FACULTY OF EDUCATION

SYLLABUS

Integrated Programme of
B.Sc.B.Ed. Degree (Four Year)
Annual Scheme

Academic Session 2019-20

Examination B.Sc B.Ed Part - III (2020)

Dy. Registrar(Academic-I)
University of Rajasthan
Jaipur
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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University of Rajasthan
Jaipur
B.Sc. B.Ed PART - III

CONTENTS

SCHEME OF EXAMINATION

SYLLABUS

1. COMPUTER APPLICATION (C+)
2. LANGUAGE ACROSS THE CURRICULUM
3. GUIDANCE AND COUNSELING IN SCHOOL
4. CONTENT (SELECT ANY THREE) - 05, 06 & 07
5. PEDAGOGY OF A SCHOOL SUBJECT (PART - 3) 1st AND 2nd YEAR
6. (CANDIDATE SHALL BE REQUIRED TO OFFER ANY TWO PAPERS FROM THE FOLLOWING FOR PART - 3 AND OTHER FOR PART - 4) - 08

- CHEMISTRY
- BOTANY
- ZOOLOGY
- PHYSICS
- MATHEMATICS
- GENERAL SCIENCE
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.

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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 pupils.

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>1st</td>
<td>Gen. English</td>
</tr>
<tr>
<td>2nd</td>
<td>Gen. Hindi</td>
</tr>
<tr>
<td>3rd</td>
<td>Computer Application (ICT)</td>
</tr>
<tr>
<td>4th</td>
<td>Environmental Education</td>
</tr>
</tbody>
</table>

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

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Jaipur
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>Chemistry</th>
<th>I, II &amp; III</th>
</tr>
</thead>
<tbody>
<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 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 1st year, 12 paper in 2nd year, 12 paper in 3rd year, and 7 paper in 4th 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:

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### 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>I</td>
<td>B.Sc. B.Ed. 01</td>
<td>Gen. English (Compulsory)*</td>
<td>100 Internal Practical Total</td>
</tr>
<tr>
<td>II</td>
<td>B.Sc.B.Ed. 02</td>
<td>Childhood and Growing Up</td>
<td>80 20 - 100</td>
</tr>
<tr>
<td>III</td>
<td>B.Sc.B.Ed. 03</td>
<td>Contemporary India and Education</td>
<td>80 20 - 100</td>
</tr>
<tr>
<td>VIII</td>
<td>B.Sc.B.Ed. 04 (G-A)</td>
<td>Instructional System &amp; Educational Evaluation</td>
<td>80 20 - 100</td>
</tr>
<tr>
<td>V VI &amp; VII</td>
<td>B.Sc.B.Ed. 05, 06 &amp; 07 (G-B)</td>
<td>Content (Select any Three)</td>
<td>33+33+34 50 150 33+33+34 50 150 33+33+34 50 150 33+33+34 50 150 40+40+40 30 150</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. IInd 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>Gen. Hindi (Compulsory)*</td>
<td>100 Internal Practical Total</td>
</tr>
<tr>
<td>II</td>
<td>B.Sc.B.Ed. 02</td>
<td>Knowledge and curriculum</td>
<td>80 20 - 100</td>
</tr>
<tr>
<td>III</td>
<td>B.Sc.B.Ed. 03</td>
<td>Learning and Teaching</td>
<td>80 20 - 100</td>
</tr>
<tr>
<td>IV</td>
<td>B.Sc.B.Ed 04 (G-A)</td>
<td>Peace Education</td>
<td>80 20 - 100</td>
</tr>
<tr>
<td>V VI &amp; VII</td>
<td>B.Sc.B.Ed 05, 06 &amp; 07 (G-B)</td>
<td>Content (Select any Three)</td>
<td>33+33+34 50 150 33+33+34 50 150 33+33+34 50 150 33+33+34 50 150 40+40+40 30 150</td>
</tr>
</tbody>
</table>

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### 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)

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</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>I</td>
<td>B.Sc. B.Ed. 01</td>
<td>Computer Application (Compulsory)*</td>
<td>60</td>
</tr>
<tr>
<td>II</td>
<td>B.Sc.B.Ed. 02</td>
<td>Language Across the Curriculum</td>
<td>80</td>
</tr>
<tr>
<td>IV</td>
<td>B.Sc.B.Ed-04 (G-A)</td>
<td>Guidance and Counseling in School</td>
<td>80</td>
</tr>
<tr>
<td>V</td>
<td>B.Sc.B.Ed. 05, 06</td>
<td>Content (Select any Three)</td>
<td>33+33+34</td>
</tr>
<tr>
<td>VIII</td>
<td>08 (a,b)</td>
<td>Pedagogy of a School Subject (part-3), 1st &amp; IInd Year (candidate shall be required to offer any two papers from the following for part-3 &amp; other for part-4), 1. Chemistry 2. Biology 3. Physics 4. Mathematics 5. General Science</td>
<td>80</td>
</tr>
</tbody>
</table>

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Practicum | Special Training Programme | 10 | 100 | 50 | 05 | 05 | 20 | 10 |
<table>
<thead>
<tr>
<th></th>
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<th></th>
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<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Final Lesson</td>
<td>100</td>
<td>100</td>
<td></td>
<td></td>
<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. 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</td>
</tr>
<tr>
<td>III</td>
<td>B.Sc.B.Ed. 03</td>
<td>Understanding Disciplines and Subject</td>
<td>80</td>
</tr>
<tr>
<td>IV</td>
<td>B.Sc.B.Ed. 04(G-A)</td>
<td>Physical Education &amp; Yoga</td>
<td>80</td>
</tr>
<tr>
<td>V</td>
<td>B.Sc.B.Ed. 05</td>
<td>Gender, School and Society</td>
<td>80</td>
</tr>
<tr>
<td>VI</td>
<td>B.Sc.B.Ed. 06</td>
<td>Assessment for Learning</td>
<td>80</td>
</tr>
<tr>
<td>VIII</td>
<td>B.Sc.B.Ed. 08(a,b)</td>
<td>Pedagogy of a School Subject (part-4), 1st &amp; 2nd Year (candidate shall be required to offer any two papers from the following for part-3 &amp; other for part-4). 1. Chemistry 2. Biology 3. Physics 4. Mathematics 5. General Science</td>
<td>80</td>
</tr>
</tbody>
</table>

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9.
Practicum

<table>
<thead>
<tr>
<th>Practicum</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Practice teaching</td>
<td>50</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Block Teaching (Participation in School Activities Social Participation in Group)</td>
<td>20</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Report of any feature of school / case study/action research</td>
<td>10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Criticism Lesson</td>
<td>20</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Final Lesson</td>
<td>100</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.

**Compulsory Papers**

<table>
<thead>
<tr>
<th>Year</th>
<th>Paper</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st Year</td>
<td>Gen. English</td>
</tr>
<tr>
<td>2nd Year</td>
<td>Gen. Hindi</td>
</tr>
<tr>
<td>3rd Year</td>
<td>Computer Application</td>
</tr>
<tr>
<td>4th 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>1st Year</td>
<td>1. Childhood and Growing Up</td>
</tr>
<tr>
<td></td>
<td>2. Contemporary India and Education</td>
</tr>
<tr>
<td>2nd Year</td>
<td>3. Knowledge and curriculum</td>
</tr>
<tr>
<td></td>
<td>4. Learning and Teaching</td>
</tr>
<tr>
<td>3rd Year</td>
<td>5. Language Across the Curriculum</td>
</tr>
<tr>
<td>4th Year</td>
<td>6. Creating an inclusive school</td>
</tr>
<tr>
<td></td>
<td>7. Understanding Disciplines and Subject</td>
</tr>
<tr>
<td></td>
<td>8. Gender, School and Society</td>
</tr>
<tr>
<td></td>
<td>9. Assessment for Learning</td>
</tr>
</tbody>
</table>

**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>
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<tr>
<td>2nd Year</td>
<td>Peace Education</td>
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<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>

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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 1st 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:-

<table>
<thead>
<tr>
<th>Years</th>
<th>Papers</th>
<th>Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>I Year</td>
<td>12 Paper + Practical</td>
<td>600 + 150 = 750</td>
</tr>
<tr>
<td>II Year</td>
<td>12 Paper + Practical + Practicum</td>
<td>600 + 150 + 100 = 850</td>
</tr>
<tr>
<td>III Year</td>
<td>12 Paper + 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>43 Papers</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:

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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.

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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 of follow 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.
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.

iii. To maintain same sequence of papers (G.A. - IVth, G.B. 05/06/07 papers (1st, IIInd & IIIrd year) and 8 a/b IIIrd year and IVth year) in the four years B.Sc.B.Ed integrated course, paper no IIIrd in B.Sc.B.Ed IIIrd year and paper no VIIIth 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 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.

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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 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.

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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.

(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

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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.
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 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 supercomputer. 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.
Unit - IV


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

Unit - V


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
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 classroom.
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.

Understand language and speech disorder and make remedial measure too.

Unit 1

Nature, 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, grammar, relation, differences

Unit 3

Skill aptitude in language, theoretical speech of oral aptitude, development of oral expression, speech in pupil teacher, classroom discourse, discussion as a tool of learning, reading in the class room, developing reading skill through text book, problems and outlines on correct 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

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• Conduct a survey in secondary school to study academic achievement in overall or in specific subject of diverse linguistic students.

References:

B.Sc.B.Ed—04 (G-A) PART-III
GUIDANCE AND COUNSELING

OBJECTIVES: —

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.

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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.
- 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:

9. NCERT, Guidance and Counselling in Indian Education, New Delhi: NCERT, 1978
B.Sc.B.Ed 05, 06 & 07
(G-B)
CONSULT TO THE SUBJECT EXPERTS AS PER SUBJECT BY DIFFERENT BOS

क्रमांक : एफ 12(5)/शैक्षणिक – प्रथम/2019/2061
dिनांक 02 फरवरी 2019 के अनुसार
विशेष नोट – राजस्थान विश्वविद्यालय बी.एससी. त्रिवर्णीय डिग्री कोर्स के तृतीय वर्ष के अन्तर्गत चल रहे हैं विषयों के पाठ्यक्रम के अनुसार ही बी.एससी.बी.एड. तृतीय वर्ष (G.B. Subject) के पेपर 05, 06, 07 का पाठ्यक्रम यथावत् माना जाये।

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Pj/\text{Signature}
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

- 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.

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

UNIT-IV Instructional Support System

- Role of State & National Level Institutions & Laboratories like DST, NCL, Fertilizer, Pesticide & Chemical Companies like Hindustan Zine 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.
   • 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:


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11. Pal, H.R.: Methodologies of Teaching & Training in Higher Education. Delhi:

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
- Inquiry approach, programmed instruction, Group discussion, self study, Team teaching, computer assisted learning, seminars and workshops.

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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.

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.

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REFERENCES:-

PEDAGOGY OF SCHOOL SUBJECT

PAPER:-VIII A / B

Physics Teaching

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.

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(c) Inculcation of scientific attitude and science related values. (d) Plan, manage physics laboratory and organize physics practical work.


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
- 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.

Unit - III - Approaches and Methods of Teaching Physics
- Concept approach – Process approach – teaching science as a process.

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• 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
2. Any one of the following:

• 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

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References:


PEDAGOGY OF SCHOOL SUBJECT
PAPER:--VIII A / B
MATHEMATICS TEACHING

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

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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.

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.

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

REFERENCES:


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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.

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• 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
• 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

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CHEMISTRY

Scheme

Max Marks: 150

<table>
<thead>
<tr>
<th>Paper</th>
<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>
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<tr>
<td>Paper-II</td>
<td>3</td>
<td>33</td>
<td>36</td>
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<tr>
<td>Paper-III</td>
<td>3</td>
<td>34</td>
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</tr>
<tr>
<td>Practical</td>
<td>5</td>
<td>50</td>
<td>18</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.

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 $\mu_0$ and $\mu_{B0}$ values, orbital contribution to magnetic moments, application of magnetic moment data for 3d metal complexes.

Unit-III

Electronic 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 [Fe(H$_2$O)$_6$]$^{3+}$ 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,
properties, bonding and applications of alkyls and aryls of Li, Al, Hg, Sn and Ti, a brief account of metal-ethylene complexes and homogeneous hydrogenation, mononuclear carboxyls and the nature of bonding in metal carboxyls.

Unit-V

Bioinorganic Chemistry:

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, Ketonolactonization in ethyl acetoacetate. Synthetic applications of ethyl acetoacetate and malonic ester.

Unit-II

Heterocyclic Compounds


Unit-III

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


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 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
Schrödinger 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-H₂ 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, sp², sp³, calculation of coefficients of A.O.'s used in these hybrid orbitals. Introduction to valence bond model of H₂, comparison of M.O. and V.B. models.

UNIT-III

Spectroscopy
Introduction: Electromagnetic radiation, spectrum, basic features of different spectrometers, statement of the Born-Openheimer approximation, degrees of freedom.
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.
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 exited 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-Mossotti 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.
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:
   a) Potassium trioxalatoferrate (III), K₃[Fe(C₂O₄)₃]
   b) Bis(diethylglyoximato) nickel (II) complex, [Ni(DMG)₂]
   c) Copper (II) sulphate, Cu(NH₃)₄SO₄
   d) Edisquabis(oxalato)chromate (III) dihydrate, K[cis-C₅(H₂O)₂(C₂O₄)₂].2H₂O

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 chlophyll pigments from spinach leaves
   Resolution of racemic mixture of (+) mendeilic acid

Qualitative Analysis
   Analysis of an organic mixture containing two solid components using water, NaHCO₃, for separation and preparation of suitable derivatives.

Synthesis of Organic Compounds
   (a) Acetylation of salicylic acid, aniline, glucose and hydroquinone.
Aliphatic electrophilic substitution
Preparation of iodoform from ethanol and acetone

Aromatic electrophilic substitution
Nitration
Preparation of m-dinitrobenzene
Preparation of p-nitroacetanilide
Halogenation
Preparation of p-bromoacetanilide
Preparation of 2, 4, 6-tribromophenol

Diazotization / coupling
Preparation of methyl orange and methyl red

Oxidation
Preparation of benzoic acid from toluene

Reduction
Preparation of aniline from nitrobenzene
Preparation of m-nitroaniline from m-dinitrobenzene.

Stereochemistry
Study of Organic Compounds via Models

E, Z configuration of optical isomers.

Conformational analysis of cyclohexanes and substituted cyclohexanes.

PHYSICAL CHEMISTRY

Electrochemistry
(a) To determine the strength of the given acid conductometrically using standard alkali solution.
(b) To determine the solubility and solubility product of a sparingly soluble electrolyte conductometrically.
(c) To study the saponification of ethyl acetate conductometrically.
(d) To determine the ionization constant of a weak acid conductometrically.
(e) To titrate potentiometrically the given ferrous ammonium sulphate solution using KMnO₄/K₂Cr₂O₇ as titrant and calculate the redox potential of Fe⁷⁺/Fe²⁺ system on the hydrogen scale.

Refractometry, Polarimetry
(a) To verify the law of refraction of mixture (e.g. of glycerol and water) using Abbe’s refractometer.
(b) To determine the specific rotation of a given optically active compound.

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

Colorimetry
(a) To verify Beer-Lambert law KMnO₄/K₂Cr₂O₇ and determined the concentration of the given solution of the substance.
(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.

(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

56

Books Suggested (Theory Course)

2. Concise Inorganic Chemistry, J.D. Lee, ELBS.
6. Inorganic Chemistry, A.G. Sharpe, ELBS.

Books Suggested (Laboratory Courses)
1. Vogel's Qualitative inorganic Analysis, revised, Svehla, Orient Longman.

Dy. Registrar (Academic)
University of Rajasthan
Jaipur
Scheme
Min. Pass Marks: 36

Paper I
Paper II
Paper III

Practical Min. Marks: 18

Duration of examination of each theory paper:
3 hrs duration
3 hrs duration
3 hrs duration

Duration of examination of practicals:
4 hrs, duration

Max Marks: 100
Max Marks: 33
Max Marks: 33
Max Marks: 34
Max Marks: 50
3 hours
4 hours

Note:

1. There will be 5 questions in each paper. All questions are compulsory. Candidate has to answer all questions in the main answer book only.

2. Q.No. 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.
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; meristems, 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; period. Anomalous secondary growth.

Unit-3
The Leaf: origin, development, arrangement and diversity in size and shape; Stomata-Structure and types, stomatal index, vascularization 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:
Fahn, A. 1985 Plant Anatomy Pergamon Press, Oxford
Munson, J.D. 1988 Plant Anatomy The Benjamin-Cummings Publishing Co. Inc Menlo Park, California, USA
Thomson, R. 2000 Trees: Their National History Cambridge University Press Cambridge
Suggested Laboratory Exercises:

1. Study of any 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 primordial.
4. Monopodial and sympodial types of branching in monocots & dicots.
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. Specialization and modifications of plant parts for vegetative reproduction.

Dy. Registrar
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University of Rajasthan
TAIPUR
Paper-II
Ecology & Economic Botany
(2 hrs week)

Unit-1


Unit-2


Unit-3


Unit-4

Species (General account with an emphasis on those cultivated in Rajasthan). Medicinal plants. General account with an emphasis on species cultivated in Rajasthan.

By Registrar (Acad.)
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.
10. Find out pH of water samples by pH meter.
11. Find out transparency of a waterbody by Secchidisk.
12. Study morphology (external and internal) of hydrophytes (Hydrilla stem, Typha leaf and NymphaeacEichhornia petiolaris) and xerophytes (Calotropis, Capparis and Cassatina stem, Nerium leaves) with special reference to their adaptations.
13. Study following specimen with special reference to:
   1. Botany of the economically important part
   2. Processing it any involved
   3. Specimen of cereals, pulses, spices, beverages (tea & coffee) beans, sugar, oil seeds (mustard, groundnut)
14. Study the effect of grain in potato and pea. Histochemical test: Cellulose, lignin, starch, fat, protein and tannin.
15. Submit specimens of locally important medicinal plants.

Dy. Registrar
(Academic)
University of Rajasthan
Paper-III
Angiosperm Taxonomy and Embryology
(2 hrs/week)

Unit-1


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, Icacinaceae, Liliaceae, Areaceae and Poaceae.

Unit-3

Oogamy of the flower parts-development and variations. Structure of anther, microsporogenesis. Tapetum types and its stages development of male gametophyte, structure of pollen grains.


...


Dy. Registrar
(Academic)

University
<table>
<thead>
<tr>
<th>S.No.</th>
<th>Practical</th>
<th>Regular</th>
<th>Ex/NC</th>
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</thead>
</table>
| 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 | 7 |
| 2     | (i) Anatomical exercise on anomalous secondary growth  
      | (ii) Anatomy of root/leaf/study of stomatal types | 3 | 3 |
| 3     | (i) Ecological exercise based on quadrat method/Exercise related to soil  
      | (b) Ecological Anatomy  
      | (c) Histochemical Test / Economic Botany | 3 | 3 |
| 4     | Comment upon spots (1-5). | 5 | 5 |
| 5     | Viva-Voce | 5 | 5 |
| 6     | Practical record | 5 | - |
|       | **TOTAL** | **50** | **50** |
### Syllabus: B.Sc.-B.Ed. Part-III (Pass Course)

**Zoology**

(2019-2020)

<table>
<thead>
<tr>
<th>Scheme</th>
<th>Max. Marks: 100</th>
<th>Min. Pass Marks: 36</th>
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<tbody>
<tr>
<td>Paper I</td>
<td>3 Hrs duration</td>
<td>33 Marks</td>
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<tr>
<td>Paper II</td>
<td>3 Hrs duration</td>
<td>33 Marks</td>
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<tr>
<td>Paper III</td>
<td>3 Hrs duration</td>
<td>34 Marks</td>
</tr>
<tr>
<td>Practicals</td>
<td>4 Hrs. duration</td>
<td>50 Marks</td>
</tr>
</tbody>
</table>

**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.
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
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.
3. Ecosystem: Biotic and abiotic factors.
10. Habitat ecology: Brief account of fresh water, marine, terrestrial and estuarine water ecosystems.
11. Major biomes of the world.

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Jaipur
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 I Nina effects.
8. Basic concepts of bioaccumulation, biomagnifications, biodegradation of pollutants.

Section - C

Environmental Biology -II
2. Impact of urbanization: Development and distribution of urban centers, factors, problems and solutions of urbanization, fauna of oriental region.

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.

Dy. Registrar (Academic-I)
University of Rajasthan
Jaipur
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.
3. Pheromones and their role in alarm spreading
5. Biological rhythms and biological clocks.

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.
7. Hypothesis: Null and alternative; Student’s t-test.
Syllabus: B.Sc.-B.Ed. Part-III (Pass Course)
Zoology Practical
(2019-2020)

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.


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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University of Rajasthan
Jaipur
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).

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

**Scheme of Practical Examination and Distribution of Marks**

<table>
<thead>
<tr>
<th>Time: 4 Hrs.</th>
<th>Min Pass Marks: 18</th>
<th>Max. Marks: 50</th>
</tr>
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<tr>
<td><strong>Regular</strong></td>
<td><strong>Ex./N.C. Students</strong></td>
<td></td>
</tr>
<tr>
<td>1. Anatomy</td>
<td>6</td>
<td>7 (5+2)</td>
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<td></td>
<td>(4+2)</td>
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<tr>
<td>2. Permanent Preparation</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>3. Environmental Biology</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>4. Ethology</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>5. Biostatistics</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>6. Identification and comments on Spots (1 to 8)</td>
<td>16</td>
<td>16</td>
</tr>
<tr>
<td>7. Viva Voce</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>8. Class Record</td>
<td>5</td>
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<td></td>
<td><strong>50</strong></td>
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</tr>
</tbody>
</table>

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[Signature]

Dy. Registrar (Academic-I)
University of Rajasthan
Jaipur
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 wildlife act 1972 and amendments made subsequently.

Recommended Books:


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

<table>
<thead>
<tr>
<th>Paper</th>
<th>Exam:</th>
<th>Min Pass marks:</th>
<th>Max. Marks:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paper I</td>
<td>3 hours duration</td>
<td>12</td>
<td>33</td>
</tr>
<tr>
<td>Paper II</td>
<td>3 hours duration</td>
<td>12</td>
<td>33</td>
</tr>
<tr>
<td>Paper III</td>
<td>3 hours duration</td>
<td>12</td>
<td>34</td>
</tr>
<tr>
<td>Practical</td>
<td>4 hours duration</td>
<td>18</td>
<td>50</td>
</tr>
</tbody>
</table>

### 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 - 1: Evolution of Quantum Physics

1. 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 Einstein's explanations. Compton effect, De-Broglie hypothesis, diffraction and interference experiments of particle (Davisson-Germer experiment).


3. 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.
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

moment, spin-orbit coupling, qualitative explanation of fine structure, Franck–Hertz experiment, Zeeman effect, normal Zeeman splitting, Qualitative understanding about Stark effect.

2. Absorption and emission spectroscopy, its block diagram, brief explanation about function of each elements and its limitations; single beam spectrophotometer.

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.

Reference books
4. AK Ghatak and S Lakanathan, Quantum Mechanics: Theory and application.
5. HS Mani, GK Mehta, Introduction to modern Physics.
7. H.E. White, Introduction to atomic physics,

Paper II: Nuclear and Particle Physics

Work Load: Two hours Lecture per week

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 - 1


UNIT - 2

Radioactive Decays: Alpha Decay-Basics of α-Decay Processes, Theory of β-Emission Spectrum, Gamow Factor, Geiger Nulatt 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

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,
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.


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:

2. Nuclear and Particle Physics, Brian R Martin, John Wiley & Sons.
3. Introduction to Nuclear and Particle Physics, Das and Ferbas, World Scientific.
5. Introductory Nuclear Physics, Kenneth S. Krane, John Wiley & Sons.
8. Introduction to Nuclear and Particle Physics, V. K. Mittal, R. C. Verma, S. C. Gupta, PHI

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.
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, polycrystalline and amorphous materials, X-ray diffraction by solids: Laue and Bragg's equation, Study of crystals by X-rays: FWHM, Scherrer 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, Kroning Penny model, Brillouin 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:

Unit IV

Magnetic properties of Materials:

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)
Teaching: 4 hrs/week  
Max. Marks: 50  
Duration: 5 hrs.  
Min. Pass Marks: 18  

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. Determination of Planck's constant by photo cell (retarding potential method using optical filters, preferably five wave length).
2. Determination of Planck's constant using solar cell.
3. Determination of Stefan's constant (Black body method).
5. Study of Judd's spectrum with the help of grating and spectrometer and ordinary bulb-light.
6. Study of characteristics of a GM counter and verification of inverse square law for the same strength of a radioactive source.
7. Study of β-absorption in Al-foil using GM Counter.
8. To find the magnetic susceptibility of a paramagnetic solution using Quinck's method. Also find the ionic molecular susceptibility of the ion and magnetic moment of the ion in terms of Bohr magneton.
10. Study of polarization by reflection from a glass plate with the help of Nicol's prism and photo cell and verification of Brewster law and law of Malus.
11. α/β measurement by helical method.
12. Measurement of magnetic field using ballistic galvanometers and search coil. Study of variation of magnetic field of an electromagnet with current.

**Section-B**

1. Study of a R-C transmission line at 50 Hz
2. Study of a L-C transmission line
   (i) at fixed frequency,
   (ii) at variable frequency.
3. Study of resonance in an LCR circuit (using air core inductance and damping by metal plate).
University of Rajasthan

1. at fixed frequency by varying \( C \), and
2. by varying frequency.
3. Study of the characteristics of junction diode & Zener diode.
4. 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.
5. To design Zener regulated power supply and study the regulation with various loads.
6. To study the characteristics of a field effect transistor (FET) and design a study amplifier of finite gain (10).
7. To study the frequency response of a transistor amplifier and obtain the input and output impedance of the amplifier.
8. To design and study of an R-C phase shift oscillator and measure output impedance (frequency response with change of component of \( R \) and \( C \)).
9. To study a voltage multiplier circuit to generate high voltage D.C. from A.C.
10. Using discrete components, study OR, AND, NOT logic gates, compare with TTL integrated circuits (I.C.'s).
11. 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.

(Raj Jain, Dy. Registrar (Academic)
University of Rajasthan, JAIPUR)

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

MATHEMATICS

B.Sc.-B.Ed. Part III – 2020

Teaching: 3 Hours per Week per Theory Paper.

Examination Scheme:

<table>
<thead>
<tr>
<th>Paper</th>
<th>Subject</th>
<th>Duration</th>
<th>Min. Pass Marks</th>
<th>Max. Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paper – I</td>
<td>Algebra</td>
<td>3 hrs.</td>
<td>Science - 54</td>
<td>150</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Arts - 72</td>
<td>200</td>
</tr>
<tr>
<td>Paper – II</td>
<td>Complex Analysis</td>
<td>3 hrs.</td>
<td>40 (Science)</td>
<td>53 (Arts)</td>
</tr>
<tr>
<td>Paper – III</td>
<td>Mechanics</td>
<td>3 hrs.</td>
<td>40 (Science)</td>
<td>54 (Arts)</td>
</tr>
<tr>
<td>Practical</td>
<td></td>
<td>2 hrs.</td>
<td>30 (Science)</td>
<td>40 (Arts)</td>
</tr>
</tbody>
</table>

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.

Dy. Registrar (Academic-I)
University of Rajasthan
Jaipur
Syllabus: B.Sc.-B.Ed.(Part-III)

Paper - I: Algebra

Teaching: 3 Hours per Week

Duration of Examination: 3 Hours
Max. Marks: 40 (Science)

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

Unit 1: 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:

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 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.

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 logz.
Evaluation of a real definite integral by contour integration.

Reference Books:
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 4: Equilibrium of coplanar force, moments and friction.

Unit 5: Virtual work and Catenary.

Reference Books:


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

Raj M.

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

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:
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.

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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