FACULTY OF EDUCATION

SYLLABUS

Integrated Programme of

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

Annual Scheme

Academic Session 2018-19
Examination B.Sc B.Ed Part - I (2019)
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 head quarter Jaipur only and not any other place.
SCHEME OF EXAMINATION

SYLLABUS

1. GENERAL ENGLISH (COMPULSORY PAPER)*

2. CHILDHOOD AND GROWING UP (COMPULSORY PAPER)

3. CONTEMPORARY INDIA AND EDUCATION (COMPULSORY PAPER)

4. INSTRUCTIONAL SYSTEM AND EDUCATIONAL EVALUATION (GROUP - A)

5. OPTIONAL PAPER PCM AND PCB GROUP (GROUP - B)
   
   I. CHEMISTRY
   II. BOTANY
   III. ZOOLOGY
   IV. PHYSICS
   V. MATHEMATICS
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.
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:**

<table>
<thead>
<tr>
<th>Year</th>
<th>Paper</th>
</tr>
</thead>
<tbody>
<tr>
<td>1\textsuperscript{st} Year</td>
<td>Gen. English</td>
</tr>
<tr>
<td>2\textsuperscript{nd} Year</td>
<td>Gen. Hindi</td>
</tr>
<tr>
<td>3\textsuperscript{rd} Year</td>
<td>Computer Application (ICT)</td>
</tr>
<tr>
<td>4\textsuperscript{th} Year</td>
<td>Environmental Education</td>
</tr>
</tbody>
</table>

*ELIGIBILITY CRITERION ON PASSING MARKS BUT MARKS SHALL NOT BE INCLUDED IN DIVISION.
### Group A: Subject Specialisation:

<table>
<thead>
<tr>
<th>Year</th>
<th>Paper</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st Year</td>
<td>Instructional System &amp; Educational</td>
</tr>
<tr>
<td>2nd Year</td>
<td>Peace Education</td>
</tr>
<tr>
<td>3rd Year</td>
<td>Guidance and Counselling in School</td>
</tr>
<tr>
<td>4th Year</td>
<td>Physical Education &amp; Yoga</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Subject</th>
<th>Papers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemistry</td>
<td>I, II &amp; III</td>
</tr>
<tr>
<td>Botany</td>
<td>I, II &amp; III</td>
</tr>
<tr>
<td>Zoology</td>
<td>I, II &amp; III</td>
</tr>
<tr>
<td>Physics</td>
<td>I, II &amp; III</td>
</tr>
<tr>
<td>Mathematics</td>
<td>I, II &amp; III</td>
</tr>
</tbody>
</table>

### Group C: Pedagogy of School Subject 08 A/B: 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 subjects the student has to study a minimum of 12 papers in 1st year. 12 Paper in II Ind 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. 1st Year**

<table>
<thead>
<tr>
<th>Theory Paper</th>
<th>Course Code</th>
<th>Title of the Paper</th>
<th>Evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>External</td>
</tr>
<tr>
<td>I</td>
<td>B.Sc.-B.Ed. 01</td>
<td>Gen. English (Compulsory)*</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>II</td>
<td>B.Sc.-B.Ed. 02</td>
<td>Childhood and Growing Up</td>
<td>80</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>III</td>
<td>B.Sc.-B.Ed. 03</td>
<td>Contemporary India and Education</td>
<td>80</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>VIII</td>
<td>B.Sc.-B.Ed. 04</td>
<td>Instructional System &amp; Educational Evaluation</td>
<td>80</td>
</tr>
<tr>
<td></td>
<td>(G-A)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>V</td>
<td>B.Sc.-B.Ed 05, 06 &amp; 07</td>
<td>Content (PCB &amp; PCM Group) (Select any Three)</td>
<td>33+33+34</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1. Chemistry(I,II,III)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. Botany (I,II,III)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>3. Zoology(I,II,III)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>4. Physics (I,II,III)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>5. Mathematics(I,II,III)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>40+40+40</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*ELIGIBILITY CRITERION ON PASSING MARKS BUT MARKS SHALL NOT BE INCLUDED IN DIVISION.*
# Four Years Integrated Course

## Scheme of B.Sc.-B.Ed. IIInd Year

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

*ELIGIBILITY CRITERION ON PASSING MARKS BUT MARKS SHALL NOT BE INCLUDED IN DIVISION.*
## Four Years Integrated Course
### Scheme of B.Sc.-B.Ed. IIIrd Year

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

Dy. Principal (Acad.)
Univ. of Jaipur, Rajasthan

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*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**

<table>
<thead>
<tr>
<th>Theory Paper</th>
<th>Course Code</th>
<th>Title of the Paper</th>
<th>Evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>B.Sc.-B.Ed. 01</td>
<td>Environmental Education(Compulsory)*</td>
<td>100</td>
</tr>
<tr>
<td>II</td>
<td>B.Sc.-B.Ed. 02</td>
<td>Creating and inclusive school</td>
<td>80 20 - 100</td>
</tr>
<tr>
<td>III</td>
<td>B.Sc.B.Ed. 03</td>
<td>Understanding Disciplines and Subject</td>
<td>80 20 - 100</td>
</tr>
<tr>
<td>IV</td>
<td>B.Sc.-B.Ed. 04(G-A)</td>
<td>Physical Education &amp; Yoga</td>
<td>80 20 - 100</td>
</tr>
<tr>
<td>V</td>
<td>B.Sc.-B.Ed. 05</td>
<td>Gender, School and Society</td>
<td>80 20 - 100</td>
</tr>
<tr>
<td>VI</td>
<td>B.Sc.-B.Ed. 06</td>
<td>Assessment for Learning</td>
<td>80 20 - 100</td>
</tr>
</tbody>
</table>
**Pedagogy of a School Subject (part-2)**

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

<table>
<thead>
<tr>
<th></th>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Final Lesson</th>
<th>100</th>
</tr>
</thead>
</table>

*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***

<table>
<thead>
<tr>
<th>Year</th>
<th>Paper</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ist Year</td>
<td>Gen. English</td>
</tr>
<tr>
<td>II Year</td>
<td>Gen. Hindi</td>
</tr>
<tr>
<td>III Year</td>
<td>Computer Application (ICT)</td>
</tr>
<tr>
<td>IV Year</td>
<td>Environmental Education</td>
</tr>
</tbody>
</table>

**Compulsory Paper**

<table>
<thead>
<tr>
<th>Year</th>
<th>Paper</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ith Year</td>
<td>1. Childhood and Growing Up</td>
</tr>
<tr>
<td></td>
<td>2. Contemporary India and</td>
</tr>
<tr>
<td>Education</td>
<td></td>
</tr>
<tr>
<td>-----------</td>
<td>---</td>
</tr>
</tbody>
</table>
| II\textsuperscript{nd} Year | 3. Knowledge and curriculum  
4. Learning and Teaching |
| III\textsuperscript{rd} Year | 5. Language Across the Curriculum |
| IV\textsuperscript{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:**

<table>
<thead>
<tr>
<th>Year</th>
<th>Paper</th>
</tr>
</thead>
<tbody>
<tr>
<td>I\textsuperscript{st} Year</td>
<td>Instructional System &amp; Educational</td>
</tr>
<tr>
<td>II\textsuperscript{nd} Year</td>
<td>Peace Education</td>
</tr>
<tr>
<td>III\textsuperscript{rd} Year</td>
<td>Guidance and Counselling in School</td>
</tr>
<tr>
<td>IV\textsuperscript{th} Year</td>
<td>Physical Education &amp; Yoga</td>
</tr>
</tbody>
</table>

**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

\[\text{Signature}\]  
\[\text{Dean (Acad.)}\]  
\[\text{University of Education}\]  
\[\text{Registrar}\]
In all the subjects the student has to study a minimum of 12 papers in Ist year, 12 Paper in IIInd 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:

<table>
<thead>
<tr>
<th>Years</th>
<th>Papers</th>
<th>Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>I Year</td>
<td>12Paper +Practical</td>
<td>600 +150= 750</td>
</tr>
<tr>
<td>II Year</td>
<td>12Paper +Practical +Practicum</td>
<td>600 +150+100= 850</td>
</tr>
<tr>
<td>III Year</td>
<td>12Paper +Practical + Practicum +Final Lesson</td>
<td>600 +150+ 100 +100 = 950</td>
</tr>
<tr>
<td>IV Year</td>
<td>7 Paper +Practical + Practicum +Final Lesson</td>
<td>600+ 100 +100= 800</td>
</tr>
<tr>
<td>Total</td>
<td>43Papers</td>
<td>2400 +550+200 +200= 3350</td>
</tr>
</tbody>
</table>

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.
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.

[Signature]

Dy. Prof. (Acad.)

[Signature]

Dy. Prof. (Reg.)

[Signature]

MUR
8. Practical work connected with school subjects.
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.
15. Techniques of teaching in large classes.

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

Notes :-

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

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

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

O.324 The examination for Integrated B.Sc.-B.Ed. for Four Year shall be in two parts- part 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 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.

2. 40 (20+20) lessons as desired in the syllabus should be completed as full period classroom 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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Dy. Registrar (Acad.)
University of Rajasthan
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).

(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:

<table>
<thead>
<tr>
<th>Division</th>
<th>Theory</th>
<th>Practice of Teaching</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>60%</td>
<td>60%</td>
</tr>
<tr>
<td>II</td>
<td>48%</td>
<td>48%</td>
</tr>
<tr>
<td>Pass</td>
<td>36%</td>
<td>40%</td>
</tr>
</tbody>
</table>

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.
Duration: 3 hrs.                                           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.
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 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)

IV. Translation of 05 Words from Hindi to English (12)
    from English to Hindi (12)

Unit B: Grammar and Usage (25 marks)
(10 periods)

I. Elements of a Sentence (05)

II. Transformation of Sentences (05)
   - Direct and Indirect Narration

20
Unit C: Comprehension (25 marks)


Candidates will be required to answer 5 questions out of ten questions from the prescribed texts. Each question will be of two (2) marks.

1. Sweta Bhatt
2. Ruskin Bond
3. M.K. Gandhi
4. J.L. Nehru
5. A.P.J. Abdul Kalam
6. Voice of the Unwanted Girl
7. Night Train for Deoli
8. The Birth of Khadi
9. A Tryst with Destiny
10. Vision for 2020

The candidates will be required to answer 5 questions from an unseen passage.

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

Unit D: Compositional Skills (30 marks)

(15 periods)

1. Letters—Formal and Informal (10)
2. CV’s Resume and Job Applications and Report (10)
3. Paragraph Writing (10)

Page 21
Singh, R.P. Professional Communication. OUP. 2004
Judith Leigh. CV's and Job Applications. OUP. 2004
Quirk and Greenbaum: A University Grammar of English Longman. 1973
Objective:

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;
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) Linguistic development
  e) Kohlberys’ gilligan’s moral development
  f) Bandura’s social developments
  g) 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
- Adolescence: meaning, concept, characteristics, effects of family, school, peer group, social climate and social media.
- Personality: concept and nature, theories of personality, assessment of personality
- Individual differences: concept, areas (With Special Educational needs-Concept) and educational implication.
- Stress: meaning, types and coping strategies with special reference to personality of adolescent.

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 and Field theory, Information processing theory, Social Constructive approach ,Types of learning by Gagne.
- Motivation:-Concept and Maslow’s Hierarchy need theory, Creating and maintaining a productive Classroom Environment:-Dealing with misbehavior - Multi-Culturalism,
Changing roles and responsibilities in contemporary Indian society with regarding educational psychology.

**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, Higher Level thinking skills - critical thinking, reasoning, problem solving, Decision making.

- Socialization and Mental health: 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

Comparative study of developing pattern's of children with reference to different in SES.
Collecting and analyzing statistics on the girl child with reference to gender ratio.
Administration of an experiment on learning, span of attention, memory Administration and interpretation of an individual group test of intelligence.

**References:**


3. Arora, Dr. Saroj, Bhargava, Rajshri (2014). Bal Manovigyan, Rakhi Prakashan, Agra


B.Sc.B.Ed - 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.
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: Educational aims as derived from the constitution of India influence of aims of education on the curriculum and transactional strategies. Idea of educational thinkers such as Gandhi, Tagore, Aurobindo, Dewey 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.


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

• 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, Eduset, Smart Class Room, Role of E-learning, E-content, E-magazines and E-journals, E-library.
• 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 :


7. अनिधिहोट्रि, रवीन्द्र: आधुनिक भारतीय शिक्षा समस्याएँ और समाधान, राजस्थान हिंदी ग्रंथ अकादमी।


10. J.F. Brown: Educational Sociology


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


16. Mookerji, R.S: Ancient Indian Education


26. अल्लेकर, अ.स.: प्राचीन भारतीय शिक्षा पवित्रि।

27. ओड, एल. के.: शिक्षा के नूतन आकांक्षा, राजस्थान हिंदी ग्रंथ अकादमी. जयपुर।
B.Sc.-B.Ed. 04
Instructional System and Educational Evaluation

MARKS-100

Objectives:

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
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 overcome 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:
  o 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:

1. Class Test 10 marks
2. Any one of the following: - 10 marks

- Develop a portfolio for assessment of 2 school students
- Prepare an advanced tool for evaluation.
- Develop a tool for self-assessment.
- Develop an achievement test and its blueprint.
References:
B.Sc.-B.Ed. Part I
CHEMISTRY

Scheme:
Max Marks: 150

<table>
<thead>
<tr>
<th>Duration (hrs.)</th>
<th>Max. Marks</th>
<th>Min. Pass Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paper I</td>
<td>3</td>
<td>33</td>
</tr>
<tr>
<td>Paper-II</td>
<td>3</td>
<td>33</td>
</tr>
<tr>
<td>Paper-III</td>
<td>3</td>
<td>34</td>
</tr>
<tr>
<td>Practical</td>
<td>5</td>
<td>50</td>
</tr>
</tbody>
</table>

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

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

Objectives: After completion of Inorganic Chemistry Course the student will have significant knowledge of the following:
- the basic concepts of Bonding and application of various theories.
- general properties of s- and p-block elements and effect of periodicity in properties.
- Chemistry of some Important Compounds of p-block Elements and Nobel gases.
- Fundamentals of Nuclear Chemistry and applications of Radiation Chemistry.

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, van der 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 $\text{NH}_3$, $\text{H}_2\text{O}^+$ $\text{SF}_4$, $\text{ClF}_3$, $\text{ICl}_2$, $\text{H}_2\text{O}$.
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 aroyls.
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, diborane and higher boranes, borazine, borohydrides, fullerenes, carbides, fluorocarbons, silicates (structural principle), tetrasulphur tetranitride, basic properties of halogens, interhalogens and polyhalides.

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.

Paper II: Organic Chemistry

(2 hrs or 3 periods / week)

Objectives: After completion of Organic Chemistry Course the student will have significant knowledge of the following –

- Primary knowledge of basic concepts of Organic reaction mechanism and application
- Isomerism and Stereochemistry, including various types of representation of organic molecules.
- Nomenclature, classification, methods of preparation, physical & chemical properties of alkanes, cycloalkanes, alkenes, cycloalkenes, dienes, arenes, alkyl & aroyl halides.
- Polyhalogen compounds
- Concept of aromaticity and aromatic electrophilic substitution

Unit-I


Unit-II


Optical Isomerism: Elements of symmetry, molecular chirality, enantiomers, stereogeniccentre, optical activity. Properties of enantiomers. chiral and achiral molecules with two stereogeniccentres. 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
Classification and Nomenclature of isolated, conjugated and cumulated dienes. Structure of alkenes and butadiene. Methods of formation, properties, Chemical reactions - 1,2- and 1,4-additions, Diels-Alder reaction and polymerization.

Unit-IV
Aromaticity: the Hückel rule, aromatic ions - three to eight membered.

Unit-V
Alkyl and Aryl Halides: Methods of formation of alkyl halides, chemical reactions. Mechanisms of nucleophilic substitution reactions of alkyl halides SN2 and SN1 reactions with energy profile diagrams.
Polyhaloarene 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.
Paper III: Physical Chemistry
(2 hrs. or 3 Periods/week)

Objectives: After completion of Organic Chemistry Course the student will have significant knowledge of the following –
- Basic Mathematical Concepts required for understanding the concepts of physical chemistry
- properties of matter in different physical states - liquid, gaseous, solid and colloidal states
- primary concepts of chemical kinetics and applications to reaction mechanism including radioactive decay as first order phenomenon.

UNIT-I
Mathematical Concepts: Logarithmic relations, curve sketching, linear graphs and calculations of slopes, differentiation of functions like $k_e$, $e^x$, $x^n$, $\sin x$ 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 cholesteric phases. Thermography and seven segment cell.

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.
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.
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 reaction- 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 bases on equilibrium constant and thermodynamic aspects.

Suggested Books:

B.Sc. Part-I
Chemistry Practical
(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
(i) 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.

(ii) Qualitative Analysis

Physical Chemistry
(One of the following experiments should be given in the examination)
Chemical Kinetics:
1. To determine the specific reaction rate of the hydrolysis of methyl acetate/ethyl acetate catalyzed by hydrogen ions at room temperature.
2. To study the effect of acid strength on the hydrolysis of an ester.
3. To compare the strengths of HCl and H₂SO₄ by studying the kinetics of hydrolysis of ethyl acetate.
4. To study kinetically the reaction rate of decomposition of iodide by H₂O₂.

Viscosity, Surface Tension:
1. To determine the viscosity/surface tension of a pure liquid (alcohol etc.) at room temperature. (Using the Ostwald viscometer/stalagmometer).
2. To determine the percentage composition of a given binary mixture by surface tension method (acetone & ethyl methyl ketone).
3. To determine the percentage composition of a given mixture (non-interacting systems) by viscosity method.
4. To determine the viscosity of amyl alcohol in water at different concentration and calculate the excess viscosity of these solutions.

(Instructions to the Examiners)

B.Sc. Part I
Chemistry Practical

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 12

Organic Chemistry
Ex.2 Laboratory Techniques 5
Ex. 3 Qualitative Analysis - Detection of element and detection of functional group 8

Physical Chemistry
Ex. 4 Perform one of the experiments mentioned in the syllabus. 12
Ex. 5 Viva-voce 8
Ex. 6 Record 5

50

Sessional Work (Max. Marks 25)

Any one of the following -

1. Life sketch, important achievements and contributions of a Eminent Indian Chemist.
2. Importance of Chemistry in Daily life
3. Demonstration of use of Models for concepts of stereochemistry
4. History and Applications of chemical fertilizers.
Theory Course
2. Concise Inorganic Chemistry, J.D. Lee, ELBS
3. Inorganic Chemistry, A.G. Sharpe, ELBS

(Laboratory Courses)
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

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 8 (Paper I and II) and 9 (Paper III) very short answer type Questions (not more than 20 words) of one marks covering entire syllabus.

3. Each paper is divided into four units. There will be one question from each unit and Q. No. 2 to 5 will have internal choice.
B.Sc.- B.Ed. (Botany)

Paper I

Cell Biology, Genetics and Plant Breeding

1. Students will understand the structure of cell organelles and nuclear material.
2. Students will apply their knowledge of cell biology in selected examples.
3. To understand the Mendelian and non-Mendelian modes of inheritance that govern passage of genetic traits across generation and categorise, predict genotype and phenotype.
4. To understand the basic structure of DNA and chromosomes.
5. To improve the characteristics of plants so that they become more desirable agronomically and economically.

Unit-I

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 and Chromosome organization: eukaryotic and prokaryotic. Chromosome morphology; specialized types of chromosomes (sex chromosomes, lampbrush chromosome, polytene chromosome); transposons.

Unit-II

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, 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-III

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


Unit-IV


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

Suggested Laboratory Exercises:

• Study of cell structure in Onion, Hydrilla and Spirogyra.
• Study of cyclosis in Tradescantia spp.
• Study of plastid for pigment distribution in Lycopersicom, 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 and tagging techniques
• Cross polination techniques
Suggested Readings:


Paper II

**Microbiology, Mycology and Plant Pathology**

1. To know the economic importance of fungi
2. To study the diseases or disorders caused by biotic and abiotic agents
3. To study the interaction between plant and pathogen in relation to the overall environment.

Paper II

**Microbiology, Mycology and Plant Pathology**

(2 hrs /week)

Unit-I

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, capsule, nutritional types, endospore, reproduction (binary fission, transformation, conjugation.
transduction), economic and biological importance.

Mycoplasma: occurrence, morphology, reproduction and importance.

Unit-II

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-III

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-IV

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 by Gram’s staining.
2. Study of Mycoplasma, TMV, Poxvirus, bacteriophage (photographs/ 3-D models)
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.
5. Media preparation: potato dextrose agar, Nutrient agar
6. Culture techniques of fungi and bacteria.
Suggested Books:


Paper III
Algae, Lichens and Bryophyta

1. To know the major classes of Algae, Lichens and Bryophyta.
2. To identify general characteristics of Algae, Lichens and Bryophyta.
3. To know the economic importance of Algae, lichens and Bryophyta.
Paper III
Algae, Liveries and Bryophyta
(2 hrs/week)

Unit-I

Unit-II
Type Studies
Cyanophyceae - Oscillatoria, Nostoc
Chlorophyceae - Volvox, Chara
Xanthophyceae - Vaucheria
Phaeophyceae - Ectocarpus
Rhodophyceae - Polysiphonia

Unit-III
General characters, Origin, and evolution of Bryophytes, Classification (Eichler), Habitat, Range of thallus structure, Reproduction (Vegetative and Sexual); Alternation of generations; Economic importance.
Type Studies: Hepaticopsida - Riccia, Marchantia

Unit-IV
Type Studies: Anthoecopoids - 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.
Suggested Readings

# BOTANY PRACTICAL EXAMINATION

## SKELETON PAPER

**M.M. 50**

**TIME: 4 Hours**

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Practical</th>
<th>Regular</th>
<th>Ex NC</th>
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</thead>
<tbody>
<tr>
<td>1(a)</td>
<td>Prepare the acetocarmine stained slide of the material &quot;A&quot; provided to you. Draw a well labeled diagram of any one stage of nuclear division. Identify it giving reasons.</td>
<td>4</td>
<td>4</td>
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<td>1(b)</td>
<td>Comment and solve the problem on Genetics allotted to you along with reasons.</td>
<td>4</td>
<td>4</td>
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<tr>
<td>2</td>
<td>Make suitably stained glycerine-preparation of any one alga from the given mixture &quot;B&quot;. Draw its labelled diagrams; assign it to its systematic position giving reasons.</td>
<td>4</td>
<td>4</td>
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<tr>
<td>3</td>
<td>Make suitable preparation of the reproductive structure of material &quot;C&quot; (Fungi). Draw labelled diagrams. Identify giving reasons.</td>
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<tr>
<td>4</td>
<td>Make suitable stained preparation of material &quot;D&quot; (Bryophyta (vegetative/reproductive). Draw labelled diagrams. Identify giving reasons.</td>
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<td>5</td>
<td>One Microbiology experiment for comments. Or Gram's staining.</td>
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<td>6</td>
<td>Comment upon spots (1-4)</td>
<td>8</td>
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<td>7</td>
<td>Viva-Voce</td>
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<td>Practical Record</td>
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<td><strong>TOTAL</strong></td>
<td><strong>40</strong></td>
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### Sessional Work (Botany)

10 Marks (3+4+3)

1. Prepare temporary semi-permanent slides of algae, fungi and bryophyte. (2 each) 3
2. Prepare an Article, Poster on any topic of biology. 4
3. Preservation of three diseased plants to prepare specimens. 3
University of Rajasthan
Syllabus: B.Sc. - B.Ed Part-I

Zoology
(2018-19)

Scheme:
Max. Marks: 100
Min. Pass Marks: 56

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:

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 6 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.

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

PAPER-1: 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.
4. Detailed classification of Non-chordata and Chordata (up to suborders with examples).
Section - B


Note: * indicates wherever required

2. Porifera: Sycon and Leucosolenia.

Section - C


Note: * indicates wherever required

1. Ctenophora: Beroe
3. Aschelminthes: Ascaris, Dracunculus and Wuchereria.

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.
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

Nuclear Organization:

- Structure and function of nuclear envelope, nuclear matrix and nucleolus.
- Chromosomes: Morphology, chromozone, chromomeres, telomeres, primary and secondary constrictions, chromatids, prokaryotic chromosome.
- Giant chromosome types: Polytene and Lampbrush.
- Chromosomal organization: Euclromatin, heterochromatin and folded fiber model and nucleosome concept.

Nucleic Acids:

- DNA structure, polymorphism (A, B and Z types) and replication (semi conservative mechanism), experiments of Messelson and Stahl; elementary idea about polymerases, RNA polymerases, single strand binding proteins, replicating forks (both unidirectional and bidirectional), leading and lagging strands, RNA primers and Okazaki fragments, elementary idea about DNA repair.
- RNA structure and types (mRNA, rRNA and tRNA) and transcription.

Genetic code and translation: Triplet code, characteristics of triplet code, protein synthesis and translation.

Cell in reproduction:

- Interphase nucleus and cell cycle: S, G-1, G-2 and M phase.
- Mitosis: Different stages, structure and function of spindle apparatus, anaphase movement.
- Meiosis: Different stages, synaptonemal complex, formation of chiasmata and significance of crossing over.

Section – C

Genetics

Mendelism: Brief history of genetics and Mendel's work; Mendelian laws, their significance and current status, chromosomal theory of inheritance.

Chromosomal mutations: Classification, translocation, inversion, deletion and duplication; variations in chromosome numbers: haploid, diploid, polyploid, aneuploid, euploid and polydiploid.

Linkage and crossing over; elementary idea of chromosome mapping.

Genetic interaction: Supplementary genes, complementary genes, duplicate genes, epistasis, inhibitory and polymorphic genes.

Multiple gene inheritance: ABO blood groups and Rh factor and their significance.

Cytoplasmic inheritance.

Sex determination in Drosophila and man, pedigree analysis.

Genetic disorders: Down's, Turner's and Klinefelter's syndromes, color blindness, Hemophilia, Phenylketonuria.

Concept of gene: Recon, muton and cistron.
Developmental Biology: Scope and Early Events

1. Historical review, types and scope of embryology.
2. Gametogenesis:
   1. Formation of ova and sperm.
   2. 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:
   1. Extra embryonic membranes in chick, their development and functions.
   2. Placenta in Mammals: Definition, types, classification on the basis of morphology and histology, functions of placenta.
   3. Paedogenesis and neoteny.

Section - C

Dimensions in Developmental Biology

1. Regeneration.
2. Various types of stem cells and their applications.
3. Cloning of animals:
   1. Nuclear transfer technique.
   2. Embryo transfer technique.
4. Teratogenesis (Genetic and Induced).
5. Biology of aging.
Min. Marks: 18

I. Microscopic Techniques:


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.
   (iii) Common reagents: Normal saline, Acid water, Acid alcohol and Mayer's albumin.

II. Study of Microscopic Slides and Museum Specimens:


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

Ccelenterata: Millepora, Physalia, Vellella, 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: Nerites, Heteroneries, Arenicola, Aphrodite, Chaetopterus, Tubaria, 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, Spongion fibres, Gemmule, Hydra, Obelia colony and Medusa, Parapodium of Nereis and Heteronereis; Earthworm-ovary, testes, septal nephridia and seminal ring; Leech-ovary, testes sac and salivary glands.

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 slice of meiosis (all stages).

3. Study of giant chromosomes in salivary glands of Chironomous or Drosophila larva.

4. Study of cell permeability using mammalian RBC's.

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)

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 em
University of Rajasthan
B.Sc. Part - I

Scheme of Practical Examination and Distribution of Marks

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

<table>
<thead>
<tr>
<th></th>
<th>Regular</th>
<th>Ex./N.C. Students</th>
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<tbody>
<tr>
<td>1. Anatomy (any system)</td>
<td>6</td>
<td>5</td>
</tr>
<tr>
<td>2. Permanent Preparation</td>
<td>4</td>
<td>7</td>
</tr>
<tr>
<td>3. Cell Biology and Genetics</td>
<td>4+4</td>
<td>6+6</td>
</tr>
<tr>
<td>4. Developmental Biology</td>
<td>6</td>
<td>5</td>
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<tr>
<td>5. Identification and comments on Spots (1 to 8)</td>
<td>16</td>
<td>16</td>
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<td>6. Viva Voce</td>
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<td>7. Class Record</td>
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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.
University of Rajasthan, Jaipur
B.Sc. B.Ed. (Physics Syllabus)
2018-21
B.Sc. B.Ed. Part I

1. PHYSICS

<table>
<thead>
<tr>
<th>Scheme</th>
<th>Max. Marks: 100</th>
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<tr>
<td>Min. Pass Marks: 36</td>
<td></td>
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<tr>
<td>Paper I</td>
<td>3 hrs. duration</td>
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<tr>
<td>Paper II</td>
<td>3 hrs. duration</td>
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<tr>
<td>Paper III</td>
<td>3 hrs. duration</td>
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<tr>
<td>Practical</td>
<td>5 hrs. duration</td>
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</tbody>
</table>

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 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 – I:

Physical Law and frame of Reference
- inertial and non-inertial frames. Transformation of displacement, velocity, acceleration between different frames of reference involving translation. Rotation 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
Unit - III:
Motion under Central Forces
- Introduction about Central Forces. Motion under central forces. Gravitational interaction.

Damped Harmonic Oscillations

Unit - IV:
Driven Harmonic Oscillations

Coupled Oscillations

Textbooks:
- Mechanics, S. H. Charles Kittel
- Introduction to classical mechanics. TMH
- The Physics of Waves & Oscillations, Bajaj
- H. Goldstein, Classical 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
Unit I: Scalar and Vector Fields

- Field, Scalar and Vector Fields, Gradient of scalar field, Physical significance of Gradient, Divergence and Curl of a vector field, Cartesian co-ordinates, 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.

Unit II: Field of stationary and moving charges

- 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 and Laplace equations in Cartesian co-ordinates and their applications to solve the problems of electrostatics.
- Gauss's law, charge, Gaussian and SI units and their inter conversions.
- Electric field measured in moving frames, Electric field of a point charge moving with constant velocity.

Unit III: Electric field in matter

- Molecular expansion, definition of moments of charge distribution, Dielectrics, induced dipole moments, polar non polar molecules, free and bound charges, Polarization, Volume 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 (i) outside the sphere (ii) inside the sphere. Electric field due to a charge placed in dielectric medium and Gauss law, Gauss-Mohr's relationship in dielectrics.

Unit IV: Maxwell's Equations and Electromagnetic Waves


References:
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:

Unit - 2 Diffraction:

Unit - 3 Polarization:
- Polarization. Plane polarized light (i) Circularly polarized light and (ii) Elliptically polarized light. Production of Plane polarized light (i) by reflection (ii) by refraction
Unit 4: Quantum Optics & Photonics

Laser: No make up and stimulated emission, Einstein’s A & B coefficients, Energy levels, radiation as a result of stimulated emission and absorption, population inversion. Methods of optical pumping, energy level schemes. He-Ne, Ruby, dye lasers.

Holography: Basic concepts of holography, principle of holography, Theory, construction and reconstruction of image. Application of holography.


References:
1. Prasad, B. Lal & Subramaniam, S. Chand.
5. Introduction to Modern Optics by G. R. Fowels.

[Signature]

Dy. Eng. (Admin.)
University of Rajasthan
JAIPUR
SYLLABUS

SCHEME OF EXAMINATION AND COURSE OF STUDY

B.Sc. B. Ed. MATHEMATICS
(ANNUAL SCHEME)

EXAMINATION 2019 ONWARDS
### MATHEMATICS

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

**Examination:**

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<td>Science</td>
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<table>
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<tr>
<th>Paper - I</th>
<th>Discrete Mathematics</th>
<th>Duration</th>
<th>Max. Marks</th>
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<th>Calculus</th>
<th>Duration</th>
<th>Max. Marks</th>
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<td>3 hrs.</td>
<td>40 (Science)</td>
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<th>Paper - III</th>
<th>Analytic Geometry and Optimization Theory</th>
<th>Duration</th>
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<td>3 hrs.</td>
<td>40 (Science)</td>
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<th>Practical</th>
<th>Optimization Techniques</th>
<th>Duration</th>
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<td>30 (Science)</td>
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**Note:**

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

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

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

4. Each candidate has to pass in Theory and Practical examinations separately.
Paper - I: Discrete Mathematics
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.


Reference Books:

2. N. Deo, Graph Theory with Applications to Computer Science, Prentice-Hall of India.
Paper- II: Calculus
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: 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 \( \sin x, \cos x, e^x, \log(1+x), (1+x)^a \).


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

Reference Books:

Paper-III: Analytic Geometry and Optimization Theory
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: 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.


Reference Books:

2. R.J.T. Bell, Elementary Treatise on Co-ordinate geometry of three dimensions, Macmillan India Ltd., 1944.
Practical: Optimization Techniques
Teaching: 2 Hours per Week

Examination:

<table>
<thead>
<tr>
<th>Scheme</th>
<th>Science</th>
<th>Arts</th>
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<tbody>
<tr>
<td>Max Marks</td>
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<td>Min Pass Marks</td>
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<td>Two Practicals one from each group</td>
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<td>30 Marks</td>
<td>40</td>
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</tbody>
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Duration: 2 Hours

Group A: Modelling of industrial and engineering problems into LPP and its dual and their solution by Simplex Method.

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

Note:

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