



GOVIND GURU TRIBAL UNIVERSITY, BANSWARA

FACULTY OF EDUCATION

(Applicable w.e.f. Academic Year 2018-2019)

SYLLABUS

Integrated Programme of

B.Sc. B.Ed.

Study & Evaluation Scheme

NOTICE

- 1. Change in syllabus/ordinance/rules/regulations/ 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 ofchange.**
- 2. All court cases shall be subject to the jurisdiction GGTU of Banswara headquarter Banswara only and not any otherplace.**

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**FACULTY OF EDUCATION
SYLLABUS AND SCHEME OF EXAMINATION
ORDINANCES FOR B.Sc. B.Ed. PROGRAMME**

1. Programme and Duration:

Integrated Programme of Teacher Education titled 'Bachelor of Science and Bachelor of Education' (B.Sc. B.Ed.) degree programme. The programme will be of four-year duration organized on the year-end examination pattern. Each year will consist of a minimum 200 days of instruction excluding examination.

2. Equivalence:

The course contents related to various core courses offered in the Programme are equivalent to similar courses offered in the B.Sc. Programme recommended by University of Govind Guru Tribal University, Banswara. The course contents of the professional education component are equivalent to that of B.Ed. of GGTU, Banswara and are in accordance with the norms and regulations for the B.Sc. B.Ed. Programme prescribed by the NCTE (2014). This degree B.Sc. B.Ed. is thereby equivalent to B.Sc. and B.Ed. degrees of the GGTU, Banswara.

On successful completion of the programme, students are eligible for admission to Master Degree Programmes in respective subjects in the GGTU, Banswara and other Indian/Foreign Universities.

3. Eligibility and Admission:

Candidates who have passed Senior Secondary 10+2 examination or any other examination recognized as equivalent thereto by the GGTU, Banswara with at least 50% marks in the aggregate are eligible for admission to the course.

The reservation for SC/ST/OBC/PWD (Person with Disability) SBS and other category shall be as per the rules of the Central Government/State Government whichever is applicable.

There will be as per B.A./B.Sc. B.Ed. test for admission in this course in all the colleges of Rajasthan. Candidates who have passed Senior Secondary Examination (10+2) in any faculty from Board of Secondary Education, Rajasthan, Ajmer, or any other board as equivalent to there to by the GGTU, Banswara, with at least 50% marks in the aggregate are eligible to apply for admission to the course, however SC/ST/OBC/SBC as well as physically challenged and widow or divorce women candidate of Rajasthan having at least 45 marks in aggregate in the senior secondary examination will be eligible to apply for admission.

4. Attendance:

A candidate will be permitted to appear in the annual examination only if s/he has pursued a regular course of study and attended at least 75% of the classes for all the course work and practicum, 90% for school internship.

5. Medium of Instruction

The medium of instruction and examination is English and Hindi.

6. Course Structure:

Objectives:

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

Learning outcomes:

1. Competence to teach effectively two school subjects at the Elementary & secondary levels.
2. Ability to translate objectives of secondary education in terms of specific Programmes and activities in relation to the curriculum.
3. Ability to understand children's needs, motives, growth pattern and the process of learning to stimulate learning and creative thinking to faster growth and development.
4. Ability to use-

5. Individualized instruction
6. Dynamic methods in large classes.
7. Ability to examine pupils' progress and effectiveness of their own teaching with proper evaluation techniques.
8. Equipment for diagnosing pupil progress and effectiveness of their own teachings with 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 assess 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.

PROGRAMME STRUCTURE AND SCHEME OF EXAMINATION

A. Generic Course:

Year	Papers
I Year	General Hindi
II Year	General English
III Year	General Studies I
IV Year	General Studies II
IV Year	Environmental Studies

B. Elective Course:

Content of Science Subject- A student has to opt any one Group from the following:

Group 1 Physics, Chemistry and Mathematics (I,II & III)
Botany, Zoology and Chemistry (I,II & III)

C. Professional Education Course:

Year	Papers
I Year	Childhood and Growing Up
	Contemporary India and Education
II Year	Language Across the Curriculum
	Learning and Teaching
III Year	Knowledge and Curriculum
IV Year	Assessment for Learning
IV Year	Educational Management & Creating, inclusive school
IV Year	Gender, School and Society
IV Year	Understanding the Self
IV Year	Understanding ICT and Its Application
IV Year	Drama & Art

D. Ability Enhancement Courses:

Year	Papers
I Year	Guidance & Counseling in School
II Year	Yoga & Sports
II Year	Action Research

E. Pedagogical courses: Pedagogy of a School subject II Year and III Year- A candidate shall be required to offer any two papers form the following-

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

B.Sc. B.Ed. Part I Examination - Total Marks : 1000

B.Sc. B.Ed. Part II Examination - Total Marks : 1200

B.Sc. B.Ed. Part III Examination - Total Marks : 1200

B.Sc. B.Ed. Part IV Examination - Total Marks : 1100

Total 4500

B.Sc. B.Ed. Part I Examination

Course No.	Course Code	Name of Paper	Periods per Week	Periods per Year	Evaluation				
					Durat ion	External	Inter nal	Total	Min. for Pass
Genetic Course*									
GC 1		General Hindi	4	124	3	100	-	100	36
Elective Course									
EL 1		Physics (I)	3	93	3	40	10	50	18
		Physics (II)	3	93	3	40	10	50	18
		Physics (III)	3	93	3	40	10	50	18
		Physics Practical	4	124	5	-	50	50	18
EL 2		Chemistry I	3	93	3	40	10	50	18
		Chemistry II	3	93	3	40	10	50	18
		Chemistry III	3	93	3	40	10	50	18
		Chemistry Practical	4	124	5	-	50	50	18
EL 3		Zoology I	3	93	3	40	10	50	18
		Zoology II	3	93	3	40	10	50	18
		Zoology III	3	93	3	40	10	50	18
		Zoology Practical	4	124	5	-	50	50	18
EL 4		Botany I	3	93	3	40	10	50	18
		Botany II	3	93	3	40	10	50	18
		Botany III	3	93	3	40	10	50	18
		Botany Practical	4	124	5	-	50	50	18
EL 5		Mathematics I	4	124	3	60	10	70	25
		Mathematics II	4	124	3	55	10	65	23
		Mathematics III	4	124	3	55	10	65	23
Professional Education Course									
PEC 1		Childhood and Growing Up	4	124	3	80	20	100	36
PEC2		Contemporary India and Education	4	124	3	80	20	100	36
Ability Enhancement Course									
AEC 1		Guidance & Counseling in School	2	62	2	40	10	50	18
PCPI		Open Air Session/ SUPW Camp (Internal Practical) 5 days Open					50	50	18

		Air Session Shall be organize out of the college campus.							
				Total				1000	

Total 1000

B.Sc. B.Ed. Part II Examination

Course No.	Course Code	Name of Paper	Periods per Week	Periods per Year	Evaluation				
					Duratio n	External	Inter nal	Total	Min. for Pass
Genetic Course*									
GC 2		General English	4	124	3	100	-	100	36
Elective Course									
EL 6		Physics (I)	3	93	3	40	10	50	18
		Physics (II)	3	93	3	40	10	50	18
		Physics (III)	3	93	3	40	10	50	18
		Physics Practical	4	124	5	-	50	50	18
EL 7		Chemistry I	3	93	3	40	10	50	18
		Chemistry II	3	93	3	40	10	50	18
		Chemistry III	3	93	3	40	10	50	18
		Chemistry Practical	4	124	5	-	50	50	18
EL 8		Zoology I	3	93	3	40	10	50	18
		Zoology II	3	93	3	40	10	50	18
		Zoology III	3	93	3	40	10	50	18
		Zoology Practical	4	124	5	-	50	50	18
EL 9		Botany I	3	93	3	40	10	50	18
		Botany II	3	93	3	40	10	50	18
		Botany III	3	93	3	40	10	50	18
		Botany Practical	4	124	5	-	50	50	18
EL 10		Mathematics I	4	124	3	60	10	70	25
		Mathematics II	4	124	3	55	10	65	23
		Mathematics III	4	124	3	55	10	65	23
Professional Education Course									
PEC 3		Language Across the Curriculum	4	124	3	80	20	100	36
PEC 4		Learning & Teaching	4	124	3	80	20	100	36
Ability Enhancement Courseb(AEC)									
AEC 3		Yoga & Sports	2	62	2	40	10	50	18
AEC 4		Action Research	2	62	2	40	10	50	18

Pedagogy Courses (Candidate Shall be required to offer any two paper from the following for Part –I and other for Part – II)									
PC (Part-I)		Pedagogy of School Subject	4	124	3	80	20	100	36
PC 1		Pedagogy of General Science							
PC 2		Pedagogy of Physics							
PC 3		Pedagogy of Chemistry							
PC 4		Pedagogy of Biology							
PC 5		Pedagogy of Mathematics							
Teaching Enhancement Programme (TEP) (Internal Assessment)									
(TEP- I)		Pre- Practice Teaching (Internal Practical)	3 WEEKS				100	100	36
		1. Micro Teaching					20		
		2. Unit Plan & Blue Print					05		
		3. Observation of Demonstration lesson					05		
		4. Lesson Plan(Related one Pedagogy Subject) Seven Lesson in Which one Technology based lesson is compulsory					30		
		5. Simulated Teaching					20		
		6. Criticism (only one Pedagogy subject)					10		
		7. TLM workshop					05		
		8. Case Study & Project work					05		
								1200	

Total 1200

B.Sc. B.Ed. Part III Examination

Course No.	Course Code	Name of Paper	Periods per Week	Periods per Year	Evaluation				
					Durati on	External	Inter nal	Total	Min. for Pass
Genetic Course*									
GC 3		General Studies I	4	124	3	100	-	100	36
Elective Course									
EL 11		Physics (I)	3	93	3	40	10	50	18
		Physics (II)	3	93	3	40	10	50	18

		Physics (III)	3	93	3	40	10	50	18
		Physics Practical	4	124	5	-	50	50	18
EL 12		Chemistry I	3	93	3	40	10	50	18
		Chemistry II	3	93	3	40	10	50	18
		Chemistry III	3	93	3	40	10	50	18
		Chemistry Practical	4	124	5	-	50	50	18
EL 13		Zoology I	3	93	3	40	10	50	18
		Zoology II	3	93	3	40	10	50	18
		Zoology III	3	93	3	40	10	50	18
		Zoology Practical	4	124	5	-	50	50	18
EL 14		Botany I	3	93	3	40	10	50	18
		Botany II	3	93	3	40	10	50	18
		Botany III	3	93	3	40	10	50	18
		Botany Practical	4	124	5	-	50	50	18
EL 15		Mathematics I	4	124	3	60	10	70	25
		Mathematics II	4	124	3	55	10	65	23
		Mathematics III	4	124	3	55	10	65	23
Professional Education Course									
PEC 5		Knowledge and Curriculum	4	124	3	80	20	100	36
Pedagogy Courses (Candidate Shall be required to offer any two paper from the following for Part –I and other for Part – II)									
PC (Part –I)		Pedagogy of School Subject	4	124	3	80	20	100	36
PC 1		Pedagogy of General Science							
PC 2		Pedagogy of Physics							
PC 3		Pedagogy of Chemistry							
PC 4		Pedagogy of Biology							
PC 5		Pedagogy of Mathematics							
Teaching Enhancement Programme (TEP) (Internal Assessment)									
TEP II		Preporty lesson & Integrated lesson Activevity based (Second Pedagogy sub.) only five lesson per activites.					50	50	20
School Attachment Programme (SIP)									
SIP I		School Internship (Phase I, 4 Weeks) Internal Assessment Engaged with	4 WEE			Criticis m 10	150	150	60

		the field: Task and Assignment for Course -- & --. Including Criticism in both Pedagogy subjects. Criticism (Related Two Pedagogy Subject) 10% Technology based lesson is compulsory	K			marks each pedagogy subject			
SAP II		Final Lesson (External Assessment)				100		100	40
				Total				1200	

Total 1200

Note- Third Year B.Sc. B.Ed.

- Practice Lessons- Each student will give 20 Class- room lessons as far as possible equally distributed in the 2 methods but not less than 18 lessons per method. These lessons are to be given in the Secondary/higher secondary school.
- Technology Based Lessons- Student teacher will conduct at least two lessons using modern technology like audiovisual cassette, T.V. Program, Internet, Computerized Programme etc. Marks calculated out of 130 are to be given for the technology-based lessons. If because of some reasons it becomes impossible to conduct these lessons in the schools, they may be conducted as simulation lesson. Technology-based lessons may be recorded as videos in the internship programme by the student teacher personally.
- Lessons observation- Each students will observe 6 lessons in each methods of other students teacher and 2 lessons of actual teacher in the evenly distributed manner throughout the year.

B.A. B.Ed. Part IV Examination

Course No.	Course Code	Name of Paper	Periods per Week	Periods per Year	Evaluation				
					Duratio n	External	Inter nal	Total	Min. for Pass
Genetic Course*									
GC 4		General Studies II	4	124	3	100	-	100	36
GC 5		Environmental Studies	4	124	3	100	-	100	36
Professional Education Course									
PEC 7		Educational Management & Crating an inclusive School	5	124	3	80	20	100	36

PEC 8		Gender, School and Society	5	124	3	80	20	100	36
PEC 9		Assessment of learning	5	124		80	20	100	36
PEC 10		Understanding the self	5	124		50	50	100	36
PEC 11		Understanding ICT and its Application in Education	5	124		50	50	100	36
PEC 12		Drama & Art	5	124			50	50	18
SIP IV		School Internship (Phase II, 16 Weeks) Internal Assessment Engagement with the field: Tasks and Assignment for Courses 1 & 9	16 Weeks				150	150	60
SIP V		Viva-Voce for School Internship subject				100		100	40
SIP VI		II Pedagogy Subject Final lesson				100		100	40
							Total	1100	

Total 1100

F. Examination

1. There shall be a University examination at the end of each year as per details of the scheme of examination.
2. A candidate shall be admitted to the next higher class only if s/he passes his/her Part I/ Part II / Part III Examination as per rules mentioned hereinafter.
3. In order to qualify for B.Sc. B.Ed. degree a candidate should obtain a minimum of 36% marks in theory and practical separately, wherever applicable in each subject in each year of the course and 40% marks in Pre Internship in III Year and also in Internship in Teaching in the Fourth Year.
4. Candidate shall not be permitted to change the core subjects in subsequent years of the course.
5. However, in the case of General Hindi/General English, and Environmental Education and Sustainable Development and Computer Fundamental, Internet & MS office, if a candidate fails in Part I s/he would get two more chances for clearing this paper either along with the supplementary examination in Part I or with the main examination in Part II. Non-appearance or absence from the examination of this paper will be counted as a chance.

6. A candidate who fails in more than two subjects but passes in practical s/he will be required to appear again in all the subjects (theory) except practical only as an ex-student.
7. A candidate will be given a maximum of three chances at the main examination and the corresponding supplementary examination in any year of the course. If s/he does not pass the examination even thereafter, s/he will not be eligible for readmission to any year of the programme.
8. If a candidate fails in the Pre-Intern -ship/Internship in Teaching or is unable to complete Pre-Internship/Internship in teaching but passes in all other subjects s/he will be required to repeat the complete Pre-Internship/ Internship in Teaching' in the next academic session along with regular candidates.
9. Division will be awarded to the successful candidates only after the Part IV examination and on the basis of cumulative total of marks obtained in all the four years of the course in all the subjects including Internship in Teaching but excluding the core subjects i.e., General Hindi/General English, and Environmental Education and Computer Application.

G. Evaluation

Evaluation of Theory Papers: Some theory papers will carry a weightage of 100 marks, out of which 80 marks will be for external University Examination and 20 marks will be for internal sessional work. Out of 20 mark, 10 marks will be for sessional and 10 marks will for mid-term test. In some of the papers carrying 80 marks, 70 marks will be for external and 10 marks will be internal sessional works. In some of the papers carrying a weightage of 50 marks, 40 marks will be for external University Examination and 10 marks will be for internal sessional work. Out of 10 mark, 5 marks will be for sessional and 5 marks will be for mid-term test.

1. Each question paper (80 Marks) will have three sections- Section A will contain 10 very short answer type questions and the candidate will be required to attempt the entire ten questions. Each question will carry two marks. Section B will contain 10 short answer type questions out of which a candidate is required to attempt any 5 questions (one question per unit to be attempted out of two questions per unit). Each question will carry 6 marks, Section C will have 5 question and a candidate will be required to attempt any three questions. There will be 10 marks for each question.
2. Each question paper (40 Marks) will have three sections- Section A will contain 4 very short answer type questions and the candidate will

be required to attempt all four questions. Each question will carry 2 marks. Section B will contain 3 short answer type questions out of which a candidate is required to attempt any 2. Each question will carry 6 marks, Section C will have 3 question with a choice of attempting any 2 questions. Essay type questions will carry 10 marks each.

3. Very short answer type questions would aim at testing of critical thinking, knowledge of concepts facts, definitions, laws, principles, generalization etc. and understanding of principles and concepts.
4. Short answer type questions would aim at testing knowledge, definitions, laws, generalization etc. and understanding of concepts.
5. Essay type questions ae to aim at testing the abilities of critical thinking and application of principles taught in theory.

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FIRST YEAR B.Sc. B.Ed.

COURSE	NOMENCLATURE
GC 1	General HINDI
EL - 1	Physics (I)
	Physics (II)
	Physics (III)
	Physics Practical
EL - 2	Chemistry I
	Chemistry II
	Chemistry III
	Chemistry Practical
EL - 3	Zoology I
	Zoology II
	Zoology III
	Zoology Practical
EL- 4	Botany I
	Botany II
	Botany III
	Botany Practical
EL- 5	Mathematics I
	Mathematics II
	Mathematics III
PEC- 1	Childhood and Growing Up
PEC- 2	Contemporary India and Education
AEC- 1	Guidance & Counselling in School
PCP:1	OPEN AIR SESSION

Generic Course GC: 1

प्रथम वर्ष बी.एस.सी. बी.एड.

सामान्य हिन्दी

- नोट :
1. उक्त पाठ्यक्रम में 5 इकाई होंगी एवं प्रत्येक इकाई से 20 प्रश्न होंगे।
 2. प्रश्न पत्र में 100 प्रश्न होंगे, प्रत्येक प्रश्न 1 अंक का होगा, इस प्रकार प्रश्न पत्र 100 अंको का होगा।
 3. प्रश्न पत्र में प्रश्न वस्तुनिष्ठ प्रकार (Objective type) के होंगे।

इकाई-1

1. हिन्दी भाषा का उद्भव एवं विकास
2. हिन्दी की उपभाषाओं का सामान्य परिचय
3. देवनागरी लिपि : नामकरण, गुण, दोष एवं सुधार का इतिहास
4. वर्ण विचार : स्वर, व्यंजन
5. शब्द विचार : तत्सम, तद्भव, देशज व विदेशी

इकाई-2

1. विकारी शब्द : सामान्य परिचय एवं भेद।
(संज्ञा, सर्वनाम, क्रिया, विशेषण)
2. अविकारी शब्द : क्रिया विशेषण, संबंधबोधक, समुच्चयबोध,
विस्मयादिबोधक, निपात (भेद उदाहरण)
3. शब्द रचना एवं शब्द शुद्धीकरण : (सन्धि, समास, उपसर्ग, प्रत्यय)
4. वाक्य रचना एवं वाक्य शुद्धीकरण : शब्द क्रम, वाक्य भेद, उदाहरण।
5. शब्द ज्ञान – पर्यायवाची, विपरीतार्थी, शब्द-युग्म, वाक्यांश बोधक एक शब्द, समश्रुत भिन्नार्थक शब्द।

इकाई-3

1. लोकोक्तियाँ, मुहावरे
2. कार्यालयी पत्र : स्वरूप, पत्र प्रकार (औपचारिक, अनुस्मारक, अर्द्ध)

सरकारी, प्रेस विज्ञप्ति, कार्यालयी पत्र लेखन के चरण परिपत्र)।

3. अँग्रेजी के पारिभाषिक (तकनीकी) शब्दों के समानार्थक हिन्दी शब्द
4. अनुवाद : पदनाम, उपाधि एवं वाक्यांश।

इकाई-IV

1. कम्प्यूटर परिचय : विकास यात्रा, घटक, कार्य प्रणाली
2. भाषाई कम्प्यूटर : यूनीकोड पूर्व स्थिति, यूनीकोड वर्तमान स्थिति, आवश्यक औज़ार (वर्ड प्रोसेसिंग कांट प्रबंधन, विविध तकनीक)
3. हिन्दी विकीपीडिया का उपयोग, ब्लॉग-प्रकाशन, इण्टरनेट का उपयोग, ई-मेल।
4. कोश : प्रयोजन, प्रयोग विधि, प्रकार (सामान्य कोश, समांतर कोश, तकनीकी कोश)।
5. फिल्म समीक्षा एवं पुस्तक समीक्षा।

Elective Course

COURSE CURRICULAM AND SYLLABUS OFFOUR YEAR INEGRATED COURSE

PHYSICS

Each theory paper in the annual examination shall have three sections.

Section A shall contain one compulsory question of 5 marks having 10 parts. Two parts shall be set from each unit. The candidate is required to answer each part in about 20 words.

Section B shall contain five compulsory questions of 5 marks each with internal choice .One question with internal choice will be set from each unit .The answer may be given in approximately 250 words.

Section C shall contain four descriptive questions covering all units and candidate has to answer any two questions of ten marks each. The answer may be given in approximately 500 words. There can be two parts in a question from this section.

In total the candidate has to answer eight questions in each theory paper.

FIRST YEAR B.Sc. B.Ed. INTEGRATED COURSE

PAPER-I

MECHANICS OF PARTICLES, RIGID BODIES AND CONTINUOUS MEDIA

Marks :50

External :40

Internal :10

UNIT - I

Laws of motion, conservation of energy and momentum, transformation equations for rotating frame, centripetal and Coriolis accelerations, Coriolis force, Coriolis force due to earth's rotation – experimental demonstration by Foucault pendulum.

Motion under a central force, conservation of angular momentum, Kepler's laws.

UNIT – II

Fields and potential, gravitational field and potential due to spherical bodies, Gauss's and Poisson's equations, gravitational self energy.

Two body problem, reduced mass, scattering and scattering cross sections, illustrations, Rutherford scattering by hard spheres, centre of mass and laboratory reference frames, binary stars.

UNIT – III

System of particles, centre of mass, calculation of centre of mass of regular bodies, angular momentum, equations of motion, conservation theorems for energy, momentum and angular momentum, system of variable mass, elastic and inelastic collisions, rigid body, degrees of freedom, Euler's theorem.

UNIT – IV

Molecular rotations (as rigid bodies), moment of inertia, di and tri atomic molecules, intrinsic spin, precessional motion, motion of top, gyroscope. Elastic constants for an isotropic solid, their inter relation, torsion of a cylinder, bending of beam, applications to cantilever.

UNIT – V

Kinematics of moving fluid, equation of continuity, Euler's law for fluidity.

Viscous fluids, streamline and turbulent flow, flow through a capillary tube, Poiseuille's law, Reynold's number, Stoke's law, theory of rotation viscometer, effect of temperature and pressure on the viscosity of liquids.

Text and Reference Books:

1. E.M. Purcell, Editor, Berkeley Physics Course, Vol. 1, Mechanics, McGraw Hill.
2. R.P. Feynmann, R.B. Lighton, M. Sands, The Feynmann Lectures in Physics, Vol.I, B.I. Publications, Bombay, Delhi, Calcutta, Madras.

PAPER-II
OSCILLATIONS, WAVES AND ACOUSTICS

Marks :50
External :40
Internal :10

UNIT - I

Free oscillations of simple systems: Equilibrium; concept of potential well, small oscillations approximation, solutions, linear and transverse oscillations of a mass between two springs, diatomic molecule, reduced mass concept.

Damped and forced oscillations: Damped oscillations; critical damping, Q of an oscillator. Forced oscillator with one degree of freedom; Transient and steady state oscillations, resonance energy absorption, low and high frequency responses.

UNIT - II

Free oscillations of system with two degrees of freedom: Two dimensional oscillator; normal modes, longitudinal and transverse oscillation of coupled masses, energy transfer between modes, coupled pendulum.

Fourier analysis: Fourier series and Fourier coefficients; simple examples (square wave, saw-tooth wave, half and full wave rectifier), use of exponential representation for harmonic oscillations, expression for Fourier coefficients. Non-periodic disturbance; representation by Fourier integral, Fourier transform. Case of a wave train of finite length, constancy of $f \times f \times k$ (the uncertainty product).

UNIT - III

Wave equation: Waves in a one-dimensional chain of particles; classical wave equation; wave velocity, boundary conditions and normal modes, dispersion relations, dispersion waves, acoustic and optical modes.

Waves in continuous media: Speed of transverse waves on a uniform string, speed of longitudinal waves in a fluid, energy density and energy transmission in waves, typical measurements, dispersion in waves, group velocity and phase velocity, their measurements.

Superposition of waves: Linear homogenous equations and the superposition principle, interference in space and energy distribution; beats and combination tones.

UNIT -IV

Ultrasonics: Production, detection, and applications of ultrasonic waves

Vibrations in bounded systems: Normal modes of a bounded system; harmonics, the quality of sound, Chladni's figures, Vibration of a drum. Noise and Music; Limits of human audibility; intensity and loudness, bel and decibel. Music scale and musical instruments.

UNIT - V

Reflection, refraction, and diffraction of sound:

Acoustic impedance of a medium, percentage reflection, and refraction at a boundary, impedance matching for transducers. Diffraction of sound; principle of a sonar system, sound ranging.

Applied acoustics: Transducers and their characteristics, recording and reproduction of sound, measurement of frequency, velocity, waveform, and intensity. The acoustics of halls, reverberation period, Sabine's formula.

Text and Reference Books:

1. Waves and Oscillations, Berkley Physics Course Vol. III
2. Vibrations and waves, I.G. Main (Cambridge University Press)
3. The Physics of Vibrations and Waves, H.J. Pain, McMillan (1975).

**PAPER-III
ELECTRICITY AND MAGNETISM**

Marks :50
External :40
Internal :10

UNIT- I

Electric Field: Coulombs law, unit of charge (SI and other systems of units). Conservation and quantization of charge. Field due to different charge distributions, monopole, dipole, quadrupoles, line charge, sheet charge. Torque on a dipole in uniform field and non-uniform fields, flux of an electric field. Gauss.s law - applications to deduce **E** fields, force per unit area on the surface of a charged conductor. Potential: Line integral of electric field and electrical potential. Field as the gradient of potential. Potential energy of a system of charges and its calculation in various configurations. Field equations for **E** in vacuum. Energy associated with **E** field. Differential form of Gauss.s law: Poisson.s equation, Laplace.s equation, boundary conditions and uniqueness theorems. Electric field around conductors: induced charges, field and potential inside a conductor, field near the surface of a conductor, method of images.

UNIT - II

Electric fields in matter: atomic and molecular dipoles, induced dipoles, polarizability tensor, electronic and molecular contributions. Electrical field caused by polarized matter, **E** and **D** fields, permittivity, dielectric constant. Capacitor filled with dielectric, field equations in presence of dielectric. The field of a polarized sphere, dielectric sphere in a uniform field. Energy in dielectric systems. Polarizability and susceptibility, frequency dependence of polarizability, Clausius-Mossotti equation. Magnetic field: Magnetic field **B** seen through Lorentz force on a moving charge, unit for **B** field, magnetic dipoles in atoms and molecules, gyromagnetic ratio. Magnetic field due to currents: Biot and Savart.s law. Field equations in magnetostatics, Ampere.s law. Fields due to a straight wire, magnetic dipole, circular current and solenoid. Magnetic fields in matter. Magnetizing current, magnetization vector, **H** and **B** fields, magnetic permeability, susceptibility. Comparison of magnetostatics and electrostatics.

UNIT - III

Electrical current: current density and current; nonsteady currents and continuity equations. Electrical conductivity, resistivity, conductance and their temperature dependence. Thermo electric current and dark current, non-ohmic circuitry, thermistor. Varying current. Rise and decay of currents in LR and CR circuits, time constant, integrating and differentiating circuits, electrical shielding. Study of a discrete LC transmission line.

UNIT - IV

Alternating currents: Skin effect for resistance at high frequencies, complex impedance, reactance, impedances of LCR series and parallel circuits, resonance, Q factor, power dissipation and power factor. AC bridges: Anderson.s, deSauty.s and Owens bridges, Self and mutual inductance. Measurement of mutual inductance by Carry Foster Method, Coupled circuits and Transformers.

UNIT - V

Ballistic Galvanometer (moving coil type), its distinction from beat type. B.G. differential equation and its solution under different conditions of damping. Critical damping, over damping. Logarithmic

decrements, charge sensitivity, current sensitivity, determination of B using search coil and B.G. Determination of high resistance using B.G. Factors for sensitivity. B.G. constant. Measurement of mutual inductance by Carey Foster's bridge by B.G. Measurement of small resistance by Kelvin's double bridge.

Text and Reference Books:

1. E.M. Purcell, Ed. Berkeley Physics Course, Vol. 1, Electricity and Magnetism McGraw Hill.
2. D. Halliday and R. Resnick, Physics, vol. 2, Wiley Eastern, New Delhi.
3. D.J. Griffiths, Introduction to Electrodynamics, Prentice Hall of India.
4. Reitz and Milford, Electricity and Magnetism, Addison Wesley.
5. A.S. Mahajan and A.A. Rangawala, Electricity and Magnetism, Tata McGraw Hill.
6. A.M. Portis Electromagnetic Fields
7. S.S. Atwood, Electricity and Magnetism, Dover publication.
8. A.F. Kip, Fundamentals of Electricity and Magnetism, International Student Edition, McGraw Hill and Kogakusha, 1969

PHYSICS PRACTICALS

Note : Students are expected to perform sixteen experiments in all taking the eight experiments from each section. One experiment from section A and one from section B will be set in the examination paper. The distribution of marks in the practical examination will be as follows:

(i) Two experiments	30 Marks
For each experiment, distribution of marks will be as follows:	
Figure :	2
Formula/Theory :	2
Observation :	7
Calculation and Result :	3
Precautions :	1
(ii) Viva voce	10
(iii) Records	10
Total	50 Marks

LIST OF EXPERIMENTS

Section-A

1. Determination of elastic constants Y , f' , f'' and K by Searle's method.
2. Determination of thermal conductivity „ K . of a bad conductor by Lee's method.
3. Determination of J by Callender and Barne's method.
4. Study of temperature variation of surface tension by Jaegers method.
5. Study of free fall of a body: use of a digital timer to get time and velocity at different depth and analysis.
6. Study of collision in two dimension
7. Kater's pendulum, precise setting, analysis and determination of value of acceleration due to gravity „ g . at a place.
8. Study of damping of a bar pendulum under various kinds of damping mechanisms.
9. To determine coefficient of damping k , relaxation time T and quality factor of a damped SHM using a Simple pendulum.
10. Study of dependence of period of oscillations of a spring or rubber band on mass and spring constant.
11. To determine the velocity of sound in air at room temperature with Kundt's tube.
12. Using scattering to deduce the nature of potential hump or well (two dimensional)
- 13 Study of laws of parallel and perpendicular axes for estimation of moment of inertia.
14. Computer simulation of equations of motion for a system of particles.
15. Computer simulation of molecular rotations, as rigid bodies.
16. Study of motion of a top and a gyroscope.
17. Study of torsion of a wire; dependence on radius, length, torque and material (static method)
18. To determine the modulus of rigidity of the material of a wire by statistical method using Bortan's Apparatus
19. To determine the value of modulus of rigidity of the material of a given wire by dynamical method using Maxwellsneedle
20. Study of flow of liquids through capillaries: laminar and turbulent flow stages, capillaries
21. To determine the coefficient of viscosity of water by Poisevill's method
22. Studying the fall of solids through a liquid.

23. To determine the coefficient of viscosity of a liquid (glycerine or castor oil) by Stoke.s method
24. Study of air flow through a capillary : U- tube with a long capillary fitted on one arm, mercury level Differencepushing air.
25. To determine Poisson.s ratio of rubber

SECTION -B

1. Calibration of Carey Fosters bridge wire and determination of the specific resistance of the material of the given wire.
2. Measurement of thermo e.m.f.
3. To study growth and decay of current in R.C. circuit and determine the time constant.
4. To determine impedance of L-R circuit and find phase relation ship in current and voltage.
5. To determine the constants of a ballistic galvanometer. Current and charge sensitivity, time period, log decrement and galvanometer resistance.
6. To determine intensity of magnetic field using search coil and ballistic galvanometer.
7. To determine high resistance by method of leakage. Measure leakage resistance of a condenser.
8. To determine low resistance by Kelvin.s double bridge.
9. Determination of dielectric constant of a given liquid.
10. To determine induStance of a coil using Anderson.s method.
11. Desauty.s bridge method for comparison of two capacitors.
12. To determine mutual inductance by Carry Foster.s Method
13. Study of the impedance of a capacitor of varying frequencies to measure C.
14. Response curve for LCR circuits series resonance.
15. Study of a discrete LC transmission line.
16. 16. Response curve for LCR circuit parallel resonance
17. Measurements of electric charge and related quantities using an electrometer.
18. Study of potential distribution in a given geometrical configuration.
19. Mapping of electric fields for specified configurations.
20. Study of magnetic field using a vibration magnetometer.
21. Study of the rise and decay of current in a RL circuits.
22. Characteristics of a choke.
- 23 Study of the impedance of an inductor at varying frequencies to measure R and L

FIRST YEAR B.Sc. B.Ed. CHEMISTRY

PAPER I INORGANIC CHEMISTRY

Marks :50
External :40
Internal :10

UNIT - I

Covalent Bond: Valence bond theory and its limitations, directional characteristics of covalent bond, various types of hybridization and shapes of simple inorganic molecules and ions. Valence Shell Electron

Pair Repulsion (VSEPR) theory, regular and deviation from regular geometry, MO theory, homonuclear and heteronuclear (CO, NO, HF and HCl) diatomic molecules, multi center bonding in electron deficient

molecules, bond strength and bond energy, percentage ionic character from dipole moment and electronegativity difference.

Ionic Solids : Ionic structures, radius ratio effect and coordination number, limitation of radius ratio rule, lattice defects, semiconductors, lattice energy and Born Haber cycle, hydration energy and solubility of ionic solids, polarizing power and polarizing of ions. Fajan's rule, Metallic bond - free electron, valence bond and band theories.

Weak Interactions: Hydrogen bonding, Van der Waals forces.

UNIT- II

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

Chemistry of Noble Gases : History of discovery, separation of inert gases, chemical properties of the noble gases, chemistry of xenon, structure and bonding in xenon compounds.

UNIT - III

Group 13 : General properties, oxides, hydroxide, halides and hydrides of boron, diborane and higher

boranes, borohydrides, borazine, oxyacids of boron, borax and borax bead test.

Group 14 : General properties, inert pair effect, halides, oxides, silicates, silicones, graphitic compounds, carbides, cyanides and carbonyls, brief idea of fullerenes.

Group 15 : General properties, hydrides, azides, halides, oxides and oxyacids of phosphorous, nitrogen fixation, fertilizers.

UNIT - IV

Group 16 : General properties, polymorphism, hydrides, halides, oxides and oxyacids of sulphur, thiosulphuric acid and salts, thionic acids and their salts, tetrasulphur tetranitride.

Group 17 : General properties hydrogen halides, oxides and oxyacids of halogens, interhalogen compounds polyhalides, basic properties of halogens.

UNIT - V

Non-Aqueous Solvents : Physical properties of a solvent, types of solvents and their general characteristics, Differentiating and leveling solvents, reactions in non-aqueous solvents with special reference to liquid NH_3 and liquid SO_2 .

Acids and Bases : Arrhenius, Bronsted - Lowry, Lax - Flood, solvent system and Lewis concepts of acid and bases, Usanovitch definition.

BOOKS RECOMMENDED

1. Concise Inorganic Chemistry : J.D. Lee
2. General Inorganic Chemistry : J.A. Duffy, Longman (2nd Ed.)
3. Principles of Inorganic Chemistry : B.R. Pun and L.R. Sharma.
4. Basic Inorganic Chemistry : F.A. Cotton and G. Wilkinson, Wiley Eastern.
5. Molecular Geometry : R.J. Gillespie, Van Nostrand Reinhold.
6. Inorganic Chemistry (Hindi ed.) : Suresh Ameta, A. Sharma and M. Mehta, Himanshu Publication.

PAPER II

ORGANIC CHEMISTRY

Marks :50
External :40
Internal :10

UNIT - I

Structure and Bonding : Localized and delocalized chemical bond, Van der Waals interaction, charge transfer complexes, resonance, hyperconjugation, aromaticity electrometric, inductive and field effects, hydrogen bonding.

Mechanism of Organic Reactions : Curved arrow notation, drawing electron movements with arrows, half-headed and double-headed arrows, types of organic reactions, energy considerations.

Reactive Intermediates : Carbocations, carbanions, free radicals, carbenes, arynes and nitrenes, their formation and stabilities.

Methods of determination of reaction mechanism (product analysis, intermediates, isotope effects, kinetic and stereochemical studies).

UNIT- II

Stereochemistry of Organic Compounds : Concept of isomerism, types of isomerism.

Optical Isomerism : Elements of symmetry, molecular chirality, enantiomers, stereogenic centre, optical activity, properties of enantiomers, chiral and achiral molecules with two stereogenic centers, diastereomers, threo and erythro diastereomers, meso compounds, resolution of enantiomers, inversion, retention and racemization.

Relative and absolute configuration. sequence rules. D and L, R and S systems of nomenclature. Geometric isomerism- determination of configuration of geometric isomers. E and Z system of nomenclature, geometric isomerism in oximes and alicyclic compounds.

Conformational isomerism- conformational analysis of ethane and n-butane; conformations of cyclohexane, axial and equatorial bonds, conformation of mono substituted cyclohexane derivatives. Newman projection and Sawhorse formulae, Fischer and Flying Wedge formulae. Difference between configuration and conformation.

UNIT - III

Alkanes : General methods of formation, physical & chemical properties. Mechanism of free radical substitution in alkanes with reference to halogenation, orientation, reactivity and selectivity.

Cycloalkanes : Nomenclature, methods of formation, chemical reactions, Baeyer's strain theory and its

limitation, ring strain in small rings (cyclopropane and cyclobutane), theory of strainless rings, the case of

cyclopropane ring: banana bond.

Alkenes, Dienes and Alkynes : Brief introduction of alkenes, their formation with reference to mechanisms of dehydration of alcohols and dehydrohalogenation of alkyl halides, regioselectivity in alcohol dehydration The Saytzeff rule, Hofmann elimination, physical properties and relative stabilities of alkenes.

Chemical Reactions of Alkenes : mechanisms involved in hydrogenation, electrophilic and free radical additions, Markownikoff's rule, hydroboration-oxidation, Oxymercuration-reduction, epoxidation, ozonolysis, hydration, hydroxylation and oxidation with KMnO_4 polymerization of alkenes, substitution at the allylic and vinylic positions of alkenes, industrial applications of ethylene and propene.

Nomenclature and Classification of Dienes : Isolated, conjugated and cumulated dienes, structure of allenes and butadiene, methods of formation, polymerization, chemical reactions- 1,2 and 1,4- additions, Diels - Alder reaction.

Alkynes : Acidity of alkynes, mechanism of electrophilic and nucleophilic addition reactions, hydroboration, metal-ammonia reductions, oxidation and polymerization.

UNIT - IV

Arenes and Aromaticity : Nomenclature of benzene derivatives, the aryl group, aromatic nucleus and

side chain, structure of benzene, molecular formula and Kekule structure, stability and carbon - carbon bond lengths of benzene, resonance structure, and M.O. picture.

Aromaticity : The Huckel rule, aromatic ions. Aromatic electrophilic substitution: General pattern of the mechanism, role of s and p complexes. Mechanism of nitration, halogenation, sulphonation, mercuration and

Friedel-Craft reaction. Energy profile diagrams. Activating and deactivating substituents, orientation and ortho-para ratio. Side chain reactions of benzene derivatives, Birch reduction, Methods of formation and chemical reactions of alkylbenzenes. alkynylbenzene and biphenyl.

UNIT - V

Alkyl and Aryl Halides : Nomenclature and classes of alkyl halides, methods of formation, chemical

reactions, mechanism of nucleophilic substitution reactions of alkyl halides, SN^2 and SN^1 reactions with energy profile diagrams, factors affecting SN^2 and SN^1 reactions.

Haloform reaction, Freons :

Methods of formation of aryl halides, nuclear and side chain reactions, the addition - elimination and elimination - addition reaction, mechanisms of nucleophilic aromatic substitution reactions.

Relative reactivities of alkyl halides v/s allyl, vinyl and aryl halides, synthesis and uses of DDT and BHC.

BOOKS RECOMMENDED

1. A Text Book of Organic Chemistry : K.S. Tiwari, S.N. Mehrotra and N.K. Vishnoi.
2. Modern Principles of Organic Chemistry : M.K. Jain and S.C. Sharma
3. A Text Book of Organic Chemistry : (Vol. I and II), O.P. Agarwal.
4. A Text Book of Organic Chemistry : B.S. Bahl and Arun Bahl.
5. A Text Book of Organic Chemistry : P.L. Soni.

6. Organic Chemistry : (Vol. I, II and III), S.M. Mukherji, S.P. Singh and R.P. Kapoor, Wiley Eastern Ltd., (New Age International).
7. Organic Chemistry, Morrison and Boyd, Prentice Hall.
8. Organic Chemistry (Hindi Ed.) : Suresh Ameta, P.B. Punjabi and B.K. Sharma, Himanshu Pub.

PAPER III PHYSICAL CHEMISTRY

Marks :50
External :40
Internal :10

UNIT - I

Mathematical Concepts : - Logarithmic relations, curve sketching, linear graphs and calculation of slopes, differentiation of function like kx , ex , xn , $\sin x$, $\log x$, maxima and minima, partial differentiation and reciprocity relations, integration of some useful/relevant functions, permutations and combinations, factorials, probability.

Computers : General introduction to computers, different components of a computer, hardware and software, input-output devices, binary numbers and arithmetic, introduction to computer languages, programming operating systems.

UNIT- II

Gaseous State : Postulates of kinetic theory of gases, deviation from ideal behavior, Van- der Waals equation of state.

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

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

Liquid State : Intermolecular forces, structure of liquid (a qualitative description).

Liquid Crystals : Difference between liquid crystal, solid and liquid, classification, structure of smectic, nematic and cholesteric phases, theory of liquid crystals and its applications, thermography and seven segments cell.

UNIT - III

Solid State : Definition of space lattice, unit cell, Bravais lattices.

Laws of crystallography : (i) Law of constancy of interfacial angles (ii) Law of rationality of indices,

Weiss and Miller indices (iii) Law of symmetry, symmetry elements in crystals classification of crystals, X-ray diffraction by crystals derivation of Bragg equation, determination of crystal structure of NaCl, KCl and CsCl (Laue's method and powder method).

Colloidal State : Definition of colloids, classification of colloids. Solids in liquid (sols): Properties - kinetic, optical and electrical, stability of colloids, protective action, Hardy - Schuize law, gold number.

Liquids in Liquid (emulsions): Types of emulsions, preparation. emulsifier, Liquids in solid (gels)- classification, preparation and properties inhibition, general applications of colloids.

UNIT - IV

Nuclear and Radiochemistry : Elementary idea of nucleus, nuclear forces, packing fraction, mass defect and binding energy, nuclear fission and fusion reactions, calculation of Q - values of nuclear reactions, liquid drop and shell models of nucleus, theory of radioactivity, G.M. Counter, half life period, average life, radioactive disintegration, radioactive steady state, group displacement law, radioactive series, separation and identification of isotopes, application of radioactivity and radioactive tracers.

UNIT - V

Atomic Structure : Dual nature of electron, De Brogue equation, Davission and Germer experiment. Heisenberg uncertainty principle, Schrodinger wave equation, significance of ψ and ψ^2 , probability distribution curves shapes of s, p and d - orbitals, Zeeman and Stark effects.

Physical Properties and Molecular Structure : Physical properties of liquids, vapour pressure, measurement of vapour pressure, heat of vaporization, Trouton's rule. Surface tension, measurement of surface tension.

Viscosity and its measurement, effect of temperature on the surface tension and viscosity, use of these properties in determination of chemical constitution.

BOOKS RECOMMENDED

1. Principles of Physical Chemistry: B.R. Puri and L.R. Sharma.
2. A Text Book of Physical Chemistry: A.S. Negi and S.C. Anand.
3. Physical Chemistry, Pt. I & II : C.M. Gupta, J.K. Saxena and M.C. Purohit.
4. Physical Chemistry (Hindi Ed.) : Suresh Ameta, R.C. Khandelwal, R. Ameta and J. Vardia, Himanshu Pub.
5. Computers and Applications to Chemistry, Ramesh Kumari, Narosa Publishing House Pvt. Ltd.

CHEMISTRY PRACTICALS

Distribution of Marks

	Exercises	Marks
1.	Semi-micro analysis of Inorganic mixture containing five radicals (excluding Na ⁺ and K ⁺)	10
2.	(i) Detection of extra element (N, S and halogen) if any and functional groups in given sample organic compounds. (ii) Purification of the given organic compounds by crystallization (charcoal) sublimation and determination of its m.p.	7
	OR	
	Determination of mixed melting points using urea-cinnamic acid mixtures of given compositions.	7
3.	One Physical Chemistry Experiment	10
4.	Vice-voce	8
5.	Records	8
	Total	50 marks

LIST OF EXPERIMENTS

1. **Semi-micro Analysis of Inorganic mixture:** The mixture shall contain **Five** radicals (at least two cations and two anions) soluble in water or in HCl. Two cations of the same group except IIA and IIB may be given. Not more than one interfering radical may be given. Interfering radical may not be given with typical anion combinations.

2. (i) Detection of extra elements (N, S and halogen), one organic compound from the following functional groups be given for identification:

Carboxylic acids, Phenols, Alcohols, Carbohydrates, Aldehydes, Ketones, Nitro.

Compounds: Amino compounds, Anilides, Amides, Esters, Thiomide,

Hydrocarbons, Halogen containing compounds.

(ii) **Crystallization:**

Concept of induction of crystallization.

Phthalic acid from hot water (using fluted filter paper and stemless funnel)

Acetanilide from boiling water.

Naphthalene from ethanol

Benzoic acid from water

Decolourization and crystallization using charcol: Crystallization and decolourization of impure naphthalene (100 g of naphthalene mixed with 0.3 g of Congo Red using 1 g decolourizing carbon) from ethanol.

Simple Sublimation: Camphor, Naphthalene, Phthalic acid and Succinic acid.

Criteria of purity: Determination of M.P., B.P., Mixed M.P.

3. Physical Chemistry Experiments : Any one of the following experiments may be given in the examination.

Ionic equilibria

a) Measurement of pH of different solutions like aerated drinks, fruit juices, shampoos and soaps (use dilute solutions of soaps and shampoos to prevent damage to the glass electrode) using pH-meter.

b) Preparation of buffer solutions and measurement of the pH of buffer solutions and comparison of the values with theoretical values of following buffers.

(i) Sodium acetate-acetic acid

(ii) Ammonium chloride-ammonium hydroxide

Colloids : To prepare arsenious sulphide sol. and compare the precipitating power of mono-, bi- and trivalent anions.

Viscosity and Surface Tension

(i) To determine the percentage composition of a given mixture (non-interacting systems) by viscosity method.

(ii) To determine the percentage composition of a given binary mixture by surface tension method.

(iii) To determine the parachor value of $-CH_2-$ group.

(iv) To determine the rheochor value of $-CH_2-$ group.

Transition Temperature

(i) Determination of transition temperature of the given substance by thermometric/dilatometric method (e.g. : $MnCl_2 \cdot 4H_2O$, $SrBr_2 \cdot 2H_2O$).

Thermochemistry

(i) To determine the solubility of benzoic acid at different temperatures and to determine ΔH of the dissolution process.

(ii) To determine the enthalpy of neutralisation of a weak acid/weak base versus strong base/strong acid and determine the enthalpy of ionisation of the weak acid/weak base.

(iii) To determine the enthalpy of solution of solid calcium chloride and calculate the lattice energy of calcium chloride from its enthalpy data using Born-Haber cycle.

Virtual experiments (any two)

(i) Purification of organic / inorganic compounds by crystallization / sublimation.

(ii) Preparation of biodiesel from vegetable oil.

(iii) Fractional distillation of crude oil / coal .

(iv) Conformational analysis of alkanes/ cycloalkanes.

(v) Any other virtual experiment related to the content of syllabus and availability of the experimental facilities.

BOOKS RECOMMENDED

1. Practical Chemistry - Giri, Bajpai and Pandey, S. Chand & Co. Ltd., New Delhi.

2. Laboratory Manual in Organic Chemistry, R.K. Bansal, Willey Eastern.

3. Experimental Organic Chemistry, Vol. I and II, P.R. Singh, D.S. Gupta and K.S. Bajpai, Tata McGraw Hill.

4. Experiments in Physical Chemistry - J.C. Ghose, Bharti Bhawan.

5. Experiments in General Chemistry, N.r. Rado and U.C. Agarwal, Eastern Press.

6. Practical Chemistry - Suresh Ameta and P.b. Punjabi, Himanshu Publication.

FIRST YEAR ZOOLOGY

Pattern of question paper in the annual examination and distribution of marks:

Each theory paper in the annual examination shall have three sections i.e. A,B, and C. In section A, total 10 questions will be set in the paper, selecting at least two from each unit. These questions are to be answered in a word or so. All questions are compulsory. Each question carries 0.5 mark, total 05 marks.

In section B, there shall be total 10 questions, selecting two questions from each unit, five questions to be answered by the student selecting at least one from each unit. Answer should be given in approximately 250 words. Each question carries 05 marks, total 25 marks.

In section C, 04 descriptive type questions will be set in the examination paper from five units of the syllabus of the paper, selecting not more than one question from a unit. Each question may have two sub divisions. Students are required to answer any two questions approximately in 500 words. Each question is of 10 marks, total 20 marks.

FIRST YEAR ZOOLOGY

PAPER-I LIFE AND DIVERSITY OF ANIMALS-I (INVERTEBRATES)

Marks :50
External :40
Internal :10

UNIT- I

- 1 General characters and classification of Protozoa and Porifera (up to classes) with examples.
- 2 Type study: Paramecium. Parasitic protozoans and their Pathogenesis
- 3 Type study-Sycon.
- 4 Canal system in sponges.

UNIT-II

- 5 General characters and classification of Coelenterata and Ctenophora
- 6 Type study-Obelia.
- 7 Corals and coral reefs - their formation, kinds and importance. Polymorphism in Coelenterates, Metagenesis.
- 8 Affinities of Ctenophora

UNIT-III

- 9 General characters and classification of Platyhelminthes (upto classes) and Aschelminthes(upto phyla)
- 10 Type study –Fasciola , Taenia
- 11 Concept of pseudocoelom
- 12 General characters and classification of Nematoda (upto classes)
- 13 Type study: Ascaris
- 14 Endoparasites in relation to human diseases, parasitic adaptations of trematodes, cestodes, and nematodes.

UNIT-IV

- 15 General characters and classification of Annelida and Arthropoda (up to classes) with examples.
- 16 Concept of metamerism, segmentation and coelom
- 17 Type study-Pheretima, Periplaneta.
- 18 Economic importance of arthropods

UNIT-V

- 19 General characters and classification of and Mollusca and Echinidermata (up to classes)with examples.
- 20 Type Study –Pila *and* Asterias
- 21 Concept of Torsion and its importance
- 22 Echinoderm larvae.

ZOOLOGY

PAPER II CELL BIOLOGY

Marks :50
External :40
Internal :10

UNIT -I

- 1 Cell theory and its modern interpretation
- 2 Structure, function and general characteristics various types of cells
- 3 Prokaryotic and eukaryotic cells.

UNIT -II

- 4 Various models and hypothesis in understanding the structure of plasmamembrane (Overton, Danielli and Davisson, Robertsons and Fluid mosaic model)
- 5 Functions of plasma membrane and membrane transport
- 6 Cell cytoskeleton-Microtubule, Microfilament and Intermediate Filament.
- 7 Structure and function Cilia, flagella, Centriole and basal bodies.
- 8 Brief idea of cell cycle (General description of mitosis and meiosis).

UNIT -III

- 9 Structure and function of nucleus and nucleolus.
- 10 Nucleic acids: Watson and Crick model of DNA, chemical nature of DNA and replication of DNA.
- 11 Chemical nature and structure of various types of RNAs and basic concept of transcription

UNIT -IV

- 12 Structure and function of Ribosome
- 13 Structure and function of Endoplasmic Reticulum (Rough and Smooth)
- 14 Basic concept of Protein Synthesis.

UNIT -V

- 15 Structure and function of Golgi. Concept of GERL system.
- 16 Structure and function of Mitochondria and Peroxisomes.
- 17 Structure, function and polymorphism of Lysosomes.

ZOOLOGY
PAPER- III
DEVELOPMENTAL BIOLOGY

Marks :50
External :40
Internal :10

UNIT -I

- 1 Aims and scope of developmental biology. Brief historical review and concepts of Embryology.
- 2 Neuroendocrine regulation of reproductive organs in brief.
- 3 Gametogenesis: Spermatogenesis and structure of sperm, oogenesis and structure of ovum, types of ova.

UNIT -II

- 4 Fertilization: Main events of fertilization, acrosome reaction, polyspermy preventing mechanisms.
- 5 Errors in fertilization and significance of fertilization. Parthenogenesis (In brief)
- 6 *In vitro* fertilization and test tube baby.
- 7 Embryo transplant.

UNIT -III

- 8 Cleavage: planes, patterns & types of cleavage.
- 9 Blastulation: Types of blastulae.
- 10 Gastrulation: fate maps, morphogenetic movements and their significance in gastrulation. Mechanism and main characteristic of gastrulation.

UNIT -IV

- 11 Elementary knowledge of fate of three germ layers.
- 12 Primary organizer and embryonic induction, concept of competence.
- 13 Determination, differentiation; Main characteristics of growth and regeneration.
- 14 Regeneration.

UNIT -V

- 15 Extra embryonic membranes: Development and functions.
- 16 Placentation: Definition, types, classification on the basis of morphology and histology. Functions of placenta.

ZOOLOGY: PRACTICAL

S.No.	Exercise	
1	Major dissection	10
2	Cell Biology/ Developmental Biology exercise	05
3	Mounting/ Slide preparation	04
4	Spots(10)	15
5	Viva-voce	8
6	Record	8
Total :-		50

Major Dissection marks will be given only if virtual dissection is available otherwise marks may be given according to availability of dissection alternate.

1. General survey of invertebrates (museum specimens):

The student is required to know classification, habit and habitat, economic importance etc.

- A Protozoa : *Entamoeba, Polystomella, Monocystis, Euglena, Noctiluca, Trypanosoma, Nyctotherus, Paramecium, Vorticella,*
- B Porifera : *Scypha, Hyalonema, Euplectella, Spongilla, Euspongia.*
- C. Coelenterata : *Physalia, Aurelia, Alcyonium, Corallium, Gorgonia, Pennatula, Madrepora, Metridium*
- D Platyhelminthes and Aschelminthes : *Dugesia, Fasciola, Taenia, Schistosoma, Dracunculus, Ascaris (male and female), Wucheraria, Enterobius*
- E Annelida and : *Nereis Heteronereis, Aphrodite, Arenicola, Chaetopterus Hirudinaria.*
- F Onychophora : *Peripatus.*
- G Arthropoda : *Limulus, Aranea, Palamnaeus, Lepas, Balanus, Apus, Sacculina, Eupagurus, Carcinus, Lepisma, Pediculus, Bombyx, Apis, Cimex, Julus, Scolopendra, Ixodes.*
- H Mollusca : *Mytilus, Chiton, Tereido, Turbinella, Loriculus, Limax, Doris, Aplysia, Dentalium, Nautilus, Sepia, Octopus, Loligo, Pecten, Solen, Pinctada.*
- I Echinodermata : *Asterias, Pentaceros, Antedon, Ophiothrix, Holothuria.*
- J Hemichordata : *Balanoglossus, Saccoglossus.*

II. Study of the permanent slides, sections passing through different regions of animals and developmental stages.

- 1 Protozoa : Blood smears showing malarial parasite. *Paramecium*: Binary fission, conjugation.
- 2 Porifera : T.S. and L.S. of *Sycon.*, spicules, spongin fibres and gemmules
- 3 Coelenterata : *Obelia* (colony and medusa), planula, scyphistoma andephyra larvae of *Aurelia*, T.S. of mesentery of *Metridium*

4 Platyhelminthes : Miracidium, sporocyst, redia and cercaria larvae of *Fasciola*, scolex of *Taenia*, W.M. of mature and gravid proglottids of *Taenia*, hexacanth and cysticercus larvae of *Taenia*.

5 Aschelminthes : T.S. of *Ascaris*. (male and female)

6 Annelida : T.S. of *Nereis* through different regions, parapodia of *Nereis* and *Heteronereis*. Trochophore larva.

7 Arthropoda : V.S. of compound eye, nauplius, zoea, megalopa larvae and *Mysis*

8 Mollusca : T.S. of gill lamella and T.S. of shell of *Lamellidens*, glochidium larva.

9 Echinodermata : T.S. of arm, tube feet and pedicellaria, bipinnaria larva of starfish, echinopluteus larva.

10 Hemichordata : *Torneria* larva.

III Dissections: Various systems of preserved animals/Virtual dissection

Virtual dissection of Digestive, Blood Vascular, Excretory, Reproductive system of Frog Rat/Rabbit (if facility of virtual is made available by University)

1. *Pheretima* : General anatomy, digestive, nervous, excretory and reproductive systems.

2. *Palaemon* : Appendages, general anatomy, digestive system and nervous system.

3. *Cockroach* : Mouth parts, Alimentary canal and Reproductive system (only after permission from institutional animal ethical committee otherwise virtual)

IV Mountings: Permanent preparation of the following: 1 Protozoa : *Euglena*, *Paramecium*, rectal ciliates, *Polystomella*.

2 Porifera : Sponge spicules, spongin fibres and gemmules.

3 Coelenterata : *Obelia* (colony and medusa)

4 Platyhelminthes : Proglottid of *Taenia*.

5 Annelida : Parapodia of *Nereis* and *Heteronereis*, ovary, septal nephridia and setae (*in situ*) of earthworm.

6 Arthropoda : Statocyst and hastate plate of prawn, salivary glands and tracheae of cockroach, W.M. of *Cyclops*, *Daphnia*, mouthparts of any 4 insects *Culex*, *Anopheles* male and female, housefly, cockroach and honey bee.

7 Mollusca : Gill lamella, glochidium larva, osphradium and radula of *Pila*.

Cell Biology

1. Prepared slides of mitochondria, Golgi bodies, centrosome, different stages of mitosis.

2. Buccal smear preparation for localization of mitochondria and Golgi complex using vital stains.

3. Preparation of Mitosis.

4. Squash preparation of polytene chromosomes.

Developmental Biology: Slides and specimen

1 W.M of eggs, early cleavage stage, T.S. of blastula and gastrula of frog.

2 Study of chick embryo: 18 hours, 24 hours, 36 hours, 48 hours and 72 hours.

3 T.S. of ovary and testis.

4 Sperm smear to study the structure of sperm.

5 Foetus with placenta.

- The teacher concerned will provide e-materials to practical in the form of video ordemonstrations or written materials including dissections.

REFERENCE BOOKS (LATEST EDITIONS):

LIFE AND DIVERSITY OF ANIMALS (INVERTEBRATES)

- 1 Hickman C.P.Jr., F.M. Hickman and L.S. Roberts, Integrated Principles of Zoology, Mosby College Publication. St. Louis.
- 2 Ayyar, E.K. and T.N. Ananthakrishnan, Manual of Zoology, Vol.1 (Invertebrata), Parts I and II. S. Viswanathan (Printers and Publishers) Pct. Ltd., Madras.
- 3 Jordan, E.L. and P.S. Verma, Invertebrate Zoology, S.Chand & Co. Ltd., RamNagar, New Delhi. (English and Hindi Editions).
- 4 Parker and Haswell, Text Book of Zoology, Vol.1, (Invertebrata), A.Z.T.B.S. Publishers and Distributors, New Delhi- 110051
- 5 Ismail, S.A., Vermicology: The Biology of Earthworms, Orient Longman, India.
- 6 Kotpal, R.L. Agarwal and Khetrapal: Modern Text Book of Zoology: Invertebrates, Rastogi Publications, Meerut. (English and Hindi Editions)
- 7 Storer, T.I. and Usinger, K.L.: General Zoology, Tata McGraw- Hill Publishing Co., New Delhi.
- 8 Simpson, G.G.: Principles of Taxonomy, Oxford and IBH Publisher Co. New Delhi.

CELL AND DEVELOPMENTAL BIOLOGY :

- 9 Alberts, Bray, Lewis, Raff, Roberts and Watson, Molecular Biology of the Cell (Garland).
- 10 Balinsky, An Introduction to Embryology (CBS College Publishers)
- 11 Grant: Biology of Developing systems (Holt, Reihart and Winston).
- 12 Gilbert: Developmental Biology (Sinauer)
- 13 Alberts, B., et al., Molecular Biology of the Cell (Garland)
- 14 Lodish, H., et al., Molecular Cell Biology (Freeman).

PRACTICAL :

- 15 Verma, P.S., A manual of practical Zoology S.Chand and Co. Ltd., Ram Nagar, New Delhi (English and Hindi Editions).
- 16 Lal, S.S.: Practical Zoology, Invertebrates, Rastogi Publication, Meerut (English and Hindi Editions).

BOTANY
PAPER-I
ALGAE, LICHENS AND BRYOPHYTES

Marks :50
External :40
Internal :10

Unit-1

General characters, thallus organisation, pigments and reserve food material in algae. Electron microscopic structure of *Chlamydomonas* and the Cyanophycean cell. Fritsch's Classification and modern trends in classification. Morphology, reproduction and evolutionary relationships in the following: Cyanophyta : *Oscillatoria*, *Nostoc*. Chlorophyta : *Chlamydomonas*, *Volvox*, *Hydrodictyon* and *Cladophora*.

Unit-2

General characters of Xanthophyta, its relationship with Chlorophyta, Morphology and reproduction in Xanthophyta : *Vaucheria*; Chlorophyta : *Coleochaete* and *Oedogonium*; Charophyta : *Chara*. General account of Bacillariophyceae.

Unit-3

Morphology & reproduction in Phaeophyta: *Ectocarpus*; Rhodophyta: *Polysiphonia*. Economic importance of algae. Lichens: Important features, structure, habitat, importance as colonisers and indicators of environment. Vegetative multiplication and life cycle of *Parmelia* and *Usnea*.

Unit-4

General characters and classification of Bryophytes. The evolutionary trends in thallus structure and sporogonium. Morphology and life history of *Riccia*, *Marchantia*, *Pellia*, *Porella* and *Anthoceros*.

Unit-5

Morphology, life history and relationships of *Sphagnum* and *Polytrichum*. Economic importance of Bryophytes.

Note:

The paper setter is required to set questions of 3 types contained in 3 Sections (**Section A**- 10 questions,

Section B- 10 questions and **Section C**- 4 questions) from the 5 units of each paper. There will be 10 questions in **Section A** which will be asked from all the 5 units, i.e., 2 questions from each unit. These questions have to be answered in one word or a few words only. Each question will be of half mark. All the questions in **Section A** are compulsory. In **Section B**, 10 questions will

be set from the 5 units, i.e., 2 questions from each unit. Students are required to attempt at least 1 question from each unit. Each question will carry 5 marks. The answers of each question should be given in about 250 words. In **Section C** there will be 4 descriptive type questions set from all the 5 units, not more than 1 question from each unit. These questions may also have subdivisions. The students are required to answer 2 questions, each in approximately 500 words. Each question will carry 10 marks.

In short, pattern of question paper and distribution of marks for UG classes will be as under :

Section A: 10 questions, 2 questions from each unit, short answer, all questions compulsory.

Total marks: **05**

Section B: 10 questions, 2 question from each unit, 5 question to be attempted, at least 1 from each unit, answer approximately in 250 words.

Total marks: **25**

Section C: 04 questions (question may have subdivision), not more than 1 question from each unit, descriptive type, answer in about 500 words, 2 questions to be attempted.

Total marks: **20**

Helpstudentpoint.com

PAPER-II
MYCOLOGY, MICROBIOLOGY AND PLANT PATHOLOGY

Marks :50
External :40
Internal :10

Unit-1

Characteristics and broad classification of fungi. Structure and life history of *Albugo*, *Penicillium*, *Phyllactinia* and *Morchella*. Elementary knowledge of Mycorrhizae and their symbiotic significance.

Unit-2

Structure and life history of *Puccinia*, *Ustilago*, *Agaricus* and *Alternaria*. Economic importance of fungi : food, industries, medicine and biological controls.

Unit-3

Characteristics, classification, structure and reproduction of bacteria. Isolation and pure culture of bacteria, Gram's staining. Salient features of Micro-biology of water, soil and food.

Unit-4

Characteristics, structure and economic importance of Mycoplasma. Viruses: Nature, structure, transmission and multiplication of plant viruses.

Unit-5

Principles of plant pathology. Methods of disease control. Important symptoms of plant diseases of the following : Green ear disease of Bajra. Loose smut of Wheat, Black Rust of Wheat, Citrus canker. Little leaf of *Solanum melongena* (Brinjal). Yellow vein mosaic of Bhindi, Tikka disease of ground nut.

Note :

The paper setter is required to set questions of 3 types contained in 3 Sections (**Section A**- 10 questions,

Section B- 10 questions and **Section C**- 4 questions) from the 5 units of each paper. There will be 10 questions in **Section A** which will be asked from all the 5 units, i.e., 2 questions from each unit. These questions have to be answered in one word or a few words only. Each question will be of half mark . All the questions in **Section A** are compulsory. In **Section B**, 10 questions will be set from the 5 units, i.e., 2 questions from each unit. Students are required to attempt at least 1 question from each unit. Each question will carry 5 marks . The answers of each question should

be given in about 250 words. In **Section C** there will be 4 descriptive type questions set from all the 5 units, not more than 1 question from each unit. These questions may also have sub-divisions. The students are required to answer 2 questions, each in approximately 500 words. Each question will carry 10 marks.

In short, pattern of question paper and distribution of marks for UG classes will be as under :

Section A : 10 questions, 2 questions from each unit, short answer, all questions compulsory. Total marks : **05**

Section B : 10 questions, 2 question from each unit, 5 question to be attempted, at least 1 from each unit, answer approximately in 250 words. Total marks : **25**

Section C: 04 questions (question may have sub-division), not more than 1 question from each unit, descriptive type, answer in about 500 words, 2 questions to be attempted. Total Marks : 20

PAPER-III
PALAEOBOTANY, PTERIDOPHYTES AND GYMNOSPERMS

Marks :50
External :40
Internal :10

Unit-1

Characteristics and broad classification of pterido-phyta. Stellar system in pteridophytes. Geological TimeScale. Types of fossils, process of fossilization. Applied aspects of Palaeobotany. Structure of *Rhynia* and *Williamsonia*.

Unit-2

Occurrence, structure and life history of *Psilotum*, *Lycopodium* and *Equisetum*.

Unit-3

Occurrence, structure and life history of *Selaginella* and *Marsilea*. Homospory, heterospory and origin of seed habit.

Unit-4

General characters, economic importance and broad classification of Gymnosperms, occurrence, structure of life history of *Cycas*.

Unit-5

Occurrence, structure and life history of *Pinus* and *Ephedra*.

Note :

The paper setter is required to set questions of 3 types contained in 3 Sections (**Section A**- 10 questions, **Section B**- 10 questions and **Section C**- 4 questions) from the 5 units of each paper. There will be 10 questions in **Section A** which will be asked from all the 5 units, i.e., 2 questions from each unit. These questions have to be answered in one word or a few words only. Each question will be of half mark . All the questions in **Section A** are compulsory. In **Section B**, 10 questions will be set from the 5 units, i.e., 2 questions from each unit. Students are required to attempt at least 1 question from each unit. Each question will carry 5 marks . The answers of each question should be given in about 250 words. In **Section C** there will be 4 descriptive type questions set from all the 5 units, not more than 1 question from each unit. These questions may also have sub-divisions. The students are required to answer 2 questions, each in approximately 500 words. Each question will carry 10 marks .

In short, pattern of question paper and distribution of marks for UG classes will be as under :

Section A : 10 questions, 2 questions from each unit, short answer, all questions compulsory.
Total marks :05

Section B : 10 questions, 2 question from each unit, 5 question to be attempted, at least 1 from each unit, answer approximately in 250 words. Total marks : **25**

Section C : 04 questions (question may have sub-division), not more than 1 question from each unit, descriptive type, answer in about 500 words, 2 questions to be attempted. Total marks : **20**

PRACTICALS

The practical exercises have been divided into following two groups based on the theory papers as detailed below:

Group-I Algae, Fungi, Lichens, Microbiology and Plant Pathology.

Group-II Bryophytes, Pteridophytes, Gymnosperms and Palaeobotany.

GROUP I

Microscopic preparations and study of following algal materials: *Nostoc*, *Oscillatoria*, *Chlamydomonas*,

Volvox, *Coleochaete*, *Hydrodictyon*, *Cladophora*, *Oedogonium*, *Vaucheria*, *Chara*, *Ectocarpus* and *Polysiphonia*.

Study of different types of Lichen specimens.

Microscopic preparation and study of following fungal materials : *Albugo*, *Phyllactinia*, *Morchella*, *Penicillium*, *Ustilago*, *Agaricus*, *Puccinia* and *Alternaria*.

Study of some locally available materials showing plant diseases caused by Viruses, Mycoplasma, Bacteria and Fungi in field/ laboratory. Yellow vein mosaic of Bhindi, Little leaf of *Solanum melongena* (Brinjal), Citrus canker, Green ear disease of bajra, Rust and Smut of wheat and White rust of crucifers.

GROUP II

Study of external and internal morphology and micro-scope preparations of following Bryophytes : *Riccia*, *Marchantia*, *Plagiochasma*, *Pellia*, *Anthoceros*, *Sphagnum* and *Polytrichum*.

Microscopic examination of fossil slide specimens/ photographs: *Rhynia* and *Williamsonia*.

Temporary, double stained microscopic preparations and study of stem/ rhizome, anatomy of following pteridophytes: *Psilotum*, *Lycopodium*, *Selaginella*, *Equisetum* and *Marsilea*. Study of temporary, single stained micro-scope preparation of the following : Cone of *Lycopodium*, *Selaginella* and *Equisetum*. Petiole, Root and Sporangium of *Marsilea* ; Rhizophore and root of *Selaginella*.

Temporary, double stained microscopic preparations of T.S., T.L.S. and R.L.S. of stem of *Pinus* and *Ephedra* and T.S. Leaflet and Rachis of *Cycas* and needle of *Pinus*, T.S. of normal and coralloid roots of *Cycas*. Microscopic preparations of male cone of *Pinus* and male and female cones of *Ephedra*. Study of male cone and megasporophyll of *Cycas*.

MARKING SCHEME

There shall be a practical examination of five hours duration and the distribution of marks shall be as follows:

S.No	TOPIC	MARKS
1.	A double stained section of plant part either of Pteridophyte or	

Gymnosperm glycerine mount	10
2. Minor preparation of Pteridophyte or Gymnosperm (not covered in Q.1)	05
3. Preparation and mounting of the part of :	10
a) A Bryophyte	
b) A Fungus	
c) An Alga	
d) Bacteria	
4. Spots : Seven	10
a) One from each group (Algae, Lichen, Bryophytes, Fungi, Fossil, Pteridophytes, Gymnosperms).	
b) One microbiological experiment for comments.	
5. Viva-Voce	10
6. Practical records	05
TOTAL	

BOOKS SUGGESTED

Alexopoulos, C.J.: Introductory Mycology, John Wiley and Sons, N.Y. 1978.

Bendre, A. and Kumar, A.: A Test Book of Practical Botany, Rastogi Publication, Meerut.

Ghemawat, M.S., Kapoor, J.N. and Narayan, H.A.: A Text Book of Algae, Ramesh Book Depot, Jaipur, 1976.

Gupta, M.N.: A Class Book of Gymnosperms, 1978.

Parihar, N.S.: An Introduction to Embryophyta, Vol. I, Pteridophyta, Vol. II, Central Book Depot, Allahabad, 1969.

Sharma, P.D.: Fungi, Rastogi Publications, Meerut, 1989.

Sharma, P.D.: Microbiology and Plant Pathology, Rastogi and Co. Meerut, 1989.

Vashishtha, B.R.: Botany for Degree Students (Algae, Fungi, Bryophyta and Gymnosperms), S. Chand and Co., New Delhi, 1976.

Singhvi, V., Pandey, P.C. and Jain, D.K.: A Text Book of Botany, Rastogi and Co., Meerut.

MATHEMATICS

PAPER-I ALGEBRA

Marks :70
External :60
Internal :10

UNIT-I

Symmetric, Skew Symmetric, Hermitian and skew Hermitian matrices. Linear independence of row and column matrices. Row rank, column rank and rank of a matrix. Equivalence of column and row ranks.

Eigen values, Eigen vectors and characteristic equation of a matrix. Cayley-Hamilton theorem and its use in finding inverse of a matrix. Theorems and examples of consistency of a system of linear equations.

UNIT- II

Relation between the roots and coefficients of general polynomial equation in one variable. Transformation of equations. Descartes' Rule of signs, solution of Cubic equations (Cardan method). Biquadratic equations. Horner's Method, Ferrari's Method.

UNIT-III

Groups and their defining theorems. Various examples, order of an element and related theorems, Permutation Groups, even and odd permutations, cyclic groups, subgroups, union, intersection of two and finite subgroups and various examples, product of two subgroups.

UNIT -IV

Left and right cosets and their properties, Lagrange's theorem, index of a subgroup. Normal subgroups their examples and elementary basic theorems, Quotient group. Simple group, centre of group, Normalizer of an element and that of a subgroup, Conjugacy relation, class equation for finite groups.

UNIT-V

Group homomorphism and isomorphism with elementary basic properties, Cayley's theorem for finite groups, fundamental theorem of homomorphism in groups. The three isomorphism theorems of groups. Automorphisms and inner automorphisms.

References:

1. I. N. Herstein : Topics in Algebra, Wiley Eastern Ltd., New Delhi, 1975.
2. R. S. Agrawal : A Textbook on Modern Algebra.

3. K. B. Datta : Matrix and Linear Algebra Prentice Hall of India Pvt. Ltd., New Delhi, 2000.
4. H. S. Hall and S.R. Knight : Higher Algebra, H.M. Publications, 1994.
5. Bansal, Bhargava, Agrawal: Amurt Beej Ganita.
6. Chandrika Prasad : Text book on Algebra and Theory of Equations, Pothishala Pvt. Ltd, Allahabad.
7. Gokhroo, Saini : Elements of Abstract Algebra
8. Sharma, Purohit : Elements of Abstract Algebra

MATHEMATICS

PAPER-II CALCULUS

Marks :65
External :55
Internal :10

UNIT-I

Polar coordinates and derivatives of arc, polar subtangent and subnormal, pedal-equation, Roll's Theorem, Mean Value Theorems, Taylor's Theorem, their proofs, verifications and applications.

UNIT -II

Asymptotes, curvature, Test of concavity and convexity. Points of inflexion. Multiple points. Tracing of curves in Cartesian and polar coordinates.

UNIT - III

Beta Gamma functions and their properties. Quadrature, Rectification.

UNIT - IV

Degree and order of a differential equation. Equations of first order and first degree, Equations in which the variables are separable, Homogeneous equations. Linear equations and equations reducible to the linear form. Exact differential equations.

UNIT - V

First order and higher degree equations solvable for x, y, p . Clairaut's form and singular solutions. Geometrical meaning of a differential equation. Linear differential equations with constant coefficients. Homogeneous linear ordinary differential equations and the equations reducible in homogeneous form.

References:

1. Gorakh Prasad : A Text book on differential calculus (Pothi shala)
2. Gorakh Prasad : A Text book on Integral calculus and Differential Equations (Pothi shala).
3. E. A. Codignton : An introduction to ordinary Differential Equations Prentice Hall of India, 1961.
4. P.K. Jain and S. K. Kaushik: An Introduction to Real Analysis, S. Chand & Co., New Delhi-11, 2000.

5. Bansal, Bhargava : Avakalan Ganita-II
6. Bansal, Bhargava : Samakalan Ganita-II
7. Gokhroo, Saini : Uchch Avakalan Ganita.
8. Gokhroo, Saini : Uchch Samakalan Ganita.
9. Bansal, Bhargava & Agrawal: Avkal Samikaran I .
10. Gokhroo, Saini, Kumbhat: Avkal Samikaran.

MATHEMATICS

PAPER –III GEOMETRY

Marks :65
External :55
Internal :10

UNIT - I

General equation of second degree, nature of conic, eccentricity and foci of conic, Tracing of different conics. Ellipse : Tangent, normal, Chord of contact of the tangents, pole and polar, eccentric angle, auxiliary circle, director circle, equation of chord in term of middle point, pair of tangents, conjugate lines, diameter and conjugate diameters and their properties.

UNIT - II

Hyperbola: Parametric coordinates, tangent, normal, chord of contact of tangents, pole and polar etc. asymptotes, conjugate hyperbola, conjugate diameters, rectangular hyperbola, equation of hyperbola referred to its asymptotes. Polar Equations: Polar equation of conic, polar equations of tangent, perpendicular lines and normal, director circle of the conic.

UNIT-III

Plane and straight line: Equation to represent two planes and angle between them, projection on a plane area of a triangle and volume of tetrahedron. Equations of line intersecting two lines, skew lines, shortest distance between two lines, intersection of three planes and three lines.

UNIT- IV

Sphere: General Equation, Tangent Plane, Pole and Polar, Intersection of two spheres, Radical plane, Radical line, Radical centre, Co-axial spheres, Limiting points.
Cone: Enveloping cone, Tangent plane, Reciprocal cone, Three mutually Perpendicular generators, Right circular cone. Cylinder: Right circular cylinder, Enveloping cylinder

UNIT-V

General equation of second degree in three dimensions. Intersection of a line and a conicoid. Tangent lines and Tangent plane. Condition of tangency, plane section with a given centre. Diametral plane. Principal planes, principal directions and plane sections.

References:

1. Gorakh Prasad and H.C.Gupta: A Text book of coordinate Geometry (Pothishala)
2. S.L.Loney : The Elements of coordinate Geometry; Mack-Millan and Company, London.

3. R.J.T. Bell : Elementary Treatise on coordinate Geometry of Three Dimensions.
4. P.K. Jain and Khalil Ahmed: A Textbook of Analytical Geometry of Three Dimensions, Wiley Eastern Ltd., 1999.
5. N.Saran and R.S.Gupta : Analytical Geometry of Three Dimensions.(Pothehishala)
6. Bansal, Bhargava : Dwivim Nirdeshank Jyamiti
7. Gokhroo, Saini : Dwivim Nirdeshank Jyamiti
8. Gokhroo, Saini : Trivim Nirdeshank Jyamiti
9. Bansal, Bhargava : Trivim Nirdeshank Jyamiti.
10. Golas, Tandon, Bhargava : Analytical solid Geometry.

PROFESSINOL COURSE

PEC- I -CHILDHOOD AND GROWING UP

Marks :100
External :80
Internal :20

OBJECTIVES:

1. Understand the Developmental characteristic of Childhood and adolescence.
2. Learn the theories of development.
3. Understand Educational provision of children at different stages of development.
4. Understand the concepts and components of personality.
5. Know the techniques of personality assessment.
6. Understand nature and characteristics of intelligence.
7. Analyse the implications of understanding human development for teachers.
8. Situate child development in a socio-cultural context.

Unit-I

Introduction to Concept and Process of Childhood Development:

- Meaning of childhood development, Principles of development.
- Study of Life span-Prenatal, early childhood, middle childhood, adolescence & adulthood and stage specific characteristics.
- Meaning of cognition and its role in learning.
- Facilitating Holistic development for self and society
- Procedure for studying Children- Observation, Interview and Case Study.

Unit-II

Theories of Childhood Development and their Significance:

- Erik Erikson's Psychosocial Theory.
- Piaget's Cognitive Theory.
- Arnold Gesell's Maturation Theory,
- Urie Bronfenbrenner's Ecological Theory.
- Vygotsky's Socio-cultural Theory
- Noam Chomsky's Processing Theory

Unit-III

Childhood and Adolescence:

- Defining Childhood and Adolescence as a distinct stage.
- Adolescence special feature and challenges
- Characteristics and developmental task of Childhood and Adolescence
- Socialization of Childhood and Adolescence in different culture.
- Role of media in the life of adolescents with special reference to use of internet (Social networking sites, E-mails, Browsing),
- Personality Concept, Types and Components of Personality.
- Psychoanalytic theory of Personality by Freud.
- Factors Affecting Personality development.

Unit-IV

Family School and Community:

- The Family: Meaning, function of the family, family as a social system, different styles of child rearing, Socioeconomic and Ethnic variation in Child Rearing, Cultural Influences of Family.
- School- Meaning and Function of School, School transition in childhood and adolescence, helping adolescence in school adjustment. Teacher student interaction, peer relation and its importance, Cultural value of peer groups.
- Community- Meaning and Function of Community, case study of a community- linked programme at local/national/international level.
- Intelligence, Nature and Characteristics
- Theories of Intelligence
 - a) J.P. Guilford Structure of Intellect

- b) Howard Garden's theory of Multiple Intelligence
- c) Daniel Goleman's Model of Emotional Intelligence
- Measurement of Intelligence, Types of Intelligence Test- Verbal, non-verbal and Performance Tests.

Unit-V

Issues and Concern in Childhood and Adolescence:

- Children with difficult circumstances and Understanding of them- Juvenile delinquency, maladjustment, depression in adolescence.
- Marginalized Children-Child labour, Overweight/ Underweight children, Children growing up in poverty, HIV affected children, Orphans.
- Approaches to intervention and therapy for well-being- Preventive and Primitive Approach, Individual counseling and family therapy.

Practicum: (Any two from the following)

1. Administration, Scoring, interpretation and Reporting of one Mental Ability Test and one Personality Test. Any one from the following.
2. Observe children during their playtime in your practicing school (or nearby school) for a week; observe their play activities, relationships, Communication with their peers. On the basis of that prepare a report about understanding childhood.
3. Prepare a case study of a girl child from a minority community or a dalit household or a tribal community.
4. Observe and interact with ten adolescent children living in different contexts (rural areas, urban slum, dalit household, tribal community, urban area and working/street people) and compare their characteristics and problems.

Books Recommended:

1. Anastasi, A. & Urbina, S. (1997). Psychological testing (Seventh Edition). Indian Reprint, Delhi Pearson Education.
2. Atwata, E. (1998), Adolescence. New Jersey: Prentice Hall.
3. Berk, L.E. (2004) Child Development (6th edition) Allyn & Bacon. Boston.
4. Berk, L.E. (2000) Child Development (8th edition) PHI learning Pvt. Ltd. New Delhi.
5. Bhargav, V. (2005) Adoption in India: Policies and Experiences. New Delhi: Sage Publications
6. व्यास हिरष्चन्द्र एवं शर्मा— अधिगम और विकास के मनोसामाजिक आधार, राजस्थान हिन्दी ग्रंथ अकादमी, जयपुर-4

7. पाठक, पी.डी. (2007), शिक्षा मनोविज्ञान, विनोद पुस्तक मंदिर, आगरा।
8. गुप्ता, एस.पी, गुप्ता, अलका (2007) उच्चतर शिक्षा मनोविज्ञान, शारदा पुस्तक भवन, इलाहाबाद।
9. मंगल, एस.के.,(2008) शिक्षा मनोविज्ञान, प्रिंटिस हॉल ऑफ इण्डिया प्राइवेट लिमिटेड, नई दिल्ली।

PEC 2 - CONTEMPORARY INDIA & EDUCATION

Marks :100
External :80
Internal :20

Objectives the Course enables the Student teacher to :

1. Understand different perspectives of Education.
2. Analysis the concept of Education & its related terms.
3. Reflect on the educational ideas & systems of various thinkers & develop the ability to theorize education practice.
4. Collect evidence for the influence of socio-cultural aspects on education.
5. Analysis the role of education on Society by gathering various evidences & Illustrations'
6. To develop an understanding of the trends issues and challenges faced by contemporary education in India.

Course & Content

Unit- I

Salient Features of Ancient Indian Education & Concept

1. Education : Meaning , types & nature , and functions of education, Informal, Formal & Non-formal education.
2. Vedic, Buddhist, Islamic & Development during British period (a) Adams Report (b) woods dispatch.
3. Post Independence area :- University Education commission (1948) , National Policy – 1986, NCF 2005, NCFTE 2009.

Unit - II

Education thoughts & Practices :-

Critical reflection on the educational thoughts of Indian & western thinkers & on their relevance to the present education system.

Indian :- Mahatma Gandhi, Swami Vivekananda, Gijju Bhai & Dr. Radhakrishnan , R. N.Tagore.

Western :- John Dewey, Rousseau, Montessori, Frobel.

Unit -III

Education & Socio Cultural Context :-

-Education as an instrument of Social Change ; Influence of Educational on Society & Family.

- Socialization, Education & Culture & Social Control

-Secularism and Education ,Education for National Integration, Human rights & Education.

Unit -IV

Teacher Education & Educational Institutions :-

- Status , Aims & Objectives of Teacher Education in India .
- Role & Responsibilities of UGC, NCERTE, NCTE, IASE , SIERT, DIET.
- Secondary Education & Open University :- Kendriya Vidyalaya , Navodaya Vidyalaya ,
- CBSE, ICSE, RBSE, IGNU, Vardhaman Open University (Introduction ,Aims ,Adminstration,Work ,) Kasturba Gandhi Balika Vidhyalaya , Modal School

Unit - V

Issue & Challenges :-

- Diversity , Inequality , Marginalization :- Meaning , Concept ,Levels with Special Reference to
- Individual , Region , Language , Cast , Gender .
- Eradication of Illiteracy , National Adult Education Program, Equality of Opportunities.
- Means & Measures taken For Equality in terms of Gender
- Population Explosions & Education

PRACTICUM:-(any two)

- Write & Presentations On Educational Thought s of Various Thinkers .
- Preparation of an Album or Posters on different Thought s of Great Thinkers.
- Analysis of aims of Education From ancient vedic times to Modern times.
- Picture Collection & detail report of Eradication of Illiteracy Program.
- Picture Collection & detail report of National Adult Education Program.
- Prepared album & Work of Central Educational Institutions.

- Collection of Examples / Evidences to Show the influence of education on social change & the socio culture influences on Education aims.
- Comparative study of NCF 2005 of NCERT on aims of Education.
- Reading s on Position paper on “ Aims of Education “ NCF 2005
- Comparative Study of Aims of Education of few Countries.
- Visit to Modal School & Kasturba Gandhi Balika Vidhyalay & study their Education management pattern & Submit the Report.
- Comparative study of CBSE , RBSE & ICSE.
- Comparative study & Picture Collection of open University IGNU & VMOU.

References:-

शिक्षा के दार्शनिक एवं समाजशास्त्रीय सिद्धान्त , विश्व ज्ञानकोष (Vol.2nd) एन.आर.स्वरूप. सक्सेना , आर.लाल. बुक डिपो , मेरठ
 उभरते भारतीय समाज में शिक्षा , डी.डी. मेहता , टण्डन पब्लिकेशन लुधियाना
 उभरते भारतीय समाज में शिक्षा , डॉ. के.सी.जैन एवं शैल जैन ,टण्डन पब्लिकेशन लुधियाना
 शिक्षा के दार्शनिक एवं समाजशास्त्रीय सिद्धान्त , विश्व ज्ञानकोष (Vol.1)) एन.आर.स्वरूप. सक्सेना एवं शिखा चतुर्वेदी, आर.लाल. बुक डिपो , मेरठ
 उदीयमान भारतीय समाज में शिक्षा, डी.एल.शर्मा ,आर.लाल. बुक डिपो , मेरठ
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ABILITY ENHANCEMENT COURSE

AEC- 1 Guidance & Counseling in School

Marks :100
External :80
Internal :20

Unit – I

Meaning and Nature of Guidance –

Guidance concept, aims, objective functions and principles, Need and procedure for (educational psychological and social) guidance.

Purpose and principles of organization of different guidance services.

Organization of guidance services at Secondary Level – Need and importance.

Group guidance – concept , Need significance and principles, organization of guidance programs in school.

Unit II:

Meaning and Nature of Counselling:

Counselling: Meaning, and nature; Difference between Guidance & Counselling; Principles and approaches of counselling, Individual and Group Counselling; Skills in Counselling- Skills for Listening, Questioning, Responding, & Communicating, Listening Attentively to the concerns of the counselee, Negotiating Self Discovery, Decision Making, Problem Solving etc and values such as Patience, Empathy etc.; Methods and Process of Counselling Academic, Personal, Career and Behaviour problems of students with special needs, viz. socio-emotional problems of children with disabilities and deprived groups such as SC, ST and girls, need for Counselling; Professional Ethics and Code of Conduct; Qualities and Qualifications of an effective Counsellor

Unit – III

Career Guidance and Counselling:

Educational and Career Information in Guidance and Counselling: Meaning, Importance, collection, types, classification of occupational information; Dissemination of Occupational Information: Class talk, career talk, Group discussion, Preparation of Charts and Poster, Career Exhibition, Career conference; Guidance for gifted, slow learner, socio-economically disadvantaged children; Career development: Meaning and Importance; Teacher's role in Career planning, Vocational training and placement opportunities for CWSN. Broad outline with respect to the emerging courses and career options available in India; Guidelines for Establishment of Guidance Cell or Career Corners in Schools

Unit – IV

Tool and Techniques of Guidance

Testing and Non testing techniques for studying and appraisal of students.

- a. Testing techniques intelligence/mental ability tests, aptitude tests, altitude scales, interest inventories and personality tests.
- b. Non testing techniques interview, observation and case study.
- c. Tools questionnaire, anecdotal records, cumulative record cards etc.

Suggestive List of Activities:

Group Guidance-Preparation of Class Talk and One Career Talk

Visit to different Guidance Centre

Design a checklist Questionnaire to collect information on students and classify them under educational, psychological or social problem.

Preparation of Cumulative Record

To prepare a Case study and Analysis of Case study

Administration, Scoring & interpretation of at least two tests: One Mental

Ability Test and One Aptitude Test

Job Analysis of a Counsellor

Preparation of list of problem behaviours based on observation. Detailed study of the Guidance and Counselling Services available in a given School

Prepare a Chart and Poster for dissemination of Career Information

Familiarise and write a report of any one of the Personality Tests used in

Guidance and Counselling

References :

1. Aggarwal JC (2004) Education vocational guidance and counseling Delhi.

2. Asch, M (2000) Principles of guidance and counseling, New Delhi Sarup and Sons.
3. Bhatia K.K. (2002), Principles of Guidance and Counseling Ludhiana, Vinod.
4. 4. Bhatanagar R.P. Rani S. (2001) Guidance and Counseling in Education and psychology.
5. Chauhan S.S. (2008) Principles and techniques of guidance UP Vikas publishing house Pvt. Ltd.

PROFESSINOL COURSE PRACTICAL

OPEN AIR SESSION / SUPW CAMP

Every college will organize 5 days camp in the first year of B.Ed. Course. Participation in such camp will be compulsory for all students.

Performance of students will be evaluated internally. Objectives of the camp will be as follows:-

1. To develop understanding about local environment and Community for connecting classroom teaching with outside world.
2. To develop sensitivity towards self, society and environment.
3. To develop feeling of togetherness and working collaboratively.
4. To develop organizational skills and leadership abilities.
5. To develop skill of conducting surveys.
6. To develop an understanding about sustainable future.
7. To develop dignity of labour through community service.

Suggested activities for Open Air Session/SUPW Camp

1. Study of the local environment/ socio cultural issues through survey.
2. Community awareness performance –cleanliness campaigns, plantation, value education, etc.
3. Participation in Health and Spiritual activities like morning Assembly, Yoga, P.T., Meditation, Silence hour.
4. Participation in Aesthetic and recreational activities.
5. Documentation and organization of exhibition for local community.
6. Productive and creative craft activities.

Note : Student teachers will participate in the above mentioned activities in collaborative manner (to develop the feeling of working and living together)

Guideline for assessment Max Marks 50