

महाराजा सूरजमल बृज विश्वविद्यालय
भरतपुर
Maharaja Surajmal Brij University
Bharatpur



FACULTY OF EDUCATION
SYLLABUS

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

Annual Scheme

Academic Session 2019-20


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

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NOTICE

1. Change in syllabus ordinance/rules/regulation/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 Maharaja Surajmal Brij Univesrity, head Quarter Bharatpur only and not any other place.




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**B.SC. B.ED. PART – III Year
CONTENTS**

SCHEME OF EXAMINATION

SYLLABUS

1. INFORMATION & COMMUNICATION TECHNOLOGY (ICT) (COMPULSORY PAPER)*
2. LANGUAGE ACROSS THE CURRICULUM (COMPULSORY PAPER)
3. GUIDANCE AND COUNSELING IN SCHOOL
4. CONTENT (SELECT ANY THREE)
 - CHEMISTRY (I, II, III)
 - BOTANY (I, II, III)
 - ZOOLOGY (I, II, III)
 - PHYSICS (I, II, III)
 - MATHEMATICS (I, II, III)
5. Pedagogy of a School Subject IIIrd Year and IVth Year(candidate shall be required to offer any one papers in both year in following subjects).
 - CHEMISTRY
 - BIOLOGY
 - PHYSICS
 - MATHEMATICS
 - GENERAL SCIENCE




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


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

Objectives:

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

Learning Outcomes:

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


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teachings through the use of proper evaluation techniques.

9. Readiness to spot talented and gifted children and capacity to meet their needs.
10. Ability to organize various school programmes, activities for pupil.
11. Developing guidance point of view in educational, personal and vocational matters.
12. Ability to access the all round development of pupils and to maintain a cumulative record.
13. Developing certain practical skill such as:
 - a. Black board work.
 - b. Preparing improvised apparatus.
 - c. Preparing teaching aids and ICT.
14. Interest and competence in the development of the teaching profession and education. Readiness to participate in activities of professional organizations.

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

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

Duration of the Course- Four years

Examination after each session in theory papers

Terminal 80 Marks for 20 Marks = Total 100

Some of the papers are fully Sessional of having according to their practical marks as the case may be Chemistry, Botany, Zoology, Physics & Mathematics.

***Compulsory Subjects:**

Year	SUBJECTS
Ist Year	Gen. English(01)
II Year	Gen. Hindi(08)
III Year	Computer Application (ICT)(16)
IV Year	Environmental Education (25)

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

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Subject Specialisation :

Year	SUBJECTS
Ist Year	Instructional System & Educational(04)
II Year	Peace Education(11)
III Year	Guidance and Counseling in School(18)
IV Year	Physical Education & Yoga(28)

Content of Science Subject:- A Student has to opt any three subjects .

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


Pedagogy of School Subject :

Pedagogy of a School Subject IIIrd Year and IVth Year(candidate shall be required to offer any one papers in both years from the following.).

Chemistry
Botany
Zoology
Physics
Mathematics

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


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


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

Subject	Course Code	Title of the Paper	Evaluation			Total
			External	Internal	Practical	
01	B.Sc.- B.Ed. 01	Gen. English(Compulsory)*	100	-	-	100
02	B.Sc.- B.Ed. 02	Childhood and Growing Up	80	20	-	100
03	B.Sc.- B.Ed. 03	Contemporary India and Education	80	20	-	100
04	B.Sc.- B.Ed. 04	Instructional System & Educational Evaluation	80	20	-	100
05(i,ii,ii iii),06(i, ii,iii),,0 7(i,ii,iii) ,	B.Sc.- B.Ed 05, 06 & 07	Content (PCB & PCM Group) (Select any Three)				
		1. Chemistry (I,II,III)	33+33+34		50	150
		2. Botany (I,II,III)	33+33+34		50	150
		3. Zoology(I,II,III)	33 +33+34		50	150
		4. Physics (I,II,III)	33+33+34		50	150
5. Mathematics(I,II,III)	40+40+40		30	150		
750						

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

Subject	Course Code	Title of the Paper	Evaluation			Total
			External	Internal	Practical	
O8	B.Sc.-B.Ed. 08	Gen. Hindi(Compulsory)*	100	-	-	100
09	B.Sc.-B.Ed. 09	Knowledge and curriculum	80	20	-	100
10	B.Sc.-B.Ed. 10	Learning and Teaching	80	20	-	100
11	B.Sc.-B.Ed 11	Peace Education	80	20	-	100
12(i,ii,iii) , 13(i,ii,iii) , 14(i,ii,iii) ,	B.Sc.-B.Ed 12,13,14	Content (PCB & PCM Group) (Select any Three) 1. Chemistry(I,II,III) 2. Botany (I,II,III) 3. Zoology(I,II,III) 4. Physics (I,II,III) 5. Mathematics(I,II,III)	33+33+34 33+33+34 33 +33+34 33+33+34 40+40+40		50 50 50 50 30	150 150 150 150 150
15 Practicum	B.Sc. - B.Ed (Practicum)	OPEN AIR / SUPW CAMP i. Community Service ii. Survey (Based on social and educational events) iii. Co-Curricular Activities iv. Health and Social awareness programme (DISASTER MANAGEMENT AND CLEANINESS)		25 25 25 25		100
						750+100


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

Subject	Course Code	Title of the Paper	Evaluation			Total
			External	Internal	Practical	
16	B.Sc.- B.Ed. 16	Information & Communication (ICT) (Compulsory)*	100	-	-	100
17	B.Sc.- B.Ed.17	Language Across the Curriculum	80	20	-	100
18	B.Sc.- B.Ed-18	Guidance and Counseling in School	80	20	-	100
19(i,ii,iii), 20(i,ii,iii),, 21(i,ii,iii),	B.Sc.- B.Ed 19,20,21	Content (PCB & PCM Group) (Select any Three) 1. Chemistry(I,II,III) 2. Botany (I,II,III) 3. Zoology(I,II,III) 4. Physics (I,II,III) 5. Mathematics(I,II,III)	33+33+34 33+33+34 33+33+34 33+33+34 40+40+40		50 50 50 50 30	150 150 150 150 150
22	B.Sc.- B.Ed 22	Pedagogy of a School Subject (candidate shall be required to offer any one papers from the following) 1.Mathematics 2. Physics 3. Chemistry 4. Biology 5. General Science	80	20		100





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Practicum 23	B.Sc.- B.Ed 23	Special Training Programme <ul style="list-style-type: none"> • Micro Teaching • Practice Lesson • Observation Lesson • Technology Based Lesson • Criticism Lesson • Attendance /Seminar/ Workshop 			10	100	
					50		05
24	B.Sc.- B.Ed 24	Final Lesson	100		05	100	
						20	
						10	
							750+100+100

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

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

Subject	Course Code	Title of the Paper	Evaluation			Total
			External	Internal	Practical	
25	B.Sc .-B.Ed. 25	Environmental Education(Compulsory)*	80	20	-	100
26	B.Sc - B.Ed. 26	Creating and inclusive school	80	20	-	100
27	B.Sc B.Ed. 27	Understanding Disciplines and Subject	80	20	-	100
28	B.Sc .-B.Ed. 28	Physical Education & Yoga	80	20	-	100
29	B.Sc -B.Ed.	Gender, School and Society	80	20	-	100




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	29					
30	B.Sc -B.Ed. 30	Assessment for Learning	80	20	-	100
31	B.Sc- B.Ed. 31	Pedagogy of a School Subject (candidate shall be required to offer any one papers from the following) 1.Mathematics 2. Physics 3. Chemistry 4. Biology 5. General Science	80	20	-	100
Practicum 32	B.Sc- B.Ed. 32	1. Practice teaching 2. Block Teaching (Participation in School Activities Social Participation in Group) 3. Report of any feature of school / case study/action research 4. Criticism Lesson		50 20 10 20		100
33	B.Sc- B.Ed. 33	Final Lesson	100			100
						600+100+ 100


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

Compulsory subjects

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





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Group – A	Group – B (PCB & PCM Group) (Select any Three subjects)
1. Instructional System & Educational 2. Peace Education 3. Guidance and Counseling in School 4. Physical Education & Yoga	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: Pedagogy of a School Subject IIIrd Year and IVth Year(candidate shall be required to offer any one papers in both year in following subjects).

Chemistry
Botany
Zoology
Physics
Mathematics

- ❖ In all the subjects the student has to study 7 subjects (1-7)in Ist year, 8 subjects(8-15) in IInd Year.9 subjects(16-24)in IIIrd Year and 9 subjects(25-32) in IVth Year.
- ❖ Each theory paper will carry 100 marks and content based paper will carry 150 marks.(including practical part).





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

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

Years	Subject	Marks
I Year	6 subjects (2-7)+Practical	600 +150= 750
II Year	6subjects(9-14)+Practical + SUPW(15)	600 +150+100= 850
III Year	6 subjects(17-22)+Practical + Practicum(23) +Final Lesson (24)	600 +150+ 100 +100= 950
IV Year	6 subjects(26-31) + Practicum (33)+Final Lesson (33)	600+ 100 +100= 800
Total	33 subjects)	2400 +450+300 +200= 3350

***ELIGIBILITY CRITERIAN ON PASSING MARKS BUT MARKS SHALL NOT BE INCLUDED IN DIVISION. (SUBJECTS 1,8,16,25)**

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 pupil's and secure their active participation in the educative process.



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6. Develop in the pupil's capacity for thinking and working independently and guide the pupils to that end.
7. Organize and manage the class for teaching learning.
8. Appreciate the dynamic nature of the class situation and teaching techniques.
9. Define objectives of particular lessons and plan for their achievement.
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 19, 20, 21 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




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lesson)


4. Organization and participation in co-curricular activities.
5. Setting fellow up assignment.
6. Evaluation in terms of education objectives use of teachers made test & 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 last 40 lessons (20 Lessons of one teaching subject in 3rd year & 20 Lesson of other teaching subject in 4th year) in a recognized school under the supervision of the staff of the college shall be eligible for admission to the examination for the degree of B.Sc. B.Ed.


Notes:-

- I. Teaching subjects means a subject offered by the candidate at his/her running B.Sc. B.Ed. course either as a compulsory subject or as n 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.




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- 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 (Ist , IInd & IIIrd Year) and IIIrd year and IVth year) in the four years B.Sc. B.Ed. integrated course, paper no IIIrd in B.Sc. B.Ed. IIIrd year and paper no VIth 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 Ist comprising theory papers & Part-2 practice of teaching in accordance with the scheme of examination laid down from time to time.
- O.325 Candidates who fail in Integrated B.Sc. B.Ed. examination in part 1 or part 2 the theory of education may present themselves for re-examination there in at a subsequent examination without attending a further course at an affiliated training college.
- Provided** that a candidate who fails in any one of the theory papers and secures at least 48% marks in the aggregate of the remaining theory papers may be allowed to reappear in the examination in the immediately following year in the paper in which he/she fails only. He/She shall be declared to have passed if he secures minimum passing marks prescribed for the paper in which he appeared and shall be deemed to have secured minimum passing marks only prescribed for the paper (irrespective of the marks actually obtained by him) for the purpose of determining his division in accordance with the scheme of examination. The candidate shall have to repeat the whole examination in subsequent year in case he fails to clear the paper in which he failed.
- O.326 Candidates who fail in the Integrated B.Sc. B.Ed. examination Part 1 and part 2


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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-least 40 lessons (20 in part 1 & part 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 reason 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 form 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. 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 evolution of practice teaching:

1. Every candidate will teach at-least 40 lessons (20 in III year & 20 in IV year) during


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- 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. 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 at-least one lesson and a minimum of 15% in two lessons (one in each of the two subjects).
 8. The board of Examination will consist of :
 - a. The principal of the college concerned.
 - b. A principal or a senior and experienced member of the teaching staff of another training college, affiliated to Maharaja Surajmal Brij University, Bharatpur.
 - c. An external examiner may be appointed from outside the Maharaja Surajmal Brij University, Bharatpur 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.


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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 (1) 30 percent marks in each theory paper and sessional (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 candidate at Integrated B.Sc. B.Ed. four year examination obtaining total marks will be classified in three division and shall be assigned separately in theory and school internship practice of teaching as follows:

Division	Theory	Practice of teaching
1	60%	60%
2	48%	48%
Pass	30% Per Paper (Aggregate 36)	40%

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


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B.Sc. B.Ed.-Paper Code 16 (PART – III)
INFORMATION & COMMUNICATION TECHNOLOGY (ICT)

Max. Marks: 100

Objectives:


1. To enable the students to recognize understand and appreciate ICT as an assertive learning as a enormous functional support to teachers.
2. To know and understand different parts of computer and their functioning.
3. To understand the operating system of Computer.
4. To develop skill in the use of Internet.
5. To appreciate the concept of integration of information and communication Technology with education.
6. To make use of Modern Information and Communication Technology to improve teaching learning process.
7. To develop positive attitude towards handling of computers.

Unit- I Information & Communication Technology in Education

- ❖ Concept, Importance, Meaning & Nature of information & Communication Technology.
- ❖ Need of information & Communication Technology in Education.
- ❖ Scope of Information and Communication Technology areas; (Teaching Learning Process, Evaluation, Research and Administration), Trends in Information and communication and technology.
- ❖ Paradigm shift in education due to ICT content with special reference to curriculum, Role of Teacher, Methods of Teaching, Classroom Environment Evaluation, Procedure and Educational management.
- ❖ Challenges in interesting information communication Technology in school Education.

Unit-II Introduction to computer




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- ❖ General awareness about functioning of computer
 - Generation, Characteristics, Types of computers and uses of Computer.
 - Brief introduction of working computer using the block diagram.
- ❖ Hardware
 - Input Device- Key Board, Mouse, Scanner, Microphone and digital camera.
 - Out device- Monitor, Printer, speaker and screen image projector.
 - Storage device - Hard Disk, CD & DVD and Mass storage Device (Pen Drive)

Unit-III Software of Computer

- ❖ Software
 - Operating System- Concept and function
 - Application software (its uses of education)
 - Word Processors
 - Power Point Presentation
 - Spread Sheet
 - Viruses & their management


Unit- IV - ICT Supported teaching/Learning strategies, Internet and Intranet

- ❖ CAL- Computer Assisted Learning
- ❖ PBL- Project Based Learning
- ❖ Technology - Aided Learning
- ❖ E-Learning- Concept & Nature
- ❖ Web Based Learning
- ❖ Virtual Classroom
- ❖ Concept, need & Importance

Unit- V - Internet and Intranet uses in Education


- ❖ Facilities available for communication
 - Email, Chat and online conferencing
 - E-Library, Websites, blog, Wikipedia
- ❖ Search Engines- Concept and uses





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3. Rajsekar, S. (2010), Computers in Education, ND: Neelkamal Publication Pvt. Ltd.
4. Roblyer, M.D. (2008) Intergating Educational Technology into Teaching New Delhi: Perason Education, South Asia, India.
5. Singh, Kamal.D., & Kaur, D. (2008). Using Computers in Education, New Delhi: Dhanpat Rai Publishing Company (Pvt.) Limited.
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B.Sc, B.Ed. - Paper Code 17 PART- III

Language across the curriculum

Max. Marks- 80

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 that nature of reading comprehension and writing in specific content areas.
5. Understand interplay of language and society.
6. Understand function of language
7. Understand language and speech disorder and make remedial measure too.

Unit 1


Meaning, Nature, scope, role, importance, function 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, Principal, objectives, Importance, relation, differences.

Unit- 3

A) Oral aptitude in language, theoretical speech of oral aptitude, development of oral expression/Speech in pupil teacher, Classroom, discourse, Discussion as a tool of learning, questioning in the class room, developing reading skill through text book,


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problems and remedies to incorrect pronunciation.

B) Language Skills- (LSWR-Listening, Speaking, Writing Reading) Meaning Concepts, importance, co-relation, methods and techniques, Language Laboratory- need, Importance, Advantage, Use in teacher's training.

Unit-4

A) Listening Skill- Pronunciation, Intonation, Stress, Pitch, Rhythm and Oral Aptitude.

B) Speaking Skill- Pronunciation, Intonation, Stress, Pitch, Rhythm and Oral Aptitude.

C) Writing Skill – Aspects of writing shapes, sounds, meanings, punctuation marks, word, Sentences, 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.


Internal 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.



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- 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 of any language subject.

Reference :

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.Asrom & R.J. Tierney (Edu) learning to read in American schools: based readers and content teats psychology.
3. Bansal R.K. and Harrison J.B.- (1990) spoken English for Indian orient Longman LTD Madras.
4. Ladson, billings G (1995) towards 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.
6. Paliwal Dr. A.K. (2002) communicative language teaching Sumtri publication, Jaipur.





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B.Sc. B.Ed. – Paper Code 18 PART- III
GUIDANCE AND COUNSELING IN SCHOOL

OBJECTIVES :-

Max. Marks – 80

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.
- Develop the various areas, tools and techniques in guidance.
- Understand the concept need and meaning of counseling.
- Get acquainted with the principles and process of counseling.
- Understand the tools and techniques in counseling.

UNIT- 1 GUIDANCE IN SCHOOL


- Concept, need and meaning of guidance.
- Principles of Guidance.
- Procedure of Guidance (Steps)
- Issues and problems of Guidance.
- Role of school in Guidance.

UNIT-2 AREAS, TOOLS AND TECHNIQUES IN GUIDANCE

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

UNIT-3 COUNSELING IN SCHOOL




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- Concept, need and meaning of counseling.
- Principles of counseling.
- Counseling process and role.
- Directive, non-directive and eclectic counseling.
- Qualities and role of a school counselor.

UNIT-4 TOOLS AND TECHNIQUES IN COUNSELING

- 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 addition centers, Career resource centre.
- Evaluation of counseling.

Need for research and reforms in guidance and counseling.

Internal Tasks and Assignment

(20 Marks)

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.





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- 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 Counseling in the classroom, Allyn & Bacon Inco, 1985.
3. Baqrki. B.G. Mukhopadhyaya. B., Guidance and Counseling; 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, 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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B.Sc. B.Ed. - Paper Code 19 (for Both PCB & PCM)
Chemistry
Scheme

Max. Marks : 150

	Duration (Hrs.)	Max. Marks	Min. Pass Marks	
Paper- I	3	33	10	} Aggregate 36
Paper- II	3	33	10	
Paper- III	3	34	10	
Practical	5	50	18	

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

Paper-I : Inorganic Chemistry Paper Code 19 (I)
(2 hrs. or 3 period/week)

Unit- I

Hard and Soft Acids and Bases (HSAB):

Classification of acids and bases as hard and soft. Person's HSAB concept, acid-base strength and hardness and softness. Symbiosis, theoretical bases of hardness and softness, electro negativity and hardness and softness.

Unit- II

Metal-ligand bonding in Transition Metal Complex:


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

Magnetic properties of Transition Metal Complexes:

Types of magnetic behavior, 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




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Electron Spectra of Transition Metal Complexes:

Types of electronic transition selection rules for d-d transition, spectroscopic ground states. Spectrochemical series. Orgel-energy level diagram for d^1 and d^9 state, discussion of the electronic spectrum of $(Ti(H_2O)_6)^{3+}$ complex.

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 organ metallic compounds, Preparation, properties, bonding and applications of alkyls and aryls of Li, Al, Hg Sn and Ti, a brief account of metalethylenic complexes and homogenous 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.


Paper - II : Organic Chemistry Paper Code 19 (II)

(2 hrs. or 3 period/week)

Unit- I

Nuclear Magnetic Resonance (NMR) Spectroscopy

Proton Magnetic Resonance (1H -NMR) Spectroscopy, nuclear shielding and


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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 acetophnone. Problems pertaining to the structure elucidation of simple organic compounds using NMR data.

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

Unit- II

Heterocyclic Compounds


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

Introduction to condensed five- and six membered heterocycles. Preparation and reactions of indole, quinoline and isoquinoline with special reference to Fischer-indole synthesis, Skraup synthesis and Bischler Napieralski synthesis, Mechanism of Electrophilic substitutions reaction 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 Shortening of aldoses. Erythro and threodiastereomers. Conversion of glucose into mutar configuration of monosaccharides. Determination of ring size of monosaccharides. Formation of glycosides, ethers and


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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-base behavior, 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 reaction 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, Polystyrene, Polyamides, Phenol-formaldehyde resins, urea-formaldehyde resins epoxy resins and polyurethanes. Natural and Synthetic rubber.

Synthesis 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.


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Paper - III: Physical Chemistry Paper Code 19 (III)
(2 Hrs. or 3 Periods/week)

Unit - I

Elementary quantum Mechanics:-

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

De Broglie hypothesis, the Heisenberg's uncertainty principle, Sinusoidal wave equation, Hamiltonian operator Schrodinger wave equation and its importance, physical interpretation of wave function postulates of quantum mechanics, particle in a one dimensional box.

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

Unit- II

Molecular orbital Theory:

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

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

Unit - III

Spectroscopy

Introduction: Electromagnetic radiation, spectrum, basic features of different spectrometers, statement of the Born-Openheimer approximation, Degree 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 excited state, qualitative description of fluorescence, phosphorescence, non-radiative processes (Internal conversion, Intersystem crossing) quantum yield, photosensitized reactions-energy transfer processes (simple examples).

Physical Properties and Molecular Structure

Optical activity polymerization - (Clausius-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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Unit- V

Solutions Dilute Solutions and Colligative Properties:

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

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

Practical : Laboratory Course - III

(6 Hrs/week)

INORGANIC CHEMISTRY

Synthesis and Analysis of:

1. Potassium Trioxalatoferrate (III), $K_3[Fe(C_2O_4)_3]$
2. Bis (Dimethyl glyoximato) Nickel (II) Complex $[Ni(DMG)_2]$
3. Tetraamminecopper (II) sulphate $[Cu(NH_3)_4]SO_4$
4. Potassium cis-diaquabis (oxalate) chromate (III) dehydrate, $k[cis-Cr(H_2O)_2(C_2O_4)_2]2H_2O$


Instrumentation

Calorimetry

1. Job's
2. Mole -ration method

Adulteration Food stuffs

Effluent analysis water analysis


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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-nitro phenols

Column Chromatography

Separation of fluorescein and methylene blue

Separation of leaf pigments from spinach leaves

Resolution of racemic mixture of (+) mandelic acid

Qualitative Analysis

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

Synthesis of organic Compounds

1. Acetylation of salicylic acid, aniline, glucose and hydroquinone.

Benzoylation of aniline and phenol

2. Aliphatic Electrophilic substitution

Preparation of iodoform from ethanol and acetone


3. Aromatic Electrophilic substitution

Nitration

Preparation of m-dinitrobenzene

Preparation of p-nitro acetanilide

Halogenation


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Preparation of p- Brome acetanilide

Preparation of 2, 4, 6 - tribronrnophenol

4. Diazotization / coupling

Preparation of methyl orange and methyl red

5. Oxidation

Preparation of benzoic acid from toluene

6. Reduction

Preparation of aniline from nitrobenzene

Preparation of m-nitroaniline from m-dinitrobenzene.

Stereo-chemical study of Organic Compounds via Methods

R and S configuration of optical isomers.

E, Z configuration of geometrical isomers.

Conformational analysis of cyclohexanes and substituted cyclohexanes.

PHYSICAL CHEMISTRY

Electrochemistry

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

Refractometry, Polarimetry

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

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Molecular Weight Determination

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

Colorimetry

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

(Instructions to the Examiner)

Chemistry Practical (Pass Course)

Max. Marks : 50

Duration of Exams : 3hrs.

Min. Mark: 18

Inorganic Chemistry

Synthesis and Analysis on 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/ $\text{NaHCO}_3/\text{NaOH}$ and preparation of suitable derivatives.

Column Chromatography techniques.

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


Physical Chemistry

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

Viva-voce 5

Record 5

50



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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. Terr, Prentice Hall.
8. Organic Chemistry, Morrison and Boyd, Prentice Hall.
9. Organic Chemistry, L.G. Wade Jr, Prentice Hall.
10. Fundamentals of Organic Chemistry, Solomons, John Wiley.
11. Organic Chemistry Vol I, II, III S.M. Mukhrji, S.P. Singh and R.P. Kapoor, Wiley Eastern Ltd. (New Age International)
12. Organic Chemistry, F.A. Carey, McGraw Hill Inc.
13. Introduction to Organic Chemistry, Streitwieser. Heathcock and Kosover. Macmillan.
14. Physical Chemistry, H.M. Barrow, International Students Edition, McGraw Hill
15. Basic Programming with Application, V.K. Jain Tata McGraw Hill.
16. University General Chemistry, C.N.R. Rao Macmillan.
17. Physical Chemistry, R.A. Alberty, Wiley Eastern Ltd.
18. The Elements of Physical Chemistry, P.W. Atkins, Oxford.
19. 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 Orinet Longman.
2. Vogel's Textbook of Quantitative inorganic Analysis (Revised) J. Bassett. R.C. Deney. G.H. Jeffery and J. Mendham ELBS.
3. Standard Methods of Chemistry Analysis .W.W. Scott The Technical Press.
4. Experimental inorganic Chemistry W.G. Palmer Cambridge.
5. Handbook of Preparative inorganic chemistry. Vol I & II, Brauer, Academic Press.]


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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 Textbooks of Practixal 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.S. Das and B. Behra Tata McGraw Hill.
12. Advanced Practical Physical Chemistry, J.I3 Yadav, Goel Publishing House.
13. Advanced Experimental Chemistry, Vol I-Physical J.N. Gurtii and R. Kapoor, S. Chand & CO.
14. Selected Experiments in Physical Chemistry, N.G. Mukhrjee, J.N. Ghjose & Sons.
15. Experiments in Physical Chemistry, J.C. Ghosh, Bharti Bhavan (Instruction to Examiners)




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B.Sc. B.Ed Paper Code - 20 (For PCB)

BOTANY

Max. Marks : 150

	Duration (Hrs.)	Max. Marks	Min. Pass Marks
Paper- I	3	33	10
Paper- II	3	33	10
Paper- III	3	34	10
Practical	4	50	18

Aggregate 36

Note:

1. There will be 5 questions in each paper all questions are compulsory. Candidate has to answer all questions in the main answer book only.
2. Q.No. will have 20 very short answer types 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 questions from each unit. These Q.No. 2 to 5 will have internal choice.

Paper-I Paper Code - 20 (I)

Plant Morphology and Anatomy

Unit - I

The basic body plan of flowering plant- type of growth, diversity of plant from in annuals, biennials and perennials,; branching pattern; monopodial and sympodial growth ; canopy architecture; meristematic, simple , complex and secretory tissues tissue systems.

Unit - II

The shoot system: The shoot apical meristem and its histological organization; vascularization of primary shoot in monocotyledons and dicotyledons; cambium and its function; formation of secondary xylem; a general account of wood structure

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growth rings; sapwood and heartwood; secondary phloem-structure and function; periderm. Anomalous secondary growth.

Unit - III

The leaf: origin, development, arrangement and diversity in size and shape: Stomata-structure and types, stomatal index. Vascularisation of leaf-modal structure and venation ; senescence and abscission.


The root system: Root apical meristem; Differentiation of primary and secondary tissues and their function; structural modification for stage, respiration, reproduction and root microbial interaction.

Unit - IV

Morphology and anatomy of seed (Monocotyledons and dicotyledons): Significance of seed- Suspended animation, dispersal strategies. Vegetative propagation.

Suggested Reading:

- Cutter. F.G. 1969 Part I cells and tissues Edward Arnold. London.
- Cutter. E.G. 1971 Plant Anatomy Experiment and interpretation Part II Organs educated Arnold; London
- Esan.K. 1977 Anatomy of seed Plants, 2nd edition John Wiley & Sons, New York
- Fahn.A. 1985 Plant Anatomy Pergamon Press Oxford.
- Hartman H.T. and Kestler, D.E. 1976 Plant Preparation Principles and of India Pvt. Ltd. New Delhi.
- Manseth J.D. 1988, Plant Anatomy. The Benjamin/Cumming Publishing co. Inc. Mento Park. California, USA
- Thomas P 2000 Trees Their National History Cambridge University Press Cambridge.
- Roven PM Events, R.F. and Eichhien, S.E. 1999 Biology of Plants, W.H. Freeman and Co Worth Publishers, New York.


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Suggested Laboratory Exercises:

1. Study of any Commonly occurring Plant to understand the body plan and modular type of growth.
2. Life forms exhibited by flowering plants visit to a forest or a garden.
3. L.S. of shoot tip of 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, Bougainvilla, Bouhaenia myctanthes Leptadema, Deacena.
7. Study of diversity on leaf shape and size Internal structure of Leaf-Dorsiventral and isobilateral leaves, study of stomatal stypes.
8. Examination of seed (monocot and dicots) Structure seed viability test
9. Specimen study of modifications of plant parts for negative reproduction.


Paper - II Paper Code - 20 (II)

Ecology and Economic Botany

Unit - I

Plants and Environment: Atmosphere (Four distinct Zone vix. Stratosphere, Troposphere, mesosphere and thermosphere). Adaptation (morphological, anatomical and physiological responses) of plants to water (Hydrophytes and xerophytes) Light (global radiation, photo synthetically active radiation. Zonation in water body: Littoral, Limnetic and profoundal Zones; photoperiodism, heliophytes and sciophytes). Temperature (Raunker's classification of plants: Megatherm, Mesotherm, Microtherm, Heikistotherm; themoperiodicity and vernalisation). Soil (Soil profile, development-weathering and maturation) Soil texture, soil types, role pg pH, organic matter, soil nutrients interactions among organisms (neutralism, amnasalism, allelopathy), Competition, predation, parasitism, protoco operation, mutualism), Environmental Protection act.




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Unit - II

Population ecology, 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, eecis, 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 N2 cycle & H2O cycles of carbon and phosphorus, Vegetation types of Rajasthan. Endangered Plants of Rajasthan.

Unit- III


Basic concept of center of origin of cultivated plants. Food plants Rice, wheat, Maize, potato, sugarcane. Vegetables general account with a note on radish, onion, garlic, cabbage, spinach, cauliflower, cucumber, tomato, lady finger and pea. Fruits : General account with a note on apple, banana ber, mango, mulberry, Jamun, Watermelon, muskmelon, guava and orange. Vegetable oil: Ground nut, mustard and coconut.

Unit - IV

Spices: General account with an emphasis on those cultivated in Rajasthan (Cumin, Capsicum, Coriander). Beverages: Tea and Coffee, Medicinal plants: General Account with an emphasis on plant species cultivated in Rajasthan (Senna, Isabgol, Safed Musli) Fibres: Cotton and jute. Wood: General account of sources of firewood, timber and bamboos; Rubber. Ethno botany: A general account.

Practical exercise:

1. Study frequency and density, abundance 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.


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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 water body by sechhidisk.
12. Study morphology (External and internally) of hydrophytes (Hydrilla stem, Typha leaf and Nymphaea/Eichhornia Petioler and xerophytes (Calotropics, Capparis and Casuarina stem, Nerium Leaf with references to their adaptations.
13. Study following specimen with special reference to :
 - Botany of the economically important part.
 - Processing, if any involved.
 - Specimen of cereals, pulses, spices beverage (Tea & Coffee) beans, sugar or seeds (Mustard, groundnut)
14. Study of starch grain in potato and pea histo-chemical test cellulose, lignin, starch Fat, protein and tannin.
15. Submit specimens of locally importance medicinal Plants.

Paper- III Paper Code - 20 (III)

Angiosperm- Taxonomy and Embryology

Unit- I


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's Engler and Prantle's system.

Diversity of flowering plants illustrated by members and economic importance of the following families: Papaveraceae, Caryophyllaceae and Apiaceae, Cucurbitaceae.





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Unit - II

Rubiaceae, Apocynaceae, Asclepiadaceae, Convolvulaceae, Acanthaceae, Lamiaceae, Cheonpoliaceae, Euphorbiaceae. Liliaceae, Arecaceae.

Unit- III

Ontogeny of the flower parts-development and variations structure of another, Microsporogenesis, Tapetum-types and functions, development of male gametophyte, structure of pollen grains.


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

Unit-IV

Development of dicot and monocot embryo. Formation, types of embryo. Endosperm, types of Endosperm, Endosperm haustoria. Polyembryony, induced polyembryony, Parthenocarpy. Apomixis and Adventive embryony.

(A) Taxonomy

1. Ranunculaceae Ranunculus Delphinium
2. Lamiaceae -Ocimum Salvia
3. Euphorbiaceae- Euphorbia Pulcherrima, Ricinus
4. Papaveraceae : Papaver. Argemone
5. Caryophyllaceae: Dianthus, Gypsophylla, Saponaria
6. Capparidaceae: Capparis, Cleome
7. Rutaceae: Murraya, Citrus
8. Apiaceae: Coriandrum, Foeniculum, Anethum
9. Cucurbitaceae: Kuffa or any Cucurbit
10. Asteraceae: Helianthus, Calandula, Sonchus
11. Apocynaceae: Catharanthus, Thevetia, Nerium
12. Asclepiadaceae: Calotropis


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13.Scrophulariaceae: Linaria, Antirrhinum

14.Musaceae: Musa

15.Poaceae: Avena, Triticum, Hordeum, Poa, Sorghum

(B) Types of inflorescence and fruits

(C) Embology

1. Study of another to study the wall layers and pollen sac with pollen grains.
2. Study the various types of ovule draw a diagram.
3. Study the various types of placentations.
4. Study the germination of pollen grain m and observe the path of pollen tube.
5. Study the various stages of embryo Ruphanus fruits

Suggested Readings

Bhandari, M.M. Flora of Indian Desert.

Bhojwani, S.S. and Bhatnagar, S.P. The Embryology of Angiosperms, 4th Revised and enlarged edition, Vikas Publ., New Delhi, 2002.

Davis, P.H. and Heywood, V.H. Principles of Angiosperm Taxonomy, Oliver and Boyd, London, 1963.

Fegerig K. and Vender Pifi The Principles of Pollination Ecology, Pergamon Press, 1979.


Gifford, E.M. and Foster, A.S. Morphology and Evolution of Vascular Plants W.H. Freeman and Company, New York, 1979.

Heywood, V.H. and Moore, D.M. (eds.) Morphology and Evolution of Vascular Plants, W.H. Freeman and Company, New York 1984.

Jeffrey, C. An Introduction to plant Taxonomy, Cambridge University Press, Cambridge, LONDON, 1982.

Jones, S.D. Jr. and Suchsinger, A.E. Plant Systematic (2nd Ed.) McGraw Hill Book Co., New York, 1986.

Maheshwari, J.K. Flora of Delhi, CSIR, New Delhi, 1963.


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Redford, A.E.: Fundamentals of PLant Systematics, Harper and Row, New York, 1986.

Sharma, O.P. Taxonomy: Tata McGraw Hill Pub. Company Ltd. New Delhi 2000.

Singh G. Plant Systematics- Theory and Practices, Oxford and IBH Ovt. Ltd. New Delhi, 1999.

Singh, V., Pandey, P.C. and Jain, D.K. Angiosperms, 2005, Rastogi Pub., Meerut.

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 indentify the family giving reason.	7	7
	(b) Comment on the embryological exercise	3	3
2.	(a) Anatomical Exercise on anomalous secondary growth.	5	5
	(b) 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) Histo-chemical 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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B.Sc. B.Ed. Paper code - 21 (for PCB)

Zoology

Max. Marks : 150

	Duration (Hrs.)	Max. Marks	Min. Pass Marks
Paper- I	3	33	10
Paper- II	3	33	10
Paper- III	3	34	10
Practical	4	50	18

} Aggregate 36

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 questions from each unit/section. Each question will carry 6 marks.

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

PAPER- I : Paper code - 21 (I)

STRUCTURE AND FUNCTION OF CHORDATE TYPES

NOTE:

1. There will be two parts of this theory question paper with total duration of 3 hours. First part of questions paper will comprise questions No. 1 containing 9 very answer (Maximum 25 words) type questions each of 1 mark. This part is

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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 questions from each unit/section. Each question will carry 6 marks.

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

Section – A


Chordates

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

Section – B

Comparative Anatomy

1. Integument including structure and development of placoid scales, feathers and hair.
2. Basic Plan of vertebrate endoskeleton.
3. Alimentary canal.
4. Heart and aortic Arches.
5. Respiratory System.
6. Urinogenital System.
7. Brain.
8. Sense organs (ear and eye).


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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 adaptation, types of feather, bird migration.
5. Mammals: Adaptive radiation, dentition.

PAPER – II : Paper code - 21 (II)

ECOLOGY AND ENVIRONMENTAL BIOLOGY

NOTE :

1. There will be two parts of these 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 questions 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:

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- Concepts of food-chain, food web, trophic structure, ecological pyramids.
5. Biogeochemical cycles of O₂, CO₂, H₂O, N, P and role microbes.
 6. Ecosystem: Homeostasis, functional aspects, productivity concepts and determination, ecotone, edge effects, niche.
 7. Population ecology; Density and methods of its management, 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 welfare with respect to use of pesticides conversation and pollution.

Section – B

Environment Biology – I

1. Environment and its concepts global environment, hydrosphere, lithosphere and atmosphere.
2. Natural resources: Present status and future needs.
3. Conversation and management of natural resources: Renewable (forest, wildlife, water) and non renewal (Soil, minerals and energy).
4. Environmental pollution I: General outline and various types of pollution of water, air and soil.




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5. Environmental pollution II: Sources and remedies for noise, radiation, industrial chemicals, agrochemicals, insecticides, pesticides and household pollutants.
6. Green House effect, Ozone layer depletion, El-Nino and La Nina effects.
7. Radiation and environment: Types of radiation, fallout effects of radiation nuclear accidents.
8. Basic concepts of bioaccumulation, biomagnifications, biodegradation of pollutants.

Section – C

Environmental Biology - II

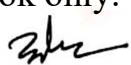
1. Wildlife conservation: Vanishing and threatened animals and plants special reference in Rajasthan, Wildlife management efforts by Government and non Government organization (including wild life acts).
2. Impact of urbanization: Development and distribution of urban centers, factors, problems and solution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

PAPER- III: PAPER CODE - 21 (III) APPLIED ZOOLOGY, ETHOLOGY 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 selection at least one questions from each unit/section. Each question will carry 6 marks.
2. The candidate has to answer all questions in the main answer book only.





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Section- A

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.
7. Piscicultural

Economics Importance of the following:


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

Section- B

Ethnology

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.
7. Methods of studying animal behavior.




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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.

B.Sc. B.Ed. Part-III

Zoology Practical

Min. Marks: 18

3 Hrs./Week

Max. Marks: 50


1. Anatomy:

- a) **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.
- b) Rat or any other suitable mammal: Blood vascular, Urino-Gentail and nervous system (brain cranial nerves). In this exercise CAL (Computer assisted Learning) May be used with a software COMPURAT.

2. Study of the following through permanent Slide preparations:

Striped muscles fibres; Smooth muscles fibres. Scales of edible fish, hair of man, bollod film of any vertebrate.

3. **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.


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4. **Study of Museum Speimens:** Ascidia, Ciona, Botryllus, Ammeocoete larva, Petromyzon, Myxine or Bdellostoma, Zygaena (Sphyrna), Torpedo, Chimaera; Acepenser, Amia or Lepidosteus, Labeo, Clarias, Anguilla, Hippocampus, Exocoetus, Echeneis, any flat-fish, protopterus, Ichthyophis or any blind-worm, Proteus, Ambystoma, Axoltil, Siren, Alytes, Hyla, Testudo, Chelone, and Fresh Water Tortoise, Sphendon, Hemidactylus Phrynosoma, Draco, Chameleon; Eryx Hydrophis, Naja, Viper, Crocodilus, Alligator, rchaeopteryx, any running Bird Pavo cristatus, Choriotis Nigriceps, Ornithorhynchus, Tachyglossus, Didelphys, Macropus, Bat, Loris, Sclay Anteater.

5. **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.


6. Environmental Biology:

Analysis of Environment:

1. Soil pH
2. Water analysis: pH, Alkalinity, acidity, dissolved O₂ and free CO₂, Salinity (Chloride).
3. Qualitative estimation of zoo-plankton in given sample of water.
4. Methods of ecological census of soil fauna.

7. 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).


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8. 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	3	4
2.	Permanent Preparation	6	6
3.	Environment Biology	7	7
4.	Ethology	3	5
5.	Biostatics	5	7
6.	Identification and comment on Spots (1 to 8)	16	16
7.	Viva voce	5	5
8.	Class Record	5	-
		50	50

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


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5. Mounting material for permanent preparations would be as per 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. Brred 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. Laharen Publications Garland STPM Press.
10. Kotpal RL: Modern Text Book of Zoology: Vertebrates Global Media Publications 2010.
11. MacFarland D: Animals 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.


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John Wiley & Sons, 2013

19. Rana S. V. : Environmental Studies 4th edition. Rastogi Publication 2012.
20. Rastogi VB Organic Evolution 6th edition Kedar Nath Ram Nath Publication Publication, Meerut, Delhi 1993.
21. Rastogi VB and Jayaraj MS Animal Ecology & Distribution of Animals Kedar nath Ram Nath Publications, Meerut, Delhi, 1983.
22. Sharma P. D: Environmental Biology and Toxicology. 3rd edition Rastogi Publications, 2013.
23. Runder 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 2014-15.
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.

B.Sc.B.Ed. Paper code - 20 (For PCM)

PHYSICS

Max. Marks : 150

	Duration (Hrs.)	Max. Marks	Min. Pass Marks	
Paper- I	3	33	10	} Aggregate 36
Paper- II	3	33	10	
Paper- III	3	34	10	
Practical	3	50	18	

Paper : I : Paper code - 20 (I)

Quantum Mechanics And Spectroscopy

Work Load: Tow hours Lecture per Week

Scheme of Examination : First questions will be of nine marks comprising of six short

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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 questions will have two parts namely (A) and (B) each carrying three marks. Part (A) of second to fifth questions 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 Einstein's explanations. Compton effect, De-Broglie Hypothesis, diffraction and interference experiments of particle (Davisson- Germer Experiments).
2. Uncertainly principle: position and momentum, angle and angular momentum energy and time. Application of uncertainly 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 wave functions. Hermitian operators, their erigen values, Hermitian adjoint operators, Eigenvalues and eigenfunctions, expectation values of operators: position, momentum, energy, Ehrenfest theorem and complementarily, concept of group and phase velocity, wave packet, Gaussain wave packet, bra-ket notation.

Unit- II: Schrodinger wave questions and its solutions

1. Schrodinger wave equation General equation of wave propagation, propagation of matter waves, time dependent and time-independent Schrodinger equation wavefunctions representation (ψ), Physical meaning of v , properties and conditions on ψ , postulates of wave mechanics, operators, observable and measurements; probability current density.
2. Time independent Schrodinger 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 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: Schrodinger 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 solutions; simple harmonic oscillator, Schrodinger 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. Schrodinger equation in spherical coordinates, Schrodinger 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
3. 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 moment, spin-orbit coupling, qualitative explanation of fine structure, Franck-Hertz experiment, Zeeman effect, normal Zeeman splitting, qualitative understanding about Stark effect.
2. Absorption and emission spectroscopy, its block diagram brief explanation about function of each elements and its limitations, single beam spectrophotometer..
3. Molecular spectroscopy: concept of rigid rotator, rotational energy levels, rotational spectra, selection rules, intensity of spectral lines, isotopic effect; Vibrational energy levels, vibrational spectra, selection rules, isotopic effect, effect of anharmonicity in vibrational spectra, vibrational-rotational spectra of CO and HCl molecules

Reference Books

1. David 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 Paper code - 20 (II)

Nuclear and Particle Physics

Work Load: Two hours Lecture per week


Scheme of examination: First questions will be of nine marks comprising of six short answer type parts 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 questions will have two parts namely (A) and (B) each carrying three marks. Part (A) of second to fifth questions 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 Density, Charge Distribution, Hofstadter's experiment, 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,


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Condition of Stability, Fermi Gas Model, Evidence for Nuclear Shell Structure, Nuclear Magic Numbers and Basic Assumptions of the shell model.

Unit- II

Radioactive Decays: Alpha Decay Basics of α Decay Processes, Theory of β - Emission Spectrum, Gamow 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 reactions, Four Factor Formula, Nuclear reactors, Classification of Nuclear Reactor, Uncontrolled Chain Reaction, Nuclear Fusion, Energy released in Number Fusion , Fusion in Stars.

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

Unit- III

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, Current Mode and Pulse Operation of Detector.

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

Unit- IV

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, Discrete Symmetries C, P and T invariance. Application of Symmetry arguments to particle reactions. Parity non-conservation in weak interaction, CP violation.

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

Suggested Books:

1. Nuclear and Particle Physics: W.E. Burcham and M Jobs Addison Wesley Longman Inc.
2. Nuclear and Particle Physics, Brain 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. Introudction 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.


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Paper III Paper code - 20 (III)

Solid State Physics

Work Load: 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 questions from each of the unit and will be of six marks each. Second to fifth questions will have two parts namely (A) and (B) each carrying three marks. Part (A) of second to fifth questions shall be compulsory and part (B) of these questions will have internal choice.

Unit - I

Bonding in solids and Crystal

Force between atoms, Ionic bonds, Covalent and metallic bonds, Vander waal's and Hydrogen bonding. Periodicity in lattices, Basis, Lattice point and pace lattice, Translation vectors, unit and primitive cell, Crystal systems, Packing fraction for Simple Cubic (SC), Body Central Cubic (BCC), Face Centred Cubic (FCC) and Hexagonal lattice structures, Bravais pace 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, Peridic Potential and Bloch Theorem , Number of States in the bands, Kroning Penny model, Brilliuon Zones, Crystal Momentum and physical origin


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of effective mass, Negative effective Mass and Holes, Energy dispersion relation: 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 relation in monoatomic and diatomic linear lattice. Lattice heat capacity, classical theory of specific heat, Dulong-Petit law, Einstein and Debye's theory of specific heat of solids and limitations of these models concept of thermoelectric Power.

Electrical Properties of Materials:

Drude- Lorentz theory, Sommerfeld's model, Thermal conductivity, Electrical conductivity , Widemann-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 Paramagnetic. 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


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Penetration Depth. Isotope effect. Idea of BCS theory (No Derivation): Cooper Pair and Coherence Length. Josephson Effect (No Derivation)

Reference Books:

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

B.Sc. B.Ed.

Physics Practical

Teaching

4 Hrs./week

Max. Marks

Duration

Min. Pass Marks

50


3 Hrs.

18

Total number of experiments to be performed by the students during the session should be 16 selecting any 6 from each section.

Section-A

1. Determination of Planck's constant by photo cell (retarding potential) method using optical filters, preferably five wave length)
2. Determination of Planck's constant using solar cell.
3. Determination of Stefan's constant (Black body method)
4. Study of the temperature dependence of resistance of a semi-conductor (four Prob-Method)
5. Study of Iodine spectrum with the help of grating and spectrometer and ordinary bulb light.
6. Study of characteristics of a Gm counter and verification of inverse square law for the same strength of a radioactive source.
7. Study of β absorption in Al foil using GM Counter.
8. To find the magnetic susceptibility of a paramagnetic solution using Quinck;s method. Also find the ionic molecular susceptibility of the ion and magnetic


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- moment of the ion in terms of Bohr magneton.
9. Determination of coefficient of rigidity as a function of temperature using torsion oscillator (resonance Method)
 10. Study of polarization by reflection from a glass plate with the help of Nicol's prism and photo cell and verification of Brewster law and law of Malus.
 11. e/m measurement by helical method.
 12. Measurement of magnetic field using ballistic galvanometers and search coil.
Study of verification of magnetic field of an electromagnet with current.
 13. Measurement of electric charge by Millikan's oil drop method.

Section- B

1. Study of a R-C transmission line at 50 Hz
2. Study of a L-C transmission line.
 - i. At fixed frequency
 - ii. at variable frequency
3. Study of resonance in an LCR circuit (using air core inductance and damping by metal plate)
 - i. At fixed frequency by varying C, and
 - ii. by varying frequency
4. Study of the characteristics of junction diode & Zener Diode.
5. Study of
 - i. Recovery time of junction diode and point contact diode.
 - ii. Recovery time as a function of frequency of operation and switching current.
6. To design Zener regulated power supply and study the regulation with various loads.
7. To study the characteristics of a field effect transistor (FET) and design /study amplifier of finite gain (10)
8. To study the frequency response of a transistor amplifier and obtain the input



- and output impedance of the amplifier.
9. To design and study of an R-C phase shift oscillator and measure output impedance (frequency response with change of component of R and C).
 10. To study a voltage multiplier circuit to generate high voltage D.C. and A.C..
 11. Using discrete components study OR and NOT logic gates, compare with TTL integrated circuits (I.C.'s)
 12. Application on operational amplifier (OP-MAP) as: Minimum two to the following exercises- (a) Buffer (for accurate voltage measurement) (b) Inverting amplifier (c) Non inverting amplifier (d) Summing amplifier

MATHEMATICS Paper Code- 21 (for PCM)

Paper- I B.A./B.Sc. B.Ed. Part III Examination-2020

Max. Marks : 150 (Only for Science Students)

	Duration (Hrs.)	Max. Marks	Min. Pass Marks
Paper- I	3	40	12
Paper- II	3	40	12
Paper- III	3	40	12
Practical	2	30	9

} Aggregate 54


Max. Marks : 200 (Only for Arts Students)

	Duration (Hrs.)	Max. Marks	Min. Pass Marks
Paper- I	3	53	16
Paper- II	3	53	16
Paper- III	3	54	17
Practical	2	40	14

} Aggregate 54

Note: This paper is divided into THREE Sections A, B & C. **Section- A** consists TEN Short answer type questions. Each question is of 1 Mark for Science and 1.5 mark or





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Arts. All questions are compulsory. **Section –B** consists TEN questions taking two questions from each unit. Each question will carry 3 marks for Science and 4 marks for Arts. Student has to attempt FIVE questions selecting ONE questions from each unit. **Section C-** consists FIVE question taking one questions from each unit. Each question will carry 5 marks for science and 6 marks for Arts. Student has to attempt ANY THREE questions.

Paper - I Paper Code- 21 (I)

MODERN ALGEBRA


Unit-I: Subgroups- Complex of a group, subgroup, criterion for a complex to be a subgroup Algebra of complexes, Union and Intersection of subgroups, cosets of a group, algebra of cosets, Index of a subgroup, lagrange's theorem, Fermat's theorem subgroups' of cyclic group.

Unit- II: Group Homomorphism, Isomorphism and Isomorphic, Properties of Homomorphism, Cayley's theorem, Normal subgroups, Simple Groups, Properties of normal subgroups, Quotient group or factor group, Fundamental theorem on homomorphism.

Unit-III: Ring, Integral domain and fields- Definition and their properties characteristics of Ring, Integral domain and Field. Subring, subfield, Prime field and their properties. Ring Homomorphism, Embedding of ring and integral domain, embedding of integral domain in a field, field of quotients.

Unit- IV: Vector Space- Definition and example of vector/Linear space, Elementary properties of vector space, Vector subspaces, Direct sum of subspaces, Linear combination of Vectors, Linear Span, Linear dependence and independence of vectors, Basis dimension, properties of finite dimensional vector spaces.

Unit-V: Linear Transformation or Homomorphism, Linear Operator, Isomorphism, theorems on isomorphism, Quotient space and its dimensions, Rank and Nullity of Linear transformation, Sylvester's Law, Matrices of linear maps, Matrices of


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composition maps, Invertible Matrices, Similar Matrices, Determinant of Matrices and its computations, Characteristic Polynomials, Eigen Values and Eigen vectors, Cayley-Hamilton's theorem.

Paper- II Paper Code- 21 (II)


Complex Analysis

Note: This paper is divided into THREE Sections A, B & C. **Section- A** consists TEN Short answer type questions. Each question is of 1 Mark for Science and 1.5 mark or Arts. All questions are compulsory. **Section –B** consists TEN questions taking two questions from each unit. Each question will carry 3 marks for Science and 4 marks for Arts. Student has to attempt FIVE questions selecting ONE questions from each unit. **Section C-** Consists FIVE question taking one questions from each unit. Each question will carry 5 marks for science and 6 marks for Arts. Student has to attempt ANY THREE questions.

Unit-I: Complex Plane : curves and regions in complex plane, Jordan curve theorem, Extended complex plane, Stereographic Projection Complex Valued Function- Limit, Continuity, Differentiability, Analytic function, Necessary and sufficient conditions for a function to be analytic, Harmonic functions, constructuin of an Analytic Functions, Milne Thomson's method. Convergence of power series- Absolute convergence, Abel's theorem, Cauchy-Hadamard theorem, circle and radius of convergence of power series.

Unit- II: Conformal Mapping: Necessary and sufficient for $w = f(z)$ to represent a conformal mapping, Bilinear transformation, Elementary mapping $w = \frac{1}{2} (z+1/z)$, $w = z^2$, $w = e^z$, $w = \text{Sin } z$, $w = \text{Cos } z$. Analytic continuation, Power series methods of analytic continuation.

Unit- III: Complex Integration- Complex line, integral, Cauchy integral theorem, Indefinite integral, Fundamental theorem integral calculus for complex, functions, Cauchy integral formula, Analyticity of derivative of an analytic functions, Morera's theorem,


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Poisson integral formula, Liouville's theorem, Maximum Modulus Principle.

Unit- IV: Taylor theorem Laurent's theorem. Singularity of an analytic function, Branch point Riemann theorem, Cauchy Weierstrass theorem, Entire and meromorphic functions. Method of detecting singularities, Zeros and poles of meromorphic function Argument principle, Rouché's theorem, Fundamental theorem of algebra.

Unit- V: Residue at Singularity, Residue at infinity, Calculation of residues, Cauchy Residue theorem, Evaluation of real definite integrals by contour integration.

Paper- III Paper Code- 21 (III)
Mechanics

Note: This paper is divided into THREE Sections A, B & C. **Section- A** consists TEN Short answer type questions. Each question is of 1 Mark for Science and 1.5 mark or Arts. All questions are compulsory. **Section –B** consists TEN questions taking two questions from each unit. Each question will carry 3 marks for Science and 4 marks for Arts. Student has to attempt FIVE questions selecting ONE questions from each unit. **Section-C** consists FIVE question taking one questions from each unit. Each question will carry 5 marks for science and 6 marks for Arts. Student has to attempt ANY THREE questions.

Unit- I: Kinematics and Kinetics: Radial and Transverse Components of velocity and Acceleration, Angular velocity and acceleration, Tangential and Normal Components of Acceleration, Kinetics: Forces and Motion. Rectilinear Motion: Simple Harmonic Motion, Hooke's Law, Horizontal Elastic String, Vertical Elastic String, Repulsion from a fixed point, Motion under Inverse square Law.

Unit-II: Motion in Resistive Medium- Resistance varies as velocity and square of velocity. Uniplanar motion: Projectile on an Horizontal Plane, Projection to pass through a given point, Projective on an Inclined Plane. Constrained Motion: Motion on a smooth curve in a vertical plane, motion on inside and outside of a smooth circle.

Unit-III: Central Orbits: p-r equation Apses, time on a orbit, Kepler's law of planetary motion. Moment of Inertia-M. I of rod, circular disk, rectangular, elliptical and

triangular lamina, solid and hollow spheres, solid ellipsoid, Product of Inertia, Theorem of Parallel Axis, Principal Axis, equipment Bodies.

Unit- IV: Equilibrium of a body under Coplanar Forces: Reduction of system of Coplanar Forces into a Force AND A Couple. Equilibrium of body under Three Forces and more than Three Forces. Friction: Force of Friction, Angle of Friction, Coefficient of Friction, Cone of Friction, Limiting Equilibrium on an Inclined Place, Least Force Required to pull a Body up and down on an inclined rough plane.

Unit-V:Catenary: Equation of Common Catenary, Properties of Catenary, Sag of Tightly Stretched Wire. Virtual Work: Principle of Virtual Work, Tension in a String, Thrust in a Rod, Problems involving Elastic and Curves, Problems Related to a body or a Frame work resting on a page or on Inclined Plane.

Practical

Teaching: 2 Hours per week

Examination Scheme:

Duration- 2 Hours

	Science	Arts
Maximum Marks	30	40
Minimum pass Marks	11	14

Distribution of Marks:

Two Exercises one from each group

10 marks each	=	20 marks	13 marks	=	26 marks
Practical Record	=	05 marks			07 marks
Viva- voce	=	05 Marks			07 Marks

Total Marks = 30 marks 40 Marks

Group-A: C-Language Preliminaries, Operators, Input-Output Statements, Conditional statements, Implementing loops in C-Programs, Array variables, some elementary programs, Matrix addition, subtraction, multiplication and to find inverse.

Group-B: Solution of some Numerical Analysis Problems- Numerical Integration, Gauss Elimination method to solve system of linear equation, Bisection method, Newton-Raphson method, Euler's method, Runge-Kutta's method using C-programming.

Note:- 1. Each candidate (Regular/Non-collegiate) has to prepare his/her record.
2. Students have to practice in a computer lab.

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PEDAGOGY OF SCHOOL SUBJECT
PAPER CODE- 22
CHEMISTRY TEACHING

Marks :- 80

Objectives:-

To enable student teacher to:

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

Unit-I: The Nature of Science

- Definition of Science, Scientific Method, Scientific Literacy with suitable examples from Chemistry.

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- 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 Constructions, 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 as Secondary/ Senior level prescribed by Board of Secondary Education, Rajasthan
- Planning-Daily lesson plan, unit plan & Yearly plan.

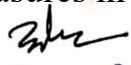
Unit – III: Methods of Teaching Chemistry

- Micro teaching, Skills of teaching Lesson Planning,
- Methods of Teaching Chemistry-Lecture Method, Demonstration Method. Discussion Method, Problem Solving Method, Project Method, Inductive-Deductive Method, Co-operative method, Constructivism method.
- Teaching models-concept Attainment model, Inquiry Training Model.
- Qualitative 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 Aids in Layout Plans, Equipments, Furniture, Maintenance of records, Repair, care and improvisation of apparatus, safety measures in lab.





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- Role of State & National Level Institutions & Laboratories like DST, NCL Fertilizer, Pesticide & Chemical Companies like Hindustan Zinc Ltd.
- Characteristics of a good text book and evaluation of a text book.

Unit – V: Evaluation of Chemistry

- Difference between measurement, Assessment and Evaluation,
- Characteristics of good Measurement, Diagnostic Test and Remedial Teaching,
- Criterion Referenced testing and Norm Referenced testing, Different Types of Items, Essay type, Short Types objective Type.
- Development and Standardization of Achievement test in Chemistry.

Assignments:-

1. Class test

10 marks

2. Any one of the following

10 marks

- Planning and Conducting Experiments.
- Preparation of models and charts.
- Preparation of Chemistry Projects.
- Critical 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 senior secondary Lab of Chemistry.
- Preparation of 10 frames of Linear or Branching type programmes on any topic





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PEDAGOGY OF SCHOOL SUBJECT

PAPER CODE - 22

BIOLOGY TEACHING

Marks 80


Objectives:

To enable student Teacher to

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

Unit -I Nature, Scope and Objectives

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


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Unit-II Curriculum and Planning


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

Unit-III Methods and Approaches

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

Unit-IV Instructional Support System

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


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Unit-V Evaluation in Biology

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


Sessional Work :

(20 Marks)

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

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PEDAGOGY OF SCHOOL SUBJECT

PAPER CODE- 22

Physics Teaching


Marks:- 80

Objectives:-

The student teachers will able to:

1. Understand the nature of Science and Physics.
2. Appreciate the contribution of Indian and Foreign Scientists in the development 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.





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7. Organize co-curricular activities related to physics.
8. Plan and critically appraise physics curriculum at senior secondary level.
9. Prepare, use and analyze achievement tests for evaluation of learning outcomes of Physics.

Course content

Unit-I Foundations of Teaching Physics

- Nature of Science and Physics, Major milestones in the development of physics contributions of Eminent Indian and Foreign Physicists: C.V. Raman, Vicar Sarabhai, Home, Jahangir Habra, Subramanian, D.S. Kothari, Chadershekhar, Satyendra 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 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.




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- Scientific methods, problem solving method,
- Cooperative learning approach,
- Activity based approach - investigatory approach,
- Project method, laboratory method,
- Demonstration-cum-discussion method,
- Constructivist approach

Unit IV- Instructional support system

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


Unit-V Physics curriculum and Evaluation of Physics Learning

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

Sessional Work-

- 1. Class Test** **10 MARKS**
- 2. Any one of the following:** **10 MARKS**
 - Case study of any one Senior Secondary School Laboratory of Physics.
 - Preparation of a diagnostic test of Physics on any one unit.






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- Planning activities for teaching a unit of physics using local resources.
- Conducting and reporting a practical class in Physics Laboratory.

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Teachers, New Delhi: Prentice Hall Pvt. Ltd.

PEDAGOGY OF SCHOOL SUBJECT

PAPER CODE- 22


MATHEMATICS TEACHING

Marks-80

Objectives:

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

1. To enable prospective mathematics teachers towards the processes in which mathematics learning takes place in children's mind.
2. To enable the nature, Characteristics and structure of mathematics and its correlation with other areas.
3. To enable the processes in mathematics and their importance.
4. To enable the content categories in mathematics and illustrate with examples.
5. To enable understanding of the Goals, Aims and Objectives of teaching mathematics at secondary school level.
6. To enable awareness about the objectives of teaching mathematics at secondary school level as envisaged by NCF 2005 and KCF 2012.
7. To enable understanding and skill in preparing lesson episodes based on Five E model: different approaches, methods, models and techniques of teaching mathematics.
8. To enable understanding about collaborative learning and cooperative learning strategies.
9. To enable the prospective mathematics teachers as facilities 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.


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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-




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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 8th, 9th, 10th, and 11th std:- content analysis, Listening 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 Test 10 Marks

2. Any one 10 Marks


- b) group puzzles
- c) Preparation of teaching aids
- d) Demonstration of teaching aids
- e) Collection of newspaper cuttings related to learning of a unit in Mathematics.


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- 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 CODE- 22

GENERAL SCIENCE TEACHING

Marks:- 80

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 basis 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 questions paper.

UNIT-I 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- II 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.


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UNIT-III Methods & Techniques of teaching in General Science

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

Unit-IV 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-V 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 10 Marks

- Preparation of a diagnostic test of General Science on any one unit.
- Analysis of syllabus.
- Evaluation of textbook.



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- Content analysis of one unit.
- Conduct presentation of lesson/unit.

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