., Singapore, 2002.
3. Charles G. Denlinger, Elements of Real Analysis, Jones and Bartlett (Student Edition), 2011.
4. S. Kumaresan, Topology of Metric Spaces, Narosa Publishing House, Second Edition 2011.
5. G. F. Simmons, Introduction to Topology and Modern Analysis, Mcgraw-Hill, Edition 2004.

Paper – II: Differential Equations

Teaching : 3 Hours per Week

Duration of Examination : 3 Hours

Max. Marks:

40 (Science)

53 (Arts)

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 n th 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. R.S. Senger, Ordinary Differential Equations with Integration, Prayal Publ. 2000.
2. D.A. Murray, Introductory Course in Differential Equations, Orient Longman (India), 1967.
3. E.A. Coddington, An Introduction to Ordinary Differential Equations, Prentice Hall of India, 1961.

Paper – III: Numerical Analysis and Vector Calculus

Teaching : 3 Hours per Week

Duration of Examination : 3 Hours

Max. Marks:

40 (Science)

54 (Arts)

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, Trapezoidal 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, Descartes's rule of signs, solution of cubic equations by Cardon's method, biquadratic equations by Ferrari'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. B. Bradie, A Friendly Introduction to Numerical Analysis, Pearson Education, India, 2007.
2. C. F. Gerald and P. O. Wheatley, Applied Numerical Analysis, Pearson Education, India, 7th edition, 2008.
3. C.F. Gerald, P.O. Wheatley, Applied Numerical Analysis, Addison-Wesley, 1998.

Practical

Teaching: 2 hours per week per batch not more than 20 students.

Examination Scheme:

Duration: 2 Hours

	Science	Arts
Max.Marks	30	40
Min.Pass Marks	11	15

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

The paper will contain TWO practical. The candidates are required to attempt both practical.

Practicals with Computer Programming in C Language.

Programming languages and problem solving on computers, Algorithm, Flow chart, Programming in C- Constants, Variables, Arithmetic and logical expressions, Input-Output, Conditional statements, Implementing loops in Programs, Defining and manipulation arrays and functions.

Group A:

1. Printing n terms of Fibonacci sequence.
2. Finding $n!$, $\sum n$, $\sum n^2$ etc.
3. Defining a function and finding sum of n terms of a series/sequence whose general term is given (e.g. $a_n = \frac{n^2+3}{n+1}$).
4. Printing Pascal's triangle.
5. Finding gcd and lcm of two numbers by Euclid's algorithm.
6. Checking prime/composite number.
7. Finding number of primes less than n , $n \in \mathbb{Z}$.
8. Finding mean, standard deviation and nP_r , nC_r for different n and r .

Group B:

1. Numerical integration using Trapezoidal, Simpson's 1/3, 3/8 and Waddle rules.

Note:

1. Each Candidate (Regular/non-Collegiate) has to prepare his/her practical record.
2. Each Candidate has to pass in Practical and Theory examinations separately.

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UNIVERSITY OF RAJASTHAN JAIPUR

FACULTY OF EDUCATION

SYLLABUS

INTEGRATED PROGRAMME OF

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

Annual Scheme

**Academic Session 2020-21
Examination B.Sc.-B.Ed. Part – III (2021)**

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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 - III

CONTENTS

SCHEME OF EXAMINATION

SYLLABUS

SCHEME OF EXAMINATION

SYLLABUS

1. ELEMENTARY COMPUTER APPLICATION (ICT) (COMPULSORY PAPER)*
2. LANGUAGE ACROSS THE CURRICULUM (COMPULSORY PAPER)
4. GUIDANCE AND COUNSELING IN SCHOOL (G-A)
5. CONTENT (SELECT ANY THREE) - 05, 06 & 07 (G-B)
 - CHEMISTRY (I, II, III)
 - BOTANY (I, II, III)
 - ZOOLOGY (I, II, III)
 - PHYSICS (I, II, III)
 - MATHEMATICS (I, II, III)
8. PEDAGOGY OF A SCHOOL SUBJECT (PART - 3) Ist AND IIInd YEAR
(CANDIDATE SHALL BE REQUIRED TO OFFER ANY TWO PAPERS FROM THE FOLLOWING FOR PART - 3 AND OTHER FOR PART - 4) - 08 (a/b)
 - CHEMISTRY
 - BIOLOGY
 - PHYSICS
 - MATHEMATICS
 - GENERAL SCIENCE

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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 the 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. Ability to access the all round development of pupils and to maintain a cumulative record.
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.
- iii) Third Year B.Sc.B.Ed.
- iv) Final Year B.Sc.B.Ed.

Duration of the Course - Four Years

Examination 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	Elementary Computer Application (ICT)
IV th Year	Environmental Studies

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Group – A: - Subject Specialisation :

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: Content of Science Subject: - A Student has to opt 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. 12 Paper in IIIrd Year and 7 Paper in IVth Year (Total 43 Papers).
- ❖ 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			Total
			External	Internal	Practical	
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 (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
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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			Total
			External	Internal	Practical	
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 (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 / SUPW 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			Total
			External	Internal	Practical	
I	B.Sc.B.Ed. 01	Elementary Computer Application (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 (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	08(a,b)	Pedagogy of a School Subject (Candidate should opt any two school subject from the following i.e. one school subject for part - 3 and other school subject for Part - 4) 1. Chemistry 2. Biology 3. Physics 4. Mathematics 5. General Science	80	20		100
Practicum		Special Training Programme • Micro Teaching • Practice Lesson • Observation Lesson • Technology Based			10 50 05 05	100


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		Lesson • Criticism Lesson • Attendance /Seminar/ Workshop			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			Total
			External	Internal	Practical	
I	B.Sc.B.Ed. 01	Environmental Studies (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
VIII	B.Sc.B.Ed. 08(a,b)	Pedagogy of a School Subject (Candidate should opt any two school subject from the following i.e. one school subject for part - 3 and other school subject for Part - 4) 1. Chemistry 2. Biology 3. Physics 4. Mathematics	80	20	-	100


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		5. General Science				
Practicum		1. Practice teaching		50		
		2. Block Teaching (Participation in School Activities Social Participation in Group)		20		
		3. Report of any feature of school / case study/action research		10		
		4. Criticism Lesson		20		100
		Final Lesson	100			100
						800

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

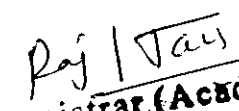
Compulsory Papers*

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

Compulsory Paper

Year	Paper
I st Year	1. Childhood and Growing Up
	2. Contemporary India and 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 Specialisation :


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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. Botany (I, II, III)
3. Zoology (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

- ❖ 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 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

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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 + Practicum +Final Lesson	600+ 100 +100= 800
Total	43Papers	2400 +550+200 +200= 3350

O. 321 The objectives of the practical work prescribed for the Integrated Programme of B.Sc.-B.Ed. 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. Arouse the curiosity and interest of the pupils and secure their active participation in the educative process.
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.

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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. Black-board 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

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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.
 - iii. To maintain same sequence of papers (G.A. - IVth, G.B. 05/06/07 papers (Ist, IInd & IIIrd year) and 8 a/b IIIrd year and IVth year) in the four years B.Sc.B.Ed itegrated course, paper no IIIrd in B.Sc.B.Ed IIIrd year and paper no VIIth in B.Sc.B.Ed IVth year were skipped.
- 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 1st 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 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 reappear 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

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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.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.

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

Part I- Main theory papers at B.Sc.B.Ed. I, In Integrated B.Sc.B.Ed I Paper nos. are 02, 03 & 04 in each session are of three hours carrying 100 marks (80 for theory + 20 for sessional) each. Compulsory paper* 01 of 100 marks and optional Paper 05, 06, 07 (G-B). in 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.

Organization evaluation of practice teaching:

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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.
4. 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.
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).
8. The board of Examination will consist of:
 - (a) The principal of the college concerned.

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(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:

(1) 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-

❖ 40 percent marks in the external examination.

❖ 40 percent marks in internal assessment.

(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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BSc. B.Ed Part III 89

BSc. B.Ed 01

Elementary Computer Applications

Maximum Marks- 100 (Main University Examinations)

Theory : Max. Marks -60

Practical : Max. Marks- 40

Each Candidate has to pass in Theory and Practical Examinations separately.

Question paper for Elementary Computer Applications, (Compulsory paper-common for B.A. / B.Sc. / B.Com. Part-I) be so set that it has 120 multiple choice questions (Bilingual) of $\frac{1}{2}$ marks each. The question paper will be of duration of 2 hours. The examinees will have to give their answers on OMR Sheet only to be provided by the University whose evaluation will be done based on OMR Scanning Technology. Further the practical examination for this paper will be of 40 marks and its duration will be of 2 hours.

Unit - I

Introduction to information technology : Evolution and generation of computers, type of computers, micro, mini, mainframe and super computer. Architecture of a computer system : CPU, ALU, Memory (Ram, Rom families) cache memory, input / output devices, pointing devices.

Concept of Operating system, need types of operating systems. batch, single user, multi - processing, distributed and timeshared operating systems, introduction of Unix, Linux, Windows, Window NT. Programming languages Low level and high level languages, generation of languages, 3 GL and 4 GL languages, Graphic User Interfaces.

Unit - II

Word Processing tool : Introduction, Creating, Saving, Copy, Move and Delete. Checking Spelling and Grammar. Page Layout, interface, toolbars, ruler, menus keyboard shortcut, editing, Text Formatting, insert headers and footers. Bullets and Numbering, Find and Replace etc. Insert Table and Picture, Macro, Mail Merge.

Power Point : Creating and viewing a presentation, managing slide shows navigating through a presentation using hyperlinks, advanced navigation with action setting and action buttons. Organizing formats with Master Slides applying and modifying designs adding graphics, multimedia and special effects.

Unit - III

Electronic Spreadsheet : Worksheet types of create and open a worksheet. Entering data text numbers and formula in a worksheet inserting and deleting cells, cell formatting, inserting rows and columns in a worksheet formatting worksheets. Using various formula and inbuilt function. Update worksheet using special tools like spell check and auto correct setup the page.

Find margins of worksheets for printing. Format the data in the worksheet globally or selectively creating charts. Enhance worksheets using charts, multiple worksheets-concepts

Unit - IV

The Internet - History and Functions of the Internet, Working with Internet, Web Browsers, World Wide Web, Uniform Resource Locator and Domain Names, Uses of Internet, Search for Information, Email, Chatting, Instant messenger services, News, Group, Teleconferencing, Video Conferencing, E-Commerce and M-Commerce

Manage an E-mail Account, E-mail Address, configure E-mail Account, log to an E-mail, Receive E-mail, Sending mails, sending files as attachments and Address Book, Downloading Files, online form filling, I - Services - E-Banking and E-Learning

Unit - V

Social, Ethical and Legal Matters - Effects on the way we Work Social,sc, Operate in other areas Cyber crime, Prevention of crime, Cyber law: Indian IT Act, Intellectual property, Software piracy, Copyright and Patent, Software licensing, Proprietary software, Free and Open source software.

Network Security - Risk assessment and security measures, Assets and types (data, applications, system and network), Security threats and attacks (passive, active): types and effects (e.g. Identity theft, denial of services, computer virus etc.), Security issues and security measures (Firewalls encryption/decryption), Prevention.

Question Paper pattern for Main University Practical Examination

Max Marks: 40

Practical

The practical exercises will be designed to help in the understanding of concepts of computer and the utilization in the areas outlined in the theory syllabus. The emphasis should be on practical usage rather than on theoretical concepts only.

The practical examination scheme should be as follows

- Three Practical Exercise (including Attendance & Record performance) 30 marks
 - Operating system
 - MS Word
 - MS Excel
 - MS Power-Point
 - Internet
- Viva voce 10 marks

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Language across the curriculum

Marks-100

Objectives:

This course will enable the pupil teacher to-

1. Understand the language background of students as the direct or seen language users.
2. Create sensitivity to the language diversity that exists in the class room.
3. Understand the nature of classroom discourse and develop strategies for using oral language in classroom.
4. Understand the nature of reading comprehension and writing in specific content areas.
5. Understand interplay of language and society.
6. Understand functions of language.
7. Understand language and speech disorder and make remedial measure too.

Unit 1

Meaning, nature, scope, role, importance, functions of language, language background, language and region, language and religion, language and class, role of literature in language

Unit - 2

Home language (mother tongue) and school language/second language. 2) Formal and informal language (3) Oral and written language – meaning, principles, objectives, importance, relation, differences

Unit-3

A)- Oral aptitude in language, theoretical speech of oral aptitude, development of oral expression/speech in pupil teacher, classroom discourse, discussion as a tool of learning, questioning in the class room, developing reading skill through text book, problems and remedies to incorrect pronunciation.

B) - Language skills – (LSWR-Listening, speaking, writing, reading,) Meaning, concepts, importance, co-relation, methods and techniques,

Language laboratory- Need, Importance, Advantage, Use in teacher's training.

Unit-4

A) **Listening skill** - Pronunciation, Intonation, Stress, Pitch, Rhythm and Oral aptitude,

B) **Speaking skill** - Pronunciation, Intonation, Stress, Pitch, Rhythm and Oral aptitude

C) **Writing skill** - Aspects of writing-shapes, Sounds, Meanings, Punctuation marks, Word, Sentence, Expression in writing, mechanics of writing, understanding and capacity to write correct logical summarizing and expanding thoughts and experiences, composition – essay story letter poetry, incidents, report articles etc

D) **Reading skill** - Consonants, Vowels, Words, Sentences, Recognition, Understanding, Silent reading, Imitation Reading, and Loud reading.

Unit - 5

Language Text Book - Criteria of selection and critical analysis of language text book, children's literature and teachers handbooks method of evaluation. Understanding the relationship between curriculum, syllabus and textbook; selection of materials; Development of activities and tasks; connecting learning to the world outside; moving away from rote-learning to constructivism; Teacher as a researcher.

Test and Assignment:-

(20 MARKS)

1. Class Test (10 marks)

2. Any One (10 marks)

- Discuss with students and find out the different language they speak, prepare a plan to use multilingualism as a teaching strategy.
- Identify speech defects of a primary level students and make remedial strategy.
- Organizing an activity based game to motivate students for creative questioning.
- Close and critical reading/discussion in small groups
- Conduct a survey in secondary school to study academic achievement in overall or in specific subject of diverse linguistic students.
- Review of a text book of any language subject

References:

1. Agnihotri, r.k. (1995) Multilingualism as a class room resource. In k. heugh, a siegruhn, p. pluddemann (Eds) multilingual education for south Africa 9pp. 3 heinemann educational books.
2. Anderson ,R.C.(1984) role of the readers schema in comprehension, learning and memory. In R.C. Anderson, J.aslrom& R.J. Tierney (Edu) learning to read in American schools: based readers and content teats psychology
3. Bansal R.K. and harrisson J.B.- (1990) spoken English for Indian orient longman LTD Madras
4. Ladson, billings G (1995) toward a theory of cultwally relevant pedagogy American Educational research journal.
5. NCERT(2006) position paper national focus group on teaching of Indian language (NCF 2005) New Delhi

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6. Paliwal Dr. A.K. (2002) communicative language teaching Sumtri publication, Jaipur.

B.Sc.B.Ed— 04 (G-A)

GUIDANCE AND COUNSELING

OBJECTIVES: -

MARKS-100

The course will enable the student teachers to –

- Understand the concept, need and meaning of guidance.
- Get acquainted with the principles , issues, problems and procedure of guidance.
- Develop understanding about the role of school in guidance.
- Understand the various areas, tools and techniques in guidance.
- Understand the concept, need and meaning of counseling.
- Get acquainted with the principles and process of counseling.
- Understand the tools and techniques in counseling.

UNIT – 1. GUIDANCE IN SCHOOL

- Concept, Need and Meaning of Guidance.
- Principles of Guidance.
- Procedure of Guidance (steps)
- Issues and problems of Guidance.
- Role of school in Guidance.

UNIT 2. AREAS, TOOLS AND TECHNIQUES IN GUIDANCE.

- Personal, Educational and vocational Guidance.
- Tools :- Records of students
- Cumulative Record
- Rating scale
- Psychological tests.
- Questionnaire and Inventories
- Techniques in Guidance (a) Observation, (b) Interview, (c) Sociometry

UNIT 3. COUNSELLING IN SCHOOL

- Concept, Need and Meaning of counseling.
- Principles of Counseling.
- counseling Process and Role.
- Directive, non-directive and eclectic counseling.

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- Qualities and role of a school counselor.

UNIT 4. TOOLS AND TECHNIQUES IN COUNSELLING

- Individual counseling and Group counseling
- Lectures , discussions and Dramatics as techniques in counseling.
- Importance of follow-up in counseling.
- Counseling for the children with special needs
- Counseling for parents.

UNIT 5 Guidance and Counseling for Special Needs Population Guidance of children with special needs

- problems and needs
- guidance of the gifted and creative students
- guidance of under achiever,
- slow learners and first generation learners
- guidance of learning disabled, Drug addicts and alcoholics
- De addiction centers, Career resource centre
- Evaluation of counseling,

Need for research and reforms in guidance and counselling .

Tasks and Assignments

- | | |
|---------------|----------|
| 1. Class Test | 10 marks |
| 2. Any one | 10 Marks |

- Interview of a school counselor.
- Visit to a guidance or counseling centre and write a report.
- Administration of an individual test and preparing a report.

References:-

1. Anastasi A, Differential Psychology, New York: Macmillan Co, 1996
2. Arbuckle Dugland, Guidance and Counselling in the classroom, Allyn & Bacon Inco, 1985.
3. Baqrki.B.G., Mukhopadhyaya.B., Guidance and Counselling; A Manual, New Delhi: Stanley Publishers, 1990.
4. Crow & Crow, An introduction to Guidance, New Delhi: Eurasia Publishing House, 1992.
5. Freeman E.S, Theory and Practice of Psychological Testing, New Delhi: Henry Holt 1992.
6. Jones.A.J., Principles of Guidance, New Delhi: McGrew Hills Publishers, 1970.
7. Kochhar S.K-Educational and vocational Guidance in secondary schools, New Delhi, sterling publishers Pvt. ltd, 1990.

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Ref / Tais
Dy. Registrar (Acad.)
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8. Kolher. S.K., Educational and Vocational Guidance, New Delhi: Practice Hall India Ltd., 1995. 9. NCERT, Guidance and Counselling in Indian Education, New Delhi: NCERT, 1978

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CHEMISTRY Scheme

Max Marks: 150

	Duration (hrs)	Max. Marks	Min. Pass Marks
Paper I	3	33	
Paper-II	3	33	36
Paper-III	3	34	
Practical	5	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.

CH-301 Paper-I : Inorganic Chemistry (2 hrs or 3 periods/ week)

Unit-I

Hard and Soft Acids and Bases (HSAB):

Classification of acids and bases as hard and soft. Pearson's HSAB concept, acid-base strength and hardness and softness. Symbiosis, theoretical basis of hardness and softness, electronegativity and hardness and softness.

Unit-II

Metal-ligand bonding in Transition Metal complexes:

Limitations of valence bond theory, an elementary idea of crystal-field theory, crystal-field splitting in octahedral, tetrahedral and square planar complexes, factors affecting the crystal-field parameters.

Magnetic properties of Transition Metal Complexes:

Types of magnetic behaviour, methods of determining magnetic susceptibility, spin-only formula, L-S coupling, correlation of μ_s and μ_{eff} values, orbital contribution to magnetic moments, application of magnetic moment data for 3d metal complexes.

Unit-III

Electron spectra of Transition Metal Complexes:

Types of electronic transitions, selection rules for d-d transitions, spectroscopic ground states, spectrochemical series, Orgel-energy level diagram for d^1 and d^9 states, discussion of the electronic spectra of $(H_2O)_6Cr^{3+}$ complex ion.


Thermodynamic and Kinetic Aspects of Metal Complexes:

A brief outline of thermodynamic stability of metal complexes and factors affecting the stability, substitution reactions of square planar complexes.

Unit-IV

Organometallic Chemistry:

Definition, nomenclature and classification of organometallic compounds. Preparation,


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properties, bonding and applications of alkyls and aryls of Li, Al, Hg, Sn and Ti, a brief account of metallocenes, complexes and homogeneous hydrogenation, mononuclear carbonyls and the nature of bonding in metal carbonyls.

Unit-V

Bioinorganic Chemistry:

Essential and trace elements to Biological processes, metalloporphyrins with special reference to haemoglobin and myoglobin. Biological role of alkali and alkaline earth metal ions with special reference to Ca^{2+} . Nitrogen fixation.

Inorganic Polymers:

Silicones and phosphazenes as examples of inorganic polymers, nature of bonding in triphosphazenes.

CH-302 Paper-II : Organic Chemistry

(2 hrs or 3 periods/week)

Unit-I

Nuclear Magnetic Resonance (NMR) Spectroscopy:

Proton magnetic resonance (^1H -NMR) spectroscopy, nuclear shielding and deshielding, chemical shift and molecular structure, spin-spin splitting and coupling constants, areas of signals. Interpretation of NMR spectra of simple organic molecules such as ethyl bromide, ethanol, acetaldehyde, 1,1,2-tribromoethane, ethyl acetate, toluene and acetophenone. Problems pertaining to the structure elucidation of simple organic compounds using NMR data.

Organic Synthesis via Enolates: Acidity of α -hydrogens in reactive methylene compounds, alkylation of diethyl malonate and ethyl acetoacetate. Claisen condensation, Keto-enol tautomerism in ethyl acetoacetate. Synthetic applications of ethyl acetoacetate and malonic ester.

Unit-II

Heterocyclic Compounds

Introduction: Molecular orbital diagram and aromatic characteristics of pyrrole, furan, thiophene and pyridine. Methods of synthesis and chemical reactions with particular emphasis on the mechanism of electrophilic substitution. Mechanism of nucleophilic substitution reactions in pyridine derivatives. Comparison of basicity of pyridine, piperidine and pyrrole.

Introduction to fused five- and six-membered heterocycles. Preparation and reactions of indole, quinoline and isoquinoline with special reference to Fischer-indole synthesis, Skraup synthesis and Bischler-Napieralski synthesis, Mechanism of electrophilic substitution reactions of indole, quinoline and isoquinoline.

Unit-III

Carbohydrates

Classification and nomenclature. Monosaccharides, mechanism of osazone formation. Epimers, anomers and mutarotation. Interconversion of glucose and fructose, chain lengthening and chain

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shortening of aldoses. Erythro and threodiastereomers. Conversion of glucose into mannose. Configuration of monosaccharides. Determination of ring size of monosaccharides. Formation of glycosides, ethers and esters. Cyclic structure of D(+)-glucose and fructose. Structures of ribose and deoxyribose.

Nomenclature and structure of disaccharides (maltose, sucrose and lactose) and polysaccharides (starch and cellulose); Glycosidic linkage.

Unit-IV

Amino Acids, Peptides, Proteins and Nucleic Acids

Classification, structure and stereochemistry of amino acids. Acid-base behaviour, isoelectric point and electrophoresis. Preparation and reactions of α -amino acids.

Structure and nomenclature of peptides and proteins. Classification of proteins. Peptide structure determination, end-group analysis, selective hydrolysis of peptides. Classical peptide synthesis. Solid-phase peptide synthesis.

Nucleic acids - Introduction, constituents of nucleic acids - nucleosides and nucleotides.

Unit-V

Organosulphur Compounds : Nomenclature, structural features, methods of formation and chemical reactions of thiols, sulphonic acids, sulphonamides and Sulpha drugs: sulphaguanidine, sulphadiazine (sulphapyrimidine), sulphamethoxazole, sulphacetamide.

Synthetic Polymers : Addition or chain-growth polymerization. Free radical and ionic polymerization. Ziegler-Natta Catalyst Condensation or step-growth polymerization. Polyesters, polyamides, phenol-formaldehyde resins, urea-formaldehyde resins, epoxy resins and polyurethanes. Natural and synthetic rubber.

Synthetic Dyes : Colour and constitution (electronic concept). Classification of dyes. Chemistry and synthesis of methyl orange, congo red, malachite green, crystal violet, phenolphthalein, fluorescein, alizarin and indigo.

CH-303 Paper III: Physical Chemistry (2 Hrs. or 3 periods/week)

UNIT-I

Elementary quantum Mechanics:

Black-body, radiation, Planck's radiation law, photoelectric effect, heat capacity of solids, Bohr's model of hydrogen atom (no derivation) and its defects. Compton effect.

De Broglie hypothesis, the Heisenberg's uncertainty principle, Sinusoidal wave equation, Hamiltonian operator, Schrodinger wave equation and its importance, physical interpretation of

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the wave function, postulates of quantum mechanics, particle in a one dimensional box.

Schrodinger wave equation for H-atom, separation into three equations (without derivation), quantum numbers and their importance, hydrogen like wave functions, radial wave functions, angular wave functions.

UNIT-II

Molecular orbital theory:

Basic ideas-criteria for forming M.O. from A.O. construction of M.O's by LCAO- H_2^+ ion calculation of energy level from wave functions, physical picture of bonding and antibonding wave functions, concept of σ , σ^* , π , π^* orbitals and their characteristics. Hybrid orbitals - sp , sp^2 , sp^3 , calculation of coefficients of A.O.'s used in these hybrid orbitals.

Introduction to valence bond model of H_2 , comparison of M.O. and V.B. models.

UNIT-III

Spectroscopy

Introduction: Electromagnetic radiation, spectrum, basic features of different spectrometers, statement of the Born-Oppenheimer approximation, degrees of freedom.

Rotational Spectrum: Diatomic molecules, Energy levels of a rigid rotator (semi-classical principles), selection rules, spectral intensity, using population distribution (Maxwell-Boltzmann distribution) determination of bond length, qualitative description of non-rigid rotator, isotope effect.

Vibrational Spectrum: Infrared spectrum: Energy levels of simple harmonic oscillator, selection rules, pure vibrational spectrum, intensity, determination of force constant and qualitative relation of force constant and bond energies, effect of anharmonic motion and isotope on the spectrum, idea of vibrational frequencies of different functional groups.

Raman Spectrum: Basic principles and applications, concept of polarizability, pure rotational and pure vibrational Raman Spectra of diatomic molecules, selection rules.

Electronic Spectrum: Concept of Potential Energy curves for bonding and antibonding molecular orbitals, qualitative description of selection rules and Frank Condon principle. Qualitative description of σ , π and n M.O. their energy levels and the respective transitions.

UNIT-IV

Photochemistry

Interaction of radiation with matter, difference between thermal and photochemical processes. Laws of photochemistry: Grothus-Draper law, Stark-Einstein law, Jablonski diagram depicting various processes occurring in the excited state, qualitative description of fluorescence, phosphorescence, non-radiative processes (internal conversion, intersystem crossing), quantum yield, photosensitized reactions-energy transfer processes (simple examples).

Physical Properties and Molecular Structure

Optical activity, polymerization - (Clausius-Mossoni equation), orientation of dipoles in an electric field, dipole moment, induced dipole moment, measurement of dipole moment temperature method and refractivity method, dipole moment and structure of molecules, magnetic properties-paramagnetism, diamagnetism and ferromagnetic.

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UNIT-V

Solutions, Dilute Solutions and Colligative Properties:

Ideal and non-ideal solutions, methods of expressing concentrations of solutions, activity and activity coefficient.

Dilute solution, colligative properties, Raoult's law, relative lowering of vapor pressure, molecular weight determination. Osmosis, law of osmotic pressure and its measurement, determination of molecular weight from osmotic pressure. Elevation of boiling point and depression in freezing point. Thermodynamic derivation of relation between molecular weight and elevation of boiling point and depression in freezing point. Experimental methods for determining various colligative properties. Abnormal molar mass, degree of dissociation and association of solutes.

Practical: CH-304: Laboratory Course - III

(6 hrs/week)

INORGANIC CHEMISTRY

Synthesis and Analysis of:

- Potassium trioxalatoferrate (III), $K_3[Fe(C_2O_4)_3]$
- Bis(dimethylglyoximate) nickel (II) complex, $[Ni(DMG)_2]$
- Tetraamminecopper (II) sulphate, $[Cu(NH_3)_4]SO_4$
- Potassium triaquabis(oxalato)chromate (III) dihydrate, $K[trans-Cr(H_2O)_2(C_2O_4)_3] \cdot 2H_2O$

Instrumentation:

Calorimetry

(a) Job's

(b) Mole-ratio method

Adulteration-Food stuffs

Effluent analysis water analysis

Solvent Extraction

Separation and estimation of Mg (II) and Fe (II)

Ion Exchange Method

Separation and estimation of Mg (II) and Fe (II)

ORGANIC CHEMISTRY

Laboratory Techniques

Steam Distillation

Naphthalene from its suspension in water

Clove oil from Clove

Separation of o- and p-nitrophenols

Column Chromatography

Separation of fluorescein and methylene blue

Separation of leaf pigments from spinach leaves

Resolution of racemic mixture of (+) mandelic acid

Qualitative Analysis

Analysis of an organic mixture containing two solid components using water, $NaHCO_3$, for separation and preparation of suitable derivatives.

Synthesis of Organic Compounds

(a) Acetylation of salicylic acid, aniline, glucose and hydroquinone,

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- Benzoylation of aniline and phenol
- (b) Aliphatic electrophilic substitution
Preparation of iodoform from ethanol and acetone
- (c) Aromatic electrophilic substitution
Nitration
Preparation of m-dinitrobenzene
Preparation of p-nitroacetanilide
Halogenation
Preparation of p-bromoacetanilide
Preparation of 2, 4, 6-tribromophenol
- (d) Diazotization / coupling
Preparation of methyl orange and methyl red
- (e) Oxidation
Preparation of benzoic acid from toluene
- (f) Reduction
Preparation of aniline from nitrobenzene
Preparation of m-nitroaniline from m-dinitrobenzene.
- Stereochemistry: Study of Organic Compounds via Models
R, S configuration of optical isomers.
E, Z configuration of geometrical isomers.
Conformational analysis of cyclohexanes and substituted cyclohexanes.

PHYSICAL CHEMISTRY

Electrochemistry

- To determine the strength of the given acid conductometrically using standard alkali solution.
- To determine the solubility and solubility product of a sparingly soluble electrolyte conductometrically.
- To study the saponification of ethyl acetate conductometrically.
- To determine the ionization constant of a weak acid conductometrically.
- To titrate potentiometrically the given ferrous ammonium sulphate solution using $\text{KMnO}_4/\text{K}_2\text{Cr}_2\text{O}_7$ as titrant and calculate the redox potential of $\text{Fe}^{2+}/\text{Fe}^{3+}$ system on the hydrogen scale.

Refractometry; Polarimetry

- To verify the law of refraction of mixture (e.g. of glycerol and water) using Abbe's refractometer.
- To determine the specific rotation of a given optically active compound.

Molecular Weight Determination

- Determination of molecular weight of a non-volatile solute by Rast method/Beckmann freezing point method.
- Determination of the apparent degree of dissociation of an electrolyte (e.g. NaCl) in aqueous solution at different concentrations by ebullioscopy.

Colorimetry

- To verify Beer-Lambert law $\text{KMnO}_4/\text{K}_2\text{Cr}_2\text{O}_7$ and determine the concentration of the given solution of the substance.

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(Instructions to the Examiner)
CH-304 Chemistry Practical (Pass Course)

Max. Marks: 50

Duration of Exam: 5 hrs.

Minimum marks: 18

Inorganic Chemistry

Synthesis and Analysis of one of the four syntheses given in the syllabus.

OR

Separation and estimation of Mg (II) and Fe (II) by solvent extraction method.

OR

Separation and estimation of Mg (II) and Fe (II) by ion exchange method.

10

Organic Chemistry

(1) Synthesis of one of the six organic preparations.

8

(2) Analysis of an organic mixture containing two solid components using water / NaHCO₃ / NaOH and preparation of suitable derivatives.

OR

Column chromatography techniques.

Perform one of the three column chromatography experiments given in syllabus.

10

Physical Chemistry

Perform one of the physical chemistry experiments given in the syllabus.

12

Viva-voce

5

Record

5

50

Books Suggested (Theory Course)

1. Basic Inorganic Chemistry F.A. Cotton, G. Wilkinson and P.L. Caus. 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.E. Shriver P.W. Atkins and C.H. Langford, Oxford.
5. Inorganic Chemistry, W.W. Potterfield 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, L.G. Wade Jr. Prentice Hall.
10. Fundamentals of Organic Chemistry, Solomons, John Wiley.
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. Macmillan.
14. Physical Chemistry, G.M. Barrow. International Student Edition, McGraw Hill.
15. Basic Programming with Application, V.K. Jain. Tata McGraw Hill.
16. Computers and Common Sense. R. Hunt and Shelly, Prentice Hall.

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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.

Books Suggested (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. Denney, 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, Brauer, 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, R.S. 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. Pehra, 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. Selected Experiments in Physical Chemistry, N.G. Mukerjee, J.N. Ghose & Sons.
15. Experiments in Physical Chemistry, J.C. Ghosh, Bharati Bhavan. (Instructions to examiners)

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BOTANY

Scheme

Min. Pass Marks : 26

Paper I	3 hrs duration	Max Marks: 100
Paper II	3 hrs duration	Max. Marks 33
Paper III	3 hrs duration	Max. Marks 33
Practical Min. Marks: 18	4 hrs, duration	Max. Marks 34
		Max. Marks 50
		3 hours
		4 hours

Duration of examination of each theory paper.
Duration of examination of practicals.

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 20 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

PLANT MORPHOLOGY AND ANATOMY

(2 hrs. week)

Unit-1

The basic body plan of flowering plant; modular type of growth. Diversity of Plant form in annuals, biennials and perennials; branching pattern: monopodial and sympodial growth; canopy architecture; meristematic, simple, complex and secretory tissues; tissue systems.

Unit-2

The Shoot system: The shoot apical meristem and its histological organization; vascularisation of primary shoot in monocotyledons and dicotyledons; cambium and its functions; formation of secondary xylem; a general account of wood structure: growth rings, sapwood and heartwood; secondary phloem-structure and function, periderm; Anomalous secondary growth.

Unit-3

The Leaf: origin, development, arrangement and diversity in size and shape; Stomata-Structure and types, stomatal index, vascularisation of leaf-nodal structure and venation, Senescence and abscission.

The root system: Root apical meristem; differentiation of primary and secondary tissues and their functions; structural modification for storage, respiration, reproduction and root-microbe interaction.

Unit-4

Morphology and anatomy of seed (monocotyledons and dicotyledons) Significance of seed-suspended animation, dispersal strategies, Vegetative propagation.

Suggested readings :

Cutter, J.G. 1960 Plant Cells and Tissues, Edward Arnold, London.

Cutter, J.G. 1971 Plant Anatomy : Experiment and interpretation, part-II, organs, Edward Arnold, London.

Esau, K. 1977 Anatomy of Seed Plants, 2nd edition, John Wiley & Sons, New York.

Fahn, A. 1985 Plant Anatomy, Pergamon Press, Oxford.

Hartman, H. and K. S. G. 1976 Plant Preparation Principles and of India Pvt. Ltd., New Delhi.

Manseth, J.D. 1988 Plant Anatomy, The Benjamin-Cummings Publishing Co. Inc. Menlo Park, California, USA.

Raven, P.M., Evert, R.F. and Eichhorn, S.E. 1969 Biology of Plants, W.H. Freeman and Co. Worth Publishers, New York.

Thomas, P. 1960 Trees Their National History, Cambridge University Press, Cambridge.

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Suggested Laboratory Exercises:

1. Study of an commonly occurring dicotyledonous plant to understand the body plan and modular type of growth.
2. Life forms exhibited by flowering plants (by visit to a forest or a garden).
3. L.S. of shoot tip to study the organization of meristem and origin of leaf primordia.
4. Monopodial and sympodial types of branching in monocots & dicots.
5. Anatomy of primary and secondary growth in monocots and dicots using hand cut sections of sunflower, maize, cucurbita stem and roots.
6. Anomalous secondary growth in stem: *Salvadora*, *Bignonia*, *Bougainvillea*, *Bouhaenia*, *Myrsinthes*, *Leptadenia*, *Deacena*.
7. Study of diversity in leaf shape and size. Internal structure of leaf-Dorsiventral and isobilateral leaves; study of stomatal types.
8. Examination of seed (monocot and dicot). Structure seed viability test.
9. Specimens of modifications of plant parts for vegetative reproduction.

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Paper-II

Ecology & Economic Botany

(2 hrs week)

Unit-1

Plants and Environment: Atmosphere (four distinct zone viz. stratosphere, troposphere, mesosphere and thermosphere) Adaptation (Morphological, anatomical and physiological responses) of plants to water (Hydrophytes and Xerophytes). Light (global radiation, photosynthetically active radiation Zonation in water body: littoral, limnetic and profundal zones, photoperiodism, heliophytes and sciophytes) Temperature (Raunkier's classification of plants megatherm, mesotherm, microtherm, hekistotherm, thermoperiodicity and vernalisation) Soil (soil profile, development, weathering and maturation) Soil texture, soil types, role of pH, organic matter, soil water, soil nutrients. Interactions among organisms (neutralism, amensalism, allelopathy, competition, predation, parasitism, proto-cooperation, mutualism. Environmental protection etc.

Unit-2

Community, Ecosystem and Phytogeography. Community characteristics: stratification, life forms and biological spectrum, frequency density and cover. Ecological succession types (primary and secondary) mechanism: nudation, migration, ecesis, reaction and climax, xerosere, hydrosere. Ecosystems: Structure, abiotic and biotic components, trophic level, food chain, food web, ecological pyramids, energy flow (Box and Pipe model of Odum). Biogeochemical cycles of carbon and phosphorus. Vegetation types of Rajasthan. Endangered plants of Rajasthan

Unit-3

Basic concept of center of origin of cultivated plants. Food plants: rice, wheat, maize, pulses, sugarcane. Vegetables: General account with a note on radish, onion, garlic, cabbage, spinach, cauliflower, cucumber, brinjal, ladyfinger and pea. Fruits: General account with a note on apple, banana, bet, mango, mulberry, jamun, watermelon, muskmelon, guava and orange. Vegetable oil production: mustard and coconut.

Unit-4

Spices: General account with an emphasis on those cultivated in Rajasthan (Black pepper, cardamom, turmeric). Beverages: Tea and coffee. Medicinal plants: General account with an emphasis on those cultivated in Rajasthan.

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(Senna, *Calliandra*, *Salvadora*, *Musli*). Fibers: Cotton and jute. Wood. General account of sources of firewood, timber and bamboos; Rubber. Fibrobotany: a general account.

Practical Exercises:

1. Study frequency and density, abundance of plant species of campus vegetation by quadrat method
2. Variation in soil moisture in relation to depth
3. To estimate bulk density of grassland and woodland soil.
4. To estimate the porosity of grassland and woodland soil sample.
5. To determine moisture content of grassland and woodland soil.
6. To measure dissolved oxygen content in polluted and unpolluted water samples.
7. To measure temperature of different water bodies.
8. Water holding capacity of the soil
9. Find out pH of soil sample by Universal Indicator method.
10. Find out pH of water sample by pH meter
11. Find out transparency of a waterbody by Secchi disk
12. Study morphology (external and internal) of hydrophytes (*Hydrilla* stem, *Typha* leaf and *Nymphaea/Eichhornia* petioles) and xerophytes (*Calotropis*, *Capparis* and *Cuscuta* stem, *Nerium* leaf) with special reference to their adaptations.
13. Study following specimen with special reference to:
 1. Botany of the economically important part
 2. Processing of any involved
 3. Specimen of cereals, pulses, spices, beverages (tea & coffee) beans, sugar, oil seeds (mustard, groundnut).
14. Study of grain in potato and pea. Histochemical test Cellulose, lignin, starch, protein and tannin.
15. Submit 2 specimens of locally important medicinal plants.

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Paper-III

Angiosperm Taxonomy and Embryology

(2 hrs/week)

Unit-1

- Introduction of Taxonomy, Units of classification, Concept of genus and species, Botanical Nomenclature, International Code of Botanical Nomenclature

Taxonomic literature: Floras, Gardens, Herbaria, Monographs, Icones, Library.

Types of systems of Classification, Bentham and Hooker's, Engler and Prantle's system.

Diversity of flowering plants illustrated by members and economic importance of the following families: Ranunculaceae, Brassicaceae, Papaveraceae, Malvaceae, Fabaceae, Caryophyllaceae and Apiaceae.

Unit-2

Rubiaceae, Asteraceae, Apocynaceae, Asclepiadaceae, Convolvulaceae, Solanaceae, Acanthaceae, Lamiaceae, Chenopodiaceae, Euphorbiaceae, Liliaceae, Arecaceae and Poaceae.

Unit-3

Ontogeny of the flower parts-development and variations, Structure of anther, microsporogenesis, Tapetum types and functions, development of male gametophyte, structure of pollen grains

Types of ovule, Megasporogenesis, development of female gametophyte (Embryosac), Polination, Pollination types, Fertilization, Double fertilization, significance of double fertilization

Unit-4

Development of dicot and monocot embryo, formation of embryo types of Embryo, Endosperm, Perisperm, Endosperm, Endosperm, Polyspermy, Induced polyspermy, Parthenocarp, Apomixis and adventive embryo

Supervised Laboratory Exercises

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(1) The following genera are suitable for study of families

- 1 Ranunculaceae-Ranunculus, Delphinium
- 2 Leguminales-Pisum sativum, Cassia and Acacia
- 3 Malvaceae-Gonolobum
- 4 Convolvulaceae-Ipomea, Jacquinia
- 5 Apocynaceae-Catharanthus, Thevetia
- 6 Scrophulariaceae-Calotropis
- 7 Labiaceae- Ocimum, Salvia
- 8 Euphorbiaceae-Euphorbia pulcherrima, Ricinus
- 9 Asteraceae-Adhatoda
- 10 Asteraceae-Helianthus
- 11 Rubiaceae-Hamelia

13* Visit to a Local Botanical Garden/Herbarium/National Park/Study of Local Floral biodiversity. (Candidates are expected to submit a detailed report of such visit)

- 1. Study of anther to study the wall layers and pollen sac with pollen grains.
- 2. Study the various types of ovule. Draw the diagrams
- 3. Study the various types of placentations
- 4. Study the germination of pollen grain on an and observe the path of pollen tube.
- 5. Study of various stages of embryo in Raphanus fructu

Suggested Readings:

- 1. Angiosperms-V. S. (1995), TMC Publishing Company New Delhi.
- 2. Principles of Botany V. V. Sivarajan (1984) Oxford & BH Publishing Co. Pvt Ltd New Delhi
- 3. Botany Sushella (2003), Dominant Publishers and New Delhi
- 4. Botany Sushella (2003), Oxford and BH Publishing Co. Pvt

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1. N. Sharma and J. S. Sharma (2003) Structure, Development and
Differentiation in Flowering Plants. Ramesh Book Depot, Jaipur
2. S.S. and Bhatnagar, S.P. (2000) The embryology of Angiosperms 4th
edition Vikas Publishing House New Delhi
3. Introduction to the Embryology of Angiosperm. Maheshwari, P. (1950)
New Delhi
4. Advances in the Embryology of Angiosperms. Ed. Maheshwari, P.
New Delhi

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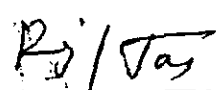
BOTANY PRACTICAL EXAMINATION B.Sc PART-III

SKELETON PAPER

M.M. 50

TIME: 4 Hours

S.No.	Practical	Regular	Ex/NC
1	(a) Plant Taxonomy Describe vegetative and reproductive parts of flower in semi-technical language. Give floral diagram and floral formula and identify the family giving reasons. (b) Comment on the embryological exercise.	7 3	7 3
2	(a) Anatomical exercise on anomalous secondary growth (b) Anatomy of root/leaf/study of stomatal types.	5 5	5 5
3	(a) Ecological exercise based on quadrat method/Exercise related to soil (b) Ecological Anatomy (c) Histochemical Test / Economic Botany	3 4 3	3 4 3
4	Comment upon spots (1-5).	10	15
5	Viva- Voce	5	5
6	Practical record	5	-
TOTAL		50	50


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Syllabus: B.Sc.-B.Ed. Part-III (Pass Course)

Zoology

(2020-2021)

Scheme:

Max. Marks: 100

Min. Pass Marks: 36

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

NOTE:

1. There will be two parts of every theory question paper with total duration of 3 hours. First part of question paper will comprise 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 question 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.

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Dy. Registrar (Academic-I)
University of Rajasthan
Jaipur

PAPER -I: Z-301

STRUCTURE AND FUNCTIONS OF CHORDATE TYPES

NOTE:

1. There will be two parts of this theory question paper with total duration of 3 hours. First part of question paper will comprise 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 question 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

Chordates

1. Comparison of habit, external features and anatomy of *Herdmania* and *Branchiostoma* (excluding development).
2. Ascidian tadpole larva and its metamorphosis.
3. Affinities of Hemichordata, Urochordata and Cephalochordata
4. Habit, habitat and salient features of *Petromyzon*, Ammocoete larva.

Section – B

Structure, organs and Systems: Brain, endoskeleton, Digestive, Circulatory, Respiratory, Excretory, Nervous & Reproductive

Pisces- Labeo

Amphibian-Frog

Reptile-Varanus

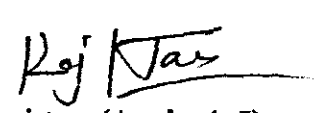
Aves-Pigeon

Mammal- Rat

Section – C

Chordate Adaptations

1. Pisces: Scales and fins, migration and parental care.
2. Amphibia: Parental care.
3. Reptilia: Poisonous and non poisonous snakes, poison apparatus.
4. Aves: Flight adaptations, types of feather, bird migration.
5. Mammals: Adaptive radiation, dentition.


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PAPER -II: Z-302
ECOLOGY AND ENVIRONMENTAL BIOLOGY


NOTE:

1. There will be two parts of this theory question paper with total duration of 3 hours. First part of question paper will comprise 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 question selection 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

Ecology

1. Basic concepts in ecology, its meaning and history.
2. Concepts of limiting factors.
3. Ecosystem: Biotic and abiotic factors.
4. Ecosystem: Production, consumption and decomposition in an ecosystem: Concepts of food-chain, food web, trophic structure, ecological pyramids
5. Biogeochemical cycles of O_2 , CO_2 , H_2O , N, P and role of microbes.
6. Ecosystem: Homeostasis, functional aspects, productivity concepts and determination, ecotone, edge effects, niche.
7. Population ecology: Density and methods of its measurement, natality, mortality, age ratio and distribution, pyramids, fluctuations, biotic potential, dispersal, growth forms, population interactions and propagation, brief idea of demography.
8. Community ecology: Characteristics of natural communities, structure, composition, stratification.
9. Ecological succession: Types and patterns, concept of climax, details of xerosere and hydrosere successions.
10. Habitat ecology: Brief account of fresh water, marine, terrestrial and estuarine water ecosystems.
11. Major biomes of the world.
12. Ecology and human future: Growth rate role of human kind in modifying natural communities in term of public health and welfare with respect to use of pesticides, conservation and pollution.


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Section - B

Environmental Biology-I

1. Environment and its concepts, global environment, hydrosphere, lithosphere and atmosphere.
2. Natural resources: Present status and future needs.
3. Conservation and management of natural resources: Renewable (forest, wildlife, water) and non renewable (soil, minerals and energy).
4. Environmental pollution I: General outline and various types of pollution of water, air, and soil.
5. Environmental pollution II: Sources and remedies for noise, radiation, industrial chemicals, agrochemicals, insecticides, pesticides and household pollutants.
6. Green House effect, Ozone layer depletion, El-Nino and La Nina effects.
7. Radiation and environment: Types of radiation, fallout effects of radiation nuclear accidents.
8. Basic concepts of bioaccumulation, biomagnifications, biodegradation of pollutants.

Section - C

Environmental Biology -II

1. Wildlife conservation: Vanishing and threatened animals and plants with special reference in Rajasthan, Wildlife management efforts by Government and non Government organization (including wild life acts).
2. Impact of urbanization: Development and distribution of urban centers, factors , problems and solutions of urbanization, fauna of oriental region.
3. Space ecology: Space ecosystem, space problems and their solutions, colonization.

PAPER -III: Z-303

APPLIED ZOOLOGY, ETHNOLOGY AND BIOSTATISTICS

NOTE:

1. There will be two parts of this theory question paper with total duration of 3 hours. First part of question paper will comprise 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 (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 question 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.

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University of Rajasthan
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Section – A

Applied Zoology

Principles and Practices of the following:

1. Vermiculture.
2. Sericulture (including ericulture).
3. Lac culture.
4. Apiculture.
5. Prawn culture.
6. Poultry keeping.

Economic Importance of the following:

1. Protozoa.
2. Corals and coral reefs.
3. Helminthes.
4. Arthropods; Insects and their management
5. Mollusca: Outline idea of pearl culture.

Section – B

Ethology

1. Introduction and history of Ethology.
2. Concepts of Ethology : Fixed action pattern, sign stimulus, innate releasing mechanism, action specific energy, motivation imprinting and learning.
3. Pheromones and their role in alarm spreading
4. Societies: Characteristics and advantage with special reference to honey bee & deer.
5. Biological rhythms and biological clocks.
6. Methods of studying animal behavior.

Section – C

Biostatistics

1. Introduction, scope and application of Biostatistics.
2. Understanding the concepts of descriptive and inferential statistics.
3. Frequency distribution.
4. Graphical and tabular presentation of data.
5. Mean, median, mode and their significance.
6. Standard deviation, standard error and their significance.
7. Hypothesis: Null and alternative; Student's t- test.

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Syllabus: B.Sc.-B.Ed. Part-III (Pass Course)

Zoology Practical

(2020-2021)

Min. Marks: 18

4 Hrs. / Week

Max. Marks: 50

I. Anatomy:

Any edible fish (*Wallago, Labeo*): External features, general viscera, afferent and efferent branchial blood vessels, eye muscles and their innervations, brain, cranial nerves and internal ear

II. Study of the following through Permanent Slide preparations:

Striped muscle fibers; Smooth muscle fibers, scales of edible fish, hair of man, bolloed film of any vertebrate.

III. Study of Microscopic Slides: Whole mounts of oral hood, velum and pharyngeal wall of *Amphioxus*; T. S. of *Amphioxus* through various regions; tadpole larva of *Ascidia*; whole mounts of *Salpa, Doliolum* and *Oikopleura*, V. S. of skin of fish, T. S. body of fish through various regions, V. S. of skin of bird, V. S. mammalian skin, T. S. mammalian liver, kidney, stomach, intestine, bone, spinal cord, lung, duodenum, pancreas, testis and ovary.

IV. Study of Museum Specimens: *Ascidia, Ciona, Botryllus*, Ammocoete larva, *Petromyzon, Myxine* or *Bdellostoma, Zygaena (Sphyrna), Torpedo, Chimaera; Acipenser, Amia* or *Lepidosteus, Labeo, Clarias, Anguilla, Hippocampus, Exocoetus, Echeinis*, any flat-fish, *Protopterus, Ichthyophis* or any blind-worm, *Proteus, Ambystoma, Axolotl, Siren, Alytes, Hyla, Testudo, Chelone*, and Fresh Water Tortoise, *Sphenodon, Hemidactylus Phrynosoma, Draco, Chameleon; Eryx, Hydrophis, Naja, Viper, Crocodilus, Alligator, Archaeopteryx*, any Running Bird, *ravo cristatus, Choriotis nigriceps, Ornithorhynchus, Tachyglossus, Didelphys, Macropus, Bat, Loris*, Scaly anteater.

V. Osteology: A comparative study of articulated and disarticulated bones of skull, vertebrae, limb bones and girdles of any amphibian, reptile, bird and mammal with the help of models/ charts/ artificial skeleton/bones.

VI. Environmental Biology:

Analysis of Environment:

1. Soil pH
2. Water analysis: pH, alkalinity, acidity, dissolved O₂ and free CO₂, Salinity (Chloride).
3. Qualitative estimation of zoo-plankton in given sample of water.

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VII. Ethology:

1. Study of any stored insect pest (food preference and response to light)
2. Antennal grooming in cockroach.
3. Chemical communication: Ants/earthworm.
4. Visit to a Zoo/ Museum of Natural History /Wild life Sanctuary and/or Study of local faunal biodiversity (Candidates are expected to submit a detailed report of such visit).

VIII. Biostatistics:

1. Construction of frequency table, bar diagram, line diagram, histogram, frequency polygon and pie chart.
2. Exercises on mean, median and mode (direct, short-cut and step-deviation methods).
3. Standard deviation and standard error.

B.Sc.-B.Ed. Part - III


Scheme of Practical Examination and Distribution of Marks

Time: 4 Hrs.

Min Pass Marks: 18

Max. Marks: 50

	Regular	Ex. /N.C. Students
1. Anatomy	6 (4+2)	7 (5+2)
2. Permanent Preparation	5	6
3. Environmental Biology	5	5
4. Ethology	3	5
5. Biostatistics	5	6
6. Identification and comments on Spots (1 to 8)	16	16
7. Viva Voce	5	5
8. Class Record	5	-
	50	50


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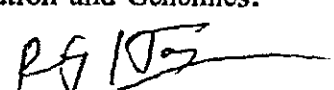
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Notes:

1. With reference to anatomy and study of museum specimens, candidates must be well versed in the study of various systems with the help of charts/models/CD- ROMs, multimedia computer based simulations including computer assisted learning (CAL) and other softwares.
2. With reference to permanent preparations and microscopic slides, in case of non-availability, the exercise should be substituted with diagrams, photographs, models, charts, etc.
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. The candidates may be asked to write detailed methodology wherever necessary and separate marks may be allocated for the same.
5. Mounting material for permanent preparations would be as per the syllabus or as available through collection and culture methods.
6. It should be ensured that animals used in the practical exercises are not covered under the wild life act 1972 and amendments made subsequently.

Recommended Books:

1. Ahsan J and Sinha SP: A Hand book on Economic Zoology. 9th edition S. Chand & Co. Ltd., 1981.
2. Alcock J: Animal Behavior: An Evolutionary Approach. Sinauer Associates 2013.
3. Animal Societies and Evolution. Scientific American Publications.
4. Alexander R. M: The Chordates, Cambridge University Press. 1975.
5. Bailey NTJ: Statistical Methods in Biology. English Universities Press, 1964.
6. Breed MD and Moore J: Animal Behavior. Academic Press. 2015.
7. Grzimek's Encyclopedia of Ethology.
8. Gurumani N: An Introduction to Biostatistics. MJP Publishers. 2011.
9. Hand book of Ethological Method. Laharen Publications Garland STPM Press.
10. Kotpal R: Modern Text Book of Zoology: Vertebrates. Global Media Publications 2010.
11. MacFarland D: Animal Behavior: Psychobiology, Ethology and Evolution 3rd edition Longman 1998.
12. Mahajan BK: Methods in Biostatistics. 7th edition Jaypee Publishers, 2010.
13. Manning A, Dawkins MS: An Introduction to Animal Behavior. Cambridge University Press 2012.
14. Mathur R: Animal Behavior. Rastogi Publications 2010.
15. Odum: Fundamentals of Ecology. Thomson Books/Cole 2005.
16. Odum: Ecology: A Bridge Between Science and Society Sinauer Associates 1997.
17. Prasad SN and Kashyap V: A Textbook of Vertebrate Zoology. 13th edition Wiley Eastern Ltd. 2011.
18. Primrose S. B. and. Twyman R. M: Principles of Gene Manipulation and Genomics. John Wiley & Sons, 2013.


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Syllabus : B.Sc.-B.Ed.(Part-III)

19. Rana S. V. S: Environmental Studies. 4th edition. Rastogi Publications 2012.
20. Rastogi VB Organic Evolution 6th edition Kedar Nath Ram Nath Publications, Meerut, Delhi. 1993.
21. Rastogi VB and Jayaraj MS Animal Ecology & Distribution of Animals Kedar Nath Ram Nath Publications, Meerut, Delhi, 1983.
22. Sharma P. D: Environmental Biology and Toxicology. 3rd edition Rastogi Publications, 2013
23. Sunder Rao PSS and Richard J: Introduction to Biostatistics and Research Methods .PHI Publishers, 2012.
24. Sharma P. D: Ecology and Environment. 12th revised edition, Rastogi Publications 2014-2015.
25. Werlace RA: Animal Behavior. Good Year Publishing Co., Inc.
26. Young JZ: The Life of Mammals. Oxford University Press 1970.
27. Young JZ: The life of Vertebrates. 2nd edition Oxford University Press. London 1962.

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PHYSICS

Scheme			
Paper I	Exam: 3 hours duration	Min Pass marks: 12	Max. Marks : 33
Paper II	Exam: 3 hours duration	Min Pass marks: 12	Max. Marks : 33
Paper III	Exam: 3 hours duration	Min Pass marks: 12	Max. Marks : 34
Practical	Exam: 4 hours duration	Min Pass marks: 18	Max. Marks : 50

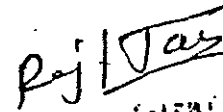
Paper I: Quantum Mechanics and Spectroscopy

Work Load: Two hours Lecture per week

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

Unit - I : Evolution of quantum physics

- Difficulties of classical mechanics to explain: the black-body emission spectrum, specific heat of solids. Plank quanta concept and radiation law, Photo electric effect and its explanations. Compton effect, De-Broglie hypothesis, diffraction and interference experiments of particle (Davisson-Germer experiment).
- Uncertainty principle: position and momentum, angle and angular momentum, energy and time. Application of uncertainty principle: (i) Ground state energy of hydrogen atom, (ii) ground state energy of simple harmonic oscillator, (iii) Natural width of spectral lines, (iv) Non-existence of electron in nucleus.
- Operators: linear operators, product of two operators, commuting and non-commuting operators, simultaneous eigen functions and eigen values, orthogonal wavefunctions, Hermitian operators, their eigenvalues, Hermitian adjoint operators.


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eigenvalues and eigenfunctions; expectation values of operators: position, momentum, energy; Ehrenfest theorem and complementarity. Concept of group and phase velocity, wave packet, Gaussian wave packet, bra-ket notation.

Unit - II : Schrödinger wave equation and its solutions

1. Schrödinger wave equation: general equation of wave propagation, propagation of matter waves, time dependent and time-independent Schrödinger equation, wavefunction representation (ψ), physical meaning of ψ , properties and conditions on ψ , postulates of wave mechanics, operators, observable and measurements; probability current density.

2. Time independent Schrödinger equation, stationary state solution, one dimensional problem: particle in one dimensional box, eigenfunctions and eigenvalues, discrete energy levels, generalization into three dimension and degeneracy of energy levels, concept of a potential well and barrier, step potential, penetration through rectangular barrier, reflection and transmission coefficients, barriers with special shapes (graphical representation), quantum mechanical tunneling (alpha decay).

Unit - III : Schrödinger equation solutions in special cases

1. Symmetric square well potential, reflection and transmission coefficients, resonant scattering; Bound state problems: particle in one dimensional infinite potential well and finite depth potential well, energy eigenvalues and eigenfunctions, transcendental equation and its solution; Simple harmonic oscillator, Schrödinger equation for simple harmonic oscillator and its solution, eigenfunction, eigenvalues, zero point energy, quantum and classical probability density, parity, symmetric and antisymmetric wave functions with graphical representation.

2. Schrödinger equation in spherical coordinates, Schrödinger equation for one electron atom in spherical coordinates, separation into radial and angular variables, solution of radial equation and angular equation, qualitative discussion of spherical harmonics, series solution and energy eigenvalues, stationary state wavefunction.

Wave-functions of H-atom for ground and first

excited states, average radius of H-atom, Bohr correspondence principle, orbital angular momentum and its quantization, commutation relation, eigenvalues and eigenfunctions.

UNIT IV: H-atom, Atomic and Molecular spectroscopy

1. Energy level derivation for H-atom, quantum features of hydrogen spectra and hydrogen like spectra, Stern-Gerlach experiment, electron spin, spin magnetic

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3. Molecular spectroscopy: concept of rigid rotator, rotational energy levels, rotational spectra, selection rules, intensity of spectral lines, isotopic effect; Vibrational energy levels, vibrational spectra, selection rules, isotopic effect, effect of anharmonicity in vibrational spectra, vibrational-rotational spectra of CO and HCl molecules.

7. H.E. White. Introduction to atomic physics,

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Nuclear Angular momentum, Nuclear Magnetic Dipole Moment, Electric Quadrupole Moment, Spin, Isospin, Wave Mechanical Properties: Parity and Statistics, Classification of Nuclei. Mass Defect and Binding Energy, Packing Fraction, Mass Spectrograph. Nuclear Forces: Properties of Nuclear Forces, Yukawa Meson Theory, Nuclear Potential. Nuclear Models: Segre Chart, Liquid Drop Model, Semi Empirical Mass Formula, Condition of Stability, Fermi Gas Model, Evidence for Nuclear Shell Structure, Nuclear Magic Numbers and Basic Assumptions of the Shell Model.

UNIT - 2

Radioactive Decays: Alpha Decay-Basics of α -Decay Processes, Theory of β -Emission Spectrum, Gamow Factor, Geiger Nuttall Law, Range of Alpha Particles, Beta Decay-Energy Kinematics for β -Decay, β -Decay Spectrum, Positron Emission, Electron Capture, Pauli's Neutrino Hypothesis.

Gamma Decay- Gamma Ray Emission and Kinematics, Internal Conversion

Applications of Radioactivity

Nuclear Fission and Fusion: Nuclear Fission, Spontaneous Fission and Potential Barrier, its Explanation by Liquid Drop Model, Chain reaction, Controlled chain reaction, Four Factor Formula, Nuclear Reactors, Classification of Nuclear Reactor, Uncontrolled Chain Reaction, Nuclear Fusion, Energy released in Nuclear Fusion, Fusion in stars.

Nuclear Reactions: Types of Reactions, Conservation Laws, Kinematics of Reactions, Q-Value, Threshold Energy, Reaction Rate, Reaction Cross-Section.

UNIT - 3

Interaction of Nuclear Radiation with Matter: Energy Loss by Heavy Charged Particles in Matter, Interaction of Electrons with Matter, Range of Charged Particle, Bremsstrahlung, Cherenkov Radiation, Gamma Ray Interaction With Matter.

Radiation Detectors: Gas filled detector, Avalanche, Geiger Discharge, Ionization Chamber, Proportional Counter, Geiger Muller Counter, Current mode and Pulse Mode Operation of Detector.

Particle Accelerators: Ion source, Van-de-Graff Accelerator (Tandem Accelerator), Linear Accelerator, Cyclotron, Synchrocyclotron, Betatron, Proton Synchrotron

UNIT - 4

Elementary Particles: Necessity of high energy to discover elementary constituents. Historical introduction to discovery of elementary particles (electron, positron, neutrinos).

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strange mesons, charm quark, intermediate vector bosons, bottom quark, top quark and Higgs boson) Elementary particles and their quantum numbers (charge, spin, parity, isospin, strangeness, etc.), elementary particles included in the standard model.

Fundamental Interactions : Four types of fundamental forces. Symmetries and Conservation Laws, Discrete symmetries C, P, and T invariance. Application of symmetry arguments to particle reactions. Parity non-conservation in weak interaction, CP violation.

Quark Model : Flavor symmetries, Gellmann-Nishijima formula, the eightfold way, Quark model, Octet Diagram for Mesons and Baryons, Concept of Quark model, the November Revolution, Baryon Decuplet, Color Quantum Number and Gluons.

Suggested Books:

1. Nuclear and Particle Physics, W. E. Burcham and M. Jobes, Addison Wesley Longman Inc.
2. Nuclear and Particle Physics, Brian R Martin, John Wiley & Sons.
3. Introduction to Nuclear and Particle Physics, Das and Ferbal, World Scientific.
4. Elements of Nuclear Physics, Walter E. Meyerhof, McGraw-Hill Book Company.
5. Introductory Nuclear Physics, Kenneth S. Krane, John Wiley & Sons.
6. Introduction to Elementary Particles, David J. Griffiths, John Wiley & Sons.
7. Radiation Detection and Measurement, G.F. Knoll (John Wiley & Sons)
8. Introduction to Nuclear and Particle Physics, V. K. Mittal, R. C. Verma, S. C. Gupta, PHI
9. Concepts of Modern Physics, A. Beiser, McGraw-Hill Book Company.

Paper III: Solid State Physics

Two hours Lecture per week

Scheme of Examination: First question will be of ten marks comprising of five short answer type parts each with answer not exceeding half a page. Remaining four questions will be set with one question 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 three marks. Part (A) of second to fifth question shall be compulsory and Part (B) of these questions will have internal choice.

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Unit I

Bonding in Solids and Crystal structure:

Force between atoms, Ionic bonds, Covalent and metallic bonds, Vander waal's and Hydrogen bonding. Periodicity in lattices, Basis, lattice point and space lattice, Translation vectors. Unit and primitive cell. Crystal systems, Packing fractions for Simple Cubic (SC), Body Centred Cubic (BCC), Face Centred Cubic (FCC) and Hexagonal lattice structures, Bravais space lattices.

Crystallography and Diffraction:

Direction, planes and miller indices in a crystal lattice, Reciprocal lattice and its significance, Conversion of SC and FCC structures in reciprocal lattice frame. Concept of crystalline, polymeric and amorphous materials, X-ray diffraction by solids: Laue and Braggs equation, Study of crystals by X-rays: FWHM, Sherrer formula and Lattice Constants (for simple cubic structure), Electron and Neutron diffraction (qualitative).

Unit II

Band theory of solids:

Formation of bands, Periodic potential and Bloch Theorem, Number of states in the bands, Kronig Penny model, Brilluon zones, Crystal momentum and physical origin of effective mass, Negative Effective Mass and Holes, Energy dispersion relations: weak and tight binding.

Semiconductors:

Energy band Structures in Insulators, Conductors, Semiconductors. Concept of Direct and Indirect band gap in semiconductors. Generation and recombination of charge carriers, Mobility of charge carriers, Hall Effect in semiconductors: Hall coefficient, Mobility, Charge carrier concentration, Conductivity and Hall angle.

Unit III

Thermal properties of Materials:

Elastic waves, Phonon. Phonon dispersion relations in monoatomic and diatomic linear lattice. Lattice heat capacity. Classical theory of specific heat, Dulong-Petit's law, Einstein and Debye's theory of specific heat of solids and limitations of these models, concept of Thermoelectric Power.

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Electrical Properties of Materials:

Drude-Lorentz theory, Sommerfeld's Model, Thermal conductivity, Electrical conductivity, Wiedemann-Franz relation, Thermionic Emission, Escape of electrons from metals, Hall Effect in Metals, Density of states.

Unit IV

Magnetic Properties of Materials:

Classification of Magnetic Materials. Origin of Atomic Magnetism, Classical Langevin Theory of dia- and Paramagnetic Domains. Quantum theory of Paramagnetism. Curie's law, Weiss's Theory of Ferromagnetism. Concept of Domain Wall, Magnetostriction, Heisenberg's Exchange Interaction, Relation between Exchange Integral and Weiss-Constant.

Superconductivity:

Experimental features of superconductivity: Critical Temperature, Critical magnetic field, Meissner effect. Type I and type II Superconductors, London's Equation and Penetration Depth, Isotope effect. Idea of BCS theory (No derivation); Cooper Pair and Coherence length. Josephson Effect (No derivation)

Reference Books

1. Introduction to Solid State Physics---- Charles Kittel (Wiley Publication)
2. Elementary Solid state Physics-----M. Ali Omar (Pearson Education)
3. Elements of X-ray diffraction----B. D. Cullity (Prentice Hall)

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- (i) at fixed frequency by varying C , and
- (ii) by varying frequency.
4. Study of the characteristics of junction diode & Zener diode.
5. Study of
 - (i) Recovery time of junction diode and point contact diode.
 - (ii) Recovery time as a function of frequency of operation and switching current.
6. To design Zener regulated power supply and study the regulation with various loads.
7. To study the characteristics of a field effect transistor (FET) and design/study amplifier of finite gain (10).
8. To study the frequency response of a transistor amplifier and obtain the input and output impedance of the amplifier.
9. To design and study of an R-C phase shift oscillator and measure output impedance (frequency response with change of component of R and C).
10. To study a voltage multiplier circuit to generate high voltage D.C. from A.C.
11. Using discrete components, study OR, AND, NOT logic gates, compare with TTL integrated circuits (I.C.'s).
12. Application of operational amplifier (OP-AMP) as : Minimum two of the following exercises-(a) Buffer (for accurate voltage measurement) (b) Inverting amplifier (c) Non inverting amplifier (d) Summing amplifier.

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MATHEMATICS

B.Sc.-B.Ed. Part III - 2021

Teaching : 3 Hours per Week per Theory Paper.

Examination Scheme :

Min. Pass Marks			Max. Marks
Science - 54			150
Arts - 72			200
		Duration	Max. Marks
Paper - I	Algebra	3 hrs.	40 (Science) 53 (Arts)
Paper - II	Complex Analysis	3 hrs.	40 (Science) 53 (Arts)
Paper - III	Mechanics	3 hrs.	40 (Science) 54 (Arts)
Practical		2 hrs.	30 (Science) 40 (Arts)

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

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Paper -I : Algebra

Teaching : 3 Hours per Week

Duration of Examination : 3 Hours

**Max. Marks: 40 (Science)
53(Arts)**

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: Definition and simple properties of Groups and Subgroups. Permutation group, Cyclic group. Cosets, Lagrange's theorem on the order of subgroups of a finite order group.

Unit 2: Morphism of groups, Cayley's theorem. Normal subgroups and Quotient groups. Fundamental theorems of Isomorphism.

Unit 3: Definition and simple properties of Rings and Subrings. Morphism of rings. Embedding of a ring, Integral domain and field. Characteristics of a Ring and Field.

Unit 4: Ideals and Quotient Ring. Maximal ideal and Prime ideal. Principal Ideal domain. Field of quotients of an integral domain. Prime fields. Definition, Examples and Simple properties of Vector spaces and Subspaces.

Unit 5: Linear combination, Linear dependence and Linear independence of vectors. Basis and Dimension. Generation of subspaces. Sum of subspaces. Direct sum and Complement of subspaces. Quotient space and its dimension.

Reference Books:

1. Joseph A. Gallian, Contemporary Abstract Algebra (4th Edition), Narosa Publishing House, New Delhi, 1999.(IX Edition 2010).
2. S Lang, Introduction to Linear Algebra (2nd edition), Springer, 2005.
3. Gilbert Strang, Linear Algebra and its Applications, Thomson, 2007.
4. S. Kumaresan, Linear Algebra- A Geometric Approach, Prentice Hall of India, 1999.
5. Kenneth Hoffman, Ray Alden Kunze, Linear Algebra 2nd Ed., Prentice-Hall Of India Pvt. Limited, 1971.

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Paper – II: Complex Analysis

Teaching : 3 Hours per Week

Duration of Examination : 3 Hours

Max. Marks: 40 (Science)

53 (Arts)

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: Complex plane. Connected and Compact sets. Curves and Regions in complex plane. Jordan curve Theorem (statement only). Extended complex plane. Stereographic projection. Complex valued function – Limits, Continuity and Differentiability. Analytic functions, Cauchy-Riemann equations (Cartesian and polar form). Harmonic functions, Construction of an analytic function.

Unit 2: Complex integration, Complex line integrals, Cauchy integral theorem, Indefinite integral, Fundamental theorem of integral calculus for complex functions. Cauchy integral formula, Analyticity of the derivative of an analytic function, Morera's theorem, Poisson integral formula, Liouville's theorem.

Unit 3: Taylor's theorem. Laurent's theorem. Maximum modulus theorem.

Power series – Absolute convergence, Abel's theorem, Cauchy-Hadamard theorem, Circle and Radius of convergence, Analyticity of the sum function of a power series.

Unit 4: Singularities of an analytic function, Branch point, Meromorphic and Entire functions, Riemann's theorem, Casorati-Weierstrass theorem.

Residue at a singularity, Cauchy's residue theorem. Argument principle. Rouché's theorem. Fundamental theorem of Algebra.

Unit 5: Conformal mapping. Bilinear transformation and its properties. Elementary mappings: $w(z) = \frac{1}{2} \left(z + \frac{1}{z} \right)$, z^2 , e^z , $\sin z$, $\cos z$, and $\log z$.

Evaluation of a real definite integral by contour integration.

Analytic continuation. Power series method of analytic continuation.

Reference Books:

1. James Ward Brown and Ruel V. Churchill, Complex Variables and Applications (Eighth Edition), McGraw – Hill International Edition, 2009.
2. Joseph Bak and Donald J. Newman, Complex analysis (2nd Edition), Undergraduate Texts in Mathematics, Springer-Verlag New York, Inc., New York, 1997.

Raj Jas
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Paper – III: Mechanics

Teaching : 3 Hours per Week

Duration of Examination : 3 Hours

**Max. Marks: 40 (Science)
54 (Arts)**

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: Velocity and acceleration – along radial and transverse directions, along tangential and normal directions. S.H.M., Hooke's law, motion along horizontal and vertical elastic strings.

Unit 2: Motion in resisting medium– Resistance varies as velocity and square of velocity. Work and Energy. Motion on a smooth curve in a vertical plane. Motion on the inside and outside of a smooth vertical circle. Projectile.

Unit 3: Central orbits – p-r equations, Apses, Time in an orbit, Kepler's law of planetary motion. Moment of inertia – M.I. of rods, Circular rings, Circular disks, Solid and Hollow spheres, Rectangular lamina, Ellipse and Triangle. Theorem of parallel axis. Product of inertia.

Unit 4: Equilibrium of coplanar force, moments and friction.

Unit-5: Virtual work and Catenary.

Reference Books :

1. I.H. Shames and G. Krishna Mohan Rao, Engineering Mechanics: Statics and Dynamics (4th Edition), Dorling Kindersley (India) Pvt. Ltd. (Pearson Education), Delhi, 2009.
2. R.C. Hibbeler and Ashok Gupta, Engineering Mechanics: Statics and Dynamics (11th Edition), Dorling Kindersley (India) Pvt. Ltd. (Pearson Education), Delhi.
3. S.L. Loney - An Elementary Treatise on the Dynamics of a Particle and of Rigid Bodies, Kalyani Publishers, New Delhi.
4. J.L. Synge & B.A. Griffith - Principles of Mechanics, Tata McGraw-Hill, 1959.

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Practical

Teaching: 2 hours per week per batch not more than 20 students.

Examination:

Duration: 2 Hours

Scheme

Science

Arts

Max.Marks

30

40

Min.Pass Marks

11

15

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

The paper will contain TWO practicals. The candidates are required to attempt both practicals.

Practicals with Computer Programming in C Language.

Group A:

1. Solution of algebraic and transcendental equations by Bisection method, Regula-falsi method and Newton-Raphson method.
2. Solution of Initial value problems by Euler's method and Runge-Kutta(third and fourth order) method.

Group B:

1. Matrix operations: addition, subtraction, multiplication, Rank of a matrix, inverse of a matrix.
2. Solution of linear algebraic equations by Gauss elimination method, Matrix method, Gauss Jordan method.

Note:

1. Each Candidate (Regular/non-Collegiate) has to prepare his/her practical record.
2. Each Candidate has to pass in Practical and Theory examinations separately.

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PEDAGOGY OF SCHOOL SUBJECT

PAPER:-VIII A / B

CHEMISTRY TEACHING

Marks-100

Objectives -

To enable student teacher to:

1. Understand the Nature, Place, Values and Objectives of teaching chemistry at secondary/senior secondary level.
2. Understand correlation with other subjects
3. Evaluate critically the existing syllabus of chemistry
4. Develop understanding of various objectives of teaching Chemistry in Secondary Schools.
5. Understand and adopt proper methods of teaching various topics of Chemistry.
6. Appreciate the usefulness of various co-curricular activities for fostering interest of pupils in Chemistry.
7. Get acquainted with various methods of evaluation of the progress of pupils in Chemistry.
8. Prepare and use different types of instructional material for teaching Chemistry.
9. Understand the difficulties faced in teaching and learning Chemistry and suggest remedial measures.
10. Evaluate critically the existing syllabus of Chemistry prescribed for Secondary/Senior Secondary level in the State of Rajasthan.
11. Provide training in scientific method and develop scientific temper among their students.

Unit - I: The Nature of Science

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- Definition of Science, Scientific Method, Scientific Literacy with suitable examples from Chemistry,
- Nature of science with special reference to chemistry
- Instructional Objectives, General and Specific Objectives of Teaching Chemistry
- Correlation of chemistry with other subjects.

Unit - II: Curriculum and Planning

- Chemistry Curriculum, Place of Chemistry in School Curriculum
- Principles of Curriculum Construction, Difference between Curriculum and Syllabus,
- Co-curricular activities, factors influencing curriculum of chemistry.
- Modern trends in Chemistry Curriculum CBA, Chemical- Education Material Study, Nuffield- O & A level.
- Critical appraisal of Chemistry syllabus at Secondary/Senior Secondary level prescribed by Board of Secondary Education, Rajasthan.
- Planning- Daily lesson plan, unit plan & yearly plan.

Unit - III: Methods of Teaching Chemistry

- Micro Teaching, Skills of teaching Lesson Planning ,
- Methods of Teaching Chemistry- Lecture Method, Demonstration Method. Discussion Method, Problem Solving Method, Project Method, Inductive-Deductive Method, Co-operative method, Constructivism method.
- Teaching Models-Concept Attainment Model, Inquiry Training Model
- Qualities of chemistry teacher.

UNIT-IV Instructional Support System

- Teaching Aids in Chemistry Audio Aids, A-V Aids, Educational Broadcasts, Television and Teleconferencing, Charts, Models, Low Cost Teaching Aids, Improvised Apparatus.
- Chemistry Lab: Layout Plans, Equipments, Furniture, Maintenance of records, repair, care and improvisation of apparatus, safety measures in Lab.
- Role of State & National Level Institutions & Laboratories like DST, NCL, Fertilizer, Pesticide & Chemical Companies like Hindustan Zinc Ltd.

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- Characteristics of a good text book and evaluation of a Text Book

Unit - V: Evaluation of Chemistry

- Difference between Measurement, Assessment and Evaluation,
- Characteristics of good Measurement, Diagnostic Test and Remedial Teaching,
- Criterion Referenced Testing and Norm Referenced Testing, Different types of items, Essay type, Short types objective type
- Development and Standardization of Achievement Test in Chemistry.

Assignments :-

1. Class Test 10 marks
2. Any one of the following :- 10 marks
 - Planning and Conducting Experiments.
 - Preparation of models and charts.
 - Preparation of Chemistry Projects.
 - Criticals analysis of chemistry textbooks.
 - Preparation of design, blue print for teacher made test.
 - Development of self-instructional material on any one topic of Chemistry
 - Life sketch & contribution of any one prominent Indian Chemist.
 - Preparation of scrap book containing original science (Scientific cartoon) Stories/article
 - Life sketch & contribution of any one prominent Indian Chemist.
 - Conducting & reporting two experiments useful at secondary/senior secondary level (other than those in syllabus)
 - A critical study of any one senior secondary Lab of chemistry.
 - Preparation of 10 frames of Linear or Branching type programmes on any topic of Chemistry.

References:

1. Bhat, B.D. and Sharma, S.R.: Methods of Science Teaching. New Delhi: Kanishka Publishing House, 1993.
2. Das, R.C.: Science in Schools. New Delhi: Sterling Publishers, 1985.
3. Directorate of Hindi Implementation, Delhi University, 2000.

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 JAIPUR 69

4. Gupta, S.K.: Teaching of Science Education. New Delhi: Vikas Publishers, 1983.
5. Gupta, S.K.: Teaching Physical Science in Secondary. New Delhi: Sterling Publishers, 1985.
6. Joyce, B. & Weil, M: Models of Teaching. Prentice Hall Inc., New Jersey, 1979.
7. Kishore, L.: Teaching of Physical Science. Delhi: Doaba House, 1991.
8. Mangal, S.K.: Teaching of Science. New Delhi: Agra Book Depot, 1982.
9. 8.NCERT: Teaching of Science in Secondary Schools. New Delhi: NCERT, 1982.
10. Pal, H.R and Pal, R.: Curriculum – Yesterday, Today and Tomorrow. Kshipra, New Delhi, 2006.
11. Pal, H.R.: Methodologies of Teaching & Training in Higher Education. Delhi:
12. Sansanwal, D.N. & Singh, P.: Models of Teaching. Society for Educational Research & Development, Baroda, 1991.
13. Vaidya, N.: Science Teaching for the 21st century. Deep and Deep Publication, New Delhi, 1996.
14. Venkataiah, S.: Teaching of Chemistry. Anmol Publisher Pvt. Ltd., New Delhi, 2002.

PEDAGOGY OF SCHOOL SUBJECT

PAPER:-VIII A / B



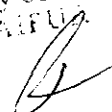
BIOLOGY TEACHING

Marks 100

Objectives:

To enable student Teacher to

1. Understand the Nature, Place Values and objectives of teaching Biology at Senior Secondary level.
2. Establish its correlation with other subjects
3. Evaluate critically the existing syllabus of Biology prescribed for Secondary/Senior Secondary level in the state of Rajasthan
4. Develop yearly plan unit plan and lesson plan for Senior Secondary classes.
5. Provide training in Scientific method and develop Scientific temper among their students.


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6. Use various methods and approaches of teaching Biology
7. Acquire the ability to develop instructional support system.
8. Plan and organize chemistry practical work at the Laboratory.
9. Organise Co-curricular activities and utilize community resources promoting Science learning.
10. Use most appropriate method to assess the progress and achievement of the pupil & thus prepare appropriate test for the purpose (both theoretical & practical)

UNIT-I Nature, Scope and Objectives

- Nature of science with special reference to Biology.
- Main discoveries and development in Biology.
- Place & values of teaching Biology at secondary/senior secondary level.
- Correlation of Biology with other subjects.
- Objectives of teaching Biology at secondary/senior secondary level.

UNIT-II Curriculum and Planning

- Principles of Biology curriculum at secondary/senior secondary level.
- Modern trends in Biology Curriculum : B.S.C.S.,
- Critical appraisal of Biology syllabus at secondary/senior secondary level prescribed by Board of secondary Education, Rajasthan.
- Planning- Daily lesson plan, unit plan & yearly plan.
- Qualities & responsibilities of Biology teacher. Teacher's role in training students in scientific method and in developing creativity and scientific temper among their students.

UNIT-III Methods and approaches

- Lecture method, Demonstration method, Lab-based methods, Inductive & deductive method, problem solving, Heuristic, Constructivism, & Project method.
- Inquiry approach, programmed instruction, Group discussion, self study, Team teaching, computer assisted learning, seminars and workshops.

UNIT-IV Instructional Support System

- Multi sensory aids: Charts, models, specimen, bulletin - boards, flannel Board, Transparencies slides, projector, OHP, Computer, T.V., and Radio etc.

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- Co-curricular Activities: Organization of science club, science fair, trips and use of community resources.
- Biology Lab: Organization of Biology Laboratory, Arrangement of Apparatus, Care & Maintenance of equipment & specimen, organization of practical work in Biology.
- Role of state & National Level Instructions & Laboratories Research centers in Botany, Zoology & Agriculture.
- Characteristics of a good text book and Evaluation of a Text Book.

UNIT-V Evaluation in Biology

- Evaluation: Concept, Types and purposes.
- Type of test items and their construction.
- Preparation of Blue Print & Achievement Test.
- Evaluation of practical work in Biology.

Sessional Work :(20 Marks)

(1) Class Test 10 Marks

(2) Any one of the following-- 10 Marks

- Life sketch & contribution of any one prominent Indian Biologist.
- Preparation of Harbarium (scrap book)
- Prepare any one of the following related to environment education.
(i) Poster (miniature), (ii) Article, (iii) Story, (iv) Play
- Description of any two teaching models.
- Prepare a Radio or T.V. script.
- Make a list of local (resources useful in teaching Biology and prepared lesson plan using some of them.
- A case study of any one senior secondary lab of Biology.
- Preparation of 10 frames of Linear or Branching type programmes on any topic of Biology.
- Construction and administration of Diagnostic test on any one unit of Biology.

REFERENCES:-

1. Bhat, B.D. and Sharma, S.R.: Methods of Science Teaching. New Delhi: Kanishka Publishing House, 1993.

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2. Das, R.C.: Science in Schools. New Delhi: Sterling Publishers, 1985.
3. Gupta, S.K.: Teaching of Science Education. New Delhi: Vikas Publishers, 1983.
4. Gupta, S.K.: Teaching Physical Science in Secondary. New Delhi: Sterling Publishers, 1985
5. Gupta, V.K.: Teaching and Learning of Science and Technology. New Delhi: Vikas Publishing House Pvt. Ltd., 1995.
6. Joyce, B. & Weil, M: Models of Teaching. Prentice Hall Inc., New Jersey, 1979.
7. Kishore, L.: Teaching of Physical Science. Delhi: Doaba House, 1991. 34
8. Mangal, S.K.: Teaching of Science. New Delhi: Agra Book Depot, 1982.
9. NCERT: Teaching of Science in Secondary Schools. New Delhi: NCERT, 1982.
10. Pal, H.R and Pal, R.: Curriculum – Yesterday, Today and Tomorrow. Kshipra, New Delhi, 2006.

PEDAGOGY OF SCHOOL SUBJECT

PAPER:-VIII A / B

Physics Teaching

MARKS:-100

Objectives:-

The student teachers will be able to:

1. Understand the nature of Science and Physics.
2. Appreciate the contribution of Indian and Foreign scientists in the development of Physics.
3. Develop the skill of planning teaching learning activities.
4. Develop competencies in (a) Selection and use of teaching methods, approaches and devices. (b) Selection, preparation and use of cost effective teaching aids. (c) Inculcation of scientific attitude and science related values. (d) Plan, manage physics laboratory and organize physics practical work
5. Develop skill of critical appraisal of Physics text book.
6. Select and effectively make use of teaching aids.
7. Organize co-curricular activities related to physics.
8. Plan and critically appraise Physics curriculum at senior secondary level.

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9. Prepare, use and analyze achievement tests for evaluation of learning outcomes of Physics.

Course content

Unit - I - Foundations of teaching physics

- Nature of Science and Physics, Major milestones in the development of physics, Contributions of Eminent Indian and foreign Physicists: C.V.Raman, Vikram Sarabhai, Homi Jehangir Bhabha, Subhramanayan, D.S. Kothari, Chadershekhar, Satyender Nath Bose, Newton, Archimedes, Alexander Graham Bell, Madam Curie, Albert Einstein.
- Relationship of science and society, impact of physics on modern Indian society with reference to issues related with Environment, Globalization, Industrialization, and Information Technology.
- Aims and objectives of teaching physics at senior secondary level, Correlation of physics with other school subjects.

Unit - II - Planning for Instruction and Role of Teacher

- Specific Objectives of Teaching Physics in Behavioural Terms, Content Analysis and Concept Mapping.
- Developing Yearly Plan, Unit Plan and Daily Lesson Plans.
- Teacher's role in training students in scientific method, developing scientific attitude, critical thinking and creativity.
- Qualities, responsibilities and professional ethics of physics teacher.
- Criteria for selection of physics text book, critical appraisal of Physics Text Book

Unit - III - Approaches and Methods of Teaching Physics

- Concept approach – Process approach – teaching science as a process,
- scientific method, problem solving method,
- Cooperative learning approach,
- Activity based approach – investigatory approach,
- project method, laboratory method ,
- Demonstration-cum-discussion method ,
- Constructivist approach

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Unit IV- Instructional support system

- Multi sensory aids: Significance and Psychological Principles of using Teaching Aids, use of charts, models, overhead projectors, computers, internet, and improvised apparatus.
- Use of Community resources in teaching of physics.
- Planning, equipping and maintaining Physics Laboratory; planning and guiding practical work
- Selecting and guiding Projects in Physics.
- Planning and organization of Science Clubs, Science fairs and Field trips

Unit –V Physics curriculum and Evaluation of Physics Learning

- Principles of developing curriculum of Physics,
- Evaluation of physics learning : formative, summative, continuous and comprehensive evaluation, types of test items and their construction, preparation of blue print and achievement test, item analysis,
- Diagnostic testing and remedial teaching in physics.. Evaluation of Practical Work

Sessional Work –

1. Class Test 10MARKS
2. Any one of the following: 10MARKS
 - Case study of any one Senior Secondary School Laboratory of Physics.
 - Preparation of a diagnostic test of physics on any one unit.
 - Planning activities for teaching a unit of physics using local resources.
 - Conducting and reporting a practical class in Physics Laboratory

References :

1. Aicken, Frederick (1984). The Nature of Science, London: Heinemann Educational Books.
2. Anderson R.D. (1970). Developing Children's Thinking Through Science, New Delhi: Pr
3. Chauhan, S.S. (2000). Innovation in Teaching Learning Process New Delhi: Vikas Publishing House Pvt. Ltd.

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75

4. Das, R. C. (1985). Science Teaching in Schools New Delhi: Sterling Publishers Pvt. Ltd.
5. Dave, R.H. Taxonomy of Educational Objectives and Achievement Testing, London: London University Press.
6. Edigar M. and Rao D.B. (1996). Science Curriculum, New Delhi: Discovery Publishing House.
7. Gronlund, Norman, E (1968). Constructing Achievement Tests, New York: Prentice
8. Gupta, N.K. (1997). Research in Teaching of Science, New Delhi: APH Publishing Corporation.
9. Kochar, S.K. (1997). Methods and Techniques of Teaching, New Delhi: Sterling Publishers Pvt. Ltd.
9. Maitre, K. (1991). Teaching of Physics, New Delhi: Discovery Publishing House.
10. Mukalel, J.C. (1998). Creative Approaches to Classroom Teaching, New Delhi: Discovery Publishing House.
11. Prakash, R. and Rath, T.N. (1996). Emerging Trends in Teaching of Physics, New Delhi: Kanisha Publishers.
12. Radha Mohan (2003). Innovative Science Teaching for Physical Science Teachers, New Delhi: Prentice Hall Pvt. Ltd.

PEDAGOGY OF SCHOOL SUBJECT

PAPER:-VIII A / B

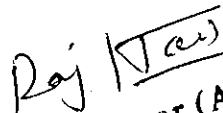
MATHEMATICS TEACHING

Marks – 100

Objectives:

On completion of the course the future teacher educators will be able:

1. To enable prospective mathematics teachers towards the processes in which mathematics learning takes place in children's mind.
2. To enable the nature, characteristics and structure of mathematics and its correlation with other areas.
3. To enable the processes in mathematics and their importance.
4. To enable the content categories in mathematics and illustrate with examples.
5. To enable understanding of the Goals, Aims and Objectives of teaching mathematics at secondary school level.


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6. To enable awareness about the objectives of teaching mathematics at secondary school level as envisaged by NCF 2005 and KCF 2012.
7. To enable understanding and skill in preparing lesson episodes based on Five E model; different approaches, methods, models and techniques of teaching mathematics.
8. To enable understanding about collaborative learning and cooperative learning strategies.
9. To enable the prospective mathematics teachers as facilitators for effective learning of mathematics.
10. To enable prospective mathematics teachers with ICT enabled skills for facilitating learning of mathematics.
11. To enable skill in assessing mathematics learning.
12. To enable prospective mathematics teachers as reflective practitioners.

UNIT I Nature and Structure of Mathematics

- a) Meaning and characteristics of mathematics– Science and Mathematics – Development of Mathematics: empirical, intuitive and logical
- b) History of Mathematics education : Ancient period to 21st century
- c) Contributions of eminent Mathematicians(Western & Indian-4 each)
- d) Branches of Mathematics: Arithmetic, Algebra, Geometry, Trigonometry -
- e) Undefined terms – Axioms – Postulates – Theorems – Proofs and verification in mathematics-Types of theorems: Existence and Uniqueness theorems – Types of proofs: Direct, indirect by contradiction, by exhaustion, by mathematical induction.
- f) Euclidean geometry and its criticisms – emergence of non Euclidean geometry.

UNIT– II Objectives and Approaches of Teaching Mathematics

- a) Aims and Objectives of Teaching Mathematics: At primary, Secondary and Higher secondary levels – Goals of mathematics education-Mathematical skills: Calculations, Geometrical, and interpreting graphs – Mathematical abilities- Problem solving ability.
- b) Approaches to teaching Mathematics: Behaviorist approach, constructivist approach,
- c) Process oriented approach, Competency based approach, Realistic mathematics education.

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UNIT-III METHODS AND MODEL OF TEACHING MATHEMATICS:

- a) Methods of teaching mathematics: Lecture, Inductive, Deductive, Analytic, Synthetic, Heuristic, Project, Problem solving, and Laboratory methods, Co-operative, constructivism method.
- b) Techniques of Teaching Mathematics: Questioning, Brain storming, Role-playing, Simulation.
- c) Non- formal techniques of learning Mathematics
- d) Models of Teaching: Concept attainment model, inquiry training model, Inductive thinking model.

UNIT – IV Pedagogical content knowledge of mathematics

- a) Concept of pedagogic content knowledge (PCK)
- b) Pedagogic content knowledge analysis for selected units of 8th, 9th , 10th and 11th std:-Content analysis, Listing pre-requisites, instructional objectives and task analysis
- c) Analysing and selecting suitable teaching methods, strategies, techniques, models; learning activities, Year plan (Programme of work), Unit plan and lesson plan in mathematics – their need and importance
- d) Analysing and selecting suitable evaluation strategies
- e) Identifying the misconceptions and appropriate remedial strategies

UNIT-V Technology in mathematics education

- a) Technology integration strategies for mathematics,web based lessons, web quest, cyber guides, multimedia presentation, Tele computing projects, online discussions
- b) E-content development concept ,formats, steps for preparation.
- c) A survey of software used in mathematics teaching and learning.

SESSIONAL:

1. Class Tests 10 MARKS

2. Any one 10 MARKS

- b) Group puzzles activity
- c) Preparation of teaching aids
- d) Demonstration of teaching aids
- e) Collection of newspaper cuttings related to learning of a unit in mathematics.
- f) Preparing a script for radio lesson or T.V. lesson in mathematics.

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g) Visiting a mathematics lab in a school and presenting a report.

REFERENCES:-

1. Aggarwal, J.C. (2001). Principles, Methods & Techniques of Teaching (2nd Ed.). New Delhi: Vikas Publishing House Pvt. Ltd.
2. Bhasin, Sonia. (2005). Teaching of Mathematics- A Practical Approach. Mumbai: Himalaya Publishing House.
3. Butler H., Charles & Wren F., Lynwood. (1960). The Teaching of Secondary Mathematics. New York: The Maple Press Company.
4. Bhasin, Sonia. (2005). Teaching of Mathematics- A Practical Approach.
5. Mumbai: Himalaya Publishing House.
6. Ediger, M. & Rao, D.B. (2000). Teaching Mathematics Successfully. New Delhi: Discovery Publishing House.
7. James, Anice. (2006). Teaching of Mathematics. Hyderabad: Neelkamal Publications Pvt. Ltd.
8. Joyce, B. & Weil. M. & Calhoun, E. (2009). Models of Teaching (8th Ed.). New Delhi : PHI Learning Private Limited.
9. Kumar, S. & Ratnalikar, D.N. (2003). Teaching of Mathematics. New Delhi: Anmol Publications Pvt. Ltd.
10. Mangal, S.K. (1981). A Text Book on Teaching of Mathematics. Ludhiana: Prakash Brothers Educational Publishers.
11. NCERT. (2005). National Curriculum Framework for School Education. New
12. Delhi: NCERT.
13. Rai, B .C. (1991). Methods of Teaching Mathematics. Lucknow: Prakashana
14. Kendra.
15. Sidhu, Kulbir Singh. (1999). The Teaching of Mathematics. Jullundar: Sterling Publishers Pvt. Ltd

PEDAGOGY OF SCHOOL SUBJECT

PAPER:-VIII A / B

General Science Teaching

MARKS:-100

OBJECTIVES:-

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The Pupil- teacher will be able to-

1. Familiarize with nature of General Science.
2. Formulate instructional objectives in behavioral terms.
3. Critically evaluate the existing science curriculum at secondary level.
4. Understand the basic concepts of General Science.
5. Acquaint themselves with laboratory plan, purchase and maintenance of equipment and material.
6. Explain the concept of evaluation and construct blue print of question paper.

Unit - 1 Teaching of General Science

- Meaning, nature, aims and objectives of General science
- Importance of General science in Teaching
- Correlation - concept, importance and types.
- Maxims of teaching in General science

Unit - 2 Planning in General- Science teaching

- Curriculum - concept, methods of curriculum construction, Difference between Curriculum and Syllabus, ,
- Place of General science in school curriculum
- Critical appraisal of General Science syllabus at secondary/senior secondary level
- Science teacher - Qualities, Competencies
- Analysis of textbook.

Unit - 3 Methods & Techniques of teaching in General Science

- Methods -Scientific Method, Demonstration, Laboratory, Heuristic, Project, Co-operative Learning, Constructivism, Inductive-deductive.
- Techniques:- Team teaching, Simulation, Task analysis, Cognitive psychology based technique, Technology based technique
- Year plan, Unit plan, Lesson plan - General, IT based,

Unit- 4 Teaching Aids and Models of teaching

- Teaching Aids :Non-projective - chart, picture, model, Projective - Film projector, OHP, LCD, DLP,
- Science laboratory, Science- club, Science Exhibition, Field trip

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- Laboratory Equipment and Material- selection, purchase, maintenance and safety measures.
- Models of teaching:- Concept Attainment Model, Inquiry training model.

Unit - 5 Pedagogical analysis & Evaluation in General Science

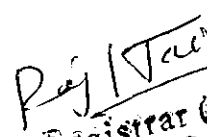
- Concept ,Approaches & importance for pedagogical analysis,
- Core elements and values, Content cum methodology approach, IT based approach
- Importance of evaluation in General Science, Evaluation according to areas - Cognitive, Psychomotor & Affective, Domain
- Use of tools and technique of evaluation:- Achievement test, Diagnostic test, Remedial teaching, Online Evaluation

Sessional Work –

1. Class Test 10 marks
2. Any one of the following: 10 marks
 - Preparation of a diagnostic test of Gen. Science on any one unit.
 - Analysis of syllabus.
 - Evaluation of textbook.
 - Content analysis of one unit.
 - Conduct presentation of lesson/ Unit.

REFERENCES:-

1. Cartin, A.A. and Sund, R.D. (1972). *Teaching Science through Discovery*. London: Merill.
2. Das, R.C. (1992). *Science Teaching in School*. New Delhi: Sterling Publishing.
3. Gerg, K.K.; Singh, Raguvir and Kaur, Inderjeet (2007). *A Text book of Science of Class X*, New Delhi: NCERT.
4. Hurd Dihurt, P. (1971). *New Directions in Teaching School Science*. Chicago: Rand McNally Co.
5. Joshi, R.; Kulkarni, V.G. and Sinha, Somdatta (1999). *A Text book of Science of Class X*. New Delhi., NCERT.
6. Kohli, V.K. (2006). *How to Teach Science*. Ambala: Vivek Pub.2006.


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7. Mangal, S.K. (1997). *Teaching of Science*. New Delhi: Arya Book Depot, New
UNESCO Source Book for Science. France: UNESCO.
- Sharma, R.C. (1998). *Modern Science Teaching*. New Delhi: Dhanpat Rai Pub. Co.

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UNIVERSITY OF RAJASTHAN JAIPUR

FACULTY OF EDUCATION

SYLLABUS

INTEGRATED PROGRAMME OF

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

Annual Scheme

**Academic Session 2020-21
Examination B.Sc.-B.Ed. Part – IV (2021)**

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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 - IV

CONTENTS

SCHEME OF EXAMINATION

SYLLABUS

SCHEME OF EXAMINATION

SYLLABUS

1. ENVIRONMENTAL STUDIES (COMPULSORY PAPER)*
2. CREATING AND INCLUSIV/E SCHOOL
3. UNDERSTANDING DISCIPLINES AND SUBJECT
4. PHYSICAL EDUCATION AND YOGA (G-A)
5. GENDER, SCHOOL AND SOCIETY
6. ASSESSMENT FOR LEARNING
8. (a/b) PEDAGOGY OF A SCHOOL SUBJECT (PART - 3) Ist AND IInd YEAR
(CANDIDATE SHALL BE REQUIRED TO OFFER ANY TWO PAPERS FROM THE
FOLLOWING FOR PART - 3 AND OTHER FOR PART - 4) - 08 (a/b)
 - CHEMISTRY
 - BIOLOGY
 - PHYSICS
 - MATHEMATICS
 - GENERAL SCIENCE

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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 foster 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 the 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. Ability to access the all round development of pupils and to maintain a cumulative record.
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.
- iii) Third Year B.Sc.B.Ed.
- iv) Final Year B.Sc.B.Ed.

Duration of the Course - Four Years

Examination 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	Elementary Computer Application (ICT)
IV th Year	Environmental Studies

***ELIGIBILITY CRITERION ON PASSING MARKS BUT MARKS SHALL NOT BE INCLUDED IN DIVISION.**

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▼ **Group – A: - Subject Specialisation :**

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: Content of Science Subject: - A Student has to opt 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			Total
			External	Internal	Practical	
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 (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
						750

*ELIGIBILITY CRITERION ON PASSING MARKS BUT MARKS SHALL NOT BE INCLUDED IN DIVISION.

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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			Total
			External	Internal	Practical	
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 (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 / SUPW 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

***ELIGIBILITY CRITERION ON PASSING MARKS BUT MARKS SHALL NOT BE INCLUDED IN DIVISION.**

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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			Total
			External	Internal	Practical	
I	B.Sc.B.Ed. 01	Elementary Computer Application (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 (Select any Three) <ol style="list-style-type: none"> 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	08(a,b)	Pedagogy of a School Subject (Candidate should opt any two school subject from the following i.e. one school subject for part - 3 and other school subject for Part - 4). <ol style="list-style-type: none"> 1. Chemistry 2. Biology 3. Physics 4. Mathematics 5. General Science 	80	20		100
Practicum		Special Training Programme <ul style="list-style-type: none"> • Micro Teaching • Practice Lesson • Observation Lesson • Technology Based Lesson • Criticism Lesson • Attendance /Seminar/ 			10 50 05 05 20 10	100

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		Workshop				
		Final Lesson	100			100
						950

*ELIGIBILITY CRITERION ON PASSING MARKS BUT MARKS SHALL NOT BE INCLUDED IN DIVISION.

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

Theory Paper	Course Code	Title of the Paper	Evaluation			Total
			External	Internal	Practical	
I	B.Sc.B.Ed. 01	Environmental Studies (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
VIII	B.Sc.B.Ed. 08(a/b)	Pedagogy of a School Subject (Candidate should opt any two school subject from the following i.e. one school subject for part - 3 and other school subject for Part - 4) 1. Chemistry 2. Biology 3. Physics 4. Mathematics 5. General Science	80	20	-	100
Practicum		1. Practice teaching 2. Block Teaching (Participation in		50 20		

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		School Activities Social Participation in Group)		10		
		3. Report of any feature of school / case study/action research		20		100
		4. Criticism Lesson				
		Final Lesson	100			100
						800

*ELIGIBILITY CRITERION ON PASSING MARKS BUT MARKS SHALL NOT BE INCLUDED IN DIVISION.

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

Compulsory Papers*

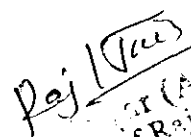
Year	Paper
Ist Year	Gen. English
II Year	Gen. Hindi
III Year	Elementary Computer Application (ICT)
IV Year	Environmental Studies

Compulsory Paper

Year	Paper
I st Year	1. Childhood and Growing Up 2. Contemporary India and 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 Specialisation :

Year	Paper
I st Year	Instructional System & Educational
II nd Year	Peace Education
III rd Year	Guidance and Counselling in School


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IV th Year	Physical Education & Yoga
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Group B: Select any three

1. Chemistry (I, II, III)
2. Botany (I, II, III)
3. Zoology (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). In I, II and III year students has to opt two optional paper that two optional paper had to studied at least two year from that only he/she can opt Pedagogy of school subject in Part III or IV

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

- ❖ 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 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

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III Year	12 Paper + Practical + Practicum + Final Lesson	600 + 150 + 100 + 100 = 950
IV Year	7 Paper + Practicum + Final Lesson	600 + 100 + 100 = 800
Total	43 Papers	2400 + 550 + 200 + 200 = 3350

O. 321 The objectives of the practical work prescribed for the Integrated Programme of B.Sc.-B.Ed. Degree (Four Year) are follows:

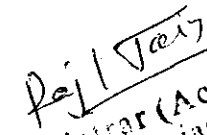
PART II

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. Arouse the curiosity and interest of the pupils and secure their active participation in the educative process.
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.


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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. Black-board 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.

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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.
 - iii. To maintain same sequence of papers (G.A. - IVth, G.B. 05/06/07 papers (Ist, IInd & IIIrd year) and 8 a/b IIIrd year and IVth year) in the four years B.Sc.B.Ed itegrated course, paper no IIIrd in B.Sc.B.Ed IIIrd year and paper no VIIth in B.Sc.B.Ed IVth year were skipped.
- 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 1st 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 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 reappear 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

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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.326 A: 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;

Part I- Main theory papers at **B.Sc.B.Ed. I**, In Integrated B.Sc.B.Ed I Paper nos. are 02, 03 & 04 in each session are of three hours carrying 100 marks (80 for theory + 20 for sessional) each. Compulsory paper* 01 of 100 marks and optional Paper 05, 06, 07 (G-B). in 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.

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.

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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.
4. 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.
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).
8. 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.

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(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:

(1) 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-

❖ 40 percent marks in the external examination.

❖ 40 percent marks in internal assessment.

(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%

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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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B.Sc. Ed Part IV
ENVIRONMENTAL STUDIES
B.Sc. Ed Examination-

Scheme of examination

Time	Min Marks	Max Marks
3 hrs	36	100

This paper will contain 100 multiple choice questions. Each question will carry 1 mark. Students should be encouraged to visit places of Environmental Importance including Natural and Manmade Habitat.

Note:

1. The marks secured in this paper shall not be counted in awarding the division to a candidate.
2. The candidates will have to clear this compulsory paper in three chances.
3. Non-appearing or absence in the examination of compulsory paper will be counted as a chance.

Unit.1: The Multidisciplinary nature of environmental studies

Definition, scope and importance- Relationship between Environmental Studies and other branches of science and social sciences.

Need for Environmental awareness, Environmental education in present day context.

Unit.2: Natural Resources and Challenges

- a. Natural resources and associated problems, Classification of resources: renewable resources, non renewable resources, classes of earth resources, resources regions: Definition and criteria, resource conservation.
- b. Forest resources: Use and over- exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forest and tribal people.
- c. Water resources: Use and over-utilization of surface and groundwater, floods, drought conflicts over water, dams-benefits and problems.
- d. Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.
- e. Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticides problems, water logging, salinity, case studies.
- f. Energy resources: Growing energy need, renewable and nonrenewable energy sources, use of alternate energy sources. Case studies.
- g. Land resources: Land as a resource, Land degradation man induced Landslides, soil erosion and desertification.

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- Role of an individual in conservation of natural resources.
- Equitable use of resources for sustainable lifestyles.

Unit 3: Ecosystems, Concepts, Structure, Functions and Types

- Concept of an ecosystem
- Structure and function of an ecosystem
- Producers, consumers and decomposers
- Energy flow in the ecosystem
- Ecological succession
- Food chains, food webs and ecological pyramids
- Introduction, types characteristics features, structure and function of the following ecosystem:
 - a. Forest ecosystem, Tropical Temperate and Alpine Ecosystem
 - b. Grassland ecosystem and Their Types
 - c. Desert ecosystem with emphasis on Thar Desert
 - d. Aquatic ecosystems(ponds, streams, lakes, rivers, oceans, estuaries) and Wet Lands

Unit 4: Biodiversity and its conservation

- Introduction –Definition, genetic, species and ecosystem diversity
- Biogeographically classification of India
- Value of biodiversity :consumptive use, productive use, social ethical, aesthetic and option values
- Biodiversity at global, National and local level
- India as a mega-diversity nation
- Hot-spot of biodiversity
- Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts
- Endangered, Threatened and endemic species of India
- Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity
- Red Data Book

Unit 5 : Environmental Pollution and Control Measures

Definition

- Causes, effects and control measures of:
 - a) Air Pollution
 - b) Water Pollution
 - c) Soil Pollution
 - d) Marine Pollution

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- e) Noise Pollution
- f) Thermal Pollution
- g) Nuclear Hazards
- Solid waste management: Causes, effects and control measures of urban and industrial wastes
- Role of an individual in prevention of pollution
- Pollution case studies
- Disaster management: floods earthquake, cyclone and landslides

Unit 6 : Social issues, Environment, Laws and Sustainability

- From Unsustainable to Sustainable development
- Urban problems related to energy
- Water conservation, rain water harvesting, watershed management
- Resettlement and rehabilitation of people; its problems and concerns. Case studies
- Environmental ethics: Issues and possible solution.
- Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case studies
- Wasteland reclamation.
- Consumerism and waste product.
- Environmental Protection Act
- Air (Prevention and Control of Pollution) Act
- Wild life protection Act
- Forest Conservation Act
- Biological Diversity Act
- Issues involved in enforcement of environmental legislation
- Public Awareness.

Unit 7: Human Population and the Environment

- Population growth, variation among nations
- Population explosion-Family Welfare Programme
- Environment and Human health
- Human Rights
- Value Education
- HIV/AIDS
- Women and Child Welfare
- Role of Information Technology in Environment and human health
- Case Studies

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 Dy. Director (Acad.)
 U.P. Board, Rajasthan
 Jaipur

Suggested Readings:-

1. Diwan A.P. and Arora D.K.1995. Human Ecology Annol Publication Pvt.Ltd.,New Delhi.
2. Dubey, R.M.1992. Human Ecology and Environmental Education,Chaug Publications,Allahabad.
3. Goudie,Andrew.The Human Impact.
4. Hussain Maxia.1994 Human Geography,Rawat Publication,Jaipur.
5. Johnston, R.J.Ed.1986 Dictionary of Human geography,National Publication,New Delhi.
6. Malik,S.L.and Bhattacharya D.K.1986. Aspects of Human Ecology,Northern Book Center,New Delhi.
7. Mishra,R.P and Bhooshan,B.S.1979.Human Settlements in Asia.Public,Polices and programmes Haritage publisher,New Delhi.
8. Nathawat, G.S.1985. Human Ecology,An Indian perspective,Indian Human Ecology Council,Jaipur.
9. Russel, Bartrand, 1976.Impact of Science of society Unwin,Publisher,Indian. (paper back).
10. Sinha Rajiv, 1996.Gloobal Biodiversity Ina.,Shri publication,Jaipur.
11. Sinha Rajiv K., 1994. Development without Desortrtction 14.Environmentalist,Jaipur. Sinha Rajiv K., 1996.Environmental Crises and Human at Risk,In A Shri Publication,Jaipur.
12. Smith, Dianne, 1984.Urban Ecology,George Allen,London.
13. Swarnkar, R.C.1985.Indian Tribes.Printwell publisher,Jaipur.
14. Tivy,Joy and O'Hugegreg,1985.Human Impact on the Ecosystem Edinburgh George Allen Boyd.
16. United Nations Development Report, 1996.Human Development Report, 1996.Oxford University Press,Delhi.
17. Vannathony & Rogers Paul, 1974. Human Ecology and World Development,Flehum Press,New York.

Raj Vaid
Dy. Registrar (Acad.)
University of Rajasthan
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B.Sc.B.Ed IV Year

02-Creating and inclusive school

MARKS: 100

Objectives

The course will enable the student teachers to –

- To demonstrate knowledge of different perspectives in the area of education of children with disabilities.
- To reformulate attitudes towards children with special needs.
- To use specific strategies involving skills in teaching special needs children in inclusive classrooms.
- To modify appropriate learner-friendly evaluation procedures.
- To incorporate innovative practices to respond to education of children with special needs.
- To contribute to the formulation of policy.
- To implement laws pertaining to education of children with special needs.

Course:-

UNIT 1: PARADIGMS IN EDUCATION OF CHILDREN WITH SPECIAL NEEDS

- Historical perspectives and contemporary trends Approaches of viewing disabilities:
- The charity model, the bio centric model, the functional model and the human rights model
- Concept of special education, integrated education and inclusive education; Philosophy of inclusive education.

UNIT 2: LEGAL AND POLICY PERSPECTIVES

- RTE Act, 2009.
- National Policy – Education of Students with Disabilities in the National Policy on Education, 1968, 1986,
- POA(1992); Education in the National Policy on Disability, 2006.

UNIT 3 : SCHEME OF INCLUSIVE EDUCATION

- Education of Special Focus Groups under the Sarva Shiksha Abhiyan (SSA, 2000);

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- MHRD, 2005, Scheme of Inclusive Education for the Disabled at Secondary School (IEDSS, 2009), National Trust and NGOs.
- Community-based education.

UNIT 4: CLASS ROOM MANAGEMENT

- Class Room management - meaning and approaches
- School's readiness for addressing learning difficulties
- Technological advancement and its application – ICT, adaptive and assistive devices, equipments and other technologies for different disabilities

UNIT 5: INCLUSIVE PRACTICES IN CLASSROOMS FOR ALL

- Pedagogical strategies to respond to individual needs of students: Cooperative learning strategies in the classroom, peer tutoring, social learning, buddy system, reflective teaching, multisensory teaching, etc.
- Documentation, record keeping and maintenance.
- Teacher role in classroom management

Tasks and Assignments

1. Class Test 10 marks

2. Any one 10 Marks

- Case study of a Learner with Special needs.
- Making a Report of Visit to a resource room of SSA.
- Interviewing a teacher working in an Inclusive School.

REFERENCES:

1. Dunn., L & Bay, D.M (ed.): Exceptional Children in the Schools, New York : Holt, Rinehart, Winston.
2. Hallahar, D.P & Kauffman, J.M., Exceptional Children: Introduction to Special Education, Allyn & Bacon, Massachusetts, 1991
3. Hewett, Frank M. & Foreness Steven R., Education of Exceptional Learners, Allyn & Bacon, Massachusetts, 1984.
4. Kirk, S.A & Gallagher J.J., Education of Exceptional Children ; Houghton Mifflin Co., Boston, 1989
5. Magnifico, L.X: Education of the Exceptional Child, New York, Longman.
6. Shanker, Udey: Exceptional Children, Jullundur: Sterling Publications.

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7. Singh, N.N and Beale, I.L. (eds.) Learning Disabilities – Nature, Theory and Treatment Spring-Verlag, New York, Inc:1992.

B.Sc.B.Ed IV Year

03- Understanding Disciplines and subjects

Marks 100

Objectives:-

After completing the course the students will be able:-

1. To develop an understanding of the nature of disciplinary knowledge in the school curriculum.
2. To acquire a conceptual understanding of the impact of school subjects on disciplines.
3. To develop interest, attitudes and knowledge about the content in respect of framing the syllabus.
4. To build up a professional, disciplinary and curriculum programme.

Unit-I Meaning and concept of disciplinary knowledge

- The Nature and role of disciplinary knowledge in the school curriculum.
- Relationship of disciplinary areas with school subject.
- Difference between disciplines & Interdisciplinary Subject.

Unit –II School Subjects on Disciplines

Impact of Social science Subject on Disciplines:-

- Social Science: Methods: Lecture method, Project method, Supervised study, Story-Telling, Biographical, Source Method, Brain-storming Dramatization, Experiential-Learning

Unit - III Impact of science and maths subject on disciplines

- Science: Methods & Techniques of Teaching Science: Brain Storming, Laboratory, Demonstration, Project & Field visit, Constructive Learning, Concept Mapping, Heuristic Learning & Problem Solving, Group Discussion & Panel Discussion
- Maths: Methods of teaching mathematics: Lecture, Inductive, Deductive, Analytic, Synthetic, Heuristic, Project, Problem solving, and Laboratory methods & techniques of Teaching Mathematics: Questioning, Brain storming, Role playing, Simulation, Non formal techniques of learning Mathematics.

Unit - IV Impact of Language subject on disciplines

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- Language: Story, Novel, Poetry, Personal Essay, Pen Portrait. Travelogue, Self Narration, Memories
- Redefinition of the school subject with concern to social Justice
- Meaning of Social cultural perspective in context of Universal education

Unit - V Process and framing of disciplines and subjects

- Recognized the theory of content, Principles and process of Preparing the syllabus and content
- Practical Knowledge ,Community& Co-curricular activity knowledge with reference to Disciplinarily and Relation with School Curriculum
- Creativity development of learning through horticulture and hospitality

Test and Assignment:-

1. Class Test 10 Marks
2. Any one of the following 10 Marks
 - Prepare charts with related language (Hindi, English, or Sanskrit)
 - Preparation of a talk with related social justice.
 - Collection of news papers cutting related with horticulture and hospitality.
 - Prepare a lab with related science and maths tools and their operation.
 - Life sketch and contribution of any two Indian scientists and socialistic.
 - Study of any one aspect of social issues and prepare a report.
 - Preparation of Five (5) word cards, 5 picture cards and cross word puzzles (Language)
 - 5 microteaching skills & 5 macro- teaching (based on different innovative methods)

References:-

1. Apple :- M.W (2008) can school contribute to a more just society education citizenship and social justice, 3 (3) 239-261
2. Brantom F.K. : The teaching of Social studies in changing world
3. Chash, S.C (2007) history of education in India, NCERT (2005) National Curriculum fram e work .NCERT
4. Clinton Golding of the centre for study of higher education Integrating of Disciplines.

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5. Daman.C Howard, Rastman, Meil(1965) "The uses of language " New yark.Holt Rinchyart and winstan. Inc.
6. Dengz. Z 92013) School subject and academic discipline in a luke a woods , B.K. weir (Eds) curriculum, Syllabus design and equity : A priner and model routledge
7. Egen, Marlow & Rao, D.B. 2003 Teaching Successfully , Discvery Pub. House New Delhi
8. Freeman Diane-Larsen (2000) Technigues and Principles in language teaching. Oxford :049
9. Sharma , L.M. 1977 (Teaching of Science & Life Science Dhanpat Rai & Sans. Delhi.
10. Wesley, Edgar Brose : Social Studies for School.

B.Sc.B.Ed IV Year

04-PHYSICAL EDUCATION AND YOGA

OBJECTIVES:-

MARKS-100

The course will enable the student teachers to –

- To enable them to understand the need & importance of Physical Education.
- To acquaint them to allied areas in Physical Education.
- To sensitize the student teacher towards physical fitness & its importance.
- To make them aware of the benefits of physical fitness & activities for its development.
- To help them acquire the skills for assessment of physical fitness.
- To introduce them to the philosophical bases of Yoga.
- To introduce them to types of Yoga & its importance.
- To motivate them to resort to physical activity for the fitness development.
- To help them understand the procedure of health related fitness evaluation

Unit 1. PHYSICAL EDUCATION

- Introduction, Definition and Meaning of physical education
- Objectives of physical education
- Scope of physical education & allied areas in Physical Education

Unit 2. PHYSICAL EDUCATION AND METHODS

- Need & importance of physical education in different levels of school(sec. and sr. sec.level)

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- Training methods:- Development of components of physical fitness and motor fitness through following training methods (continuous method, interval method, circuit method, fartlek/speed play and weight training)
- Development of Techniques and Tactics

Unit 3. PHYSICAL FITNESS

- Definition, Meaning, Types and factors of physical fitness
- Factors affecting physical fitness
- Benefits Physical Fitness

Unit 4:- PHYSICAL FITNESS AND YOGA ACTIVITIES

- Need of physical activities at school level
- Importance of physical activities at school level
- Assessment of physical fitness
- Introduction, Meaning and mis-concepts of Yoga
- Ashtang Yoga (8 stages of Yoga)
- Types of Yoga
- Importance of Yogasanas, Pranayama and Shudhikriya
- Importance of Meditation in school

Unit 5 :- Human abilities and Yoga in Indian context

- Education and Yoga - Promotion of intelligence, awareness and creativity through Yoga, Yoga in Class – rooms (Primary , Secondary and Higher education levels).
- Stress and Yoga: Stress – Definition, Causes, Symptoms, Complications in life ; Yogic management of stress related disorders – Anxiety, Depression and Suicidal tendencies.

Tasks and Assignments

1. Class Test - 10 Marks
2. Any one following : 10 marks
 - Learning and performing of basic yogic activities
 - Health and physical education relationship with other subject areas like science, social science and languages.
 - Fundamental skill of games/sports and yoga

REFERENCES:-

- Kuvalayananda, Swami, Pranayama,(1983) , Popular Prakashan Bombay.
- Kuvalayananda, Swami, Asanas,(1983) Popular Prakashan Bombay, English/Hindi.
- Lal, Raman Bihari. (2008). Siksha Ke Daarshnik Evam Samajshastriye Sidhant. Meerut, Rastogi Publications.

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- Nagendra, H.R. (1993). Yoga in Education. Bangalore, Vivekananda Kendra.
- Niranjana, Swami. (1998). Yoga Darshan. Deogarh, Panchadashanam Paramahansa Alakh Bara.
- Rai, Lajpat, Sawhney, R.C. and Selvamurthy, W.Selvamurthy (1998). Meditation Techniques, their Scientific Evaluation. Gurgaon, Anubhav Rai Publication.
- Raju, P.T. (1982). The Philosophical Traditions of India. Delhi, Moti Lal Banarsi Dass.
- Ram, Swami. (1999). A Practical Guide to Holistic Health. Pennsylvania, Himalayan Institute of Yoga.
- Reyna, Ruth. (1971). Introduction to Indian Philosophy. New Delhi, Tata McGraw-Hill Publishing Co. Ltd.

B.Sc.B.Ed IV Year

05- Gender, School and Society

MARKS: 100

Objectives:

After completing the course the students will be able:-

- To develop basic understanding and familiarity with key concepts-gender, gender bias, gender stereotype, empowerment, gender parity, equity and equality, patriarchy and feminism and transgender.
- To understand some important landmarks in connection with growth of women's education in historical and contemporary periods.
- To learn about gender issues in school, curriculum, textual materials across disciplines, pedagogical processes and its intersection with class, caste, religion and region;
- To understand the need to address gender based violence in all social spaces and evolves strategies for addressing it.

Unit 1: Gender Issues: Key Concepts

- Gender, Sexuality, Patriarchy, Masculinity and Feminity
- Gender Bias, Gender Stereotyping and prejudices
- Equity and Equality in Relation with Caste, Class, Religion, Ethnicity, Disability and Region.

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- Issues and Concerns of Transgender

Unit 2: Socialization Processes in India: Family, School and Society

- Gender Identities and Socialization Practices in different types of families in India.
- Sites of Conflict: Understanding the Importance of addressing sexual abuse in family, Neighborhood and School and in other formal and informal institutions.

Unit 3: Gender Issues in Curriculum

- Gender, Culture and Institution: Intersection of class, caste, Religion and Region - Construction of gender in curriculum Frameworks since Independence : An Analysis - Gender and the hidden curriculum
- Gender in Text and classroom processes - Teacher as an agent of change - Life skills and sexuality.
- Institutions redressing sexual harassment and abuse.

Unit 4: Gender Studies: Historical Perspectives on Education

- Historical Backdrop: Some Landmarks in Socio-Economic and Educational upliftment of Status of Girls and Women.
- Women empowerment : Meaning, Definition, Needs, Obstacles in the path of women empowerment, Role of Government and institutions for women empowerment

Unit 5: Constitutional Commitments

- Reports of Commissions and Committees, Policy initiatives,
- Schemes and Programmes on Girls Education and Overall Development of Women for Addressing Gender Discrimination in Society.

Tasks and Assignments

- | | |
|---------------|----------|
| 1. Class Test | 10 marks |
| 2. Any one | 10 Marks |

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- Preparation of Project on Key Concepts and its operational definitions relating it with the Social Context of the Teachers and Students.
- Analyses Textual Materials from the Perspective of Gender Bias and Stereotype.
- Organize Debates on Equity and Equality cutting across Gender, Class, Caste, Religion, Ethnicity Disability and Region.
- Prepare a project on Issues and Concerns of Transgender.
- Project on analyzing the growing up of Boys and Girls in different types of family in India.

References:-

- Desai, Neera and Thakkar, Usha. (2001). Women in Indian Society. National Book Trust, New Delhi
- Dunne, M. et al. (2003). Gender and Violence in Schools. UNESCO.
- Kirk Jackie e.d. , (2008), Women Teaching in South Asia, SAGE, New Delhi
- Leach, Fiona. (2003). Practising Gender Analysis in Education, Oxfam
- National Curriculum Framework 2005: Position Paper, National Focus Group on Gender Issues in Education, 3.2, NCERT, 2006.
- Nayar, Sushila and Mankekar Kamla (ed.) 2007, 'Women Pioneers in India's Renaissance, National Book Trust, New Delhi, India.
- Sherwani, Azim. (1998). the girl child in crisis. Indian Social Institute, New Delhi.
- Srivastava Gouri, (2012), Gender and Peace in Textbooks and Schooling Processes, Concept Publishing Company Pvt. Ltd, New Delhi
- UNICEF (2005). 2005 and Beyond – Accelerating Girls' Education in South Asia. Meeting Report.
- Unterhalter, Elaine. (2007). Gender, Schooling and Global Social Justice, Routledge.

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Assessment for Learning

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Objectives

The course will enable the student teachers to –

- understand the process of evaluation.
- develop the skill in preparing, administering and interpreting the achievement test.
- understand and use different techniques and tools of evaluation for learning.
- comprehend the process of assessment for learning
- develop skills necessary to compute basic statistical measures to assess the learning.

Unit 1: Basic Concepts and Overview

- Basic Concepts: assessment, evaluation, measurement, test, examination, formative and summative evaluation, continuous and comprehensive assessment mandated under RTE, and grading.
- Purpose of assessment in different paradigms: (a) behaviourist (with its limited view on learning as behaviour), (b) constructivist paradigm and (c) socio-culturalist paradigm; distinction between 'assessment of learning' and 'assessment for learning'; assessment as a basis for taking pedagogic decisions .
- Significance of assessment for learning
- Self assessment and peer assessment

Unit 2: Analysis of Existing Practices of Assessment

- Records used in Assessment: a) Profiles: Meaning, Steps involved and criteria for developing and maintaining a comprehensive learner profile. b) Evaluation rubric: Meaning , Construction and Uses c) Cumulative records : Meaning, Significance
- Ethical Principles of Assessment Examination Reforms a. Continuous and Comprehensive Evaluation (CCE) b. Choice Based Credit System (CBCS) c. Open Book Examination

Unit 3: Assessment in the Classroom and Record Keeping

- Expanding notions of learning in a constructivist perspective.
- Ability to develop indicators for assessment.

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- Tasks for assessment: projects, assignments.
- Formulating tasks and questions that engage the learner and demonstrate the process of thinking.
- Scope for original responses, observation of learning processes by self, by peers, by teacher.
- Organizing and planning for student portfolios and developing rubrics for portfolio assessment, teachers' diaries, and group activities for assessment.

Unit 4: INTERPRETING TEST SCORES

- Presentation and Organization of data : Frequency distribution
- Graphical representation of data, Histogram, Frequency polygon
- Measures of Central Tendency : Mean, Median, Mode
- Measures of Variability : Quartile Deviation, Standard Deviation
- Percentile and Percentile Rank
- Rank difference method by spearman's, Co-efficient of correlation, Types of correlation
- Normal Probability Curve : Properties, Uses

Unit 5: Feedback

- Feedback : meaning, importance and types
- Feedback as an essential component of assessment; types of teacher feedback (written and oral).
- Feedback to students and feedback to parents; peers' feedback, scores, grades and qualitative descriptions, developing and maintaining a comprehensive learner profile.
- Challenges of assessment.

Tasks and Assignments

1. Class Test 10 marks
2. Any one 10 Marks
 - Developing an achievement test with its Blue Print, Answer Key and Marks Distribution.
 - Developing a Portfolio / Profile / Evaluation Rubric (format).
 - Evaluation of available Unit test and reformation of the same.
 - Designing Questionnaire / Interview Schedule on a given topic
 - Preparing any four evaluation tools for Formative Assessment.

REFERENCES:-

1. Deshpande, J.V. Examining the Examination System Economic & Political Weekly, April 17, 2004 Vol XXXIX, No. 16, Nawani, D (2015).
2. Re-thinking Assessments in Schools, Economic & Political Weekly, Jan 17, Vol L, No.
3. Nawani, D (2012), Continuously and comprehensively evaluating children, Economic & Political Weekly, Vol. XLVIII, Jan 12, 2013.
4. NCERT(2007) National Focus Group Paper on Examination Reforms S. K. (1994).
5. Applied Statistics for Education. Mittal Publications.
6. Garrett, H.E. (2008). Statistics in Psychology and Education. Delhi: Surjeet Publication.
7. Mrunalini, T. (2013). Educational Evaluation. Hyderabad: Neelkamal Publications Pvt. Ltd.

B.Sc.B.Ed IV Year

PEDAGOGY OF SCHOOL SUBJECT

PAPER:-VIII A / B

CHEMISTRY TEACHING

Marks-100

Objectives -

To enable student teacher to:

1. Understand the Nature, Place, Values and Objectives of teaching chemistry at secondary/senior secondary level.
2. Understand correlation with other subjects
3. Evaluate critically the existing syllabus of chemistry
4. Develop understanding of various objectives of teaching Chemistry in Secondary Schools.
5. Understand and adopt proper methods of teaching various topics of Chemistry.
6. Appreciate the usefulness of various co-curricular activities for fostering interest of pupils in Chemistry.

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7. Get acquainted with various methods of evaluation of the progress of pupils in Chemistry.
8. Prepare and use different types of instructional material for teaching Chemistry.
9. Understand the difficulties faced in teaching and learning Chemistry and suggest remedial measures.
10. Evaluate critically the existing syllabus of Chemistry prescribed for Secondary/Senior Secondary level in the State of Rajasthan.
11. Provide training in scientific method and develop scientific temper among their students.

Unit - I: The Nature of Science


- Definition of Science, Scientific Method, Scientific Literacy with suitable examples from Chemistry,
- Nature of science with special reference to chemistry
- Instructional Objectives, General and Specific Objectives of Teaching Chemistry
- Correlation of chemistry with other subjects.

Unit - II: Curriculum and Planning

- Chemistry Curriculum, Place of Chemistry in School Curriculum
- Principles of Curriculum Construction, Difference between Curriculum and Syllabus,
- Co-curricular activities, factors influencing curriculum of chemistry.
- Modern trends in Chemistry Curriculum CBA, Chemical- Education Material Study, Nuffied- O & A level.
- Critical appraisal of Chemistry syllabus at Secondary/Senior Secondary level prescribed by Board of Secondary Education, Rajasthan.
- Planning- Daily lesson plan, unit plan & yearly plan.

Unit - III: Methods of Teaching Chemistry

- Micro Teaching, Skills of teaching Lesson Planning ,
- Methods of Teaching Chemistry- Lecture Method, Demonstration Method. Discussion Method, Problem Solving Method, Project Method, Inductive-Deductive Method, Co-operative method, Constructivism method.


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- Teaching Models-Concept Attainment Model, Inquiry Training Model
- Qualities of chemistry teacher.

UNIT-IV Instructional Support System

- Teaching Aids in Chemistry Audio Aids, A-V Aids, Educational Broadcasts, Television and Teleconferencing, Charts, Models, Low Cost Teaching Aids, Improvised Apparatus.
- Chemistry Lab: Layout Plans, Equipments, Furniture, Maintenance of records, repair, care and improvisation of apparatus, safety measures in Lab.
- Role of State & National Level Institutions & Laboratories like DST, NCL, Fertilizer, Pesticide & Chemical Companies like Hindustan Zinc Ltd.
- Characteristics of a good text book and evaluation of a Text Book

Unit - V: Evaluation of Chemistry

- Difference between Measurement, Assessment and Evaluation,
- Characteristics of good Measurement, Diagnostic Test and Remedial Teaching,
- Criterion Referenced Testing and Norm Referenced Testing, Different types of items, Essay type, Short types objective type
- Development and Standardization of Achievement Test in Chemistry.

Assignments :-

1. Class Test 10 marks
2. Any one of the following :- 10 marks
 - Planning and Conducting Experiments.
 - Preparation of models and charts.
 - Preparation of Chemistry Projects.
 - Criticals analysis of chemistry textbooks.
 - Preparation of design, blue print for teacher made test.
 - Development of self-instructional material on any one topic of Chemistry
 - Life sketch & contribution of any one prominent Indian Chemist.
 - Preparation of scrap book containing original science (Scientific cartoon) Stories/article
 - Life sketch & contribution of any one prominent Indian Chemist.

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- Conducting & reporting two experiments useful at secondary/senior secondary level (other than those in syllabus).
- A critical study of any one senior secondary Lab of chemistry.
- Preparation of 10 frames of Linear or Branching type programmes on any topic of Chemistry.

References:

1. Bhat, B.D. and Sharma, S.R.: Methods of Science Teaching. New Delhi: Kanishka Publishing House, 1993.
2. Das, R.C.: Science in Schools. New Delhi: Sterling Publishers, 1985.
3. Directorate of Hindi Implementation, Delhi University, 2000.
4. Gupta, S.K.: Teaching of Science Education. New Delhi: Vikas Publishers, 1983.
5. Gupta, S.K.: Teaching Physical Science in Secondary. New Delhi: Sterling Publishers, 1985.
6. Joyce, B. & Weil, M: Models of Teaching. Prentice Hall Inc., New Jersey, 1979.
7. Kishore, L.: Teaching of Physical Science. Delhi: Doaba House, 1991.
8. Mangal, S.K.: Teaching of Science. New Delhi: Agra Book Depot, 1982.
9. 8.NCERT: Teaching of Science in Secondary Schools. New Delhi: NCERT, 1982.
10. Pal, H.R and Pal, R.: Curriculum – Yesterday, Today and Tomorrow. Kshipra, New Delhi, 2006.
11. Pal, H.R.: Methodologies of Teaching & Training in Higher Education. Delhi:
12. Sansanwal, D.N. & Singh, P.: Models of Teaching. Society for Educational Research & Development, Baroda, 1991.
13. Vaidya, N.: Science Teaching for the 21st century. Deep and Deep Publication, New Delhi, 1996.
14. Venkataiah, S.: Teaching of Chemistry. Anmol Publisher Pvt. Ltd., New Delhi, 2002.

B.Sc.B.Ed IV Year

PEDAGOGY OF SCHOOL SUBJECT

PAPER:-VIII A / B

BIOLOGY TEACHING

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Objectives:

To enable student Teacher to

1. Understand the Nature, Place Values and objectives of teaching Biology at Senior Secondary level.
2. Establish its correlation with other subjects
3. Evaluate critically the existing syllabus of Biology prescribed for Secondary/Senior Secondary level in the state of Rajasthan
4. Develop yearly plan unit plan and lesson plan for Senior Secondary classes.
5. Provide training in Scientific method and develop Scientific temper among their students.
6. Use various methods and approaches of teaching Biology
7. Acquire the ability to develop instructional support system.
8. Plan and organize chemistry practical work at the Laboratory.
9. Organise Co-curricular activities and utilize community resources promoting Science learning.
10. Use most appropriate method to assess the progress and achievement of the pupil & thus prepare appropriate test for the purpose (both theoretical & practical)

UNIT-I Nature, Scope and Objectives

- Nature of science with special reference to Biology.
- Main discoveries and development in Biology.
- Place & values of teaching Biology at secondary/senior secondary level.
- Correlation of Biology with other subjects.
- Objectives of teaching Biology at secondary/senior secondary level.

UNIT-II Curriculum and lanning

- Principles of Biology curriculum at secondary/senior secondary level.
- Modern trends in Biology Curriculum : B.S.C.S.,
- Critical appraisal of Biology syllabus at secondary/senior secondary level prescribed by Board of secondary Education, Rajasthan.
- Planning- Daily lesson plan, unit plan & yearly plan.

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- Qualities & responsibilities of Biology teacher. Teacher's role in training students in scientific method and in developing creativity and scientific temper among their students.

UNIT-III Methods and approaches

- Lecture method, Demonstration method, Lab-based methods, Inductive & deductive method, problem solving, Heuristic, Constructivism, & Project method.
- Inquiry approach, programmed instruction, Group discussion, self study, Team teaching, computer assisted learning, seminars and workshops.

UNIT-IV Instructional Support System

- Multi sensory aids: Charts, models, specimen, bulletin - boards, flannel Board, Transparencies slides, projector, OHP, Computer, T.V., and Radio etc.
- Co-curricular Activities: Organization of science club, science fair, trips and use of community resources.
- Biology Lab: Organization of Biology Laboratory, Arrangement of Apparatus, Care & Maintenance of equipment & specimen, organization of practical work in Biology.
- Role of state & National Level Instructions & Laboratories Research centers in Botany, Zoology & Agriculture.
- Characteristics of a good text book and Evaluation of a Text Book.

UNIT-V Evaluation in Biology

- Evaluation: Concept, Types and purposes.
- Type of test items and their construction.
- Preparation of Blue Print & Achievement Test.
- Evaluation of practical work in Biology.

Sessional Work :(20 Marks)

(1) Class Test 10 Marks

(2) Any one of the following-- 10 Marks

- Life sketch & contribution of any one prominent Indian Biologist.
- Preparation of Harbarium (scrap book)
- Prepare any one of the following related to environment education.
(i) Poster (miniature), (ii) Article, (iii) Story, (iv) Play

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- Description of any two teaching models.
- Prepare a Radio or T.V. script.
- Make a list of local (resources useful in teaching Biology and prepared lesson plan using some of them.
- A case study of any one senior secondary lab of Biology.
- Preparation of 10 frames of Linear or Branching type programmes on any topic of Biology.
- Construction and administration of Diagnostic test on any one unit of Biology.

REFERENCES:-

1. Bhat, B.D. and Sharma, S.R.: Methods of Science Teaching. New Delhi: Kanishka Publishing House, 1993.
2. Das, R.C.: Science in Schools. New Delhi: Sterling Publishers, 1985.
3. Gupta, S.K.: Teaching of Science Education. New Delhi: Vikas Publishers, 1983.
4. Gupta, S.K.: Teaching Physical Science in Secondary. New Delhi: Sterling Publishers, 1985
5. Gupta, V.K.: Teaching and Learning of Science and Technology. New Delhi: Vikas Publishing House Pvt. Ltd., 1995.
6. Joyce, B. & Weil, M: Models of Teaching. Prentice Hall Inc., New Jersey, 1979.
7. Kishore, L.: Teaching of Physical Science. Delhi: Doaba House, 1991. 34
8. Mangal, S.K.: Teaching of Science. New Delhi: Agra Book Depot, 1982.
9. NCERT: Teaching of Science in Secondary Schools. New Delhi: NCERT, 1982.
10. Pal, H.R and Pal, R.: Curriculum – Yesterday, Today and Tomorrow. Kshipra, New Delhi, 2006.

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PEDAGOGY OF SCHOOL SUBJECT

PAPER:-VIII A / B

Physics Teaching

MARKS:-100

Objectives:-

The student teachers will be able to:

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1. Understand the nature of Science and Physics.
2. Appreciate the contribution of Indian and Foreign scientists in the development of Physics.
3. Develop the skill of planning teaching learning activities.
4. Develop competencies in (a) Selection and use of teaching methods, approaches and devices. (b) Selection, preparation and use of cost effective teaching aids. (c) Inculcation of scientific attitude and science related values. (d) Plan, manage physics laboratory and organize physics practical work
5. Develop skill of critical appraisal of Physics text book.
6. Select and effectively make use of teaching aids.
7. Organize co-curricular activities related to physics.
8. Plan and critically appraise Physics curriculum at senior secondary level.
9. Prepare, use and analyze achievement tests for evaluation of learning outcomes of Physics.

Course content

Unit - I - Foundations of teaching physics

- Nature of Science and Physics, Major milestones in the development of physics, Contributions of Eminent Indian and foreign Physicists: C.V.Raman, Vikram Sarabhai, Homi Jehangir Bhabha, Subhramanayan, D.S. Kothari, Chadershekhar, Satyender Nath Bose, Newton, Archimedes, Alexander Graham Bell, Madam Curie, Albert Einstein.
- Relationship of science and society, impact of physics on modern Indian society with reference to issues related with Environment, Globalization, Industrialization, and Information Technology.
- Aims and objectives of teaching physics at senior secondary level, Correlation of physics with other school subjects.

Unit - II - Planning for Instruction and Role of Teacher

- Specific Objectives of Teaching Physics in Behavioural Terms, Content Analysis and Concept Mapping.
- Developing Yearly Plan, Unit Plan and Daily Lesson Plans.

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- Teacher's role in training students in scientific method, developing scientific attitude, critical thinking and creativity.
- Qualities, responsibilities and professional ethics of physics teacher.
- Criteria for selection of physics text book, critical appraisal of Physics Text Book

Unit - III - Approaches and Methods of Teaching Physics

- Concept approach –Process approach – teaching science as a process,
- scientific method, problem solving method,
- Cooperative learning approach,
- Activity based approach – investigatory approach,
- project method, laboratory method ,
- Demonstration-cum-discussion method ,
- Constructivist approach

Unit IV- Instructional support system

- Multi sensory aids: Significance and Psychological Principles of using Teaching Aids, use of charts, models, overhead projectors, computers, internet, and improvised apparatus.
- Use of Community resources in teaching of physics.
- Planning, equipping and maintaining Physics Laboratory; planning and guiding practical work
- Selecting and guiding Projects in Physics.
- Planning and organization of Science Clubs, Science fairs and Field trips

Unit –V Physics curriculum and Evaluation of Physics Learning

- Principles of developing curriculum of Physics,
- Evaluation of physics learning : formative, summative, continuous and comprehensive evaluation, types of test items and their construction, preparation of blue print and achievement test, item analysis,
- Diagnostic testing and remedial teaching in physics.. Evaluation of Practical Work

Sessional Work –

1. Class Test 10MARKS
2. Any one of the following: 10MARKS

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- Case study of any one Senior Secondary School Laboratory of Physics.
- Preparation of a diagnostic test of physics on any one unit.
- Planning activities for teaching a unit of physics using local resources.
- Conducting and reporting a practical class in Physics Laboratory

References :

1. Aicken, Frederick (1984). The Nature of Science, London: Heinemann Educational Books.
2. Anderson R.D. (1970). Developing Children's Thinking Through Science, New Delhi: Pr
3. Chauhan, S.S. (2000). Innovation in Teaching Learning Process New Delhi: Vikas Publishing House Pvt. Ltd.
4. Das, R. C. (1985). Science Teaching in Schools New Delhi: Sterling Publishers Pvt. Ltd.
5. Dave, R.H. Taxonomy of Educational Objectives and Achievement Testing, London: London University Press.
6. Edigar M. and Rao D.B. (1996). Science Curriculum, New Delhi: Discovery Publishing House.
7. Gronlund, Norman, E. (1968). Constructing Achievement Tests, New York: Prentice
8. Gupta, N.K. (1997). Research in Teaching of Science, New Delhi: APH Publishing Corporation.
9. Kochar, S.K. (1997). Methods and Techniques of Teaching, New Delhi: Sterling Publishers Pvt. Ltd.
9. Maitre, K. (1991). Teaching of Physics, New Delhi: Discovery Publishing House.
10. Mukalel, J.C. (1998). Creative Approaches to Classroom Teaching, New Delhi: Discovery Publishing House.
11. Prakash, R. and Rath, T.N. (1996). Emerging Trends in Teaching of Physics, New Delhi: Kanisha Publishers.
12. Radha Mohan (2003). Innovative Science Teaching for Physical Science Teachers, New Delhi: Prentice Hall Pvt. Ltd.

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PEDAGOGY OF SCHOOL SUBJECT

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PAPER:-VIII A / B
MATHEMATICS TEACHING

Marks – 100

Objectives:

On completion of the course the future teacher educators will be able:

1. To enable prospective mathematics teachers towards the processes in which mathematics learning takes place in children's mind.
2. To enable the nature, characteristics and structure of mathematics and its correlation with other areas.
3. To enable the processes in mathematics and their importance.
4. To enable the content categories in mathematics and illustrate with examples.
5. To enable understanding of the Goals, Aims and Objectives of teaching mathematics at secondary school level.
6. To enable awareness about the objectives of teaching mathematics at secondary school level as envisaged by NCF 2005 and KCF 2012.
7. To enable understanding and skill in preparing lesson episodes based on Five E model; different approaches, methods, models and techniques of teaching mathematics.
8. To enable understanding about collaborative learning and cooperative learning strategies.
9. To enable the prospective mathematics teachers as facilitators for effective learning of mathematics.
10. To enable prospective mathematics teachers with ICT enabled skills for facilitating learning of mathematics.
11. To enable skill in assessing mathematics learning.
12. To enable prospective mathematics teachers as reflective practitioners.

UNIT I Nature and Structure of Mathematics

- a) Meaning and characteristics of mathematics– Science and Mathematics – Development of Mathematics: empirical, intuitive and logical
- b) History of Mathematics education : Ancient period to 21st century
- c) Contributions of eminent Mathematicians(Western & Indian-4 each)

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- d) Branches of Mathematics: Arithmetic, Algebra, Geometry, Trigonometry -
- e) Undefined terms – Axioms – Postulates – Theorems – Proofs and verification in mathematics-Types of theorems: Existence and Uniqueness theorems – Types of proofs: Direct, indirect by contradiction, by exhaustion, by mathematical induction.
- f) Euclidean geometry and its criticisms – emergence of non Euclidean geometry.

UNIT– II Objectives and Approaches of Teaching Mathematics

- a) Aims and Objectives of Teaching Mathematics: At primary, Secondary and Higher secondary levels – Goals of mathematics education-Mathematical skills: Calculations, Geometrical, and interpreting graphs – Mathematical abilities- Problem solving ability.
- b) Approaches to teaching Mathematics: Behaviorist approach, constructivist approach,
- c) Process oriented approach, Competency based approach, Realistic mathematics education.

UNIT-III METHODS AND MODEL OF TEACHING MATHEMATICS:

- a) Methods of teaching mathematics: Lecture, Inductive, Deductive, Analytic, Synthetic, Heuristic, Project, Problem solving, and Laboratory methods, Co-operative, constructivism method.
- b) Techniques of Teaching Mathematics: Questioning, Brain storming, Role-playing, Simulation.
- c) Non- formal techniques of learning Mathematics
- d) Models of Teaching: Concept attainment model, inquiry training model, Inductive thinking model.

UNIT – IV Pedagogical content knowledge of mathematics

- a) Concept of pedagogic content knowledge (PCK)
- b) Pedagogic content knowledge analysis for selected units of 8th, 9th , 10th and 11th std:-Content analysis, Listing pre-requisites, instructional objectives and task analysis
- c) Analysing and selecting suitable teaching methods, strategies, techniques, models; learning activities, Year plan (Programme of work), Unit plan and lesson plan in mathematics – their need and importance
- d) Analysing and selecting suitable evaluation strategies
- e) Identifying the misconceptions and appropriate remedial strategies

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UNIT-V Technology in mathematics education

- a) Technology integration strategies for mathematics, web based lessons, web quest, cyber guides, multimedia presentation, Tele computing projects, online discussions
- b) E-content development concept, formats, steps for preparation.
- c) A survey of software used in mathematics teaching and learning.

SESSIONAL:

1. Class Tests 10 MARKS

2. Any one 10 MARKS

- b) Group puzzles activity
- c) Preparation of teaching aids
- d) Demonstration of teaching aids
- e) Collection of newspaper cuttings related to learning of a unit in mathematics.
- f) Preparing a script for radio lesson or T.V. lesson in mathematics.
- g) Visiting a mathematics lab in a school and presenting a report.

REFERENCES:-

1. Aggarwal, J.C. (2001). Principles, Methods & Techniques of Teaching (2nd Ed.). New Delhi: Vikas Publishing House Pvt. Ltd.
2. Bhasin, Sonia. (2005). Teaching of Mathematics- A Practical Approach. Mumbai: Himalaya Publishing House.
3. Butler H., Charles & Wren F., Lynwood. (1960). The Teaching of Secondary Mathematics. New York: The Maple Press Company.
4. Bhasin, Sonia. (2005). Teaching of Mathematics- A Practical Approach.
5. Mumbai: Himalaya Publishing House.
6. Ediger, M. & Rao, D.B. (2000). Teaching Mathematics Successfully. New Delhi: Discovery Publishing House.
7. James, Anice. (2006). Teaching of Mathematics. Hyderabad: Neelkamal Publications Pvt. Ltd.
8. Joyce, B. & Weil. M. & Calhoun, E. (2009). Models of Teaching (8th Ed.). New Delhi : PHI Learning Private Limited.
9. Kumar, S. & Ratnalikar, D.N. (2003). Teaching of Mathematics. New Delhi: Anmol Publications Pvt. Ltd.

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10. Mangal, S.K. (1981). A Text Book on Teaching of Mathematics. Ludhiana:Prakash Brothers Educational Publishers.
11. NCERT. (2005). National Curriculum Framework for School Education. New Delhi: NCERT.
13. Rai, B .C. (1991). Methods of Teaching Mathematics. Lucknow: Prakashana
14. Kendra.
15. Sidhu, Kulbir Singh. (1999 .), The Teaching of Mathematics. Jullundar: Sterling Publishers Pvt. Ltd

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PEDAGOGY OF SCHOOL SUBJECT

PAPER:-VIII A / B

General Science Teaching

MARKS:-100

OBJECTIVES:-

The Pupil- teacher will be able to-

1. Familiarize with nature of General Science.
2. Formulate instructional objectives in behavioral terms.
3. Critically evaluate the existing science curriculum at secondary level.
4. Understand the basic concepts of General Science.
5. Acquaint themselves with laboratory plan, purchase and maintenance of equipment and material.
6. Explain the concept of evaluation and construct blue print of question paper.

Unit - 1 Teaching of General Science

- Meaning, nature, aims and objectives of General science
- Importance of General science in Teaching
- Correlation - concept, importance and types.
- Maxims of teaching in General science

Unit - 2 Planning in General- Science teaching

- Curriculum - concept, methods of curriculum construction, Difference between Curriculum and Syllabus, ,

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- Place of General science in school curriculum
- Critical appraisal of General Science syllabus at secondary/senior secondary level
- Science teacher - Qualities, Competencies
- Analysis of textbook.

Unit - 3 Methods & Techniques of teaching in General Science

- Methods -Scientific Method, Demonstration, Laboratory, Heuristic, Project, Co-operative Learning, Constructivism, Inductive-deductive.
- Techniques:- Team teaching, Simulation, Task analysis, Cognitive psychology based technique, Technology based technique
- Year plan, Unit plan, Lesson plan - General, IT based,

Unit- 4 Teaching Aids and Models of teaching

- Teaching Aids :Non-projective - chart, picture, model, Projective - Film projector, OHP, LCD, DLP,
- Science laboratory, Science- club, Science Exhibition, Field trip
- Laboratory Equipment and Material- selection, purchase, maintenance and safety measures.
- Models of teaching:- Concept Attainment Model, Inquiry training model.

Unit - 5 Pedagogical analysis & Evaluation in General Science

- Concept ,Approaches & importance for pedagogical analysis,
- Core elements and values, Content cum methodology approach, IT based approach
- Importance of evaluation in General Science, Evaluation according to areas - Cognitive, Psychomotor & Affective, Domain
- Use of tools and technique of evaluation:-Achievement test, Diagnostic test, Remedial teaching, Online Evaluation

Sessional Work –

1. Class Test 10 marks
2. Any one of the following: 10 marks
 - Preparation of a diagnostic test of Gen. Science on any one unit.
 - Analysis of syllabus.
 - Evaluation of textbook.

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- Content analysis of one unit.
- Conduct presentation of lesson/ Unit.

REFERENCES:-

1. Cartin, A.A. and Sund, R.D. (1972). *Teaching Science through Discovery*. London: Merrill.
 2. Das, R.C. (1992). *Science Teaching in School*. New Delhi: Sterling Publishing.
 3. Gerg, K.K.; Singh, Raguvir and Kaur, Inderjeet (2007). *A Text book of Science of Class X*, New Delhi: NCERT.
 4. Hurd Dihurt, P. (1971). *New Directions in Teaching School Science*. Chicago: Rand McNally Co.
 5. Joshi, R.; Kulkarni, V.G. and Sinha, Somdatta (1999). *A Text book of Science of Class X*. New Delhi, NCERT.
 6. Kohli, V.K. (2006). *How to Teach Science*. Ambala: Vivek Pub. 2006.
 7. Mangal, S.K. (1997). *Teaching of Science*. New Delhi: Arya Book Depot, *New UNSECO Source Book for Science*. France: UNSECO.
- Sharma, R.C. (1998). *Modern Science Teaching*. New Delhi: Dhanpat Rai Pub. Co.

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