UNIVERSITY OF RAJASTHAN JAIPUR

FACULTY OF EDUCATION

SYLLABUS

INTEGRATED PROGRAMME OF

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

Annual Scheme

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

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NOTICE

1. Change in syllabus/ordinance/rules/regulations/ syllabi and books may from time to time, be made by amendment or remaking and a candidate shall, accept in so far as the university determines otherwise comply with any change that applies to years he/she has not completed at time of change.

2. All court cases shall be subject to the jurisdiction of Rajasthan Univeristy head quarter Jaipur only and not any other place.

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B.Sc. B.Ed PART - III

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2. LANGUAGE ACROSS THE CURRICULUM (COMPULSORY PAPER)

4. GUIDANCE AND COUNSELING IN SCHOOL (G-A)

5. CONTENT (SELECT ANY THREE) - 05, 06 & 07 (G-B)

   - CHEMISTRY (I, II, III)
   - BOTANY (I, II, III)
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   - MATHEMATICS (I, II, III)

8. PEDAGOGY OF A SCHOOL SUBJECT (PART - 3) Ist AND IInd YEAR (CANDIDATE SHALL BE REQUIRED TO OFFER ANY TWO PAPERS FROM THE FOLLOWING FOR PART - 3 AND OTHER FOR PART - 4) - 08 (a/b)

   - CHEMISTRY
   - BIOLOGY
   - PHYSICS
   - MATHEMATICS
   - GENERAL SCIENCE

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

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

Objectives:

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

Learning outcomes:

1. Competence to teach effectively two school subjects at the Elementary & secondary levels.

2. Ability to translate objectives of secondary education in terms of specific Programmes and activities in relation to the curriculum.

3. Ability to understand children's needs, motives, growth pattern and the process of learning to stimulate learning and creative thinking to faster growth and development.

4. Ability to use-

5. Individualized instruction

6. Dynamic methods in large classes.

7. Ability to examine pupil's progress and effectiveness of their own teaching through the use of proper evaluation techniques.

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8. Equipment for diagnosing pupil progress and effectiveness of their own teachings through the use of proper evaluation techniques.

9. Readiness to spot talented and gifted children and capacity to meet their needs.

10. Ability to organize various school programmes, activities for pupil.

11. Developing guidance point of view in educational, personal and vocational matters.

12. Ability to access the all round development of pupils and to maintain a cumulative record.

13. Developing certain practical skill such as:

   a. Black board work

   b. Preparing improvised apparatus

   c. Preparing teaching aids and ICT.

14. Interest and competence in the development of the teaching profession and education. Readiness to participate in activities of professional organizations.

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

i)   First Year B.Sc.B.Ed.
ii) Second Year B.Sc.B.Ed.
iii) Third Year B.Sc.B.Ed.
iv) Final Year B.Sc.B.Ed.

Duration of the Course - Four Years

Examinination after each session in theory papers

Scheme of Examination against each subject separately.

Compulsory Papers:

Year	Paper
Ist Year	Gen. English
IInd Year	Gen. Hindi
IIIrd Year	Elementary Computer Application (ICT)
IVth Year	Environmental Studies

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

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Group – A: - Subject Specialisation :

Year	Paper
Ist Year	Instructional System & Educational
IInd Year	Peace Education
IIIrd Year	Guidance and Counselling in School
IVth Year	Physical Education & Yoga

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

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

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

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

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❖ In all the subjects the student has to study a minimum of 12 papers in Ist year, 12 Paper in IInd Year. 12Paper in IIIrd Year and 7 Paper in IVth Year (Total 43Papers).

❖ Each theory paper will carry 100 marks and content base paper 05, 06, 07 (G-B) will carry 150 marks. (With practical part). Distribution of marks in mathematics is according to their marking scheme in page no.7.

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

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

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

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

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

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

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

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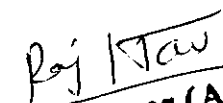# Four Years Integrated Course
Scheme of B.Sc.B.Ed. IIIrd Year

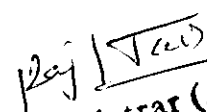| Theory Paper	Course Code	Title of the Paper	Evaluation			
			External	Internal	Practical	Total
I	B.Sc.B.Ed. 01	Elementary Computer Application (ICT) (Compulsory)*	60	-	40 (30+10)	100
II	B.Sc.B.Ed. 02	Language Across the Curriculum	80	20	-	100
IV	B.Sc.B.Ed-04 (G-A)	Guidance and Counseling in School	80	20	-	100
V VI & VII	B.Sc.B.Ed 05, 06 & 07 (G-B)	Content (Select any Three) 1. Chemistry(I,II,III) 2. Botany (I,II,III) 3. Zoology(I,II,III) 4. Physics (I,II,III) 5. Mathematics(I,II,III)	33+33+34 33+33+34 33+33+34 33+33+34 40+40+40		50 50 50 50 30	150 150 150 150 150
VIII	08(a,b)	Pedagogyof a School Subject (Candidate should opt any two school subject from the following i.e. one school subject for part - 3 and other school subject for Part - 4) 1. Chemistry 2. Biology 3. Physics 4. Mathematics 5. General Science	80	20		100
Practicum		Special Training Programme • Micro Teaching • Practice Lesson • Observation Lesson • Technology Based			10 50 05 05	100

						20	
		Lesson					
		• Criticism Lesson				10	
		• Attendance /Seminar/ Workshop					
		Final Lesson	100				100
							950

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

Theory Paper	Course Code	Title of the Paper	Evaluation			
			External	Internal	Practical	Total
I	B.Sc.B.Ed. 01	Environmental Studies (Compulsory)*	100	-	-	100
II	B.Sc.B.Ed. 02	Creating and inclusive school	80	20	-	100
III	B.Sc. B.Ed. 03	Understanding Disciplines and Subject	80	20	-	100
IV	B.Sc.B.Ed. 04(G-A)	Physical Education & Yoga	80	20	-	100
V	B.Sc.B.Ed. 05	Gender, School and Society	80	20	-	100
VI	B.Sc.B.Ed. 06	Assessment for Learning	80	20	-	100
VIII	B.Sc.B.Ed. 08(a,b)	Pedagogyof a School Subject (Candidate should opt any two school subject from the following i.e. one school subject for part - 3 and other school subject for Part - 4) 1. Chemistry 2. Biology 3. Physics 4. Mathematics	80	20	-	100

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

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

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

Compulsory Papers*

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

Compulsory Paper

Year	Paper
Ist Year	1. Childhood and Growing Up 2. Contemporary India and Education
IInd Year	3. Knowledge and curriculum 4. Learning and Teaching
IIIrd Year	5. Language Across the Curriculum
IVth Year	6. Creating and inclusive school 7. Understanding Disciplines and Subject 8. Gender, School and Society 9. Assessment for Learning

Group – A: - Subject Specialisation :

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IInd Year	Peace Education
IIIrd Year	Guidance and Counselling in School
IVth Year	Physical Education & Yoga

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

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

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

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

❖ In all the subjects the student has to study a minimum of 12 papers in Ist year, 12 Paper in IInd Year. 12Paper in IIIrd Year and 7 Paper in IVth Year (Total 43Papers).

❖ Each theory paper will carry 100 marks and content base paper 05, 06, 07 (G-B) will carry 150 marks. (With practical part). Distribution of marks in mathematics is according to their marking scheme in page no.7.

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

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

Years	Papers	Marks
I Year	12Paper +Practical	600 +150= 750

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

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

PART II

Practical Work

Objectives:

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

1. To be conscious of sense of values and need for their inculcation in children through all available means including one's own personal life.

2. Possess a high sense of professional responsibility.

3. Develop resourcefulness, so as to make the best use of the situation available.

4. Appreciate and respect each child's individuality and treat him as independent and integrated personality.

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

6. Develop in the pupil's capacity for thinking and working independently and guide the pupils to that end.

7. Organize and manage the class for teaching learning.

8. Appreciate the dynamic nature of the class situation and teaching techniques.

9. Define objectives of particular lessons and plan for their achievements.

10. Organize the prescribed subject- matter in relation to the needs, interest and abilities of the pupils.

11. Use the appropriate teaching methods and techniques.

12. Prepare and use appropriate teaching aids, use of the black board and other apparatus and material properly.

13. Convey ideas in clear and concise language and in a logical manner for effective learning.

14. Undertake action research.

15. Give proper opportunity to gifted pupils and take proper care of the back-ward pupils.

16. Co-relate knowledge of the subject being taught with other subjects and with real life situations as and when possible.

17. Prepare and use assignments.

18. Evaluate pupil's progress.

19. Plan and organize co curricular activities and participate in them.

20. Co-operates with school teachers and administrators and learns to maintain school records and registers.

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

1. Observation of lesson delivered by experienced teachers and staff of the college.

2. Planning units and lessons.

3. Discussion of lesson plans, unit plans and lessons given (including criticism lesson)

4. Organization and participation in co- curricular activities.

5. Setting follows up assignment.

6. Evaluation in terms of educational objectives use of teachers made tests & administration of standardized tests.

7. Black-board work.

8. Practical work connected with school subjects.

9. Preparation and use of audio visual aids related to methods of teaching.

10. Experimental and laboratory work in chemistry, botany, zoology, physics, and mathematics subjects of experimental and practical nature.

11. Study of the organization of work and activities in the school.

12. Observation and assistance in the health education programme.

13. Observation and assistance in the guidance programme.

14. Maintenance of cumulative records.

15. Techniques of teaching in large classes.

O. 322 A candidate has to deliver at least 40 lessons (20 Lessons of one teaching subject in 3rd year & 20 Lessons of other teaching subject in 4th year) in a recognized school under the

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supervision of the staff of the college shall be eligible for admission to the examination for the degree of B.Sc.B.Ed.

Notes :-

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

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

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

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

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

O.325 Candidates who fail in Integrated B.Sc.B.Ed examination in part 1or/ part 2 the theory of education may present themselves for re-examination there in at a subsequent examination without attending a further course at an affiliated training college.

Provided that a candidate who fails in any one of the theory papers and secures at least 48% marks in the aggregate of the remaining theory papers may be allowed to reappear in the examination in the immediately following year in the paper in which he/she fails only. He/she shall be declared to have passed if he secures minimum passing marks prescribed for the paper in which he appeared and shall be deemed to

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have secured minimum passing marks only prescribed for the paper (irrespective of the marks actually obtained by him) for the purpose of determining his division in accordance with the scheme of examination. The candidate shall have to repeat the whole examination in subsequent year in case he fails to clear the paper in which he failed.

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

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

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

Regulation 42 :-

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

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

Part I- Main theory papers at **B.Sc.B.Ed. I,** In Integrated B.Sc.B.Ed I Paper nos. are 02, 03 & 04 in each session are of three hours carrying 100 marks (80 for theory + 20 for sessional) each. Compulsory paper* 01 of 100 marks and optional Paper 05, 06, 07 (G-B). in each session are three hours carrying 150 marks (100 marks theory + 50 marks practical). Distribution of marks in mathematics is according to their marking scheme in page no.7.

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

Organization evaluation of practice teaching:

1. Every candidate will teach at-least 40 lessons (20 in III Year & 20 in IV Year) during practice teaching session. At least ten lessons in each subject should be supervised.

2. 40 (20+20) lessons as desired in the syllabus should be completed as full period class room lesson. Micro teaching lesson to be used in addition to those 40 lessons for developing certain teaching skills.

3. A minimum of ten lessons in each subject will be supervised evaluated by the subject specialist or a team of specialists of the subjects.

4. By and large, the evaluation of the performance in the practical teaching will be based on the last ten lessons in the subject when the student has acquired some competence and skills of teaching.

5. The internal assessment in practice of teaching will be finalized by the principal with the help of members of the teaching staff and the same will be communicated to the university before the commencement of the practical each year.

6. At Integrated B.Sc.B.Ed III Year each candidate should be prepared to teach one lessons at the final practical examination. At the Integrated B.Sc.B.Ed IV Year exam candidate should be prepared to teach two lessons (one in each subject).The external examiners may select at-least 10% of the candidates to deliver two lessons in Integrated B.Sc.B.Ed IV Year.

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

8. The board of Examination will consist of:

   (a) The principal of the college concerned.

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

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

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

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

Working out the result and awarding the division:

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

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

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

❖ 40 percent marks in the external examination.

❖ 40 percent marks in internal assessment.

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

Division	Theory	Practice of Teaching
I	60%	60%

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II	48%	48%
Pass	36%	40%

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

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 ½ marks each. The question paper will be of duration of 2 hours. The examinees will have to give their answers on OMR Sheet only to be provided by the University whose evaluation will be done based on OMR Scanning Technology. Further the practical examination for this paper will be of 40 marks and its duration will be of 2 hours.

Unit – I

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

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

Unit – II

Word Processing tool : Introduction , Creating, Saving, Copy, Move and Delete. Checking Spelling and Grammer. 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.

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

Unit – IV

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

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

Unit - V

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

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

Question Paper pattern for Main University Practical Examination   *Max Marks: 40*

Practical

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

The practical examination scheme should be as follows

* Three Practical Exercise (including Attendance & Record performance)   30 marks
    - Operating system
    - MS Word
    - MS Excel
    - MS PowerPoint
    - Internet
* Viva voce   20 marks

B.Sc.B.Ed-02

Language across the curriculum

Marks-100

Objectives:

This course will enable the pupil teacher to-

1. Understand the language background of students as the direct or seen language users.

2. Create sensitivity to the language diversity that exists in the class room.

3. Understand the nature of classroom discourse and develop strategies for using oral language in classroom.

4. Understand the nature of reading comprehension and writing in specific content areas.

5. Understand interplay of language and society.

6. Understand functions of language.

7. Understand language and speech disorder and make remedial measure too.

Unit 1

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

Unit - 2

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

Unit-3

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

B) - Language skills – (LSWR-Listening, speaking, writing, reading,) Meaning, concepts, importance, co-relation, methods and techniques,
Language laboratory- Need, Importance, Advantage, Use in teacher's training.
Unit-4
A) Listening skill - Pronunciation, Intonation, Stress, Pitch, Rhythm and Oral aptitude,
B) Speaking skill - Pronunciation, Intonation, Stress, Pitch, Rhythm and Oral aptitude

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

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

Unit - 5

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

Test and Assignment:-   **(20 MARKS)**
>   1. Class Test (10 marks)
>   2. Any One (10 marks)
- Discuss with students and find out the different language they speak, prepare a plan to use multilingualism as a teaching strategy.
- Identify speech defects of a primary level students and make remedial strategy.
- Organizing an activity based game to motivate students for creative questioning.
- Close and critical reading/discussion in small groups
- Conduct a survey in secondary school to study academic achievement in overall or in specific subject of diverse linguistic students.
- Review of a text book of any language subject

References:

1. Agnihotri, r.k. (1995) Multilingualism as a class room resource. In k. heugh, a siegruhn, p. pluddemann (Eds) multilingual education for south Africa 9pp. 3 heinemann educational books.

2. Anderson ,R.C.(1984) role of the readers schema in comprehension, learning and memory. In R.C. Anderson, J.aslrom& R.J. Tierney (Edu) learning to read in American schools: based readers and content teats psychology

3. Bansal R.K. and harrisson J.B.- (1990) spoken English for Indian orient longman LTD Madras

4. Ladson, billings G (1995) toward a theory of cultwally relevant pedagogy American Educational research journal.

5. NCERT(2006) position paper national focus group on teaching of Indian language (NCF 2005) New Delhi

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

B.Sc.B.Ed— 04 (G-A)

GUIDANCE AND COUNSELING

OBJECTIVES: -   MARKS-100

The course will enable the student teachers to –
- Understand the concept, need and meaning of guidance.
- Get acquainted with the principles , issues, problems and procedure of guidance.
- Develop understanding about the role of school in guidance.
- Understand the various areas, tools and techniques in guidance.
- Understand the concept, need and meaning of counseling.
- Get acquainted with the principles and process of counseling.
- Understand the tools and techniques in counseling.

UNIT – 1.GUIDANCE IN SCHOOL
- Concept, Need and Meaning of Guidance.
- Principles of Guidance.
- Procedure of Guidance (steps)
- Issues and problems of Guidance.
- Role of school in Guidance.

UNIT 2. AREAS, TOOLS AND TECHNIQUES IN GUIDANCE.
- Personal, Educational and vocational Guidance.
- Tools :- Records of students
- Cumulative Record
- R a t in g scale
- Psychological tests.
- Q u estionnaire and Inventories
- Techniques in Guidance (a) Observation, (b)Interview,(c)Sociometry

UNIT3. COUNSELLING IN SCHOOL
- Concept, Need and Meaning of counseling.
- Principles of Counseling.
- counseling Process and Role.
- Directive, non-directive and eclectic counseling.

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- Qualities and role of a school counselor.

UNIT 4. TOOLS AND TECHNIQUES IN COUNSELLING
- Individual counseling and Group counseling
- Lectures , discussions and Dramatics as techniques in counseling.
- Importance of follow-up in counseling.
- Counseling for the children with special needs
- Counseling for parents.

UNIT 5 Guidance and Counseling for Special Needs Population Guidance of children with special needs
- problems and needs
- guidance of the gifted and creative students
- guidance of under achiever,
- slow learners and first generation learners
- guidance of learning disabled, Drug addicts and alcoholics
- De addiction centers, Career resource centre
- Evaluation of counseling,

Need for research and reforms in guidance and counselling .

Tasks and Assignments

1. Class Test   10 marks

2. Any one   10 Marks

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

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

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8. Kolher. S.K., Educational and Vocational Guidance, New Delhi: Practice Hall India Ltd., 1995. 9. NCERT, Guidance and Counselling in Indian Education, New Delhi: NCERT, 1978

CHEMISTRY
Scheme

Max Marks: 150

	Duration (hrs)	Max. Marks	Min. Pass Marks
Paper I	3	33	
Paper-II	3	33	36
Paper-III	3	34	
Practical	5	50	18

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

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

Unit-I

Hard and Soft Acids and Bases (HSAB):
Classification of acids and bases as hard and soft. Pearson's HSAB concept, acid-base strength and hardness and softness. Symbiosis, theoretical basis of hardness and softness, electronegativity and hardness and softness.

Unit-II

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

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

Unit-III

Electron spectra of Transition Metal Complexes:
Types of electronic transitions, selection rules for d-d transitions, spectroscopic ground states, spectrochemical series, Orgel energy level diagram for d^1 and d^9 states, discussion of the electronic spectra of $[Ti(H_2O)_6]^{3+}$ 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,

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

Unit-V

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

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

CH-302 Paper-II : Organic Chemistry
(2 hrs or 3 periods/week)

Unit-I

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

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

Unit-II

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

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

Unit—III

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

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

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

Unit-IV

Amino Acids, Peptides, Proteins and Nucleic Acids

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

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

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

Unit-V

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

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

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

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

UNIT-I

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

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

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

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-H_2^+ ion calculation of energy level from wave functions, physical picture of bonding and antibonding wave functions, concept of σ, σ^*, π, π^* orbitals and their characteristics. Hybrid orbitals - sp, sp^2, sp^3, calculation of coefficients of A.O.'s used in these hybrid orbitals.
Introduction to valence bond model of H_2, comparison of M.O. and V.B. models.

UNIT-III

Spectroscopy
Introduction: Electromagnetic radiation, spectrum, basic features of different spectrometers, statement of the Born-Openheimer approximation, degrees of freedom.
Rotational Spectrum: Diatomic molecules, Energy levels of a rigid rotator (semi-classical principles), selection rules, spectral intensity, using population distribution (Maxwell-Boltzmann distribution) determination of bond length, qualitative description of non-rigid rotator, isotope effect.
Vibrational Spectrum: Infrared spectrum: Energy levels of simple harmonic oscillator, selection rules, pure vibrational spectrum, intensity, determination of force constant and qualitative relation of force constant and bond energies, effect of anharmonic motion and isotope on the spectrum, idea of vibrational frequencies of different functional groups.
Raman Spectrum: Basic principles and applications, concept of polarizability, pure rotational and pure vibrational Raman Spectra of diatomic molecules, selection rules.
Electronic Spectrum: Concept of Potential Energy curves for bonding and antibonding molecular orbitals, qualitative description of selection rules and Frank Condon principle. Qualitative description of σ, π and n M.O. their energy levels and the respective transitions.

UNIT-IV

Photochemistry
Interaction of radiation with matter, difference between thermal and photochemical processes. Laws of photochemistry: Grothus-Drapper law, Stark -Einstein law, Jablonski diagram depicting various processes occurring in the exited sate, 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.

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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), $K_3[Fe(C_2O_4)_3]$

    b) Bis(dimethylglyoximato) nickel (II) complex, $[Ni(DMG)_2]$

    c) Tetraminecopper (II) sulphate, $[Cu(NH_3)_4]SO_4$

    d) Potassium diaquabis(oxalato)chromate (III) dihydrate, $K[cis\text{-}Cr(H_2O)_2(C_2O_4)_2].2H_2O$

Instrumentation

    Calorimetry

    (a) Job's

    (b) Mole-ration method

    Adulteration-Food stuffs

    Effluent analysis water analysis

Solvent Extraction

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

Ion Exchange Method

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

ORGANIC CHEMISTRY

    Laboratory Techniques

Steam Distillation

    Naphthalene from its suspension in water

    Clove oil from Clove

    Separation of o- and p-nitrophenols

Column Chromatography

    Separation of fluorescein and methylene blue

    Separation of leaf pigments from spinach leaves

    Resolution of racemic mixture of (+) mendelic acid

Qualitative Analysis

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

Synthesis of Organic Compounds

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

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

PHYSICAL CHEMISTRY
Electrochemistry
(a) To determine the strength of the given acid condcutometrically 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 $KMnO_4/K_2Cr_2O_7$ as titrant and calculate the redox potential of Fe^{++}/Fe^{+++} 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 $KMnO_4/K_2Cr_2O_7$ and determined the concentration of the given solution of the substance.

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CH-304 Chemistry Practical (Pass Course)

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

Inorganic Chemistry

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

OR

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

OR

Separation and estimation of Mg (II) and Fe (II) by ion exchange method.   10

Organic Chemistry

(1)   Synthesis of one of the six organic preparations.   8

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

OR

Column chromatography techniques.

Perform one of the three column chromatography experiments given in syllabus.   10

Physical Chemistry

Perform one of the physical chemistry experiments given in the syllabus.   12

Viva-voce   5

Record   . 5

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Books Suggested (Theory Course)

1.   Basic Inorganic Chemistry F.A. Cotton, G. Wilkinson and P.L. Caus. Wiley.
2.   Concise Inorganic Chemistry, J.D. Lee, ELBS
3.   Concepts of Models of Inorganic Chemistry B. Douglas, D. McDaniel and J. Alexander, John Wiley.
4.   Inorganic Chemistry, D.E. Shriver P.W. Atkins and C.H. Langford, Oxford.
5.   Inorganic Chemistry, W.W. Porterfield Addison Wesley.
6.   Inorganic Chemistry, A.G. Sharpe, ELBS
7.   Inorganic Chemistry, G.L. Miessler and D.A. Tarr, Prentice Hall.
8.   Organic Chemistry, Morrison and Boyd, Prentice Hall.
9.   Organic Chemistry, L.G. Wade Ji. Prentice Hall.
10.   Fundamentals of Organic Chemistry, Solomons, John Wiley.
11.   Organic Chemistry Vol. I, II, III S.M. Mukherji, S.P. Singh and R.P. Kapoor, Wiley Eastern Ltd. (New Age International)
12.   Organic Chemistry, F.A. Carey, McGraw Hill, Inc.
13.   Introduction to Organic Chemistry. Streitwieser. Heathcock and Kosover. Macmilan.
14.   Physical Chemistry, G.M. Barrow. International Student Edition, McGraw Hill.
15.   Basic Programming with Application, V.K. Jain. Tata McGraw Hill.
16.   Computers and Common Sense. R. Hunt and Shelly, Prentice Hall.

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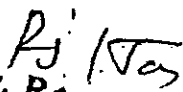(Academic)
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17. University General Chemistry, C.N.R. Rao, Macmillan.
18. Physical Chemistry, R.A. Alberty, Wiley Eastern Ltd.
19. The Elements of Physical Chemistry, P.W. Atkins, Oxford.
20. Physical Chemistry Through problems, S.K. Dogra and S. Dogra, Wiley Eastern Ltd.

Books Suggested (Laboratory Courses)

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

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BOTANY

Note:

1. There are 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; meristematic, simple, complex and secretary tissues, tissue systems.

Unit-2

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

Unit-3

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

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

Unit-4

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

Suggested readings :

Cutter, E.G. 1969 Plant Cells and Tissues Edward Arnold, London.

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

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

Fahn, A. 1982 Plant Anatomy Pergamon Press, Oxford

Hartman, H.T. and Kester, D.E. 1976. Plant Propagation Principles and of India Pvt. Ltd., New Delhi.

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

Roven, P.M. Evert R.F. and Eichhien, S.E. 1999 Biology of Plants W.H. Freeman and Co. Worth Publishers, New York.

Thomas, P. 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.

5. Anatomy of primary and secondary growth in monocots and dicots using hand-out sections of sunflower, maize, cucurbita stem and roots.

6. Anamolous secondary growth in stem *Salvadora, Bignonia, Bougainvillia, Bouhaenia, Mecanthes, Leptadenia Deucena*

7. Study of diversity in leaf shape and size. Internal structure of leaf-Dorsiventral and isobilateral leaves; study of stomatal types.

8. Examination of seed (monocot and dicot) Structure seed viability test.

9. Specimens of modifications of plant parts for Vegetative reproduction

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Paper-II

Ecology & Economic Botany

(2 hrs week)

Unit-1

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

Unit-2

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

Unit-3

Basic concept of center of origin of cultivated plants. Food plants-rice, wheat, maize, pea, sugarcane Vegetables General account on radish, onion, garlic, cabbage, spinach, cauliflower, cucumber, lady's finger and pea. Fruits: General account and note on apple, banana, ber, mango, mulberry, jamun, watermelon, muskmelon, guava, orange. Vegetable oil groundnut, mustard and coconut.

Unit-4

Spices General account with an emphasis on those cultivated in Rajasthan (Cumin, coriander) Beverages tea and coffee. Medicinal plants General account with emphasis on those cultivated in Rajasthan

(Senna [...] musli). Fibers Cotton and jute. Wood. General account of sources of firewood timber and bamboos; Rubber Ethnobotany: a general account.

Practical Exercises:

1. Study frequency and density, abundance of plant species of campus vegetation by quadrat method

2. Variation in soil moisture in relation to depth

3. To estimate bulk density of grassland and woodland soil.

4. To estimate the porosity of grassland and woodland soil sample.

5. To determine moisture content of grassland and wood land soil.

6. To measure dissolved oxygen content in polluted and unpolluted water samples.

7. To measure temperature of different water bodies.

8. Water holding capacity of the soil

9. Find out pH of soil sample by universal Indicator method.

10. Find out pH of water sample by pH meter

11. Find out transparency of a waterbody by Secchidisk

12. Study morphology (external and internal) of hydrophytes (*Hydrilla* stem, *Typha* leaf and *Nymphaea*/*Eichhornia* petioles and xerophytes (*Calotropis*, *Capparis* and *Casuarina* stem, *Nerium* leaf) with special reference to their adaptations.

13. Study following specimen with special reference to
   1. Botany of the economically important part
   2. Processing if any involved
   3. Specimen of cereals, pulses, spices beverage (tea & coffee) beans, sugar, oil seeds (mustard, groundnut)

14. Study through grain in polar and oca Histochemical test Cellulose, lignin, starch [...] and tannin.

15. Submit 3 specimens of locally important medicinal plants

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Paper-III

Angiosperm Taxonomy and Embryology
(2 hrs /week)

Unit-1

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

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

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

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

Unit-2

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

Unit-3

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

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

Unit-4

Development of dicot and monocot embryo, formation of embryo types of Embryo. Endosperm types, dialaspem Endosperm, Polyembrony, Induced polyembryony. Parthenocarpy, Apomixis and adventive embryony

Series of Laboratory Exercises

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Botany:

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

1. Ranunculaceae-*Ranunculus*, *Delphinium*.

2. Leguminosae *Pisum sativum*, *Cassia* and *Acacia*

3. Apiaceae *Coriandrum*

4. Convolvulaceae-*Ipomea*, *Jacquemontia*

5. Apocynaceae-*Catharanthus*, *Thevetia*

6. Asclepiadaceae-*Calotropis*

7. Lamiaceae- *Ocimum*, *Salvia*

8. Euphorbiaceae-*Euphorbia pulcherrima*, *Ricinus*

9. Acanthaceae- *Adhatoda*.

10. Asteraceae-*Helianthus*

11. Rubiaceae-*Hamelia*

12. Poaceae *Triticum*

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

(III) Types of Inflorescence and Fruits

(IV) Anatomy
1. L.S. of anther to study the wall layers and pollen sac with pollen grains.
2. Study the various types of ovule. Draw the diagrams.
3. Study the various types of placentations
4. Study the germination of pollen grain in vitro and observe the path of pollen tube.
5. Study various stages of embryo *Raphanus* fruit.

Suggested Readings:

1. Pandey B.P. Angiosperms S. Chand (1995) I.M.H. Publishing Company New Delhi.
2. Introduction to the Principles of plant taxonomy V.V. Sivarajan (1984) Oxford & IBH Publishing Co. Pvt. Ltd. New Delhi
3. Plant taxonomy Sushella M... (2003) Dominant Publishers and ... New Delhi
4. ... Saracharan Singh ... Oxford and IBH Publishing Co. Pvt. ...

C. N. Sharma and J. . Sharma (2003) Structure, Development and . . . . on in Flowering Plant. Ramesh Book Depot. Jaipur

. . . . S.S. and Bhatnagar, S. P. (1980) The embryology of Angiosperms 4th . . . . Vikas Publishing House. New Delhi

. . . . duction to the Embryology of Angiosperm. Maheshwari, P. (1950) . . . . .

. . . . . vances in the Embryology of Angiosperms. Ed. Maheshwirari. P . . . . . Delhi

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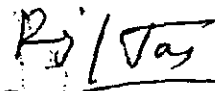
BOTANY PRACTICAL EXAMINATION B.Sc PART-III

SKELETON PAPER

M.M. 50   TIME: 4 Hours

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

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

Zoology

(2020-2021)

Scheme:

Max. Marks: 100   Min. Pass Marks: 36

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

NOTE:

1. There will be two parts of every theory question paper with total duration of 3 hours. First part of question paper will comprise question No. 1 containing 9 (Paper I & II) or 10 (Paper III) very short answer (Maximum 25 words) type questions, each of 1 mark. This part is compulsory to attempt. Questions should be evenly distributed covering entire syllabus.

   Second part of question paper will be of long answer type questions having three sections. There will be total 9 questions (Q. No. 2 to 10) in this part, *i.e.*, three from each unit /section out of which candidate will be required to attempt any 4 question selecting at least one question from each unit/section. Each question will carry 6 marks.

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

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PAPER –I: Z-301
STRUCTURE AND FUNCTIONS OF CHORDATE TYPES

NOTE:

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

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

Section – A

Chordates

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

Section – B

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

Pisces- Labeo

Amphibian-Frog

Reptile-Varanus

Aves-Pigeon

Mammal- Rat

Section – C

Chordate Adaptations

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

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PAPER –II: Z-302
ECOLOGY AND ENVIRONMENTAL BIOLOGY

NOTE:

1. There will be two parts of this theory question paper with total duration of 3 hours. First part of question paper will comprise question No. 1 containing 9 very short answer (Maximum 25 words) type questions, each of 1 mark. This part is compulsory to attempt. Questions should be evenly distributed covering entire syllabus.

   Second part of question paper will be of long answer type questions having three sections. There will be total 9 questions (Q. No. 2 to 10) in this part i.e. three from each unit /section, out of which candidate will be required to attempt any 4 question selection at least one question from each unit/section. Each question will carry 6 marks

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

Section – A

Ecology

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

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Section – B

Environmental Biology-I

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

Section - C

Environmental Biology -II

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

PAPER –III: Z-303

APPLIED ZOOLOGY, ETHNOLOGY AND BIOSTATISTICS

NOTE:

1. There will be two parts of this theory question paper with total duration of 3 hours. First part of question paper will comprise question No. 1 containing 10 very short answer (Maximum 25 words) type questions, each of 1 mark. This part is compulsory to attempt. Questions should be evenly distributed covering entire syllabus.

   Second part of question paper will be of long answer type questions having three sections. There will be total 9 questions (Q. No. 2 to 10) in this part i.e. three from each unit /section, out of which candidate will be required to attempt any 4 question selecting at least one question from each unit/section. Each question will carry 6 marks

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

Section – A

Applied Zoology

Principles and Practices of the following:

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

Economic Importance of the following:

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

Section – B

Ethology

1. Introduction and history of Ethology.
2. Concepts of Ethology : Fixed action pattern, sign stimulus, innate releasing mechanism, action specific energy, motivation imprinting and learning.

3. Pheromones and their role in alarm spreading
4. Societies: Characteristics and advantage with special reference to honey bee & deer.
5. Biological rhythms and biological clocks.
6. Methods of studying animal behavior.

Section – C

Biostatistics

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

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Syllabus: B.Sc.-B.Ed. Part-III (Pass Course)
Zoology Practical
(2020-2021)

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

I.   **Anatomy:**

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

II.   **Study of the following through Permanent Slide preparations:**

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

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

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

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

VI.   **Environmental Biology:**

Analysis of Environment:

1. Soil pH
2. Water analysis: pH, alkalinity, acidity, dissolved O_2 and free CO_2, Salinity (Chloride).
3. Qualitative estimation of zoo-plankton in given sample of water.

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VII. Ethology:

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

VIII. Biostatistics:

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

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

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

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

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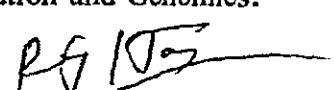
Notes:

1. With reference to anatomy and study of museum specimens, candidates must be well versed in the study of various systems with the help of charts/models/CD- ROMs, multimedia computer based simulations including computer assisted learning (CAL) and other softwares.

2. With reference to permanent preparations and microscopic slides, in case of non-availability, the exercise should be substituted with diagrams, photographs, models, charts, etc.

3. Candidates must keep a record of all work done in the practical class and submit the same for inspection at the time of the practical examination.

4. The candidates may be asked to write detailed methodology wherever necessary and separate marks may be allocated for the same.

5. Mounting material for permanent preparations would be as per the syllabus or as available through collection and culture methods.

6. It should be ensured that animals used in the practical exercises are not covered under the wild life act 1972 and amendments made subsequently.

Recommended Books:

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

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

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PHYSICS

Scheme

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

Paper I: Quantum Mechanics and Spectroscopy

Work Load: Two hours Lecture per week

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

Unit – I : Evolution of quantum physics

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

2. Uncertainty principle: position and momentum, angle and angular momentum, energy and time. Application of uncertainty principle: (i) Ground state energy of hydrogen atom, (ii) ground state energy of simple harmonic oscillator, (iii) Natural width of spectral lines, (iv) Non-existence of electron in nucleus.

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

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

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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 it's 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

1. D.J. Griffiths, Introduction to Quantum Mechanics, 2nd edition.
2. R. Shankar, Principles of Quantum Mechanics, 2nd edition.
3. Arthur Beiser, Perspective of modern Physics, 6th edition.
4. AK Ghatak and S Lokanathan, Quantum Mechanics: Theory and application.
5. HS Mani, GK Mehta, Introduction to modern Physics.
6. C.N. Banwell and E.M. McCash, Fundamental of Molecular Spectroscopy, 4th edition.
7. H.E. White, Introduction to atomic physics,

Paper II: Nuclear and Particle Physics

Work Load: Two hours Lecture per week

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

UNIT - I

Properties of Nucleus : Discovery of Nucleus, Rutherford Scattering. Constituents of the Nucleus, Mass, Charge, Size, Nuclear Density, Charge Distribution, Holstadter's experiment.

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Nuclear Angular momentum, Nuclear Magnetic Dipole Moment, Electric Quadrupole Moment, Spin. . Isospin, Wave Mechanical Properties: Parity and Statistics, Classification of Nuclei. Mass Defect and Binding Energy, Packing Fraction, Mass Spectrograph.

Nuclear Forces: Properties of Nuclear Forces, Yukawa Meson Theory. Nuclear Potential.

Nuclear Models: Segre Chart, Liquid Drop Model, Semi Empirical Mass Formula, Condition of Stability, Fermi Gas Model, Evidence for Nuclear Shell Structure, Nuclear Magic Numbers and Basic Assumptions of the Shell Model.

UNIT - 2

Radioactive Decays: Alpha Decay-Basics of α-Decay Processes, Theory of β-Emission Spectrum, Gammow Factor, Geiger Nuttal Law, Range of Alpha Particles,

Beta Decay Energy Kinematics for β-Decay, β-Decay Spectrum, Positron Emission, Electron Capture, Pauli's Neutrino Hypothesis.

Gamma Decay- Gamma Ray Emission and Kinematics, Internal Conversion

Applications of Radioactivity

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

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

UNIT - 3

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

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

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

UNIT - 4

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

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

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

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

Suggested Books:

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

Paper III: Solid State Physics

Two hours Lecture per week

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

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 Braggs equation, Study of crystals by X-rays: FWHM, Sherrer formula and Lattice Constants (for simple cubic structure), Electron and Neutron diffraction (qualitative).

Unit II

Band theory of solids:

Formation of bands, Periodic potential and Bloch Theorem, Number of states in the bands, Kroning Penny model, Brilliuon 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 current carriers, Hall Effect in semiconductors: Hall coefficient, Mobility, Charge carrier concentration, Conductivity and Hall angle.

Unit III

Thermal properties of Materials:

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

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Electrical Properties of Materials:

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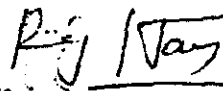
Unit IV

Magnetic properties of Materials:

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

Superconductivity:

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

Reference Books

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

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   (i)   at fixed frequency by varying C, and

   (ii) by varying frequency.

4. Study of the characteristics of junction diode & Zener diode.

5.. Study of

   (i)   Recovery time of junction diode and point contact diode..

   (ii) Recovery time as a function of frequency of operation and switching current.

6. To design Zener regulated power supply and study the regulation with various loads.

7. To study the characteristics of a field effect transistor (FET) and design/study amplifier of finite gain (10).

8. To study the frequency response of a transistor amplifier and obtain the input and output impendence of the amplifier.

9. To design and study of an R-C phase shift oscillator and measure output impedance (frequency response with change of component of R and C).

10. To study a voltage multiplier circuit to generate high voltage D.C. from A.C.

11. Using discrete components, study OR, AND, NOT logic gates, compare with TTL integrated circuits (I.C.'s).

12. Application of operational amplifier (OP-AMP) as : Minimum two of the following exercises–(a) Buffer (for accurate voltage measurement) (b) Inverting amplifier (c) Non inverting amplifier (d) Summing amplifier.

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

Teaching : 3 Hours per Week per Theory Paper.

Examination Scheme :

Min. Pass Marks			Max. Marks
Science – 54			150
Arts – 72			200

		Duration	Max.Marks
Paper – I	Algebra	3 hrs.	40 (Science)
			53 (Arts)
Paper – II	Complex Analysis	3 hrs.	40 (Science)
			53 (Arts)
Paper – III	Mechanics	3 hrs.	40 (Science)
			54 (Arts)
Practical		2 hrs.	30 (Science)
			40 (Arts)

Note:

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

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

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

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

Paper -I : Algebra

Teaching : 3 Hours per Week

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

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

Unit 1: Definition and simple properties of Groups and Subgroups. Permutation group,
Cyclic group. Cosets, Lagrange's theorem on the order of subgroups of a finite order group.

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

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

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

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

Reference Books:

1. Joseph A. Gallian, Contemporary Abstract Algebra (4th Edition), Narosa Publishing
   House, New Delhi, 1999.(IX Edition 2010).

2. S Lang, Introduction to Linear Algebra (2nd edition), Springer, 2005.

3. Gilbert Strang, Linear Algebra and its Applications, Thomson, 2007.

4. S. Kumaresan, Linear Algebra- A Geometric Approach, Prentice Hall of India, 1999.

5. Kenneth Hoffman, Ray Alden Kunze, Linear Algebra 2nd Ed., Prentice-Hall Of India
   Pvt. Limited, 1971.

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Paper – II: Complex Analysis

Teaching : 3 Hours per Week
Duration of Examination : 3 Hours

Max. Marks: 40 (Science)

53 (Arts)

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

Unit 1: Complex plane. Connected and Compact sets. Curves and Regions in complex plane. Jordan curve Theorem (statement only). Extended complex plane. Stereographic projection. Complex valued function – Limits, Continuity and Differentiability. Analytic functions, Cauchy-Riemann equations (Cartesian and polar form). Harmonic functions, Construction of an analytic function.

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

Unit 3: Taylor's theorem. Laurent's theorem. Maximum modulus theorem.
Power series – Absolute convergence, Abel's theorem, Cauchy-Hadamard theorem, Circle and Radius of convergence, Analyticity of the sum function of a power series.

Unit 4: Singularities of an analytic function, Branch point, Meromorphic and Entire functions, Riemann's theorem, Casorati-Weierstrass theorem.
Residue at a singularity, Cauchy's residue theorem. Argument principle. Rouche's theorem. Fundamental theorem of Algebra.

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

Evaluation of a real definite integral by contour integration.

Analytic continuation. Power series method of analytic continuation.

Reference Books:

1. James Ward Brown and Ruel V. Churchill, Complex Variables and Applications (Eighth Edition), McGraw – Hill International Edition, 2009.

2. Joseph Bak and Donald J. Newman, Complex analysis (2nd Edition), Undergraduate Texts in Mathematics, Springer-Verlag New York, Inc., New York, 1997.

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Paper – III: Mechanics

Teaching : 3 Hours per Week

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

54 (Arts)

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

Unit 1: Velocity and acceleration – along radial and transverse directions, along tangential and normal directions. S.H.M., Hooke's law, motion along horizontal and vertical elastic strings.

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

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

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

Unit-5: Virtual work and Catenary.

Reference Books :

1. I.H. Shames and G. Krishna Mohan Rao, Engineering Mechanics: Statics and Dynamics (4th Edition), Dorling Kindersley (India) Pvt. Ltd. (Pearson Education), Delhi, 2009.

2. R.C. Hibbeler and Ashok Gupta, Engineering Mechanics: Statics and Dynamics (11th Edition), Dorling Kindersley (India) Pvt. Ltd. (Pearson Education), Delhi.

3. S.L. Loney - An Elementary Treatise on the Dynamics of a Particle and of Rigid Bodies, Kalyani Publishers, New Delhi.

4. J.L. Synge & B.A. Griffith - Principles of Mechanics, Tata McGraw-Hill, 1959.

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Practical

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

Examination: **Duration: 2 Hours**

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

Distribution of Marks:

Two Practicals one from each group

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

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

Practicals with Computer Programming in C Language.

Group A:

1. Solution of algebraic and transcendental equations by Bisection method, Regula-falsi method and Newton-Raphson method.

2. Solution of Initial value problems by Euler's method and Runga-Kutta(third and fourth order) method.

Group B:

1. Matrix operations: addition, subtraction, multiplication, Rank of a matrix, inverse of a matrix.

2. Solution of linear algebraic equations by Gauss elimination method, Matrix method, Gauss Jordan method.

Note:

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

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PEDAGOGY OF SCHOOL SUBJECT

PAPER:-VIII A / B

CHEMISTRY TEACHING

Marks-100

Objectives -

To enable student teacher to:

1. Understand the Nature, Place, Values and Objectives of teaching chemistry at secondary/senior secondary level.

2. Understand correlation with other subjects

3. Evaluate critically the existing syllabus of chemistry

4. Develop understanding of various objectives of teaching Chemistry in Secondary Schools.

5. Understand and adopt proper methods of teaching various topics of Chemistry.

6. Appreciate the usefulness of various co-curricular activities for fostering interest of pupils in Chemistry.

7. Get acquainted with various methods of evaluation of the progress of pupils in Chemistry.

8. Prepare and use different types of instructional material for teaching Chemistry.

9. Understand the difficulties faced in teaching and learning Chemistry and suggest remedial measures.

10. Evaluate critically the existing syllabus of Chemistry prescribed for Secondary/Senior Secondary level in the State of Rajasthan.

11. Provide training in scientific method and develop scientific temper among their students.

Unit - I: The Nature of Science

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

Unit - II: Curriculum and Planning

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

Unit - III: Methods of Teaching Chemistry

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

UNIT-IV Instructional Support System

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

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

Unit - V: Evaluation of Chemistry

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

Assignments :-

1. Class Test   10 marks

2. Any one of the following :-   10 marks

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

References:

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

2. Das, R.C.: Science in Schools. New Delhi: Sterling Publishers, 1985.

3. Directorate of Hindi Implementation, Delhi University, 2000.

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4. Gupta, S.K.: Teaching of Science Education. New Delhi: Vikas Publishers, 1983.

5. Gupta, S.K.: Teaching Physical Science in Secondary. New Delhi: Sterling Publishers, 1985.

6. Joyce, B. & Weil, M: Models of Teaching. Prentice Hall Inc., New Jersey, 1979.

7. Kishore, L.: Teaching of Physical Science. Delhi: Doaba House, 1991.

8. Mangal, S.K.: Teaching of Science. New Delhi: Agra Book Depot, 1982.

9. 8.NCERT: Teaching of Science in Secondary Schools. New Delhi: NCERT, 1982.

10. Pal, H.R and Pal, R.: Curriculum – Yesterday, Today and Tomorrow. Kshipra, New Delhi, 2006.

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

12. Sansanwal, D.N. & Singh, P.: Models of Teaching. Society for Educational Research & Development, Baroda, 1991.

13. Vaidya, N.:Science Teaching for the 21st century. Deep and Deep Publication, New Delhi, 1996.

14. Venkataiah, S.: Teaching of Chemistry. Anmol Publisher Pvt. Ltd., New Delhi, 2002.

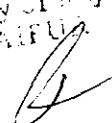## PEDAGOGY OF SCHOOL SUBJECT

PAPER:-VIII A / B

BIOLOGY TEACHING

Marks100

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 Scienctific 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 Laboaratory.
9. Organise Co-curricular activities and utilize community resoruces promoting Science learning.
10. Use most approapariate method to asses the progress and achievement of the pupil & thus prepare appropriate test for the purpose (both theoretical & practical)

UNIT-I Nature, Scope and Objectives

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

UNIT-II Curriculum and lanning

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

UNIT-III Methods and approaches

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

UNIT-IV Instructional Support System

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

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

UNIT-V Evaluation in Biology

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

Sessonal Work :(20 Marks)

(1) Class Test   10 Marks

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

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

REFERENCES:-

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

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2. Das, R.C.: Science in Schools. New Delhi: Sterling Publishers, 1985.

3. Gupta, S.K.: Teaching of Science Education. New Delhi: Vikas Publishers, 1983.

4. Gupta, S.K.: Teaching Physical Science in Secondary. New Delhi: Sterling Publishers, 1985

5. Gupta, V.K.: Teaching and Learning of Science and Technology. New Delhi: Vikas Publishing House Pvt. Ltd., 1995.

6. Joyce, B. & Weil, M: Models of Teaching. Prentice Hall Inc., New Jersey, 1979.

7. Kishore, L.: Teaching of Physical Science. Delhi: Doaba House, 1991. 34

8. Mangal, S.K.: Teaching of Science. New Delhi: Agra Book Depot, 1982.

9. NCERT: Teaching of Science in Secondary Schools. New Delhi: NCERT, 1982.

10. Pal, H.R and Pal, R.: Curriculum – Yesterday, Today and Tomorrow. Kshipra, New Delhi, 2006.

PEDAGOGY OF SCHOOL SUBJECT

PAPER:-VIII A / B

Physics Teaching

MARKS:-100

Objectives:-

The student teachers will be able to:

1. Understand the nature of Science and Physics.

2. Appreciate the contribution of Indian and Foreign scientists in the development of Physics.

3. Develop the skill of planning teaching learning activities.

4. Develop competencies in (a) Selection and use of teaching methods, approaches and devices. (b) Selection, preparation and use of cost effective teaching aids. (c) Inculcation of scientific attitude and science related values. (d) Plan, manage physics laboratory and organize physics practical work

5. Develop skill of critical appraisal of Physics text book.

6. Select and effectively make use of teaching aids.

7. Organize co-curricular activities related to physics.

8. Plan and critically appraise Physics curriculum at senior secondary level.

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

Course content

Unit - I - Foundations of teaching physics

- Nature of Science and Physics, Major milestones in the development of physics, Contributions of Eminent Indian and foreign Physicists: C.V.Raman,Vikram Sarabhai,Homi Jehangir Bhabha, Subhramanayan, D.S. Kothari, Chadershekhar, Satyender Nath Bose, Newton, Archimedes, Alexander Graham Bell, Madam Curie, Albert Einstein.

- Relationship of science and society, impact of physics on modern Indian society with reference to issues related with Environment, Globalization, Industrialization, and Information Technology.

- Aims and objectives of teaching physics at senior secondary level, Correlation of physics with other school subjects.

Unit - II - Planning for Instruction and Role of Teacher

- Specific Objectives of Teaching Physics in Behavioural Terms, Content Analysis and Concept Mapping.

- Developing Yearly Plan, Unit Plan and Daily Lesson Plans.

- Teacher's role in training students in scientific method, developing scientific attitude, critical thinking and creativity.

- Qualities, responsibilities and professional ethics of physics teacher.

- Criteria for selection of physics text book, critical appraisal of Physics Text Book

Unit - III - Approaches and Methods of Teaching Physics

- Concept approach –Process approach – teaching science as a process,

- scientific method, problem solving method,

- Cooperative learning approach,

- Activity based approach – investigatory approach,

- project method, laboratory method ,

- Demonstration-cum-discussion method ,

- Constructivist approach

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Unit IV- Instructional support system

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

Unit –V Physics curriculum and Evaluation of Physics Learning

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

Sessional Work –

1. Class Test   10MARKS

2. Any one of the following: 10MARKS

- Case study of any one Senior Secondary School Laboratory of Physics.
- Preparation of a diagnostic test of physics on any one unit.
- Planning activities for teaching a unit of physics using local resources.
- Conducting and reporting a practical class in Physics Laboratory

References :

1. Aicken,Frederick(1984).The Nature of Science,London: Heinemann Educational Books.

2. Anderson R.D. (1970). Developing Children's Thinking Through Science, New Delhi: Pr

3. Chauhan, S.S. (2000). Innovation in Teaching Learning ProcessNew Delhi: Vikas Publishing House Pvt. Ltd.

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4. Das, R. C. (1985).Science Teaching in SchoolsNew Delhi: Sterling Publishers Pvt. Ltd.

5. Dave , R.H..Taxonomy of Educational Objectives and Achievement Testing,London: London University Press.

6. Edigar M. and Rao D.B. (1996). Science Curriculum,New Delhi: Discovery Publishing House.

7. Gronlund,Norman,E(1968). Constructing Achievement Tests, New York: Prentice

8. Gupta, N.K. (1997). Research in Teaching of Science,New Delhi: APH Publishing Corporation. 9. Kochar, S.K. (1997). Methods and Techniques of Teaching,New Delhi: Sterling Publishers Pvt. Ltd.

9. Maitre, K. (1991). Teaching of Physics,New Delhi: Discovery Publishing House.

10. Mukalel, J.C. (1998). Creative Approaches to Classroom Teaching,New Delhi: Discovery Publishing House.

11. Prakash, R. and Rath, T.N. (1996).Emerging Trends in Teaching of Physics, New Delhi: Kanisha Publishers.

12. Radha Mohan (2003). Innovative Science Teaching for Physical ScienceTeachers,New Delhi:Prentice Hall Pvt.Ltd.

PEDAGOGY OF SCHOOL SUBJECT

PAPER:-VIII A / B

MATHEMATICS TEACHING

Marks – 100

Objectives:

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

1. To enable prospective mathematics teachers towards the processes in which mathematics learning takes place in children's mind.

2. To enable the nature, characteristics and structure of mathematics and its correlation with other areas.

3. To enable the processes in mathematics and their importance.

4. To enable the content categories in mathematics and illustrate with examples.

5. To enable understanding of the Goals, Aims and Objectives of teaching mathematics at secondary school level.

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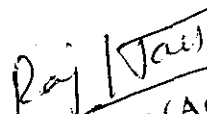University of Rajasthan
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6. To enable awareness about the objectives of teaching mathematics at secondary school level as envisaged by NCF 2005 and KCF 2012.

7. To enable understanding and skill in preparing lesson episodes based on Five E model; different approaches, methods, models and techniques of teaching mathematics.

8. To enable understanding about collaborative learning and cooperative learning strategies.

9. To enable the prospective mathematics teachers as facilitators for effective learning of mathematics.

10. To enable prospective mathematics teachers with ICT enabled skills for facilitating learning of mathematics.

11. To enable skill in assessing mathematics learning.

12. To enable prospective mathematics teachers as reflective practitioners.

UNIT I Nature and Structure of Mathematics

a) Meaning and characteristics of mathematics– Science and Mathematics – Development of Mathematics: empirical, intuitive and logical

b) History of Mathematics education : Ancient period to 21st century

c) Contributions of eminent Mathematicians(Western &Indian-4 each)

d) Branches of Mathematics: Arithmetic, Algebra, Geometry, Trigonometry -

e) Undefined terms – Axioms – Postulates – Theorems – Proofs and verification in mathematics-Types of theorems: Existence and Uniqueness theorems – Types of proofs: Direct, indirect by contradiction, by exhaustion, by mathematical induction.

f) Euclidean geometry and its criticisms – emergence of non Euclidean geometry.

UNIT– II Objectives and Approaches of Teaching Mathematics

a) Aims and Objectives of Teaching Mathematics: At primary, Secondary and Higher secondary levels – Goals of mathematics education-Mathematical skills: Calculations, Geometrical, and interpreting graphs – Mathematical abilities- Problem solving ability.

b) Approaches to teaching Mathematics: Behaviorist approach, constructivist approach,

c) Process oriented approach, Competency based approach, Realistic mathematics education.

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.

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PEDAGOGY OF SCHOOL SUBJECT

PAPER:-VIII A / B

General Science Teaching

MARKS:-100

OBJECTIVES:-

The Pupil- teacher will be able to-

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

Unit - 1 Teaching of General Science

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

Unit - 2 Planning in General- Science teaching

- Curriculum - concept, methods of curriculum construction, Difference between Curriculum and Syllabus, ,
- 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, Constructvism, Inductive-deductive.
- Techniques:- Team teaching, Simulation, Task analysis, Cognitive psychology based technique, Technology based technique
- Year plan, Unit plan, Lesson plan - General, IT based,

Unit- 4 Teaching Aids and Models of teaching

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

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

Unit - 5 Pedagogical analysis & Evaluation in General Science

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

Sessional Work –

1. Class Test   10 marks

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

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