BHUPAL NOBLES' UNIVERSITY, UDAIPUR

Scheme of Examination and Course of Studies
SYLLABUS (I SEMESTER)
INTEGRATED TEACHER EDUCATION PROGRAM
B.SC. B.Ed. FOUR YEAR

DEPARTMENT OF EDUCATION

FACULTY OF EDUCATION

BHUPAL NOBLES' UNIVERSITY, UDAIPUR (Raj.)

Scheme of Examination and Course of Studies

BACHELOR OF SCIENCE (B. Sc.) & BACHELOR OF EDUCATION (B. Ed.)

FOUR YEARS INTEGRATED COURSE

INTRODUCTION

The NCTE has recommended that the B.Sc.B.Ed. Course should be of four years duration and has prepared a Curriculum Framework for Four year B.Sc.B.Ed. Program me. *Bhupal Nobles' University* also decided to introduce four year B.Sc.B.Ed. Course and has prepared a detailed course of study and Scheme of Examination for four years B.Sc. B.Ed. Course on the basis of guideline given in the curriculum framework. The four year B.Sc.B.Ed Course will come in to force from the session commencing in 2019-20. The four year B.Sc.B.Ed. Course aims at a complete development of the student-teacher; particularly in knowledge and skills, in individual care of the learner and also in methods and evaluation designed to facilitate learning. This course is divided into four parts. It aims at developing understanding of and competence to render disciplinary knowledge into forms relevant to stage specific understanding of teaching-learning situation apprehended through intensive study of conceptual explanations, observation and analysis of live classroom situations as well as hand-on experiences and longer duration of field experience. Interactive processes, i.e. group reflection, critical thinking and meaning-making have been encouraged. The maturity of student-teachers has while visualizing modes of learning engagements; instead of continuous teacher monitoring, greater autonomy to learners has been given in accordance with andragogic principles of learning. The syllabus retains the essence of student-teachers being active participants in the learning process and prepares the student-teachers for facing the emerging challenges resulting out of globalization and its consequences. Therefore it becomes essential for any nation to give necessary professional inputs to its teachers. *Bhupal Nobles' University* pursues the following curriculum for its pre-service teacher training program me. The curriculum also aims at developing language proficiency of the pupil teacher by providing him opportunities through different activities and course content.

The B.Sc.B.Ed. Courses are integrated progressive in accruing the doubles bachelor's degree which is the B.Sc.B.Ed. degree. The degree enable's the students to complete the B.Ed. Education along with the B.Sc. degree course. The courses are conducted by *BNU*.

ELIGIBILITY

Candidates who have passed Senior Secondary (10+2) examination or any other examination recognized board with at least 50% marks in the aggregate are eligible for admission to the course. There will be a pre B.A./B.Sc. B.Ed. test for admission in this course .Candidates who have passed senior secondary examination (10+2) in any faculty from Board of Secondary Education, Rajasthan Ajmer or any other recognized board 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.

The Institute will regulate admission through selection on the basis of marks in the qualifying examination and/or in the entrance examination or any other selection process as per the policy of the state or and the Bhupal Nobles' University and in accordance with the state quota as decided.

RESERVATION

Reservation of seats for SC/ST/OBC/SBC and Physically Disabled will be as per existing Rajasthan Govt. /Central Govt./ University rules.

ADMISSION PROCEDURE FOR B.SC. B.ED..

Admission shall be made on merit on the basis of marks obtained in the qualifying Examination and/or in the entrance examination or any other selection process as per policy of the State Government and the university.

DURATION AND WORKING DAYS

The B.Sc.B.Ed Programme shall be of duration of Eight Semester with *Four Academic Years*, which can be completed in a maximum of six years.

WORKING DAYS

There shall be at least *Two Hundred Fifty Working Days devided into 2 Semesters* each year *exclusive* of the period of examination and admission.

• Institution shall work for a minimum of *Thirty Six hours* **a week**, during which physical presence in the institution of all the teachers and student teachers is necessary to ensure their availability for advice, guidance, dialogue and consultation as and when needed.

• The minimum attendance of student-teachers shall have to be *80*% for all *course work* **and** *practicum***, and** *90*% **for** *School Internship***.**

OBJECTIVES OF THE COURSE

The objectives of this program me is to prepare teachers from *Upper Primary to* Middle *Level* (Classes VI-VIII) & *Secondary Level* (Classes IX-X) pre-service teacher education program are to enable the prospective teacher to –

The objectives of theory course prescribed for the B.Sc.B.Ed course are as follows:

1. To develop competence to teach subjects of their specialization on the basis of an adequate theory of learning and a sound knowledge of the subjects.

2. To develop interest, attitude and knowledge which will enable them **(i)** to foster the all-round growth and development of children under their care and **(ii)** to provide guidance to individual pupils.

3. To develop an understanding of the aims and objectives of education in the Indian background and to promote an awareness of the role of the school and the teacher in realizing these aims and ideals.

4. To develop an understanding of the close relationship between societies and the school, between life and school work.

5. To become self-regulated learners; develop professional commitment and work as responsible professionals.

6. To make them comfortable with content and pedagogical effective use and utilization of ICT.

7. To enable them to critically analyze the various evaluation tools to serve CCE.

8. To reflect on teacher practices and interface with societal resources

9. To build up professional consciousness.

The objectives of Practical *Work* prescribed for the B.Sc.B.Ed. course are as follows:

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

1. Be conscious of a sense of values and need for their inculcation in children through all available means including ones own personal life.

2. Posses a high sense of professional responsibility.

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

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

5. Arouse their curiosity and interest and secure their active participation in the education process.

6. Develop capacity for thinking and working independently and guide them to that end.

7. Organize and manage the class for teaching learning .

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

9. Define objectives of particular lessons and plan for achievement.

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

11. Use appropriate teaching methods and techniques.

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

13. Convey ideas in clear and concise language and in a logical manner for effective learning.
14. Undertake action research.
15. Give proper opportunity to the gifted pupils and take proper care of the pupils with special need.
16. Correlate knowledge of the subjects being taught with other subjects and with real life situations as and when possible.
17. Prepare and use assignment.
18. Evaluate pupil's progress.
19. Plan and organize co-curricular activities and participate in them.
20. Co-operate with the school teachers and administrators and learn to maintain school records and registers.

LEARNINGOUTCOME:

After the completion of the course the student teacher is expected to attain the following learning out comes:
- Competence to teach effectively two school subjects at the secondary/senior secondary level.
- Ability to translate broad objectives of secondary/senior secondary education in terms of specific   programme and activities in relation to the curriculum.
- Ability to understand children's needs, motives, growth pattern and the process of learning to stimulate learning and creative thinking to foster growth and development.
- Ability to use (A) individualized instruction and (B) dynamic methods in large classes.
- Ability to examine pupil's progress and effectiveness of their own teaching through the use of proper evaluation techniques.
- Use of Equipment for diagnosing pupil's difficulties and deficiencies in achievement and dealing with them through remedial work.
- Readiness to spot talented and gifted children and capacity to meet their needs.
- Ability to cater to the need of children with special needs.
- Ability to organize various school program me, activities for pupils.
- Ability to provide guidance in educational, personal and vocational matters.
- Ability to assess the all round development of pupils and to maintain a cumulative record.
- Development of certain practical skills such as:
  - ➢ Black board work
  - ➢ Preparing improvised apparatus
  - ➢ Preparing teaching aids
- Developing professional competence.
- Readiness to participate in activities of professional organizations.

MODES OF LEARNING ENGAGEMENT
  Overall Intention of Modes of Learning Engagement :
- The Curriculum is so designed that the student-teachers internalize the nature of education and pedagogic process through enriched experiences.
- The kinds of learning engagement suggested will contribute to reduction of the gap between theory and practice by dovetailing both appropriately.
- The Curriculum emphasises the use of varied modes of learning engagement in accordance with the
- Interactive processes wherein group reflection, critical thinking and meaning making will be encouraged
- In this respect, critical theory, critical pedagogy and critical thinking become very crucial theoretical inputs and are embedded implicitly in various courses.
- While visualizing modes of learning engagement, the nature of student teachers who are adults has been kept in mind. Instead of continuous teacher monitoring greater autonomy to learners has been recommended which is more

relevant and in accordance with the andragogic principles of learning.

- Multiple learning engagements visualized being more active / interactive, the course work is clearly not meant to be burdensome and memory based, but challenging and engaging.

Some Specific Modes of Learning School Observation

- Observation of school infrastructure.
- Short Less plan.
- Innovation in teaching learning.
- Importance of interaction between Parents & Teachers.
- Tutorial classes.
- Prepare a Sociometry test.
- To develop and evaluate moral values.
- To prepare, administrate & analysis questionnaire.

These are suggestive modes of learning engagement. Teacher educators will have to create, design and evolve different modes of learning engagement based on the course and suited to the   needs of student teachers.

SCHOOL INTERNSHIP

a) The student teachers will be actually placed in a school for a duration of four and sixteen weeks,in sixth and seventh semesters respectively.

b) Student teachers will function in liaison with the regular teachers in the school in the school in all day-to-day functioning along with teaching learning.

c) Pre-internship will be held for two weeks in which school observation,orientation of subject specific skills,Pre-view of Text-books and development of teaching learning material will be done.

d) In Sixth Semester students, will have to go for 4 week internship in school in which lesson plans based on different methods and approaches(fusion based) will be developed and teaching in original condition will be organized.

e) In the Seventh Semester, students will have go for 'School Internship' of sixteen weeks.It is desirable tha students teacher will be provided internship in upper-primary or secondary /senior secondary schools. During this period ,their role in the school is something like an

'apprentice'and its specific cotours need to be worked out worked out by course faculty.They will

be engaged in the school functioning in all its aspects.

B.Sc. B.Ed.
SYLLABUS
I SEMESTER

SEMESTER-I

COURSE No.	Name of Subject
COURSE 1	Childhood & Growing up
COURSE 2	Gen. English
COURSE 3	Physics
	Physics practical
COURSE 4	Chemistry
	Chemistry Practical
COURSE 5	Mathematics
COURSE 6	Botany
	Botany Practical
COURSE 7	Zoology
	Zoology Practical

B.Sc.B.Ed. I SEMESTER

COURSE No.	Paper Code	Nomenclature
COURSE 1	CGU111TH	Childhood & Growing up
COURSE 2	GEN 111TH	Gen. English
COURSE 3	PHY111TH	Physics
	PHY111PR	Physics Practical
COURSE 4	CHE111TH	Chemistry
	CHE111PR	Chemistry Practical
COURSE 5	MAT111TH	Mathematics
COURSE 6	BOT111TH	Botany
	BOT111PR	Botany Practical
COURSE 7	ZOO111TH	Zoology
	ZOO111TH	Zoology Practical

B.Sc. B.Ed. FIRST SEMESTER COURSE STRUCTURE

COURSE NO.	COURSE CODE	PAPER NAME	CREDITS		MID TERM	END TERM	MAX MARKS
			TH.	PR.			
COURSE 1	CGU111TH	CHILDHOOD AND GROWING UP	6	-	30	70	100
COURSE 2	GEN 111TH	GENERAL ENGLISH	4	-	30	70	100
COURSE 3	PHY111TH	**ANY THREE OF THE FOLLOWING:** PHYSICS	4	-	20	50	70
	PHY111PR	PHYSICS PRACTICAL	-	2	-	30	30
COURSE 4	CHE111TH	CHEMISTRY	4	-	20	50	70
	CHE111PR	CHEMISTRY PRACTICAL	-	2	-	30	30
COURSE 5	MAT111TH	MATHEMATICS	6	-	30	70	100
COURSE6	BOT111TH	BOTANY	4		20	50	70
	BOT111PR	BOTANY PRACTICAL	-	2	-	30	30
COURSE 7	ZOO111TH	ZOOLOGY	4	-	20	50	70
	ZOO111PR	ZOOLOGY PRACTICAL	-	2	-	30	30
		TOTAL CREDITS AND MARKS	**28**				**500**

Course 1 - CHILDHOOD & GROWING UP

Objectives–After completion of the course the student teachers will be able to:-

1. Understand the Developmental characteristics of Childhood and adolescence.
2. Learn the Theories of development.
3. Understand Educational provisions of children at different stages of development.
4. Understand the Concepts and Components of Personality.
5. Know the Techniques of Personality Assessment.
6. Understand the Psycho-Analytic Theory of personality.
7. Understand the Concept and Importance of Mental Health and role of Teacher in Promoting Mental Health.
8. Acquire the Concept of Individual Variation and their Classroom Implications.
9. Understand nature and Characteristics of Intelligence.
10. Understand the Theories of Intelligence.
11. Acquire the skill of Measurement of Intelligence.

COURSE CONTENT

UNIT-I   Basic Concepts of Child Development
1. Meaning, Scope and importance of studying Child Development.
2. Methods of study of Children- Case Study. Observation and Field Studies.
3. Basic Concepts in Child Development- Growth V/S Development, Maturation V/S Learning, heredity vs. Environment (Family, Neighborhood, School and Community)
4. Principles of Growth and Development.
5. Stages of Development.

UNIT-II   Childhood
1. Development characteristics of Childhood with reference to Physical, Cognitive, Motor, Social, Emotional and Moral aspects.
2. Theories of Development- Piaget (cognitive), Erikson (Psychosocial)
3. Education Implications of Development during Childhood.

UNIT- III   Adolescence
1. Characteristic of adolescence development. Physical, Cognitive, Social and Emotional.
2. Difficulties during transition period – Difficulties in Social Transition, Conflicts, Social Attitude and Behavior, Influence of Peers, Conformity and Self assertiveness and Personality Integration.
3. Impact of Urbanization, Economic, Social and Political change on the construction and experience of adolescence.
4. Issue and adolescence –
   a. Identity crisis
   b. Idealism and Hero worship
   c. Gender Issue
   d. Child Labor
   e. Changing Family Structures
   f. Peer Pressures
   g. Pressure of Competition
   h. Juvenile Delinquency
5. Critical analysis of significant events e.g. Sexual abuse, Harassment, Gender and Poverty.
6. Guidance and Counseling of adolescent.

UNIT- IV
Personality and Mental Health
➢ Personality Concept, types and Components of Personality.
➢ Psychoanalytic theory of Personality by Freud.
➢ Factors affecting Personality development.
➢ Assessment of Personality- Projective and Non-Projective Techniques.
➢ Mental Health :
   • Concept and Importance
   • Types of Conflicts and Defense Mechanism.

- Role of Teacher in Promoting Mental Health

UNIT – V

Individual Variation

➢ Concept of Variation and Classroom, Implication with reference to Intelligence, Aptitude,
➢ Creativity, Emotional Stability, Social Adjustment, Self Concept and Interest.
➢ Introduction to Socially disadvantaged children who are marginalized on account of class, caste, Language, ethnicity or gender, first class generation learners.

(Focus should be to understand how different socio political realities construct different childhoods Within children's lived contexts: Family, Schools, Neighborhood and Community through close Observation and interaction with children of different socio- economic and cultural backgrounds)

➢ Intelligence, Nature and Characteristics
➢ Theories of Intelligence
- J.P. Guilford Structure of Intellect
- Howard Gardener's Theory of Multiple Intelligence.
- Daniel Goleman's Model of Emotional Intelligence.

➢ Measurement of Intelligence, Types of Intelligence, Tests – Verbal, Non- Verbal and Performance Tests.

SESSIONAL / PRACTICUM

Any Two from the following: Practicum no.1 is compulsory for all.

1. Administration, Scoring, Interpretation and Reporting of one *Mental Ability Test* and one *Personality Test*.(*Any one from the following*):

- Preparation of case history of children from early childhood to adolescence taken from different Socio - economic and cultural background in the context of family, schools, neighbourhood and community.
- Study of any one psychosocial issue related to adolescence (Child labour, Juvenile Delinquency, Pressure of Competition, Gender issues)
- Study of any one issue represented and highlighted by media (sexual abuse and harassment, poverty, gender, child labour etc

REFERENCES

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2. Atkinson, Richard C. etal (1983) Introduction to Psychology Harcourt Brace Johanovich inc, New York. Benjafield, J.G (1992) Cognition, Prentice hall, Englewood Cliffs.
3. Bains, Narinder Singh (2008). Shiksha Manovigyan Evam Vikas Ki Avastha, Jaipur: Jain Prakashan.
4. Bhatia, K.K. (2005). Shiksha Manovigyan ke Aadhar Ludhiana : Kalyani Publishers.
5. Blackie, J.How Children Learn in J.C Stone an F.W. Schneider (eds) (1971) Readings in the Foundations of Education vol, II Cromwell : New york.
6. Brown J.S.Collins A and Dugrid P (1989) Situated Cognition and the Culture of Learning, Educational Researcher, 32- 42
7. Chouhan, R.S. (2007). Adhigam Evam Vikas Ki Manovigyan, Jaipur : Agresen Shiksha Prakashan
8. Dweck, C. (2006). Mindset: The new Psychology of Success. Random House LLC.
9. Flavell, J.H (1963) the Developmental Psychology of Jean Piaget, Van Nostrand: New York.
10. Gardner, H (1999) The Disciplined Mind: what all Students should Understand. New york: Simon and Schuster.
11. Gardner, Howard (1989) Frames of Mind The Theory of Multiple Intelligence, Basic Books, New York.
12. Gardner, Howard (1989) the Unschooled Mind Basic books. New york.
13. Hurlock, E.B. (1964) Child Development, Mcgraw Hill Book co. New york, Jeanne Ellis ormrod Educational Psychology, Developing learners, fourth Edition
14. Lindgn, H.C. (1980) Educational Psychology in the Classroom Oxford University press, New york.
15. Luria, A.R(1976) Cognitive Development: Its Cultural and Social Foundations. Howard University Press Cambridge mass.
16. Mangal, Dr. S.K. Mangal, Shubhra, 2005, Child Development, Arya Book Depot New Delhi.
17. Mishra Mithlesh, Ahlawat Meena (2008), Jaipur : Neelkanth Pustak Mandir.
18. Mishra, Mahindra Kumar (2008). Vikasatmak Manovigyan, Jaipur : University Book House.
19. Mishra, Manju. (2008). Adhigamkarta Ka Vikas Evam Shikshan Adhigam Prakirya, Jaipur : University Book House.
20. Mishra. R.C. 2010, Child Psychology. A.P.H. Publishing Corporation, New Delhi.
21. Pareek, Mathureshwar, 2002, Child Development and Family Relationship, Research Publication, Jaipur
22. Patricia A. Alexander, Phillp H.Winnie (2006) Handbook of Educational Psychology.
23. Phillpee Aives (1962) Centuries of childhood: A Sociology of Family Life, Knops, Newyork.
24. Piaget, J. (1997) Development and Learning. in M gauvarin & M. Cole (Eds.) readings on the development of children. New York. WH freeman & company
25. Piaget,J,Inhelder,B(1969).Psychology of Child : New York.
26. Rajoria, Arun Kumar, Arora, Preeti (2007). Adhigamkarta Ka Vikas Evam Shikshan Adhigam Prakirya. Jaipur : Kavita Prakashan.
27. Rogers, C.R. (1983) Freedom to Learn (revised edition) Columbus, OH: Merrill.

BHUPAL NOBLES' UNIVERSITY UDAIPUR (RAJASTHAN)
NEP 2020 Pattern Syllabus
First Year Arts /Science/ Commerce/ B.C.A./ Bio. Tech./Education/law (In Semester First/ Second)
Ability Enhancement Compulsory Course (AECC)
Subject – ENGLISH LANGUAGE LEARNING
Paper Code - ENGLISH LANGUAGE LEARNING
SEMESTER FIRST

UNIT -I
- Report Writing
- Letter Writing

UNIT – II
- Tenses
- Voice (Active and Passive)
- Articles

UNIT – III
- Modal Auxiliary Verbs
- Phrasal Verbs

UNIT -IV
- Synonym
- Antonym
- Direct and Indirect Speech

UNIT – V
- Comprehension Passage
- Essay Writing
- Precis Writing / Summary of a Reading Passage

Recommended Books:
- Fluency in English – Part II, Oxford University Press, 2006.
- Business English, Pearson, 2008.
- Language, Literature and Creativity, Orient Black Swan, 2013.
- Language through Literature, Ed. Gauri Mishra, Dr Ranjana Kaul, Dr Bharti Biswas.
- Developing Language Skills – 2, Ed. S.C. Sood et al., Spantech, Delhi 1992.
- Penny Ur, A Course in Language Teaching: Practice and Theory, Cambridge Univ. Press., 1996.
- R.K. Bansal and J.B. Harrison, Spoken English: A Manual of Speech and Phonetics, Orient Black Swan: New Delhi, 2013

Course 3 – PHYSICS
MECHANICS (THOERY)

UNIT-I

Laws of motion and Frame of reference: Laws of motion, conservation of momentum and energy, Co-ordinate frames, inertial and non-inertial frame of reference, Galilean transformation and invariance, fictitious force, centrifugal force, transformation of coordinate, velocity, acceleration and displacement in a rotating frame of reference, uniformly rotating frame of reference, Coriolis force, effect of centrifugal and Coriolis force due to earth's rotation, Foucault'spendulum.

UNIT-II

Gravitational Field and Potential: Newton's universal law of gravitation, gravitational field intensity, gravitational potential due to spherical shell and solid sphere, gravitational potential energy, Laplace and Poisson's equations, Gauss's law, gravitational self-energy of a uniform sphere.

Dynamics of System of Particles: Centre of mass, calculation of centre of mass of regular rigid bodies like circular disc, hemispherical body, right circular cone, triangular plate, motion of centre of mass, centre of mass frame, conservation of linear momentum, kinetic energy of a system of particles, elastic, inelastic and perfectly inelastic collisions, rocket propulsion, two body problem, reduced mass, application of reduced mass, binary stars.

UNIT-III

Motion under a Central force field: Central force, equation of motion under central force field, orbital motion of particle under central force field, constants of the elliptical orbit, circular orbit and their stability, Kepler's laws.

Molecular rotations and Gyroscopic motion: Molecular rotations, moment of inertia of diatomic and tri-atomic molecules, intrinsic spin, precession of a symmetric top, gyroscope and its applications.

UNIT-IV

Elasticity: Stress and strain, their types, Hooke's law, stress-strain curve, elastic behavior of solid, types of elasticity, Poisson's ratio, work done in stretching a wire, theorems of stress and strain, relation between various elastic constant, limiting value of Poisson's ratio and its experimentaldetermination.

Bending of Beam: Torsion of cylinder, bending of beam, cantilever, beam supported at its ends and loaded in the middle, applications of bending of beams.

UNIT-V

Kinematics of moving fluid: Streamline and turbulent flow, Reynold's number, equation of continuity, energy of a liquid, Euler's equation of motion for fluidity, Bernoulli's theorem and its applications.

Viscosity: Introduction, coefficient of viscosity, Poiseuille's equation-limitations and correction, Poiseuille's method for determination of coefficient of viscosity, Stokes' law, measurement of viscosity by rotating cylinder method, variation of viscosity with temperature andpressure.

Text and Reference Books:

1. Mechanics by D.S.Mathur
2. Mechanics by P.K.Srivastava
3. Mechanics byJ.C.Upadhyay
4. Mechanics by Keith R.Symon
5. Mechanics by Saraswat, HimanshuPublications.
6. Physics by Resnick, Halliday & Walker 9/e, 2010,Wiley
7. Mechanics (Hindi Edition) by Kalra, HimanshuPublications

Course 3– PHYSICS

MECHANICS (PRACTICAL)

1. Measurements of diameter using travelling microscope.

2. To determine the Height of a Building using a Sextant.

3. To determine the Modulus of Rigidity of a Wireby Maxwell's needle.

4. To determine the Elastic Constant sofa Wire by Searle'smethod.

5. To determining by Bar Pendulum.

6. To determining by Kater's Pendulum.

7. To determining and velocity for a freely falling body using Digital Timing Technique

8. To study the Motion of a Spring and calculate (a) Spring Constant (b) Value of g.

9. To determine the modulus of rigidity of the material of a wire by statistical method using Bortan's apparatus.

10. To determine the Poisson's ratio of rubber.

11. To determine the Moment of Inertia of a Flywheel.

12. Study of laws of parallel and perpendicular axes for estimation of momento finertia.

13. To determine the viscosity of fluid by rotation viscometer.

Any other experiment can be setas per the availability in the laboratory as per theory course.

Text and Reference Books:

1. Advanced Practical Physics for students, Flintand Worsnop, Asia Publishing House.

2. Advanced level Physics Practical by Nelsonand Ogborn, Heinemann Educational Publishers.

3. Engineering Practical Physics by Panigrahi and Mallick, Cengage Learning India Pvt. Ltd.

4. A Text Book of Practical Physics by Prakash and Ramakrishna ,Kitab Mahal,New Delhi.

5. Practical Physics-I by Saraswat, Himanshu Publications.

6. Practical Physics-I (Hindi) by Bhandari and Saraswat, HimanshuPublications.

> Course 4
> CHEMISTRY

Paper- Fundamentals of Chemistry (Thoery)

Unit 1:

Introduction to Indian ancient Chemistry and contribution of Indian Chemists, in context to the holistic development of modern science and technology should be included under Continues Evaluation CIE)

Atomic Structure:

Bohr's theory, its limitations and atomic spectrum of hydrogen atom. Wave mechanics: de Broglie equation, Heisenberg's Uncertainty Principle and its significance, Schrödinger's wave equation, significance of ψ and $\psi2$. Quantum numbers and their significance. Normalized and orthogonal wave functions. Sign of wave functions. Radial and angular wave functions for hydrogen atom. Radial and angular distribution curves. Shapes of s, p, d and f orbitals. Contour boundary and probability diagrams.

Unit II :

Periodicity of Elements:

s, p, d, f block elements, the long form of periodic table. Brief discussion of the following properties of the elements, with reference to s and p-block.

(a) Effective nuclear charge, shielding or screening effect, Slater rules, variation of effective nuclear charge in periodic table. (b) Atomic radii (van der Waals) (c) Ionic and crystal radii. (d) Covalent radii (octahedral and tetrahedral) (e) Ionization enthalpy, Successive ionization enthalpies and factors affecting ionization energy. Applications of ionization enthalpy. (f) Electron gain enthalpy, trends of electron gain enthalpy. (g) Electronegativity, Pauling's/ Mulliken's/ Allred Rachow's/ and Mulliken-Jaffé's electronegativity scales. Variation of electronegativity with bond order, partial charge, hybridization, group electronegativity. Sanderson's electron density ratio.

Unit III :

Chemical Bonding:

Simple Bonding theories of Molecules, Atomic orbitals, Aufbau principle, multiple bonding (σ and π bond approach) and bond lengths valance bond theory (VBT) Concept of hybridization, hybrid orbitals and molecular geometry, Bents rue, Valence shell electron pair repulsion theory (VSEPR), shapes of the following simple molecules and ions containing lone pairs and bond pairs of electrons: H_2O, NH_3, PCl_5, SF_6, SF_4, ClF_3, I_3^-, ClF_2^-, SO_4, H_3O^+ Molecular orbital theory (MOT). Molecular orbital diagrams bond orders of homonuclear and heteronuclear diatomic molecules and ions N_2, O_2, C_2, B_2, F_2, CO, NO and their ions.

Unit IV :

Recapitulation of basics of Organic Chemistry: Hybridization, bond lengths and bond angles bond energy, localized and delocalized chemical bonding, Van der Walls interactions, Inclusion compounds, Clathrates, Charge transfer complexes, hyperconjugation, Dipole moment; Electronic Displacements: Inductive, electrometric, resonance mesomeric effects and their applications.

Mechanism of Organic Reactions: Curved arrow notation, drawing electron movements with allows, half-headed and double-headed arrows, homolytic and heterolytic bond fission. Types of reagents - electrophiles and nucleophiles, Types of organic reactions, Energy consideration. Reactive intermediates-Carbocations, carbanions, free radicals, carbenes, arynes and nitrenes (with examples). determination of reaction mechanism (product analysis, intermediates, isotope effects, kinetic and stereochemical studies).

Unit – V

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.

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

Self-study:

1. Electronic configuration of various elements in periodic table
2. Predicting structure of molecules
3. How hydrogen bonding, metallic bonding is important in common materials' Scientific applications to material fabrication

Text Books:

1. Lee, J.D. *Concise Inorganic Chemistry* ELBS, 1991.

2. Douglas, B.E. and McDaniel, D.H. *Concepts & Models of Inorganic Chemistry* Oxford, 1970.

3. Modern Principles of Organic Chemistry : M.K. Jain and S.C. Sharma

4. A Text Book of Organic Chemistry : (Vol. I and II), O.P. Agarwal.

5. A Text Book of Organic Chemistry : B.S. Bahl and Arun Bahl. J.Yadav LDS. Advanced Advanced Organic Chemistay. LD.S Yadav, Pragati Eaition

6. Morrison, R. N. & Boyd R. N. Organic Chemisty Dorling Kindersley (Lndia) PVE Ltd Pason Eatt

7. Clayden, J, Greevcs, N. &Waren, S. Organic Chemistry, 2- cdition. Oxtord Lniversity Press,012

8. Graham Solonons, T.W Fryhle, B. Oreanic Chemist John Wiley & Soas

9. Sykes, P. A guidebook to Mechanism n Organic Chemist Pearson ducation, 0

10. Computers and Applications to Chemistry, Ramesh Kumari, Narosa Publishing House Pvt. Ltd.

11. Atkins, P.W. & Paula, J. *Physical Chemistry*, 10th Ed., Oxford University Press, 2014.

COURSE-4

CHEMISTRY LAB PRACTICAL

First Semester

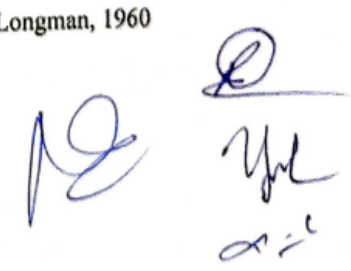### Section A: Inorganic Chemistry - Volumetric Analysis

1. Estimation of sodium carbonate and sodium hydrogen carbonate present in a mixture.

2. Estimation of oxalic acid by titrating it with $KMnO_4$.

3. Estimation of water of crystallization in Mohr's salt by titrating with $KMnO_4$.

4. Estimation of Fe (II) ions by titrating it with $K_2Cr_2O_7$ using internal indicator.

5. Estimation of Cu (II) ions iodometrically using $Na_2S_2O_3$.

Section B: Organic Chemistry

1. Detection of extra elements (N, S, Cl, Br, I) in organic compounds (containing upto two extra elements)

2. Separation of mixtures by Chromatography: Measure the Rf value in each case (combination of two compounds to be given)
(a) Identify and separate the components of a given mixture of 2 amino acids (glycine, aspartic acid, glutamic acid, tyrosine or any other amino acid) by paper chromatography
(b) Identify and separate the sugars present in the given mixture by paper chromatography.

Reference Books:
- Svehla, G. *Vogel's Qualitative Inorganic Analysis*, Pearson Education, 2012.
- Mendham, J. *Vogel's Quantitative Chemical Analysis*, Pearson, 2009.
- Vogel, A.I., Tatchell, A.R., Furnis, B.S., Hannaford, A.J. & Smith, P.W.G., *Textbook of Practical Organic Chemistry*, Prentice-Hall, 5th edition, 1996.
- Mann, F.G. & Saunders, B.C. *Practical Organic Chemistry* Orient-Longman, 1960

Course -5 MATHEMATICS

CALCULUS

UNIT-I

Polar coordinates and derivatives of arc, Polar subtangent and subnormal, Pedal-equation, Asymptotes of the Cartesian curve and methods of finding the Asymptotes.

UNIT –II

Curvature of the curve, Concavity and convexity. Points of inflexion. Multiple points. Tracing of curves in Cartesian and polar coordinates.

UNIT – III

Beta Gamma functions and their properties, Relation between Beta Gamma function, Duplication formula, Gamma Integral formula.

UNIT – IV

Quadrature: Area of Cartesian curve and polar curve, common area of two curves
Rectification: length of curve of various curves, intrinsic equation of various curves.

UNIT – V

Volume and Surfaces of Solids of Revolution: Cartesian, polar and parametric curves, volume and surface area generated by revolution about any line.
:

Reference Books:

Bansal, Bhargava   : Avakalan Ganita-Il
Gorakh Prasad   :Differential Calculus
Gokhroo, Saini : Calculus
Tondon & Sharma   : Integral Calculus
Gokharoo Saini   : Advanced Calculus
Gorakh Prasad   :Integral Calculus

Course -6 BOTANY
Algae, Fungi and Plant Pathology

UNIT I

Algae: General account of major classes, Range of thallus organization, Fristch's; classification of Algae

Types of life cycles, Ecological and Economic importance of Algae

UNIT II

Life cycle of economically important algae- Chlorella, Spirulina and Gracilaria. General account of

Diatoms, Algal blooms, Single cell protein and Bioluminescence

UNIT III

Fungi: General characteristics of major classes, Asexual and sexual reproduction in Fungi. Alexopolus'

classification of fungi. General account of Heterothallism and Parasexuality, Economic importance of

Fungi.

UNIT IV

Life cycle of economically important fungi- Saccaromyces, Ustilago and Puccinia. General account of

Neurospora

UNIT V

General Principles of Plant pathology, Important symptoms (Mildew, Smut, Rust, Blast, Rot, Necrosis,

Sclerotia, Hypoplasia, Heterotrophy). Defense mechanism in plants. Role of toxins and Phytolaexins.

Prevention (quarantine) and biological control of fungi.

Course -6 BOTANY
(PRACTICAL)
Algae, Fungi and Plant Pathology

Practical/s
1.   To Study the life cycle stages of -
        i. Chlorella,
        ii. Spirulina
        iii. Gracilaria
        iv. Saccaromyces,
        v. Ustilago
        vi. Puccinia
2.   Study of following Plant disease
        i. Citrus canker
        ii. Little leaf of Brinjal
        iii. Yellow vein mosaic of Abelmoschus
        iv. Green ear disease of Bajra
        v. Blast of Rice

Suggested Readings

1. Fritsch FE. 1935. The Structure And Reproduction Of The Algae, University Press Cambridge.

2. Graham, L. E. and Wilcox, L. W. (2000). Algae. Prentice-Hall, Inc. pp. 640.

3. Alexopolus, C. J., Minms, C. W. and Blackwell, M. (1999). (4th edn) Indtroductory Mycology.Wiley, New york. Alford, R. A..

4. Mehrotra, R. S. and Aneja, K.R. (1990). An introduction to mycology. New age publishers, ISBN 8122400892.

5. Agrios, G.N. (1997). Plant Pathology, 4th edition. Cambridge, U.K.: Academic Press.

6. Sharma, P.D. (2011). Plant Pathology. Meerut, U.P.: Rastogi Publication.

Course 7 –ZOOLOGY

Cell Biology & Genetics

Cell Biology
UNIT-I
1..Prokaryotic and Eukaryotic cells; Ultra structure of eukaryotic cell;Diversity of cell (types, shape and size)
2..Plasma membrane (Ultra structure, chemical composition, models of plasma membrane; Specializations of plasma membrane, functions of plasma membrane).
3..Structure and functions of following cell organelles: (a) Mitochondria (b) Ribosomes (c) Lysosomes (d) Centrioles (e) Golgi Complex (f) Endoplasmic reticulum.

UNIT-II
4..Structure and functions of Nucleus and nucleolus.
5..Cell division – (a) Cell cycle
 (b) Mitosis (Process of mitosis and significance of mitosis),
 (c) Meiosis (Process of meiosis, structure and functions of synaptonemal complex, significance of meiosis).
6..
An idea of cell transformation and cancer.

Genetics
UNIT-III
7.Mendel's life, Pre-Mendelian experiments, symbols and terminologies, Laws of dominance, segregation and independent assortment.
8.Linkage: Coupling and repulsion hypothesis, Morgan's view of linkage, kinds of linkage, chromosome theory of linkage.
9.Crossing over: Somatic and germinal crossing over, kinds of crossing over, theories of the mechanism of crossing over, significance.

UNIT-IV
10.Eukaryotic chromosomes- Structure, chemical composition, classification and uninemic and multinemic concept of chromosome structure.
11.Structure and functions of polytene and lamp brush chromosomes.

UNIT-V
12.Determination of sex: chromosome mechanism, Genic balance theory, External environment and sex determination.
13.Sex linked inheritance: Inheritance of X-linked gene (Colour blindness and haemophilia in man), Sex linkage in Drosophila.
14.Mutation: Historical background, chromosomal mutation (Chromosomal aberrations), gene mutations and their interpretation.

Suggested Readings:
1. Lodish et al: Molecular Cell Biology: Freeman & Co, USA (2004).
2. Alberts et al: Molecular Biology of the Cell: Garland (2002).
3. Cooper: Cell: A Molecular Approach: ASM Press (2000).
4. Karp: Cell and Molecular Biology: Wiley (2002). Pierce B. Genetics. Freeman (2004).
5. Lewin B. Genes VIII. Pearson (2004).
6. Watson et al. Molecular Biology of the Gene. Pearson (2004).
7. Principles of Genetics by B. D. Singh .

Course 7
ZOOLOGY

Cell Biology & Genetics (PRACTICAL)

Cell Biology & Cytogenetic Lab
COURSE OUTCOMES (COs):
At the end of the course the student should be able to:
1. To use simple and compound microscopes.
2. To prepare stained slides to observe the cell organelles.
3.. To be familiar with the basic principle of life, how a cell divides leading to the growth of an organism and also reproduces to form new organisms.
4. The chromosomal aberrations by preparing karyotypes.
5. How chromosomal aberrations are inherited in humans by pedigree analysis in families. The antigen-antibody reaction.
 TOPICS:
1.   Understanding simple and compound microscope.
2.   To study different cell types such as buccal epithelial cells, neurons striated muscle cells using Methylene blue (Virtual/slaughtered tissue).
3.   To study the different stages of Meiosis (Virtual).
4.   To check the permeability of cells using salt solution of different concentrations.
5.   Preparation of a temporary slide of squashed and stained onion root tip to study various stages of mitosis.
6.   Study of various stages of meiosis through permanent slides.
7.   Determination of ABO Blood group.
8.   Enumeration of red blood cells and white blood cells using haemocytometer.
9.   Study of mutant phenotypes of Drosophila.
10. Study of Polytene chromosomes.
11. Study of sex chromatin (Barr bodies) in buccal smear (Human).
12. Preparation of human karyotypes and study the chromosomal aberration with respect to number, translocation, deletion etc. from the pictures provided.
13. To prepare Family pedigrees.

Virtual Labs:

1. https://www.vlab.co.in
2. https://zoologysan.blogspot.com
3. www.vlab.iitb.ac.in/vlab
4. www.onlinelabs.in
5. www.powershow.com
6. https://vlab.amrita.edu
7. https://sites.dartmouth.edu

Suggested Readings:

1.   Lodish et al: Molecular Cell Biology: Freeman & Co, USA (2004).
2.   Alberts et al: Molecular Biology of the Cell: Garland (2002).
3.   Cooper: Cell: A Molecular Approach: ASM Press (2000).
4.   Karp: Cell and Molecular Biology: Wiley (2002). Pierce B. Genetics. Freeman (2004).
5.   Kesar, Saroj and Vasishta N.2007 Experimental Physiology: Comprehensive Manual. Heritage Publishers, NewDelhi.
6.   Renu Gupta, SeemaMakhija and Ravi Toteja (2018). Cell Biology Practical Manual,Prestige Publishers, New Delhi
7.   VK Sharma (1991). Techniques in Microscopy and Cell Biology, Tata McGraw-HillPublishing Company Limited, New Delhi

BHUPAL NOBLES' UNIVERSITY, UDAIPUR

Scheme of Examination
and
Course of Studies
SYLLABUS (II SEMESTER)
INTEGRATED TEACHER EDUCATION PROGRAM

B.SC. B.Ed. FOUR YEAR

DEPARTMENT OF EDUCATION

FACULTY OF EDUCATION

B.Sc. B.Ed.
SYLLABUS
II SEMESTER

B.Sc. B.Ed. SECOND SEMESTER COURSE STRUCTURE

COURSE NO.	COURSE CODE	PAPER NAME	CREDITS		MID TERM	END TERM	MAX MARKS
			TH.	PR.			
COURSE 9	CIE121TH	CONTEMPORY INDIA AND EDUCATION	6	-	30	70	100
COURSE 10	EVS121TH	ENVIRONMENTAL STUDIES	4	-	30	70	100
COURSE 11	PHY121TH PHY121PR	**ANY THREE OF THE FOLLOWING:** PHYSICS PHYSICS PRACTICAL	4 -	- 2	20 -	50 30	70 30
COURSE 12	CHE121TH CHE121PR	CHEMISTRY CHEMISTRY PRACTICAL	4 -	- 2	20 -	50 30	70 30
COURSE 13	MAT121TH	MATHEMATICS	6	-	30	70	100
COURSE 14	BOT121TH BOT121PR	BOTANY BOTANY PRACTICAL	4 -	- 2	20 -	50 30	70 30
COURSE 15	ZOO121TH ZOO121PR	ZOOLOGY ZOOLOGY PRACTICAL	4 -	- 2	20 -	50 30	70 30
COURSE 16	STA121TH STA121PR	STATISTICS STATISTICS PRACTICAL	4 -	- 2	20 -	50 30	70 30
		TOTAL CREDITS AND MARKS	**28**				**500**

Course code-CIE121TH   **Course 9 - Contemporary India & Education   *B.Sc.B.Ed.II SEM***
(Including Gender, school & Society)
COURSE CONTENT

UNIT-I   Indian Society & Education
   1. Meaning, Nature & purpose of Education:
      According to different thinkers i.e, Gandhi, Tagore , Aurobindo, J.Krishnamurti,Swami Vivekanand, Rousseau and Dewey.
   2. Globalization, Liberalization, and Privatization and their implications in Education.

UNIT- II   Education in India
   1. Education in pre Independence Period/ Macaulay's Minutes/ and major educational polices during pre Independence British Period.
   2. Education in Post independence period-
      a. Policies regarding Education in post independence Period Specially NPE(1986), RTE (2009)
      b. Important national documents on Education commission (1966), NCF (2005), Learning without burden (Yashpal committee report), NCFTE (2009)
      c. Dellors commission report – relevance to Indian Conditions
      d. National Education Policy (NEP) 2020-Aims,Objectives,Role of higher education and Teacher education in NEP 2020.

UNIT-III   Challenges in Education
   1. Language policy
   2. Enhancement of quality in Education and role of SSA and RAMSA in this.
   3. Increasing enrollment at different stages.
   4. Universalization of Education/ RTE(2009) & its Challenges

UNIT –IV   Gender, School and Society
1.   Gender Sensitivity and its importance for society.
      a. Gender Sensitivity and its importance for society.
      b. Gender discrimination I family
      c. Gender discrimination society
      d. Gender discrimination of school
   2. Role of Education, Family, media and legislation in developing gender parity.

UNIT- V   Values in Education-
   1. **Values:** concept and classification, unity of all life and being); tolerance; Values in modern Indian context with the reference to the Indian Constitution. Rights and Duties of a citizen as stated in constitution.
   2. Value Education and role of school. Human rights and danger to social security, role of education in safe guarding human rights. Activities helpful in inculcation in values.
   3. Environmental Education- role of teacher in promoting conservation of Environment.
   4. Education for peaceful and cooperative living.

Practicum/ Sessional work
Attempt any two- (One each from following sections)
Section A
   1. Term paper on any one Topic/issues related to Education
   2. Two abstraction of any Two articles related to Education
Section B
   1. Prepare a report on Co-curricular Activities of a school supporting Environment protection.
   2. Case study of any one institution with reference to gender sensitivity.
   3. Prepare a report of a group discussion conducted on language Policy/ Constitutional values/ Globalization/ Liberalization/ Privatization.

Course-10
ENVIRONMENTAL STUDIES

Unit –I

Resources

The multidisciplinary nature of environmental studies and **Natural Resources**

●   Definition, Scope and awareness, Need for public awareness.

    Renewable and non- renewable resources, Natural resources and associated problems.

➢   **Forest resources** – Use and over – exploitation, Deforestation, Timder exploitation,Mining – Dams and their effects on forests and tribal people.

➢   **Water resources** – Use and over utilization of surface and ground water, Floods, Drought,Conflicts over water, Dams benefits and problems.

➢   **Mineral resources** – Use and exploitation, Environmental effects of extracting and usingmineral resources.

➢   **Food resources** – World food problems, Changes caused by agriculture and overgrazing,Effects of modern agriculture, Fertilizer ,Pesticide problems, Water logging, salinity.

➢   **Energy resources** – Growing energy needs – Renewable and non- renewable energy resources. Use of alternate energy resources.

➢   **Land resources** – Land as a resource – Land degradation- Man induced landslides.- Soil erosion & desertification. Role of an individual in conservation of natural resources. Equitable use of resources for sustainable system.

UNIT -II

Ecosystem

    Concept of an ecosystem:

●   Structure and function of an ecosystem.

●   Producers, consumers and decomposers.

●   Energy flow in the ecosystem.

●   Ecological succession.

●   Food chains, food web and ecological pyramids.

●   Introduction types, characteristic features, structure and function of the followingecosystems.

●   Forest ecosystem.

●   Grassland ecosystem

●   Desert ecosystem

●   Aquatic ecosystem (ponds, streams, lakes, rivers, oceansestuaries)

UNIT-III

➢   **Biodiversity and its conservation**

  Introduction, definition and diversity at genetic, species and ecosystem level.

●   Biogeographically classification of India.

●   Value of biodiversity, consumptive use productive use, social, ethical, aesthetic andoption values.

●   Biodiversity at global, national & local levels.

●   India as a mega- diversity nation.

●   Hot- spots of biodiversity.

●   Threats to biodiversity

●   habital loss poaching of wild life, man

●   Wild life conflicts.

●   Endangered and endemic species of India.

●   Conservation of biodiversity- In situ and Ex – situ conservation of biodiversity.

UNIT-IV

➢ *Environmental Pollution*

Definition, causes, effect and control measures of :
Air pollution.

- Water pollution
- Soil pollution.
- Marine pollution
- Noise pollution
- Thermal pollution
- Nuclear hazards.
- Soild waste management: causes, effects and control measures of urban industrialwastes.
- Role of an individual in prevention of pollution.
- Disaster management: flood, earthquake, cyclone and landslides.

UNIT-V

➢ *Social issues, Human population and the Environment*

From unsustainable development

- Urban problems related to energy.
- Water conservation, rain water harvesting, water shed management.
- Settlement and rehabilitation of people, of concerns.
- Environmental ethics
- Issues and possible solutions. Ozone layer depletion, nuclear accidents.
- Wasteland reclamation. Consumerism and waste products

➢ *Environment protection Act*

- Air Prevention and control of pollution Act.
- Wild life protection Act

   Forest conservation Act

Issues involved in enforcement of environmental legislation.Public awareness.

- *Population growth, variation among nations*

Population explosion Family welfare
rogramme.
Environment and ppHuman health.Human rights.

Value education

HIV/AIDS-Women and child welfare.
Role of information technology in environment and human health.

Field Work-

✓ Visit to local area to document environmental assets – river / forest / grassland / hill / mountain.
✓ Visit to local polluted site – Urban / Rural /Industrial / Agricultural.
✓ Study of common plants, insects and birds .
✓ Study of simple eco system – Pond ,River, hill slope etc.

Course 11- PHYSICS
PAPER- ELECTRICITY and MAGNETISM

UNIT-I

Electrostatics: Charge and its properties, Coulomb's law, superposition principle, continuous distribution of charge, electric field due to point charge and due to different types of distribution of charge, field due to an infinitely long straight charged wire, electric potential due to an arbitrary distribution of charge, electric potential energy, electric dipole, a dipole in uniform and non- uniform electric field, electric quadrupole.

Gauss's Law: Electric flux, Gauss's law and its applications, electrostatic energy of a uniformly charged sphere, classical radius of an electron, force on the surface of a charged spherical conductor.

UNIT-II

Electric field around conductors: Poisson and Laplace equations in different Cartesian coordinate system (without derivation), boundary conditions, solution of Laplace equation in Cartesian coordinate system, potential at a point inside rectangular body, electrical image method.

Electric field in matter: Coulomb's law, capacitor, capacity of a parallel plate capacitor in the presence and absence of dielectric, field of a charge in dielectric medium (Gauss's law).

UNIT-III

Magnetostatics: Magnetic field, laws for the direction of magnetic field, Biot Savart law and its applications, magnetic dipole and current loop, magnetic Lorentz force, force on a current carrying conductor, Ampere's law and its applications, torque on a current carrying loop in magnetic field.

Electric current: Current and current density, equation of continuity, drift velocity, mobility, resistance, resistivity, conductance, conductivity, electron theory of resistivity, thermoelectricity, growth and decay of current in LR and RC circuit.

UNIT-IV

Alternating current circuit: Representation of a.c. quantities by complex number system, impedance, quality factor, power factor, series and parallel a.c. circuit and their resonance, principle of a.c. bridges, Anderson's bridge, de Sauty's bridge, Owen's bridge, self-inductance, mutual inductance, transformer.

UNIT-V

Moving coil ballistic galvanometer and its applications: Introduction, current and charge sensitivity, condition for a galvanometer to become a ballistic galvanometer, different equation of
B.G. and its solution under the condition of critical damping, over damping and under damping, logarithmic decrement, applications of B.G. for the mutual inductance by Carey foster bridge method, magnetic field using search coil, low resistance by Kelvin's double bridge method.

Text and Reference Books:

1.   Electricity and Magnetism by Purcell, McGraw-Hill Education.
2.   Electricity and Magnetism by Fewkes and Yarwood. Vol. I, Oxford Univ. Press.
3.   Electricity and Magnetism by Tayal, Himalaya Publishing House.
4.   Electricity and Magnetism by Saraswat, Himanshu Publications.
5.   University Physics by Reese, Thomson Brooks/Cole.
6.   Electricity and Magnetism (Hindi) – Kalra, Himanshu Publications

Course 11- PHYSICS
PAPER- ELECTRICITY AND MAGNETISMPRACTICAL

1. To use a multimeter for measuring (a) Resistances, (b) AC and DC Voltages, (c) DC Current,and (d) Checking electrical fuses.

2. Determination of charge and current sensitivity using Ballistic Galvanometer.

3. Determination of high resistance by Leakage Method

4. To determine Self Inductance of a Coil by Rayleigh's Method.

5. To compare capacitances using de' Sauty's bridge.

6. To determine an unknown capacitance by using de' Sauty's bridge.

7. Measurement of field strength B and its variation in a Solenoid.

8. To study the Characteristics of a Series RC Circuit.

9. To study a series LCR circuit and determine its (a) Resonant Frequency, (b) Quality Factor

10. To study a parallel LCR circuit and determine its (a) Anti-resonant frequency and (b) Qualityfactor Q

11. To determine a low resistance by Carey Foster's bridge

12. To verify the Thevenin and Norton theorem

13. To verify the Superposition, and Maximum Power Transfer Theorem

14. To determine self-inductance of a Coil by Anderson's bridge.

15. To determine impedance of L-R circuit and find phase relationship in current and voltage.

16. To determine low resistance by Kelvin's double bridge.

17. Study of BH curve.

Any other experiment can be set as per the availability in the laboratory as per theory course.

Course12- CHEMISTRY

FUNDAMENTALS OF CHEMISTRY

Unit I:

Stereochemistry of Organic Compounds: Types of isomerism- optical isomerism- elements of symmetry, molecular chirality, enantiomers, stereo genic centers, optical activity, properties of enantiomers, chiral and achiral molecules with two stereo genic center, diastereomers, threo and erythro diastereomers, meso compounds, inversion, retention and racemization. Relative and absolute configuration, sequence rules, D & L and R & S systems of nomenclature. Geometrical isomerism: determination of configuration of geometrical isomers, E & Z system of nomenclature. Conformational Analysis of Cycloalkanes Types of cycloalkanes and their relative stability, Baeyer strain theory, Conformation analysis of alkanes: Relative stability: Energy diagrams of cyclohexane stability.

Unit II:

Carbohydrates - Classification and nomenclature, monosaccharides, mechanism of osazone formation, interconversion of glucose and fructose, chain lengthening and chain shortening of aldoses, configuration of glucose and fructose, erythro and threo diastereomers. Conversion of glucose into mannose, formation of glycosides, ether and esters. Determination of ring size of glucose and fructose, Cyclic structure of D (+) - glucose. Mechanism of mutarotation.
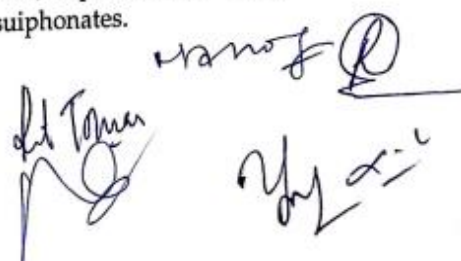
An introduction to disaccharide (maltose, sucrose and lactose) and polysaccharides (starch and cellulose) without involving structure determination.

Amino Acids, Peptides, Proteins and **Nucleic Acids** - Classification, structure and stereochemistry of amino acids, acid-base behavior, isoelectric point and electrophoresis. Preparation and reactions of a-amino acids.

Structure and nomenclature of peptides and proteins, classification of proteins, peptide structure determination, and group analysis, selective hydrolysis of peptides. Classical peptide synthesis, solid-phase peptide synthesis. Structures of peptide and proteins. Levels of protein structure. Protein denaturation! renaturation.

Nucleic acids: Introduction, constituents of nucleic acids. Ribonucleosides and ribonucleotides. The double helical structure of DNA.

Fats, Oils and **Detergents** - Natural Fats, edible and industrial oils of vegetable origin, common fatty acids, glycerides, hydrogenation of unsaturated oils, saponification value, iodine value, acid value, soaps synthetic detergents, alkyl and aryl suiphonates.

Unit III:

States of Matter-I: Gaseous State-Postulates of kinetic theory of gases, deviation from ideal behavior, van der Waal's equation of states, Critical phenomena – PV isotherms of real gases, relationship between critical constants and van der Waals constants. Molecular velocities: Root mean square, average and most probable velocities, qualitative discussion of the Maxwell's distribution of molecular velocities, Numerical problems.

Liquid State-Intermolecular forces, Structural differences between solids, liquids and gases. Physical properties of liquids including their methods of determination: surface tension, viscosity, Numerical problems.

Unit IV:

States of Matter-II:

Solid State: Introduction to crystalline materials, Definition of space lattice, unit cell, crystal planes, Miller indices, Laws of crystallography – (i) law of constancy of interfacial angles (ii) law of rationality of indices (iii) law of symmetry. Symmetry elements in crystals, X-ray diffraction by crystals. Bragg's equation, Numerical problems.

Colloidal State: Definition of colloids, classification of colloids. Solids in liquids (sols): properties – kinetic, optical and electrical; stability of colloids, protective action, Hardy-Schulze law, gold number.

Unit V:

Chemical Bonding: (i) Ionic bond: General characteristics, types of ions, size effects, radius ratio rule and its limitations. Packing of ions in crystals. Born-Landé equation with derivation and importance of Kapustinskii expression for lattice energy. Madelung constant, Born-Haber cycle and its application, Solvation energy. (ii) Covalent bond: Lewis structure, Valence Bond theory (Heitler-London approach). Energetics of hybridization, equivalent and non-equivalent hybrid orbitals. Bent's rule, Resonance and resonance energy, Molecular orbital theory. Molecular orbital diagrams of diatomic and simple polyatomic molecules N_2, O_2, C_2, B_2, F_2, CO, NO, and their ions; HCl, $BeF2$, CO_2, (idea of s-p mixing and orbital interaction to be given). Formal charge, Valence shell electron pair repulsion theory (VSEPR), shapes of simple molecules and ions containing lone pairs and bond pairs of electrons, multiple bonding (σ and π bond approach) and bond lengths.

Course 12-CHEMISTRY

CHEMISTRY PRACTICAL

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) if any and functional group in given simple organic compounds (one organic compound from the following list 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 naphtha lene (100 g of naphthalene mixed with 0.3 of Congo Red using 1 g decolourizing carbon) from ethanol.

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

   Mixed Melting Point determination: Urea - Cinnamic acid mixture of various compositions (1:4, 1:1, 4:1).

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

   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.

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.

Course 13-MATHEMATICS
Paper - Algebra

Learning Objectives : The course aims is to introduce the basic concepts of Algebra and lay foundation for further learning of the Linear and Advanced Algebra through second course on Algebra which is a prerequisite for competitive exams.

UNIT-I
Groups and its properties, Types of group, Order of group, Related theorems of group, Various examples of group, Order of an element of group and its properties.
Subgroups: Union and intersection of subgroups and various examples. Product of two subgroups, Cyclic group, Left and right cosets and their properties, Lagrange's theorem, Index of a subgroup.
UNIT- II
Permutation groups, Even and odd permutations, group of permutations, symmetric group, cyclic permutation, disjoin cycles, transposition, alternating group.
UNIT-III
Normal subgroups their examples and elementary basic theorems, Quotient group, Simple group, Centre of group, Normalizer of an element and that of a subgroup.
UNIT –IV
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.
UNIT-V
Rings, definition and examples of various kinds of rings, integral domain, division ring, field, characteristic of a ring and integral domain, subring and subfield With examples. Left and right ideals with examples and properties, Principal ideal, principal ideal ring. Maximal, prime and Principal ideals in Commutative rings and their theorems.
Reference Books:

I. N. Herstein   : Topics in Algebra, Wiley Eastern Ltd., New Delhi, 1975
R. S. Agrawal   : A Textbook on Modern Algebra
Gokhroo & Gokhroo   : Group Theory
Gokhroo, Saini   : Elements of Abstract Algebra
Sharma, Purohit   : Elements of Abstract Algebra
Bansal & Bhargava   : Abstract Algebra

Course Outcomes:
CO1: Group theory is one of the building blocks of modern algebra. Objective of this course is to introduce students to basic concepts of Group and their properties.
CO2: Students will be able to know the concepts of group morphism and other related properties which will prepare the students to take up further applications in the relevant fields.

Course 14- BOTANY

Paper-   **Bryophyte, Pteridophyte and Palaeobotany**

Course Objectives:

- To provide the general preview about the geological time scale and the evolution of life forms
- To provide the insight about the evolution of plants from aquatic habitat to terrestrial mode
- To acquaint the students about fossils and process of fossilization

Theory

Unit I

Bryophytes: General characters, Classification of Bryophytes. Evolution of gametophytes and sporophytes. Economic and Ecological importance .Application of peat moss

Unit II

General account on morphology, anatomy and life history of *Riccia*, *Anthoceros* and *Sphagnum*
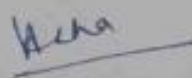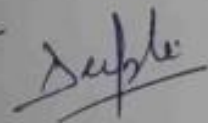
Unit III

Pteridophytes: General characters, Classification of Pteridiophytes, Stelar system and its evolution, Telome theory, Heterospory and Seed habit.

Unit VI

General account of Rhynia. Life cycle of *Lycopodium* and *Marsilea* with special reference to habit and habitat, morphology, stellar system in root and stem, homospory and heterospory

Unit V

Palaeobotany: Brief account of Geological time Scale (Major Life forms in Era and Periods). Types of fossils (Peat coal, amber) and process of Fossilization. Fossils record of plant from India.

Course 14 BOTANY

Paper- Bryophyte, Pteridophyte and Palaeobotany

Practical/s

1 Morphological, anatomical, and reproductive studies of –
   i.   *Riccia*
   ii.   *Anthoceros*
   iii. *Sphagnum*
   iv.   *Lycopodium*
   v.   *Selaginella*

2 To study the general features of *Rhynia* fossil

Suggested Readings

1. Prem puri (1981). Bryophytes: Morphology, Growth and Differentiation, Atma ram and Sons, New Delhi.

2. Chopra, R. N. and Kumar, P. K. (1988). Biology of bryophytes. John Wiley&Sons, New York, NY.

3. Parihar NS (1976) Biology and morphology of the Pteridophytes. Central Book Depot.Meerut, UP

4. Sporne KR (1986) The morphology of Pteridophytes. Hutchinson University Press. London.

5. Stewart WN and Rothwell GW (2005) Paleobotany and the Evolution of plants, 2nd Edn. Cambridge University Press.

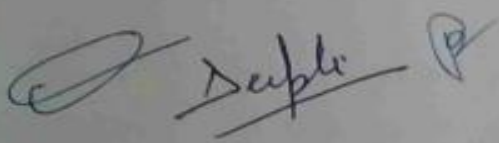6. Anold AC (2005 Repr.) An Introduction to Paleobotany. Agrobios (India), Jodhpur.
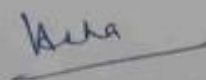
Course Outcome/s

successfully completing the course, students will be able to:

Sensitize on the role of bryophytes in ecological succession

Have an understanding of evolutionary concepts in terms of changing habitat

Have an insight on the applicability of peat moss

Course 15-ZOOLOGY

Paper- Animal Physiology and Biochemistry

COURSE OUTCOMES (COs):

The student at the completion of the course will learn:

1. To develop a deep understanding of structure of biomolecules like proteins, lipids and carbohydrates.
2. How simple molecules together form complex macromolecules.
3. To understand the thermodynamics of enzyme catalyzed reactions.
4. Mechanisms of energy production at cellular and molecular levels.
5. To understand various functional components of an organism.
6. To explore the complex network of these functional components.
7. To comprehend the regulatory mechanisms for maintenance of function in the body.

UNIT-I

Enzyme Action and Regulation

    1.Nomenclature and classification of enzymes; Cofactors; Specificity ofenzymeaction;

    2.Enzymekinetics

    3.Allostericenzymesandtheirkinetics; Regulation ofenzymeaction.

Muscular system

    4.Ultra structure ofskeletalmuscle; Molecular andchemical basisof muscle contraction

UNIT-II

Metabolism of Carbohydratesand Lipids

    5.Metabolismof Carbohydrates: glycolysis, citricacidcycle.

    6.GlycogenolysisandGlycogenesis

    7.Lipids-Biosynthesisofpalmiticacid;Ketogenesis,

    8.B-oxidationand omega-oxidationof Saturatedfattyacids with evenand oddnumberofcarbonatoms.

Metabolism of Protein

    9.Catabolismofaminoacids:Transamination,Deamination,Ureacycle

    10.Reviewof mitochondrialrespiratorychain, Oxidativephosphorylation,anditsregulation.

UNIT-III

Digestion and Respiration

11.Mechanicalandchemicaldigestionoffood;Absorptionsofcarbohydrates,lipids,proteins, water,minerals andvitamins;

12.Mechanismofrespiration,Pulmonaryventilation;Respiratoryvolumes and capacities; Transport of oxygen and carbon dioxide inblood

13. Dissociationcurvesandthefactorsinfluencingit;Controlof respiration

UNIT-IV

Circulation and Excretion

14.Componentsofbloodandtheirfunctions

15.Haemostasis:Bloodclottingsystem,Blood groups:Rhfactor,ABOand MN

16.Structureofmammalianheart

17.Cardiaccycle;Cardiacoutputanditsregulation,

18.Structureof kidneyand its functional unit;Mechanismof urineformation

UNIT-V

Nervous system and Endocrinology

19. Structureofneuron,restingmembranepotential

20.Originofactionpotentialanditspropagationacrossthemyelinatedandunmyelinatedner vefibers

21.Endocrineglands - pituitary, thyroid, parathyroid, pancreas,adrenal;hormonessecretedbythem

22.Classificationofhormones; MechanismofHormoneaction

Suggested Readings:

1. Nelson & Cox: Leininger 's Principles of Biochemistry: McMillan (2000)
2. Zubay et al: Principles of Biochemistry: WCB (1995)
3. Voet&Voet: Biochemistry Vols 1 & 2: Wiley (2004)
4. Murray et al: Harper 's Illustrated Biochemistry: McGraw Hill (2003).
5. Elliott and Elliott: Biochemistry and Molecular Biology: Oxford University Press
6. Guyton, A.C & Hall, J.E. Textbook of Medical Physiology, XI Ed. W.B.Saunders Co. (2006).
7. Tortora, G.J. &Grabowski, S. Principles of Anatomy & Physiology. XI Ed. John Wiley & sons (2006).
8. Christopher D. Moyes, Patricia M. Schulte. Principles of Animal Physiology. 3rd Ed. Pearson Education (2016).
9. Hill, Richard W., et al. Anima l physiology. Vol. 2. Sunderland, MA: Sinauer Associates, (2004).
10. Chatterjee CC Human Physiology Volume I & 2, 11th edition, CBS Publishers (201 6).

Course 15 -ZOOLOGY

Paper- Zoology Practical

TOPICS:

1. Estimation of haemoglobin using Sahil's haemoglobinometer.
2. Preparationofhaeminandhaemochromogencrystals.
3. Recording ofbloodpressureusing sphygmomanometer.
4. Recordingofbloodglucose levelbyusingglucometer.
5. Preparationofmolecularmodelsofaminoacids, dipeptidesetc.
6. StudyofpermanentslidesofMammalianskin,Cartilage,Bone,Spinal cord, Nerve cell, Pituitary, Pancreas, Testis, Ovary, Adrenal,ThyroidandParathyroid
7. Recordingofsimplemuscletwitchwithelectricalstimulation(Virtual)
8. Demonstrationoftheunconditionedreflexaction(kneejerkreflex)
9.Testforsugarandacetoneinurine.
10.Qualitativetestsoffunctionalgroupsincarbohydrates,proteinsandlipids.
11. Actionofsalivaryamylaseunderoptimumconditions.

Viruallabs

1 https://www.vlab,co.in

2 https://zoologysan.blogspot.com

3 www.vlab,iitb.ac.in/vlab

4 www.onlinelabs.in

5 www.powershow.com

6 https://vlab.amrita.edu

7 https://sites,dartmouth.edu

Suggested Readings:

1. Nelson & Cox: Leininger's Principles of Biochemistry: McMillan (2000)
2. Zubay et al: Principles of Biochemistry: WCB (1995)
3. Voet&Voet: Biochemistry Vols I & 2: Wiley (2004)
4. Murray et al: Harper 's Illustrated Biochemistry: McGraw Hill (2003) Elliott and Elliott: Biochemistry and Molecular Biology: Oxford University Press
5. Guyton, A.C. & Hall, J.E. Textbook of Medical Physiology, XI Ed., W.B.Saunders Company. (2006).
6. Tortora, G.J. &Grabowski, S. Principles of Anatomy & Physiology. XI Edition John Wiley & sons (2006).
7. Christopher D. Moyes, Patricia M. Schulte. Principles of Animal Physiology. 3rd Edition, Pearson Education (2016).
8. Hill, Richard W., et al. Anima l physiology. Vol. 2. Sunderland, MA: Sinauer Associates, (2004).
9. Chatterjee CC Human Physiology Volume I & 2, 11th edition, CBS Publishers (2016).

BHUPAL NOBLES' UNIVERSITY,UDAIPUR

Scheme of Examination and Course of Studies

FACULTY OF EDUCATION

SYLLABUS (IIYear)

INTEGRATED TEACHER EDUCATION PROGRAM

B.SC.B.Ed. III SEMESTER

B.Sc. B.Ed.

III SEMESTER

SYLLABUS

B.Sc. B.Ed. THIRD SEMESTER COURSE STRUCTURE

COURSE NO.	COURSE CODE	PAPER NAME	CREDITS TH.	CREDITS PR.	MID TERM	END TERM	MAX MARKS
COURSE17	LAT231TH	LEARNING AND TEACHING	4	-	30	70	100
COURSE18	ECA231TH	ELEMENTRY COMPUTER APPLICATION	4	-	30	70	100
COURSE19	PHY231TH	**ANY THREE OF THE FOLLOWING:** PHYSICS	4	-	20	50	100
	PHY231PR	PHYSICS PRACTICAL	-	2	-	30	
COURSE 20	CHM231TH	CHEMISTRY	4	-	20	50	100
	CHM231PR	CHEMISTRY PRACTICAL	-	2	-	30	
COURSE 21	MTH231TH	MATHEMATICS	6	-	30	70	100
COURSE 22	BOT231TH	BOTANY	4	-	20	50	100
	BOT231PR	BOTANY PRACTICAL	-	2	-	30	
COURSE 23	ZOL231TH	ZOOLOGY	4	-	20	50	100
	ZOL231PR	ZOOLOGY PRACTICAL	-	2	-	30	
COURSE 24	SUO231PR	**SUPW /OPEN AIR SESSION**	-	2	-	-	50
		TOTAL CREDITS AND MARKS	**28**				**550**

Value added course (VAC)

COURSE 25	YAM231PR	**YOGA AND MEDITATION**		6	30	70	100

Course 17 - LEARNING AND TEACHING

Objectives - After completing this course, the student-teachers will be able to :

1. Understand the process of learning and different approaches to the teaching learning process.
2. Apply psychological principles in the teaching learning process.
3. Understand the concept of motivation and strategies to develop motivation and use the motivational devices during teaching learning process.
4. Apply transfer of learning to foster maximum positive transfer.
5. Identify and cater to the educational needs of children with learning difficulties.
6. Develop an understanding of cognitive processes.
7. Understand various factors that influence learning.
8. Understand the concept, principles of teaching and models of teaching.
9. Develop an understanding of various approaches of teaching.
10. Understand the management of teaching.
11. Understand the role of professional organizations in professional development of teachers.

COURSE   CONTENT

UNIT-I

Learning and Motivation

➢ *Learning* - Concept and Factors Affecting Learning.
➢ *Approaches to Learning:*
  • *Cognitive* : Gestalt (Werthimier, Kofka, Kohler)
  • *Behaviorist* : (Pavlov, Thorndike, Skinner)
  • *Social Cognitive*: Bandura
➢ *Relevance and the applications of the above approaches to learning.*
  • *Transfer of Learning* – Meaning, Types of Transfer and Teaching for Transfer.
  • *Motivation*– Concept and Significance, Types of Motivation (Intrinsic and Extrinsic), Maslow's Hierarchy of Needs and Motivational Devices for Classroom Teaching.

UNIT- II

Individual Differences and Cognitive Processes

➢ Individual differences – Nature, Types, Causes, Accommodating individual differences in classroom.
➢ Understanding differences based on cognitive abilities in children with
➢ learning difficulties (for instance, slow learner, dyslexic).
➢ Cognitive Processes-Sensation, Perception, Attention, Memory, Concept formation and Problem Solving in Learning.

UNIT- III Teaching and Teaching Process

Teaching:

• Concept and Nature of Teaching.
• Relationship between Teaching and Learning.
• Principles of Teaching.

- Levels and phases of teaching.
- Components of Teaching: Teacher, Student, Teaching-Learning material and Classroom climate.
- Interrelatedness of objectives, teaching learning experiences and evaluations.
- Content analysis and Task analysis.

➢ **Teaching Process:**
- Teaching Technology: Concept, Assumptions, Characteristics and Components – Planning, Organization and Evaluation.
- Approaches to teaching- Participatory, Child Centered, Constructivist and Investigatory – Their meaning, characteristics and use in teaching.
- Criterion of effective teaching, Methods of assessment of teaching (Classroom observation, Peer assessment, Self reporting and Evaluation by a supervisor).
- Teacher behavior during Teaching: Flanders Interaction Analysis System.

UNIT- IV
➢ **Models of Teaching**
- Concept of models of teaching.
- Elements of Models of Teaching.
- Families of Models of Teaching.
- Types of Models of Teaching - Richard Suchman‟s Inquiry Training Model, Glaser‟s Basic Teaching Model, Information Processing Model and Concept Attainment Model

UNIT-V
➢ **Teaching as a Profession**
- Definition and characteristics of a profession.
- Teaching as a Profession: why and how.
- Professional Ethics for Teachers.
- Strengthening Teaching Profession
  a) Role of Teachers Organizations at state and national level.
  b) Role of Educational Organizations in the professional development of
  c) teachers (UGC, NCTE, NCERT, Universities and SIERT)
  d) Role of Teacher Education Institution in the professional development of teachers.
  e) Role of School and Community in enriching Teaching Profession
- Balancing personal aspirations and professional obligations by teachers.

SESSIONAL WORK
The student teachers shall undertake any two of the following activities (one from each section)
Section-A
1. Preparing a teaching plan based on constructivist approach / child centered approach / activity based learning.
2. Case study of a child with learning difficulties.
3. A comparative study of learning of children belonging to different socio-cultural background.
Section-B:
1. Study and report on pressures on school teachers.
2. Observation of one student-teacher‟s behavior during one teaching period (using Flander‟s Interaction Analysis System).
3. Collection of few success stories of teachers.
4. A case study of a professional organisation of teachers.

REFERENCES

- ✓ चौहान, आर.एस. (2007), अधिगम व विकास का मनोविज्ञान, जयपुर : अग्रसेन शिक्षा प्रकाशन
- ✓ मिश्रा मंजू (2008), अधिगमकर्ता का विकास एवं शिक्षा अधिगम प्रक्रिया, जयपुर यूनिवर्सिटी बुक हाऊस
- ✓ राजोरिया, अरूणा कुमार अरोड़ा प्रीति (2007), अधिगमकर्ता का विकास एंव शिक्षा अधिगम प्रक्रिया, जयपुर : कविता प्रकाशन
- ✓ कुलश्रेष्ठ, एस.पी. (1988) : शैक्षिक तकनीकी के मूल आधार, विनोद पुस्तक मंदिर, आगरा
  सक्सेना एवं ओबेराय (1995) : शिक्षक की तकनीकी, विनय रखेजा, सूर्या पब्लिकेशन, मेरठ

- ✓ Aggarwal, J. C. (1995), Essentials of Educational Psychology,Delhi:Vikas Publishing House Pvt. Ltd.
- ✓ Benjafield, J. G. (1992), Cognition, Prentice Hall, Englewood Cliffs.
- ✓ Brown, J. S., Collins A and Dugrid, P (1989), Situated Cognition and the Culture of Learning, Educational Researcher, 32-42.
- ✓ Bhatia, K. K.(2003), Bases of Educational Psychology The Learner – Nature and Development, New Delhi: Kalgoni publisher.
- ✓ Bains, Narinder Singh (2008). Shiksha Manovigyan Avam Vikas Ki Avastha, Jaipur : Jain Prakashan.
- ✓ Bhatnagar, S. C. (1977) : Shikshan Shilp Vigyan.
- ✓ Barnard H. C. (1970) : An Introductions to teaching, UI Publication, U.S.A.,
- ✓ Becker, H. J., & Riel, M. M. (2000). Teacher professional engagement and constructivist compatible computer use (Report No. 7). Irvine, CA: Center for Research on Information Technology and Organizations.
- ✓ Buch, M. B. and Santharam M R (1972) Communication in Classroom, CASE, Faculty of Ed. & Psy. M S Univ. Baroda
- ✓ Bagley, Classroom Management, New York: Macmillan
- ✓ Buch, T (et al) (1980) Approaches to School Management, Harper & Row Publishers, London.
- ✓ Clark, S. C. T. (1970) : A General Theory of Teaching
- ✓ Chauhan, S. S. (1990) :Innovation in teaching learning process, Vikas Publication, New Delhi.
- ✓ Chouhan, R. S. (2007). Adhigam avam Vikas Ka Manovigyan,J aipur: Aggrasen Shiksha Prakashan
- ✓ Gagne, R. M. (1985) The Conditions of Learning and Theory of Instruction (4th edition). New York: Holt, Rinehart and Winston.
- ✓ Gupta, S. K. and Gupta S (1991) Educational Administration and Management, Manorama Prakashan, Indore.
- ✓ Hilgard, E. R. (1956).Theories of Learning,New York:Appleton Century Craft.
- ✓ Joyce, B. Weil, M. Models of Teaching, Prentice Hall, New Jersey.
- ✓ Kulkarni S. S. (1986) :Introduction to Education Technology, Oxford & IBH Publishing Co. New Delhi.
- ✓ Loura, E. Berk (2008).Child Development,New Jersey: Pearson Prentice Hall (Low Price Edition) .
- ✓ Luria, A. R. (1976), Cognitive Development : Its Cultural and Social

Foundations. Havward University Press, Cambridge, Mass.
- ✓ Mishra, Manju . (2008). Adhigamkarta Ka Vikas avam Shikshan Adhigam Prakirya, Jaipur : University Book House.

- ✓ Pathak, P. D. (1973). Educational Psychology,Agra: Vinod Pustak Mandir .
- ✓ Passi, B. K. (1976) Becoming Better Teacher, Micro teaching Approach, Sahitya Mudranalya, Ahmedabad.
- ✓ Rajoria, Arun Kumar, Arora, Preeti (2007). Adhigamkarta Ka Vikas avam Shikshan Adhigam Prakirya. Jaipur: Kavita Prakashan.
- ✓ Rayans, D. G. (1969), Characteristics of Teachers.
- ✓ Saxena & Oberoi (1995), Technology of Teaching 1995.
- ✓ Skinner, B.F.(1960), Essentials of Educational Psychology,Bombay:Asia Publishing House.
- ✓ Thorndike Edward L. (2007), Educational Psychology, Published by READ Books. Woolfolk, A.E. (2009), Educational Psychology (11th Edition) (My Education Lab Series) Prentice Hall.
- ✓ Wertsch, J. V. (1985), Vygotsky and the Social Formation of Mind. Havard University Press.
- ✓ Verma, Rampal Singh .Adhigam avam Vikas Ke Mano-Samajik Adha, Agra: Vinod Pustak Mandir.
- ✓ Veeraraghavan,Vimla (2006), Behavioural Problems in Children and Adolescents, New Delhi : Northern Book Centre.

Course 18 - Elementry Computer Application

Unit-I

Fundamentals of Computer: Block diagram of Computer, Computer Memory, Input and Output Devices: Mouse, Printers (Dot matrix, Inkjet, Laser-Jet), Microphone, Speakers, Scanner Number System (Decimal, Binary, Octal, Hexadecimal)
Software: System Software, Application Software

Unit-II

Word Processing: MS Word: Features, Creating, Saving and Opening Documents in Word, Toolbars, Ruler, Menus, Keyboard Shortcut, Editing, Previewing, Printing & Formatting Document, Advanced Features of MS Word, Find & Replace, Tables & Charts, Converting a word document into various formats like-Text, Rich Text format.

Unit-III

Worksheet- MS-Excel : Worksheet basics, creating worksheet, entering into worksheet, heading information, data, text, dates, alphanumeric values, saving worksheet, Opening and moving around in an existing worksheet, Toolbars and Menus, Keyboard shortcuts, working with formulae & Autosum, Copying formulae, Worksheet with ranges, formatting of worksheet, Previewing & Printing worksheet, Graphs and charts, Sort & Filter.

Unit-IV

Introduction to PowerPoint: Presentations, Creating, Manipulating & Enhancing Slides, Organizational Charts, Excel Charts, WordArt, Animations and Sounds, Inserting Animated Pictures or Accessing through Object, Inserting Recorded Sound Effect or In-Built Sound Effect.

Unit-V

E-commerce: Introduction and growth of e-commerce, electronic payment system, e-payment modes- Banking Cards, Unstructured Supplementary Service Data(USSO), Aadhaar Enabled Payment System(AEPS), UPI, Mobile Wallets, Banks Pre-Paid cards, Point of Sale(POS), Internet Banking, Mobile Banking, Micro ATMs, Virtual meeting tools- Zoom, Go To Meeting, WebEx, Google Hangouts, Slack, Google Meet, Google Drive, Face Time, Free Conference Call. Networking, LAN, WAN, MAN, Internet & Applications.

Recommended Books:

1. *PC Software for Windows – R.K. Taxali*
2. *Computer Fundamentals – P.K. Sinha*

Course 19 - PHYSICS
KINETIC THEORY AND THERMODYNAMICS

UNIT-I

The laws of thermodynamics: The zeroth law of thermodynamics, various indicator diagrams, work done by and on the system, first law of thermodynamics, internal energy as a state function. Carnot cycle and its efficiency, Carnot theorem and the second law of thermodynamics, different versions of the second law, reversible and irreversible changes, practical cycles used in internal combustion engines. entropy, principle of increase of entropy. thermodynamic scale of temperature; its identity with the perfect gas scale, impossibility of attaining absolute zero, third law of thermodynamics.

Thermodynamic relationships: Thermodynamic variables; extensive and intensive, Maxwell's general relationships; applications to J-T cooling and adiabatic cooling in a general system, Vander Waals gas, and the Clausius-Clapeyron heat equation.

Thermodynamic Potentials: Relation to the thermodynamic variables, Equilibrium of thermodynamic systems, Cooling due to adiabatic demagnetization.

UNIT-II

Ideal Gas: Kinetic Model, Deduction of Boyle's law, Review of the kinetic model of an ideal gas, Interpretation of temperature, Brownian motion, Estimate of the Avogadro number, equi-partition of energy, specific heat of monatomic gas, extension to diatomic and tri-atomic gases, behaviour at low temperatures, Adiabatic expansion of an ideal gas. Application to atmospheric physics (derivation of barometric equation)

Real Gas: Vander Waals model; equation of state, nature of Van der Waals forces, comparison with experimental P-V curves. The critical constants, gas and vapour. Joule-Thomson expansion of an Ideal gas and Van der Waals gas; Constancy of U+ PV, Joule coefficients, Estimates of J-T cooling, adiabatic expansion of an ideal gas.

UNIT-III

Transport phenomena in gases: Molecular collisions, mean free path and collision cross-sections, Estimates of molecular diameter and mean free path, Experimental determination of mean free path, transport of mass, momentum and energy and interrelationship, dependence on temperature and pressure.

Maxwellian distribution of speeds in gas: Derivation of distribution of speeds and velocities, experimental verification, distinction between mean, rms and the most probable speed values, Doppler broadening of spectral lines.

UNIT-IV

Black Body Radiation: Spectral distribution of BB radiation; pure temperature dependence, Stefan-Boltzmann law, Wien's displacement law, Rayleigh-Jeans law and the ultraviolet catastrophy, pressure of radiation, Planck's hypothesis, mean energy of an oscillator and the Planck's law, complete fit with the experiment, interpretation of specific heats of gases at low temperature.

UNIT-V

Transition to quantum statistics: 'h' as a natural constant and its implications,cases of particles in a box and simple harmonic oscillator, in distinguishability of particles and its consequences. Maxwell-Boltzmann, Bose-Einstein and Fermi-Dirac statistics, comparison of three statistics, Planck's law and derivation of other laws from it.

Text and Reference Books:

1. Thermal Physics, S. Garg, R. Bansal and C. Ghosh, 1993, Tata McGraw-Hill.
2. A Treatise on Heat, Meghnad Saha, and B.N. Srivastava, 1969, IndianPress.
3. Thermodynamics, Enrico Fermi, 1956, Courier Dover Publications.
4. Heat and Thermodynamics, M.W.Zemasky and R. Dittman, 1981, McGraw Hill
5. Thermodynamics, Kinetic theory & Statistical thermodynamics, F.W.Sears & G.L.Salinger. 1988, Narosa
6. University Physics, Ronald Lane Reese, 2003, Thomson Brooks/Cole.
7. Thermal Physics, A. Kumar and S.P. Taneja, 2014, R. chand Publications.
8. Kinetic theory, thermodynamics and Statistical Mechanics (Hindi Ed.)- Kalra, Himanshu Publications.

Course 19 - PHYSICS
KINETIC THEORY AND THERMODYNAMICS PRACTICAL

1.   To determine Mechanical Equivalent of Heat, J, by Callender and Barne's constant flow method.
2.   Measurement of Planck's constant using black body radiation.
3.   To determine the value of Stefan's Constant.
4.   To determine the thermodynamic constant, $= C_p/C_v$ of air using Clementand Desorme's method
5.   To determine the coefficient of thermal conductivity of copper by Searle's Apparatus.
6.   To determine the Coefficient of Thermal Conductivity of Copper by Angstrom's Method.
7.   To determine the coefficient of thermal conductivity of a bad conductorby Lee and Charlton's disc method.
8.   To determine the temperature coefficient of resistance by Platinum resistance thermometer.
9.   To study the variation of thermo emf across two junctions of a thermocouple with temperature.
10.   To record and analyze the cooling temperature of an hot object as a function of time using a thermocouple and suitable data acquisition system
11.   To calibrate Resistance Temperature Device (RTD) using Null Method/Off-Balance Bridge

Any other experiment can be set as per the availability in the laboratory as pertheory course.

Text and Reference Books:

1.   Advanced Practical Physics for students, B.L.Flint & H.T.Worsnop, 1971,Asia Publishing House.
2.   Advanced level Physics Practicals, Michael Nelson and Jon M. Ogborn, 4th Edition, reprinted 1985, Heinemann Educational Publishers
3.   A Text Book of Practical Physics, Indu Prakash and Ramakrishna, 11th Edition, 2011, Kitab Mahal, New Delhi.
4.   A Laboratory Manual of Physics for Undergraduate Classes, D.P. Khandelwal, 1985, Vani Publication.

Course 20 - CHEMISTRY
THERMODYNAMICS

Chemistry of Transition Elements, Coordination chemistry, Functional Group Organic Chemistry-I and Thermodynamics

Credits: Theory-04,
Practicals-02

Course outcomes: This paper provides detailed knowledge of synthesis of various classes of organic compounds and functional groups inter conversion. Organic synthesisis the most important branch of organic chemistry which provides jobs in production & QC departments related to chemicals, drugs, medicines, FMCG etc. industries.
- ✓ It relates and gives an analytical aptitude for synthesizing various industrially important compounds.
- ✓ This paper also provides a detailed knowledge on the elements present in our surroundings, their occurrence in nature. Their position in periodic table, their physical and chemical properties. This paper also gives detailed understanding of the d-block elements and their characteristics.
- ✓ After successful completion of this course, the students will be able to gather theinformation regarding Werner's theory and VBT of transition metal complexes.
- ✓ Students will be able to learn the basic concepts of spontaneity, chemical and phase equilibrium and able to apply these concepts in predicting the spontaneous reactions and will be able to solve the numerical problems based on these concepts.

Unit 1:

Chemistry of Transition Elements (First, second and third Transition Series): Characteristic properties of the elements; electronic configuration, atomic & ionic radii, oxidation states and stability of uncommon oxidation states, ionization energy, boiling & melting points, complex compound formation, colour, catalytic properties and magnetic properties. coordination number and geometry.

Comparative treatment of 3d, 4d and 5d elements and their analogues in respect of occurrence, atomic & ionic radii, oxidation state, ionization energy, complex formation tendency, magnetic behaviour, geometry and colour.

Unit 2:

Coordination chemistry: Introduction, classification of ligands, chelation, polynuclear complexes, Werner's coordination theory, IUPAC nomenclature of coordination compounds and structural and stereoisomerism in complexes with coordination numbers 4 and 6. Valence bond theory (VBT), Inner and outer orbital complexes of 3d series and limitations of VBT.

Crystal field theory: Main postulates, crystal field splitting of d-orbitals in octahedral and tetrahedral complexes and square planner complexes, factors affecting the magnitude of Δo, calculation of crystal field stabilization energy, strong field and weak field ligands, spectrochemical series, distortion of octahedral complexes and Jahn-Teller theorem.

Unit 3:

Functional Group Organic Chemistry-I

Alcohols: Classification, nomenclature, preparation and important chemical reactions of monohydric, dihydric (glycol) and trihydric (glycerol) alcohols.

Phenols: Nomenclature, structure and bonding, preparation of phenols, physical properties, acidic character, comparative acidic strength of alcohols and phenols and stability of phenoxide ion. Reactions of phenol-electrophilic aromatic substitution(acylation and carboxylation), Fries rearrangement, Clasien rearrangement, Gatterman synthesis, Hauben-Hoesch reaction, Lederer Manasse reaction and Reimer-Tiemann reaction with their mechanism.

Unit 4: (12 Lectures)

Thermodynamics I : Review of thermodynamics and first law of thermodynamics, Joule's law, Joule-Thomson coefficient and inversion temperature, important principles and definitions of thermos chemistry, concept of standard state and standard enthalpies of formations, integral and differential enthalpies of solution and dilution, calculation of bond energy, bond dissociation energy and resonance energy from thermo-chemical data, variation of enthalpy of a reaction with temperature - Kirchhoff's equation.

Unit 5: (12 Lectures)

Thermodynamics II: Second law of thermodynamics, need of the law, different statements of the law. Carnot cycle and its efficiency, Carnot theorem. Thermodynamic scale of temperature. Concept of entropy: entropy as a state function, entropy as a function of V and T, entropy as a function of P and T, entropy change in physical and chemical processes, entropy change for reversible, irreversible and equilibrium condition. Clausius inequality, entropy as criteria of spontaneity and equilibrium. Entropy change in ideal gases. Gibbs free energy and Helmholtz work functions. Criteria for thermodynamic equilibrium and spontaneity, advantage Gibbs free energy and Helmholtz work functions over entropy change for spontaneity. Variation of G and A with P, V and T, Gibbs-Helmholtz equation, Clausius-Claperyron equation and applications, Numerical problems.

Reference Books:

Books Recommended:
1. Lee, J.D., "Concise, Inorganic Chemistry", Oxford University Press, 2008, India, 5th edition.
2. Puri, B.R., Sharma, L.R., and Kalia, K.C., "Principles of Inorganic Chemistry", VishalPublishing Co., India, 2020, 33rd edition.

S. ChandPublishing, New Delhi, India, 2011, 3rd edition.

4. Madan, R.D., Malik, U.M. and Tuli, G.D., "Selected topics in Inorganic Chemistry", S.Chand Publishing, New Delhi, India, 2010.

5. Chandra, S., "Comprehensive Inorganic Chemistry" New Age International Publishers, India, 2018, 1st edition.

6. Prakash, S., Tuli, G.D., Basu, S.K. and Madan, R.D., "Advanced Inorganic Chemistry",
S. Chand Publishing, New Delhi, India, 2000, Vol 1.

7. Finar, I.L., "Organic Chemistry", Pearson Education India, 2002, 6th edition.

8. Eliel, E.L. and Wilen, S.H., "Stereochemistry of Organic Compounds", Willey, 1994, 1st edition.

9. Boyd, Morrison and Bhattacharjee, "Organic Chemistry", Pearson Education India, 2010, 7th edition.

10. Mukerji, S.M., "Reaction mechanism in Organic Chemistry", Laxmi Publications, 2007, 3rd edition.

11. Singh, Jagdamba and Yadav, L.D.S., "Undergraduate Organic Chemistry" PragatiPrakashan, India, 2011, Vol 1.

12. Loudon, G. Marc, "Organic Chemistry", Oxford University Press, 2008, 4th edition.

13. Atkins P.W., "Atkin's Physical Chemistry: International", Oxford University Press, 2018, 11th edition.

14. Ball D.W., "Physical Chemistry", Cengage India Private Limited, 2017, 2nd edition.

15. Puri, B.R., Pathania, M.S. and Sharma, L.R., "Principles of Physical Chemistry", Vishal Publishing, India, 2020, 47th edition.

16. Bahl, A., Bahl, B.S. and Tuli, G.D., "Essential of Physical Chemistry", S. ChandPublishing, India, 2010.

Suggested online links:
1. https://www.youtube.com/watch?v=Fmclk9oUkEE&list=PLmxSS9XYst20Pz1SpRl4jd crv-zh1AoYy
2. https://www.youtube.com/watch?v=y67STFWoQ3A&list=PLmUlqVgZsTVV9zQAF- umZzs65MzOU8Ty9
3. https://www.youtube.com/watch?v=xo2sRayaVyc&list=PLmUlqVgZsTVUAEThwJsJ w_WPE87_yfhCO
4. https://www2.chemistry.msu.edu/faculty/reusch/VirtTxtJml/itro1.htm
5. https://nptel.ac.in/courses/104/103/104103071/#
6. https://swayam.gov.in/
7. https://nptel.ac.in/courses/104/103/104103071/

Course 20 - CHEMISTRY
THERMODYNAMICS (PRCTICAL)

Practical Course Title: Functional Group Identification and Volumetric Analysis-1

(Major Practical)

Course outcomes:
   After completing this course, the students will be able to test the inorganic mixtures of acidic and basic radicals in given samples, to qualitatively differentiate between alcohols and phenols and determine the critical solution temperature of partially miscible liquids.

Lab. Safety and Rules   06
Laboratory hazards and safety precautions

                                                                                      30
Inorganic exercise:
Complete analysis of inorganic mixture including both acid and basic radicals witha special emphasis on the role of common ion effect and solubility product.

                                                                                      12
Organic exercise:
Functional group tests for alcohols and phenols. Differentiation between alcohols and phenols using chemical and physical tests.

                                                                                      12
Physical   exercise: Any Four Experiment
   1. **Volumetric Analysis:**
        a. Estimation of calcium content in chalk as calcium oxalate using permanganate.
        b. Estimation of hardness of water by EDTA.
        c. Estimation of ferrous and ferric ions by dichromate methods.
        d. Estimation of copper using thiosulphate.

                                        OR

Gravimetric Analysis :
Analysis of Cu as CuSCN and Ni as Ni (dimethylgioxime)
Note: Candidates are required to prepare standard solutions by proper weighing.

   2. **Thin Layer Chromatography :**
   Determination of Rf values and identification of organic compounds.
        (a) Separation of green leaf pigments (spinach leaves may be used)
        (b) Preparation and separation of 2,4 dinitrophenyihydrazones of acetone, 2-butanorle, hexane-2-and 3-ones using toluene and light petroleum(40: 60)
        (c) Separation of a mixture of dyes using cyclohexane and ethyl acetate (8.5:1.5)

Suggested Readings:

i. Mendham, J., A. I. Vogel's Quantitative Chemical Analysis 6th Ed., Pearson, 2009.
ii. Willard, H.H. et al.: Instrumental Methods of Analysis, 7th Ed. Wordsworth PublishingCompany, Belmont, California, USA, 1988.
iii. Christian, G.D. Analytical Chemistry, 6th Ed. John Wiley & Sons, New York, 2004.
iv. Harris, D. C. Exploring Chemical Analysis, 9th Ed. New York, W.H. Freeman, 2016.
v. Khopkar, S.M. Basic Concepts of Analytical Chemistry. New Age InternationalPublisher, 2009.
vi. Skoog, D.A. Holler F.J. and Nieman, T.A. Principles of Instrumental Analysis, Cengage Learning India Edition.
vii. Mikes, O. & Chalmes, R.A. Laboratory Handbook of Chromatographic & Allied Methods, Elles Harwood Ltd. London.
viii. Ditts, R.V. Analytical Chemistry: Methods of separation. Van Nostrand, New York, 1974.

Suggestive digital platforms web links

1. https://www.labster.com/chemistry-virtual-labs/
2. https://www.vlab.co.in/broad-area-chemical-sciences
3. http://chemcollective.org/vlabs

Course 21 - MATHEMATICS

Title of Course :   :   Advanced Calculus

Learning Objectives :

The objective of the course is to introduce the concept of continuity and differentiability. Apply mean value theorems and Double ,triple Integration.

UNIT-I

Roll's Theorem, Mean Value Theorems, Taylor's Theorem, verifications, Various examples and their geometrical interpretations.

UNIT- II

Continuity: continuity of functions, discontinuous functions and their kinds

Derivability: Differentiable functions and their properties.

Examples of continuous and differentiable functions.

UNIT-III

Partial Differentiation: Partial derivatives of higher order, Homogeneous function, Euler's theorem on homogeneous functions and their generalization of degree n, Composite functions, Change of variables, Derivative of implicit function.

Maxima and Minima: Increasing and decreasing function, extreme values of functions of two variables, Lagrange's method of undetermined multipliers.

UNIT-IV

Jacobian: Definition and their particular case, Jacobian of implicit function, Functional relationship.

Envelopes and Evolutes.

UNIT –V

Double Integral: Double integral in polar co-ordinate

Triple Integral: Dirichlet's Integral, Liouville's extension of Dirichlet's Integral.

Reference Books:

Gokharoo & Saini	: Advanced Calculus, Navkar
Gorakh Prasad	: A Text book on Differential Calculus, PothiShala.
	: A Text book on Integral Calculus, PothiShala..
S.K. Pundir & B. Singh	: Differential and Integral Calculus, PragatiPrakashan.
Shanti Narayan & P.K. Mittal	: Differential Calculus, S. Chand.
	: Integral Calculus, S. Chand.
Bansal & Bhargava	: Integral Calculus, JPH.
Gokhroo & Saini	: Advanced Calculus, Navkar.
Goswami, Saini & Saini	: Integral Calculus, Neelkanth,

Course 22 -BOTANY

Gymnosperms and Dendrology

Course Objectives:

To develop understanding and practical knowledge of biology and diversity of Gymnosperms.
To study structural, developmental and economic aspects of Gymnosperms and wood.
To provide basic insight of dendrology and its terminology.

Theory

Unit I
General characters, economic importance and classification of Gymnosperms

Unit II
Occurrence, structure and life cycle of Cycas and Pinus

Unit III
Occurrence, structure and life cycle of Ephedra and Gnetum

Unit IV
Wood terminology: manoxylic, pycnoxylic, softwood-hard wood, heart wood -sap wood, Bark periderm, ring, diffused and porous wood, annual rings, economic importance of bark and wood

Unit V
Wood anatomy, Heart wood, Sap wood, different types of wood, tissue composition of wood, properties of wood (Physical and mechanical properties) and Chemical composition

Course 22 -BOTANY

Gymnosperm and Dendrology (Practical)

1	Cycas: External morphology, T.S. of normal root (Permanent slide only),T.S. of coralloid
2	Pinus: External morphology, T.S. of needle, specimens of male and female cones.
3.	Ephedra: External morphology, T.S. of stem, mounting of male flower and L.S. of female

Suggested Readings

Govil C.M. 2011. Gymnosperm. Krishna Prakashan Media. Sambamurthy, A.V.S.S. 2005. A Textbook of Bryophytes, Pteridophytes, Gymnosperms and Paleobotany. I.K. International Publishing House. New Delhi.
Vashishta B.R. 2001. Botany for degree students – gymnosperms. S Chand & Co Ltd; 5th edition. Bhatnagar S.P. and Alok Moitra1996. Gymnosperms. New Age International

Course Outcome/s

By successfully completing the course, students will be able to:

• To understand the Evolution pollination mechanisms and embryogeny of gymnosperms .
• To aware students about the diversity, morphology and reproduction, evolutionary origin, significance and economic value of Gymnosperms
• To Study the food, medicine, industry and ornamental plants. To know the Impact of coniferous forest on human life.

Course 23 -ZOOLOGY

SEMESTER III

THEORY

DEVELOPMENTAL BIOLOGY

COURSE OBJECTIVES

- To teach students about themolecular and cellular principles behind how a single cell becomes an organism.

- Tounderstand the processes that lead from the fertilization of an egg cell to the formation ofa well-structured and functional multicellular organism.

- To describe the main anatomical changes that occurs during development.

- To understand the treatment of birth defects and infertility in humans.

STUDENT LEARNING OUTCOMES

The students at the completion of the course should be able to:

- Identify the cellular behaviours that lead to morphological change duringdevelopment.

- Understand the basic principles of embryonic development, lifelong tissuerenewal, and the molecular mechanisms that regulate these processes.

- Describe the developmental stages that occur in a variety of animals and identify the characteristics and basic needs of living organisms.

- Describe the main changes that occur during development.

UNIT-I

History and basic concepts of Embryology.

Gametogenesis: Spermatogenesis andoogenesis.

Structure and types: eggs and sperms.

Neuroendocrine regulation ofreproductive organs in brief.

Elementary idea of menstrual and estrous cycle.

UNIT- II

Fertilization: Main events of fertilization, acrosome reaction, polyspermy preventing

mechanisms.

Cleavage: planes, patterns & types of cleavage.

Blastulation: Types ofblastulae.

UNIT- III

Gastrulation: fate maps, morphogenetic movements and their significance in

gastrulation. Mechanism and main characteristic of gastrulation. Parthenogenesis.

Regeneration.

UNIT- IV

Elementary knowledge of fate of three germ layers.

Primary organizer and embryonicinduction, concept of competence. Determination and differentiation.

UNIT- V

Extra embryonic membranes: Development and functions.

 Placentation: Definition, types, classification on the basis of morphology and histology.

Functions of placenta.

Post embryonic development: Insects and amphibians.

Course 23-ZOOLOGY
DEVLOPMENT BIOLOGY PRACTICAL

PRACTICAL

DEVELOPMENTAL BIOLOGY (LAB)

COURSE OBJECTIVES

- To familiarize students with developmental biology byinvestigating how animals and organ developed.

- Students will gain practical skills inexperimental techniques, and data analysis.

STUDENT LEARNING OUTCOMES

The students at the completion of the course should be able to:

- Develop skills in observing anddocumenting various stages of embryonic and post-embryonic development indifferent organisms.

- Learn to record and describe developmental changes,including morphological, cellular, and molecular events.

- Acquire a comprehensiveunderstanding of the principles and mechanisms underlying embryonicdevelopment.

- Learn about processes such as fertilization, cleavage,gastrulation, organogenesis, and tissue differentiation.

- Understand the molecularand cellular basis of development.

- Study developmental stages/Metamorphosis of insects.

TOPICS:

1. Spotting

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

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

c. T.S. of ovary and testis of mammals.

d. Study of different types of sperm.

e. Study of different types of eggs

2. Study of foetus with placenta.

3. Study of developmental stages and metamorphosis of insects: Mosquitoes,

Cockroach, Butterfly/ Moth, Drosophila (virtual demonstration)

4. Study of living tadpole larvae and its metamorphosis

5.Prepared slides /virtual pictures of the different developmental stages: Fish eggs,

Amphioxus eggs, Different developmental stages of mosquito eggs/larvae/ Pupae/

Adult

SUGGESTED READINGS:

- "Developmental Biology" by Scott F Gilbert.

- "Principles of Development" by Lewis Wolpert

- Balinsky, An Introduction to Embryology (CBS College Publishers)

- Grant: Biology of developing systems (Holt, Reihart and Winston).

- Koli VK. Practical Zoology (B. Sc. III year). Himanshu Publication. Udaipur

- Verma, PS, A manual of practical Zoology S.Chand and Co. Ltd., Ram Nagar, NewDelhi (English and Hindi Editions).

- Lal, SS: Practical Zoology, Invertebrates, Rastogi Publication, Meerut (English andHindi Editions).

- https://www.onlinebiologynotes.com/

- https://byjus.com/biology/

- Virtual Library-Developmental Biology (sdbonline.org)

Course 24 – OPEN AIR SESSION / SUPW CAMP

1. In the Second year will organize 5 days camp for B.Sc. B.Ed. and B.A. B.Ed. Course. Participation in such camp will be compulsory for all students.
2. Performance of students will be evaluated internally. Objectives of the camp will be as follows:-

   ➢ To develop understanding about local environment and Community for connecting classroom teaching with outside world.

   ➢ To develop sensitivity towards self, society and environment.

   ➢ To develop feeling of togetherness and working collaboratively.

   ➢ To develop organizational skills and leadership abilities.

   ➢ To develop skill of conducting surveys.

   ➢ To develop an understanding about sustainable future.

   ➢ To develop dignity of labor 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

S. No.	Activity	Marks
1.	Participation in preparation of Camp	5
2.	Presentation of report of survey/ creative work	20
3.	Participation in Community Awareness Programme	15
4.	Participation in organizational process/community living/cultural and aesthetic activities	10
	Total Marks	50

Course 25 – YOGA AND MEDITATION

	Syllabus	
Unit-I	**YOGA:** **(12 Hours)**	
	Meaning, Aim and types of Yoga, Concept of Hatha Yoga and its Relationship with physical, mental and special Health.	
Unit-II	**Yoga Asanas:** **(12 Hours)**	
	Practical Yoga Yogic Practices –Asana, Pranayama, & Surya Namaskara (Techniques, Salient, Features & Benefits)	
Unit-III	**Meditative Possess** **(12 Hours)**	
	Padhmasana, Vajraasana and sukhasana. Their Techniques, Passions and effects /Advantages.	
Unit-IV	**Pranayama** **(12 Hours)**	
	Breath awareness, Sectional breathing and Kriya Their Techniques, Passions and effects /Advantages.	
Unit-V	**Yoga for Modern Era** **(12 Hours)**	
	Role of Yoga in development of respiratory system. Role of Yoga in development of cardiovascular system. Role of Yoga in development of digestive system.	

Practice Syllabus:
1. Practical of Knowledge of Asanas
2. Types of Pranayam

Refrences
1. Basavaraddi, I.V. & others: SHATKARMA: A Comprehensive description about Cleansing Process, MDNIY New Delhi, 2009
2. Joshi, K.S. : Yogic Pranayama, Oriental Paperback, New Delhi, 2009
3. Swami Kuvalyananda : Pranayama, Kaivalyadhama, Lonavla, 2010
4. Swami Rama: Science of Breath, A Practical Guide, The Himalayan International Institute, Penanselvenia, 1998
5. Swami Niranjananand Saraswati: Prana, Pranayama & Pranvidya, Yoga Publications Trust, Munger, Bihar, 2005.

BHUPAL NOBLES' UNIVERSITY,UDAIPUR

Scheme of Examination and Course of Studies
SYLLABUS (IV Year)

INTEGRATED TEACHER EDUCATION PROGRAM

B.SC. B.Ed. FOUR YEAR

DEPARTMENT OF EDUCATION

FACULTY OF EDUCATION

B.Sc.B.Ed.
SYLLABUS
FOURTH YEAR

COURSE No.	NAME OF SUBJECT
COURSE 91	Educational Management & creating an Inclusive school
COURSE 92	Knowledge & Curriculum
COURSE 93	Drama & Art (Internal Assessment)
COURSE 94	Optional Courses (any 1) 1. Health & Physical Education 2. Guidance & Counselling 3. Peace Education
COURSE 95	School Internship (Phase II, 16 Weeks) Engagement with the field: Tasks and Assignment for courses
COURSE 96	External Assessment Viva-Voce for School Internship subject

External members   Convener

Internal members   Dean

PROGRAMME STRUCTURE, INSTRUCTIONS & SCHEME OF EXAMINATION

B.Sc. B.Ed. IV YEAR

COURSE NO.	Paper Code	Name of Subject	Paper	Theory Marks	Internal /practical marks	Minimum Marks		Maximum Marks
						Th.	Int /Prac	
COURSE 91	BSCBED CC401	Educational Management& creating an Inclusive school	Theory	70	30	28	12	100
COURSE 92	BSCBED CC402	Knowledge & Curriculum	Theory	70	30	28	12	100
COURSE 93	BSCBED CC403	Drama & Art (Internal Assessment)	Theory	-	100	-	40	100
COURSE 94	BSCBED CC404	Optional Courses (any 1) 1. Health & Physical Education. 2. Guidance & Counselling 3. Peace Education	Theory	70	30	28	12	100
COURSE 95	BSCBED PC405	School Internship (Phase II, 16 Weeks) Engagement with the field: Tasks and Assignment for courses	Practical	-	250	-	100	250
COURSE 96	BSCBED PC406	External Assessment Viva-Voce for School Internship subject	Practical	-	200	-	80	200

Course 91 - EDUCATIONAL MANAGEMENT AND CREATING

INCLUSIVE SCHOOL

*Objectives***:** *After completing the course the student Teachers will be able to :*

➢ Develop understanding about concept and importance of Educational Management

➢ Understand the educational Management structure at different levels.

➢ Understand the role of Heads and Teachers in School Management.

➢ Understand the importance of Management of different resources in school system

➢ Develop an institutional plan for a secondary school

➢ Understand the characteristics of inclusive school and appreciate diversity

➢ Develop skills and practices for creating inclusive school so as to address the special needs of children with different backgrounds.

COURSE CONTENT

UNIT-I

Introduction to Educational Management

➢ Concept, need, Functions & recent trends in Education Management

➢ Characteristics of Effective Educational Management.

➢ Management structure of education in India at different levels – Centre, State and Local.

➢ Educational Management in the state of Rajasthan with special reference to School Education.

UNIT-II

Management of Resources

- **Leadership role of Principal** – Characteristics & skills. Role in building the climate of a school.

- Material resource Management.

- **Human Resource Management** – Recruitment, Orientation and Professional development of Teachers.

- **Financial Management** – Budgeting, Monitoring and Auditing.

- **School community Symbioses** – Utilization of Community resources for school development, role of PTA and SMC.
- **Managing school supervision**- Concept, need, principles, scope and techniques of supervision.

UNIT-III

Management of School Activities

- **Time Management** – School Calendar, preparation of time table – concept, principles, types

- **Curricular & Co curricular activities-** Their importance, Principles, planning and effective organization
- Institutional Planning, Concept, Areas and Steps
  ### UNIT-IV

Inclusive Education:

- Meaning, Need and Importance of inclusive education

- Historical overview of education of children with disabilities – from welfare to right

- Policies related to inclusive education

- Barriors of Learning and Participation

- Challenges in Inclusive Education.

UNIT-V

Creating inclusive School

- Characteristics of inclusive school

- Understanding student needs.

- Inclusive Practices – Collaboration, Team work peer strategies and innovative instructional practices.

- Role of Teacher in inclusive education

- Role of Principal in managing inclusive schools.

- Role of Government for promoting inclusive education.

PRACTICUM/ SESSIONAL WORK

(One from each of the following two sections)

Section -A

- Study of an institutional plan of a school

- A critical study of a secondary school time-table

- Study the management of co-curricular activities of a school.

- Study the leadership role of Headmaster of a Secondary School.

Section -B

- Case-study of an inclusive school.

- Case study of an individual with disability.

- Study of inclusive practices of a secondary school.

REFERENCES

- ✓ Agrawal, J.C. (2010) Shiksha Vyavastha Ka Adhar Tatha Prabandhan, Agra, Agrawal Publications.

- ✓ Allen, L.A. (1995) – Management and Organization, McGraw-Hill Auckland.

- ✓ Baquer, A & Sharma, A. (1997) Disability: Challenges VS Responses: CAN, New Delhi.

- ✓ Bhatnagar, Suresh (1996), Shaikshik Prabandh Avam Shiksha Ki Samasyaye, Meerut, Surya Publication.

- ✓ Dave, Amritlal Avam Anya (2015), Bharat Me Shaikshik Vyavastha Avam Vidyalaya Prabandh, Meerut, R. Lall Book Depot.

- ✓ Farrell, M. (2004) Special Educational Needs: A Resources for Practitioners, New Delhi, Sage Publications.

- ✓ Hearty, S. & Alur, M. (eds.) (2002) Education and Children with Special Needs: From Segregation to Inclusion. New Delhi, Sage Publications.

- ✓ Jaswant Singh (1959), How to be successful the school Headmaster, Jalandhar, University Publishers.
- ✓ Khan, M.S. (1996) – Educational Administration, ES-362, Block-4, New Delhi.

- ✓ Kochar, S.K. (1970, Secondary School Administration, New Delhi, Sterling Publishers.

- ✓ Kochhar, S.K. (1994) – Secondary School Administation, Sterling Publishers, New Delhi.

- ✓ Mahajan, Baldev (1996), Educational Administration in Rajasthan, New Delhi, Vikas Publishing House (Private) Limited.

- ✓ Mohanty, J. (2000) – School Management, Administration and Supervision, Deep and Deep, New Delhi.

- ✓ Mohi-u-ddin, M.S. (1962) School Organization and Management, Baroda, Acharya Book Depot.

- ✓ Mukerji, S.N. (1963), Secondary School Administrating, Baroda, Acharya Book Depot.

- ✓ Mukherji, S.N. (1962), Administration of Education in India, Baroda, Acharya Book Depot.

- ✓ NCERT (2000) Assessment of Needs for Inclusive Education: Report of the First Regional Workshop for SAARC Countries, NCERT, New Delhi, India.

- ✓ Puri, M. & Abraham, G. (eds.) (2004) Handbook of Inclusive Education for Educators, Administrators, and Planners, New Delhi, Sage.

- ✓ Reynolds, C.R. and Janzen, F.E. (eds.) Encyclopedia of Special Education: A reference for the Education of the Handicapped and other Exceptional Children and Adults, Vol. No. 2 ed. USA, John Willey and Sons, Inc.
- ✓ Safaya, R.N. (2006), Modern School Administatoin and Organziation, New Delhi, Dhanpat Rai Publishing (Pvt.) Limited.

- ✓ Sidhu, K.S. (1992) – School Organization and Administration Sterling Publisher, New Delhi.

- ✓ The persons with Disabilities (Equal Opportunities, Protection of Rights and Full Participation Act (1995) Ministry of Law, Justice and Company Affairs (Legislative Department)

Course 92 - KNOWLEDGE AND CURRICULUM

Objectives: On completion the course the student teacher will be able to:

➢ Develop understanding of meaning philosophical basis and sourses of knowledge.

➢ Develop understanding of the relationship between knowledge and curriculum.

➢ Develop understanding of Activity, Discovery and Dialogue related to modern child centered education with reference to Gandhi, Tagore, Dewey, Plato and Freire.

➢ Understand the concept of Nationalism, Secularism and Universalisation with special reference to Tagore and J.krishnamurthi.

➢ Understand the changes brought about by Industrialization,

➢ Implications of Democracy, Individual autonomy, Equality, Social justice for education.

➢ Understand the difference between Curriculum framework, Curriculum, Syllabus and textbook.

➢ Understand the Principles of Curriculum Construction.

➢ Understand the assessment modes of Curriculum Evaluation.

COURSE CONTENT

UNIT- I
Epistemology, Knowledge and Knowing

➢ Epistemology**:** Meaning; Philosophical basis of Knowledge according to Western and Indian Philosophy.

➢ Distinction between : Knowledge and Belief; Knowledge and Information ; Knowledge and Skill; Knowledge and Reason; Knowledge and Education; knowledge and Training

➢ Facets of Knowledge Such as Local and Universal ; Concrete and Abstract ; Theoretical and Practical; Contextual and Textual; School and out of School.

➢ Process of Knowing Process of Construction of Knowledge; Factors involved in construction of Knowledge; The role of Knower and Known in Construction and Transmission of Knowledge;

➢ The role of Culture in Knowing

UNIT –II

Forms of Knowledge and Its Organization in Schools.

➢ Categorization of Knowledge; Basis of Categorization;

➢ The essential forms of Knowledge.

➢ Basis of selection of categories of Knowledge in School Education.

➢ The responsibility of Selection Legitimacy of inclusion of knowledge in School curriculum.

UNIT- III

Educational Thinkers and Child Centered Education

➢ Basis of Child Centered Education in relation to Activity, Discovery and Dialogue with reference to Gandhi, Tagore, Dewey, Plato and Freire. Social basis of Education in the context of society in relation to Democracy, Industrialization and Ideas of Individual Autonomy Equality and Social- justice.

➢ Concepts of Nationalism, Universalization and Secularism and their interrelationship with education.

➢ Critical Multiculturalism and Democratic education as the basis of analyzing concepts of learning rooted in school practices.

UNIT- IV

Principles of Curriculum construction:

➢ Meaning and need of Curriculum.

➢ Principles of Curriculum construction

➢ Differentiation between curriculum framework, Curriculum and Syllabus.

➢ Determinates of Curriculum

➢ Social-Political-cultural-economic diversity.

➢ Socio-Political aspirations including ideologies.

➢ Economic necessities and Technological possibilities.

➢ National priorities and International contexts.

➢ Considerations in curriculum making.

➢ Relevance and specificity of educational objectives for concerned level.

➢ Critical issues: Environmental concerns, Gender differences, Values and Social sensitivity.

UNIT –V

Curriculum Development and its Implementation

➢ Different approaches of curriculum development: Subject centered: Environmentalist (incorporating local concerns) Behaviorist ; Competency based, Learner centered and Constructivist

➢ Role of external agencies in providing curriculum and pedagogic supports to teachers within schools; teacher `s role in transacting, developing and researching curriculum.
➢ Operationalisation of curriculum into learning situations; selection and development of learning resources i.e. text books, teaching – learning materials and resources outside the school- local environment, community and media.

➢ Process of Curriculum evaluation; Evolving assessment modes, need of model of Continuous Comprehensive Evaluation; Feedback from learners, teachers, community and administrators.

PRACTICUM / SESSIONAL WORK

Attempt any two of the following.

1. Report on analysis of operationalisation of Curriculum into learning situations in school and outside school in any one school.
2. Conduct a survey on feedback of curriculum from learners/ Teachers/ community and prepare a report.

3. Prepare a report of a group discussion conducted on democratic education multiculturalism as the basis of analyzing school practices.
4. Prepare three activities to develop awareness about Environmental concerns, Gender sensitivity and Social Sensitivity (one on each issue).

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Course 93 - DRAMA AND ART IN EDUCATION

(Internal Assessment)

Objectives: After completion of this course, the student teachers will be able to:

➢ Understand the role of fine arts in enhancing the creative potentials of an individual.

➢ Understand the concept and basics of different art forms (all the visual and performing arts).

➢ Understand the significant implications for the role of art, music and drama in education, to nurture children's creativity and aesthetic sensibilities through genuine exploration, experience and free expression.

➢ Respond to the beauty in different Art forms.

➢ Develop ability to appreciate the inherent rhythm, beauty and harmony in visual and performing art forms (specifically regional, traditional and classical art forms).

➢ Enhance skills for integrating different Art forms across school curriculum at secondary level.

➢ Develop skill to create artistic pieces through waste materials.

➢ Develop awareness regarding the rich cultural and artistic heritage of India and the specific regions.

➢ Develop awareness regarding the role of arts and crafts in the society and day-to-day life situation.

➢ Get acquainted with the life and work of the local artists/artistes.

➢ Deepen understanding, appreciation and skills in one chosen medium through self work and evaluate self as an artist.

➢ Develop the ability to use drama and other visual and performing art processes to generate new knowledge, understanding and perception of the world.

➢ Get acquainted with the vast range of the regional and traditional art forms in the light of National Integration.

➢ Gets an opportunity for self expression resulting in emotional harmony .

➢ Communicate important social issues through drama.

COURSE CONTENT

Note: The entire course will be based on practical oriented.

UNIT - I

Visual Arts and Crafts

Experiencing visual and plastic resources and means of creative expression:

➤ Exploration and Experimentation with different 'materials' of two dimensional and three dimensional Visual Art –such as lines, strokes, colours, shades, tones, textures etc. by rendering through pencil, charcoal, crayon and pastel, pen and ink, water ,poster and acrylic colours, rangoli, alpana, and mandana materials, clay and metal scraps wire, thread, coloured papers, printed materials from magazines and news paper, cardboards and other available throw away materials.

➤ Exploration, experimentation and expressing with different techniques of Visual Arts like Sketching; Drawing; Painting; Poster making; Chart making; Block and Stencil printing; Collage and Mosaic work with a variety of coloured papers and coloured printed pictures/ photographs from magazines and news papers; Clay modelling; Hanging mobiles and Stables; Paper cutting and folding, and other local crafts work etc.Framing and displaying of Art works.

UNIT–II

Performing Arts: Dance, Music, Theatre and Puppetry Experiencing Rhythmic and Kinetic resources and means of creative expression through:

➤ Exploration and Experimentation with the terms used in Music and Dance like-Nada, Swara (Shudha, Komal, Tivra), Saptak, Sargham, Mandra, Madhyama, Tar, Arohi Avarohi, Raga, Ragini, Laya, Maatra, Tal, Avartal, Mishra Sam Tal, Gati, Padghat, Classical, Regional and Folk forms of Music and Dance and other related elements.

➤ Listening/viewing and exploring Regional Art forms of music and dance through live and recorded performances.

Course 94 - OPTIONAL COURSE

A. HEALTH AND PHYSICAL EDUCATION

Objectives: On completion of the course the student teacher will be able to:

➢ Develop Physical fitness.

➢ Understand the concept, aims & objectives of Health & physical education.

➢ Understand various communicable diseases

➢ Understand and practice good posture, Balance diet, first aid

➢ Understand the characteristics of hygienic environment along with contributing factors and its importance.

➢ Understand the rules & regulations and develop skill of organizing different physical education activities.

➢ Develop competencies in games & athletic events

➢ Conduct tournaments, competitions & Athletic Meets.

COURSE CONTENTS

UNIT-I

Health Education

➢ Meaning, Concept, Aims & Objectives, School Health Programme. Nutrition & Balanced Diet Components of balanced diet, major sources & malnutrition.

➢ Posture Concept & values Postural deformities and their management.

➢ Communicable diseases Mode, Control & Prevention Physical fitness & first aid Physical fitness meaning, elements & importance. First aid in the following- Wounds, cuts, Hammaerage, dislocation, fracture, bites of insects, sprain & strain.

UNIT-II

Physical Education

➢ Concept, definition, aims, objectives and importance. Its place in school programme.
➢ A suggestive physical education programme in an Indian school

UNIT-III

Management & organization of different physical education activities.

➢ Rules of important major games and sports. Methods of marking a standard track (400m), Connected areas & their rules.

➢ Organization, Management & administration of tournaments, intramurals, play day, health day, play centers and other similar activities. Organizing Indigenous games like Kho-Kho, Kabbadi, Malkham etc.Indian street games-Satoliya, Gilli–Danda, and Rumal Jhapatta etc.

➢ Officiating, Coaching, fundamental skills & ground marking of any two major games.

SESSIONAL WORK

Any one of the following:

1. Organize games / sports / health activities during OAS/SUPW Camp

2. Conduct awareness programme on issue of social health

3. Prepare an exhibition / awareness rally/poster competition on health awareness in   nearby schools.

4. Organize a programme on health & hygiene.

5. Organize intramurals.

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  ✓ Physical Education and Health- Dr. A.K. Uppal, Dr. G.P. Gautam, Friends Publications, New Delhi.

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Course 94

B. GUIDANCE AND COUNSELLING

Objectives: On completion of this course the student will be able to:-

➢ Understand the meaning, nature and scope of guidance.

➢ Understand various types of guidance.

➢ Develop skills in administrating and interpreting testing and non testing tools of data collection.

➢ Know and use the information and methods of guidance programme of special learners.

➢ Understand with the meaning, nature and techniques of counselling.

➢ Develop/learn the skills to organize guidance programme in the secondary schools.

COURSE CONTENT

UNIT-1

Introduction to Guidance and Counselling

➢ Meaning, Purpose, Scope, Nature and Functions of Guidance.

➢ Need of Guidance at various stages

➢ Principles of Guidance

➢ Types of Guidance: Educational, Vocational and Personal guidance (Their Meaning, Objectives, needs and Importance)

➢ Guidance services: Need and Importance

➢ Types of Guidance Service, Individual inventory service, Information Service, Counselling Service, Follow up service.

UNIT-2

Guidance Programme, Services and Procedures

➢ Individual and group procedure of guidance and counselling.

➢ Characteristic of good guidance programme.

➢ Group guidance Techniques, Class-talks, Career Talks, Career Conference, Group discussion, Career exhibitions, Audio-Visuals Techniques.

➢ Role of various community Agencies in school guidance programme.

➢ Outline of minimum guidance programme at secondary on senior secondary level.

➢ Meaning of Nature of Counselling and Role of Teachers as a Counsellor

UNIT-III

Guidance for special learner and Tools and Techniques

➢ Concept of special learner Guidance needs of special learner

➢ *Guidance methods for*

➢ Special learner

➢ Case study method

➢ Remedial measures

➢ *Tools and Techniques*

➢ Types of tools

➢ Standardized and self made tools

➢ Techniques; Interview; Observation; Rating Scale & Check List

➢ *Sources of Collecting data*

➢ Cumulative record card

➢ Anecdotal record car
➢ Autobiography

PRACTICUM / SESSIONAL WORK

Any one of the following:-

1. Group Guidance – One career talk

2 .Critical study of guidance programme in any senior secondary school.

3. Survey of Guidance needs of Adolescents

4. Celebration of Career day ensuring participation of all

REFERENCES

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Course 94

C. PEACE EDUCATION

Objectives: On completion of this course the student will be able to-

1. Explain about peace and education, their relevance and connection to inner harmony as well as harmony in social relationships.

2. Understand the views of different philosophies about peace.

3. Understand and resolve conflicts within self and in society.

4. Use pedagogical skills and strategies in and out of classroom for promoting peace.

COURSE CONTENT

UNIT – I

- ➢ Concept, Need and importance of peace education.
- ➢ Peace values vis-à-vis constitutional values: Importance of the attitudes , beliefs and values of peace viz compassion, cooperation , love etc. that foster inner peace and constitutional values of justice, equality, freedom, respect for differences and ecological resources that ensure peace in society.
- ➢ Challenges to peace by increasing stresses, conflicts crimes, terrorism, violence and wars resulting in poor equality of life.
- ➢ Nature and causes of conflicts.
- ➢ Conflicts at different levels in society: with himself, interpersonal, organizational, interstate and global.
- ➢ Role of Social and Ecological condition and processes that sustain conflict: limited resources, poverty, political interest, economic interest, socio –Cultural and ecological conditions, environmental resources viz. water, mineral, forests, energy etc.

UNIT-II
Role of various thinkers and agencies in promoting peace
- ➢ Concept of peace according to the following thinkers –Gandhi, Krishnamurthy, Aurbindo, Vivekananda, Rabindranath Tagore, Gijubhai Badheko, Mother Terasa Initiatives at National and international levels.
- ➢ Agencies contributing to peace – UNESCO, Gandhi Peace Foundation etc.

UNIT –III

➢ Awareness of the influence of Social milieu on self Understanding adequate self as a product of positive experiences of caring , warmth and appreciation in the family, school, neighbourhood, etc. which promote healthy discipline, shunning violence.

  i) Negative experiences generate stress, anger, aggressor

  ii) Yoga, meditation, anger/ stress management, as practices that restore positive physical healthy and attitudes.

  iii) Role of different subjects in inculcation of PEACE.

  iv) Suggested Activities in schools for promoting peace.

   a) Celebration of Festivals of different religions/ important days

   b) Exposure to personalities working or fostering peace in society.

   c) Practice of Yoga &Meditation.

   d) Peace Rallies

  v) Intervention in resolution of societal conflicts.

PRACTICUM /SESSIONAL

Any one of the following:-

1. Visits to organizations connected with peace and inter cultural harmony and aesthetic appreciation to experience peace as reality submission of reports on experiences.
2. Analysis of morning assembly programme of a school from the point of peace.
3. Preparation of a report on school programmes for promoting to peace.
4. Case study of a child suffering from bad habit.
5. Developing an action plan for peace in school and local community.

REFERENCE

✓ Balasovriya, A.S.(1994) Teaching Pece to Children, National institute of Education Maharagama, Sri Lanka.

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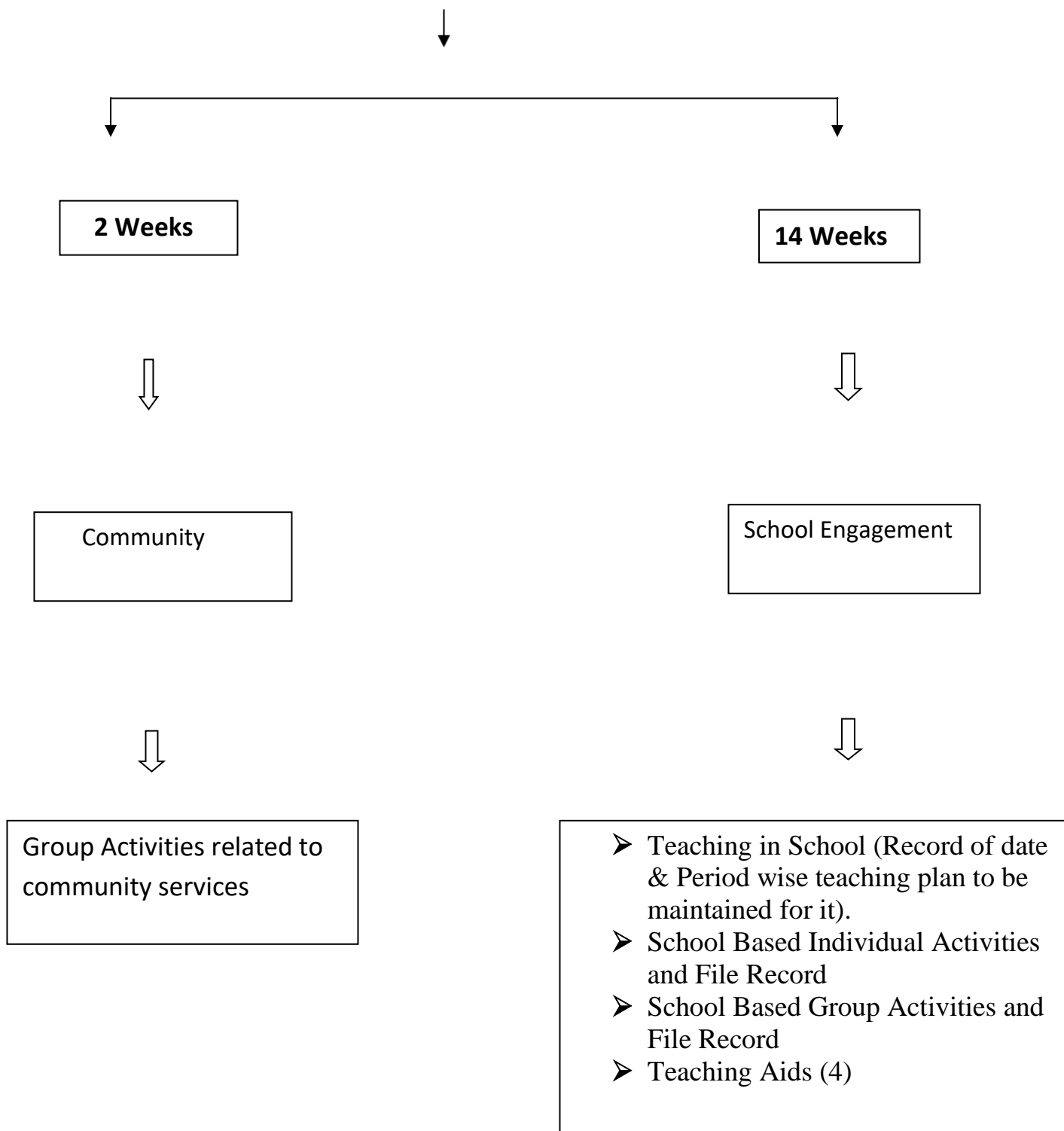Course 95 - INTERNSHIP PROGRAMME (School Internship Phase-II)

School Internship is designed to lead to the development of broad repertoire of perspectives, professional capacities, teacher dispositions, sensibilities and skills. During the internship, a student-teacher shall work as a regular teacher and participate in all the school activities, including planning, teaching and assessment, interacting with school teachers, community members and children.

Objectives: After completion of the Internship the student - teachers will be able to –

- ✓ Develop the understanding of the school and its management.

- ✓ Develop the ability to plan and manage the class-room teaching.

- ✓ Develop the sensibility towards diverse needs of learners in school.

- ✓ Develop ability to discharge various responsibilities expected from a teacher.

- ✓ Organize and conduct the co- curricular activities.

- ✓ Get acquainted with various school records maintained by the school.

- ✓ Maintain records expected from a teacher.

- ✓ Develop skills of conducting community contact programmes.

- ✓ Get acquainted with the functioning of SMC.

As per the School Internship Framework and Guidelines (Jan., 2016) of the NCTE Regulations, 2014, following revised plan of the School Internship is proposed for the consideration of the committee.

Execution of the Internship Programme (16 Weeks)

↓

2 Weeks	14 Weeks

⇩ ⇩

Community	School Engagement

⇩ ⇩

Group Activities related to community services	➤ Teaching in School (Record of date & Period wise teaching plan to be maintained for it). ➤ School Based Individual Activities and File Record ➤ School Based Group Activities and File Record ➤ Teaching Aids (4)

During the 14 weeks period of internship in schools, the student-teachers will perform the under mentioned tasks:-

➢ Interact with Headmaster and mentor teachers of the school about the two teaching Subjects he/she has offered.

➢ They will teach at least 3-4 periods per day (Minimum of 200 lessons).

➢ They will have to discharge the duties of a class- teacher of any class.

➢ They will have to participate in the following activities individually as well as in group. The suggested individual and the group activities are as follows:-

INDIVIDUAL ACTIVITY

1) Preparation of time table of the school other than that in force.

2) Maintaining students' attendance and preparing a monthly record of students' attendance.
3) Maintaining Teacher's diary.

4) Case study of a special child.

5) A critical study and report of Institutional plan of the school.

6) Preparation of a progress report of a student of the class of which he /she is the Class teacher.

7) Analysis of school syllabus and textbooks of their pedagogy subjects.

8) Undertaking of Action Research Project on at least one problem area of Schooling.

GROUP ACTIVITY

1) Organising Morning Assembly

2) Organising Literary and Cultural Activities

3) Organising Games and Sports Activities

4) Participation in Parent's-Teacher Meeting and Meeting of School Management Committee (SMC)

5) Observing and participating in Mid-day Meal Programme

6) Organising Science Club or other Club Activities

7) Maintaining discipline in the school.

8) Participating in Community Contact Programmes like- Rallies, awareness Campaigns, community health campaigns, and cleanliness campaigns and so on.

NOTE: - From group activities (1) to (7), each student- teacher has to participate in at least 5 of the activities and activity no. (8) Is compulsory for all student-teachers

➢ Study of various records maintained by the school for instance
➢ stock register,
➢ service book,
➢ letter receipt & dispatch register,
➢ Library book accession & issue register,
➢ scholar register,
➢ leave account,
➢ T.A. bill etc.)

NOTE: - Each student - teacher has to submit a file in which detailed reports of all the activities and tasks observed and discharged by him/her are to be mentioned along with reflective thinking. A viva- voce will be conducted after the internship programme. The file record, the viva-voce and the lesson plan diary will form the basis of assessment of the internship programme. The student-teachers performance shall be assessed jointly by the TEI Principal and faculty (The grade recommended for a particular student by the Principal and mentor teachers of internship school must also be considered.)

S.No.	INTERNAL EVALUTION	Marks
1.	Teaching in Schools (Record of date and period wise teaching plan to be maintained for it.	100
2.	Individual Activities and File Record	80
3.	Group Activities and File Record	30
4.	Teaching Aid (4)	20
5.	Community Engagement and Report writing	20
	Total Marks	**250**

Course 96- INTERNSHIP PROGRAMME (School Internship Phase-II)

(Viva-Voce)

External Evaluation, the details of which are as follows:

S.No	EXTERNAL EVALUATION	Marks
1.	Viva-Voce for Internship Programme	**100**
2.	Written test based on internship	**50**
3.	Power point presentation and documentation of internship	**50**
	Total Marks	**200**

THE BOARD OF EXAMINERS FOR VIVA-VOCE WILL CONSIST OF:

✓ The Principal of the college concerned.

✓ One senior member of the college. (Preferably Internship Incharge)

✓ Two external members appointed by the university.

BHUPAL NOBLES' UNIVERSITY, UDAIPUR

Scheme of Examination and Course of Studies

SYLLABUS (III Year)

INTEGRATED TEACHER EDUCATION PROGRAM

B.SC. B.Ed. FOUR YEAR

DEPARTMENT OF EDUCATION

FACULTY OF EDUCATION

B.Sc. B.Ed.

III YEAR

SYLLABUS

COURSE No.	NAME OF SUBJECT
COURSE 61	Assessment for Learning
COURSE 62	Language across the curriculum (Including Reading &Reflecting on texts)
COURSE 63	General Hindi
COURSE 64	School Internship (Phase I,4 weeks)Internal assessment Engagement with the field : Tasks and Assignment for course
COURSE 65	External assessment one lesson of pedagogy of a school subject
COURSE 66	Physics I
	Physics II
	Physics III
	Physics Practical
COURSE 67	Chemistry I
	Chemistry II
	Chemistry III
	Chemistry Practical
COURSE 68	Zoology I
	Zoology II
	Zoology III
	Zoology Practical
COURSE 69	Botany I
	Botany II
	Botany III
	Botany Practical
COURSE 70	Mathematics I
	Mathematics II
	Mathematics III -A
	Mathematics III -B
	Mathematics III –C
COURSE 71	Statistics I
	Statistics II
	Statistics III-A
	Statistics III-B
	Statistics Practical
COURSE 72	Computer Science I
	Computer Science II
	Computer Science III
	Computer Science Practical

PROGRAMME STRUCTURE, INSTRUCTIONS & SCHEME OF EXAMINATION

COURSE NO.	Paper Code	Name of Subject	Paper	Theory Marks	Internal/ Practical Marks	Minimum Marks		Maximum Marks
						Th.	Int/ Prac	
COURSE 61	BSCBED CC301	Assessment for Learning	Theory	70	30	28	12	100
COURSE 62	BSCBED CC302	Language across the curriculum (Including Reading &Reflecting on texts)	Theory	70	30	28	12	100
COURSE 63	BSCBED CC303	Core Subject General Hindi	Theory	70	30	28	12	100
COURSE 64	BSCBED PC304	School Internship (PhaseI,4weeks) Internal assessment Engagement with the field : Tasks and Assignment for course	Practical	--	250	--	100	250
COURSE 65	BSCBED PC305	External assessment one lesson of pedagogy of a school subject	Practical	--	100	--	40	100
COURSE 66	BSCBED EC306	Physics I	Paper I	35	15 (Int.)	14	6	50
	BSCBED EC307	Physics II	Paper II	35	15(Int.)	14	6	50
	BSCBED EC308	Physics III	Paper III	35	15(Int.)	14	6	50
	BSCBED PC309	Physics Practical	Practical	--	75	--	30	75
COURSE 67	BSCBED EC310	Chemistry I	Paper I	35	15(Int.)	14	6	50
	BSCBED EC311	Chemistry II	Paper II	35	15(Int.)	14	6	50
	BSCBED EC312	Chemistry III	Paper III	35	15(Int.)	14	6	50
	BSCBED PC313	Chemistry Practical	Practical	--	75	--	30	75
COURSE 68	BSCBED EC314	Zoology I	Paper I	35	15(Int.)	14	6	50
	BSCBED EC315	Zoology II	Paper II	35	15(Int.)	14	6	50
	- BSCBED EC316	- Zoology III	- Paper III	- 35	- 15(Int.)	- 14	- 6	- 50

	BSCBED PC317	Zoology Practical	Practical	--	75	--	30	75
COURSE 69	BSCBED EC318	Botany I	Paper I	35	15(Int.)	14	6	50
	BSCBED EC319	Botany II	Paper II	35	15(Int.)	14	6	50
	BSCBED EC320	Botany III	Paper III	35	15(Int.)	14	6	50
	BSCBED PC321	Botany Practical	Practical	--	75	--	30	75
COURSE 70	BSCBED EC322	Mathematics I	Paper I	53	22(Int.)	21	09	75
	BSCBED EC323	Mathematics II	Paper II	53	22(Int.)	21	09	75
	BSCBED EC324	Mathematics III (A)	Paper III	53	22(Int.)	21	09	75
		Mathematics III (B)	Paper III	53	22(Int.)	21	09	75
		Mathematics III (C)	Paper III	53	22(Int.)	21	09	75
COURSE 71	BSCBED EC325	Statistics I	Paper I	35	15(Int.)	14	06	50
	BSCBED EC326	Statistics II	Paper II	35	15(Int.)	14	06	50
	BSCBED EC327	Statistics III (A)	Paper III	35	15(Int.)	14	06	50
		Statistics III (B)	Paper III	35	15(Int.)	14	06	50
	BSCBED PC 328	Statistics Practical	Practical	---	75	---	30	75
COURSE 72	BSCBED EC329	Computer Science I	Paper I	35	15(Int.)	14	06	50
	BSCBED EC330	Computer Science II	Paper II	35	15(Int.)	14	06	50
	BSCBED EC331	Computer Science III	Paper III	35	15(Int.)	14	06	50
	BSCBED PC 332	Computer Science Practical	Pactical	---	75	---	30	75

COURSE 61-ASSESSMENT FOR LEARNING

Objectives: After completion of the course the student teacher will be able to-

➢ Understand the historical aspect and current practices of Assessment.

➢ Understand assessing children`s progress in terms of psychological development and the criteria provided by the curriculum.

➢ Explain cognizant of key concept related to assessment such as measurement, evaluation, assessment, Examination, Test, Formative and Summative evaluation etc.

➢ Evolve realistic, comprehensive and dynamic assessment procedures that are able to keep the whole students in view.

➢ Explore the use of wide range of assessment tool their selection and appropriate construction.

➢ Develop critical understanding of issues in assessment for learning (from constructivist paradigm)

➢ Use statistical techniques for interpretation of assessment data.

➢ Understanding the critical role of assessment in enhancing learning.

➢ Design, integrate and evaluate appropriate assessment tools as part of the learning process.

➢ Develop assessment linked to student learning outcomes.

➢ Understand and use assessment for improvement of teaching and learning.

COURSE CONTENT

UNIT- I Overview concept of assessment

➢ Concept and purpose of assessment

➢ Perspective on assessment and evaluation for learning in a constructivist paradigm.

➢ Clarification of the terms: Assessment, evaluation, test, examination, measurement

➢ Formative and summative assessment, Continuous and comprehensive assessment

➢ Grading

➢ Distinction between terms

➢ Assessment for learning

➢ Assessment as learning

➢ Assessment of learning

➢ Principles of assessment for learning, Critical review of current evaluation practices and their assumption about learning and development.

UNIT- II Assessment of Subject based learning

➢ Enlarging notions of subject based learning in a constructivist perspective.

➢ Assessment tools

➢ Kinds of task : project, assignments & performance

➢ Observation of learning process by

Self

Peers

Teachers

Self and peer assessment

➢ Assessment technique: Oral, Practical test, CAA(Computer Aided Assessment), Test, Exercise, Portfolio, Assignment, MCQ, Short Answer, Notes, Summary, Observing, interviewing and writing comprehensive profile of a student.

UNIT- III Context of assessment and evaluation

➢ Context of assessment: subject related, person related.

➢ Steps in pedagogical analysis of content matter.

➢ Preparation of test items, development of blue print.

➢ Checking of answer script: subjective and objective.

➢ Classification of assessment based on

➢ Purpose: prognostic, diagnostic, formative, summative

➢ Scope: teacher made, standardized

➢ Attribute: achievement, attitude, aptitude, interest, personality, intelligence, creativity.

➢ Information: qualitative, quantitative

➢ Response: oral, written formulation of the research problem

UNIT- IV Data analysis & feedback

➢ Importance and use of educational statistics.

➢ Statistical tools-frequency distribution, normal distribution, graphical representation, percentile, central tendency, deviation, rank difference and product moment coefficient of correlation and their interpretation.

➢ Meaning and purpose of feed back in teaching learning process.

➢ Types of teacher feedback (written, comments, oral, peer feedback)

➢ Reporting on a learner profile in consolidated form.

➢ Use of assessment for feedback and taking pedagogic decision.

UNIT V Reforms in assessment for learning

➢ Critical analysis of prevalent practices of assessment.

➢ Commercialization of assessment i.e. tuition, coaching, study centre etc.

- Assessment for social selection and placement.
- NCF-2005 & NCFTE-2009 on assessment reforms.
- Improving quality and range of question in examination paper.
- Role of ICT in Assessment.
- De linking of school based assessment from examination: some possibilities and alternative practices.
- Innovation in assessment practices.

SESSIONAL WORK

(Any two of following)

- A critical analysis of a question paper in any subject of RBSE/CBSE.
- Prepare a diagnostic test and remedial programme of any subject at secondary level.
- Organize a group activity (like: competition, story telling, reading, writing), evolve criteria for assessing the activity and present an assessment report of the activity.
- School visits followed by presentation of a report on evaluation practices in school.
- Construction, administration and interpretation of self made achievement test.

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Websites link

➢ http://www.aahe.org/assessment/assess_links.htm

A hefty site updated by the American Association of Higher Education. Has many links to assessment articles, sites and listserves.

➢ http://www.duq.edu/~tomei/tomei/advancedsites.html

Another hefty site that includes many links to articles and sites on assessment, Bloom‟s taxonomy, learning styles, etc.

➢ http://www.snow.utoronto.ca/Learn2/introll.html

Learning to Learn, a thinking and learning skills site, is for learners, teachers, and researchers to learn about the value of self-awareness as a critical part of learning. It was created for educators developing their assessment and instructional design skills.

➢ http://www.ldcommunity.org/thesystem.html

Learning Disabilities Resource Community (LDRC) site that focuses on teaching and assessment including the Intelligent Tutoring and Assessment System that plans to focus on the navigational tools available to users, including perceptual modes.

➢ http://www.sbctc.ctc.edu/Board/Educ/Outcomes/outcom_wag.htm

➢ Washington State Assessment Newsletter

➢ http://www.wwu.edu/~assess/airlinks.htm

A site generated by Western Washington University that includes resources, articles and

➢ links to assessment sites.

➢ http://trgmcber.haygroup.com/Products/learning/lsius.htm

An online version of David Kolb‟s Learning-Style Inventory. Material is not printable, but one can opt to pay for it, take it online or order copies for class use.

➢ http://www.keirsey.com/

➢ Links to Meyers Briggs information sites

http://pss.uvm.edu/pss162/learning_styles.html

➢ http://www.hcc.hawaii.edu/intranet/committees/FacDevCom/guidebk/teachtip/

➢ http//www. snow.utoronto.ca/Learn 2/mod3/ tchstyle.html for a Multiple Intelligence Inventory, Thinking Styles Inventory, Teaching Styles Inventory, Learning Styles Inventories and Tests on the Web, and Learning Styles Links.

Course 62 - LANGUAGE ACROSS THE CURRICULUM
(Including reading and reflecting on text)

Objectives: After the completion of the course, the student teacher will be able to:

1. Understand the language background of students as the first or second language users.

2. Create sensitivity to the language diversity that exists in the classroom.

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

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

5. Understand interplay of language and society.

6. Understand function of language and how to use it as a tool.

7. Understand language and speech disorders and make remedial measure, too.

COURSE CONTENT

UNIT –I Language and society

➢ Relationship between language and society**,** Multilingualism- concept, status of Indian classroom language.

➢ Deficit theory and discontinuity theory.

➢ Social stimulation- gestures, emotional and facial expressions, postures and movements, articulate speech, physiognomy.

UNIT- II Language development

➢ Theories of language development
➢ Language development in different stages.
Speech defects: lisping, slurring, stuttering and stammering and role of teachers in its resolution.

➢ Language acquisition: stages, language and thought.

➢ Meta- linguistics: concept, meaning, listening, speaking, reading, comprehension and writing for varying context, language proficiency for teacher.

UNIT- III Classroom and language

➢ Classroom discourse- nature, meaning and medium.

➢ Questioning in the classroom- type of questions, why and how of asking of questions, teachers role and control during questioning, encouraging questioning by students.

➢ Functions of language within and outside the classroom.

➢ Classroom as a language lab.

➢ Role of literature in language learning

UNIT- IV Reading and writing

➢ Reading skills- purpose and methods.

➢ Reading in the content areas- science, social science and Mathematics.

➢ Reading strategies- note making, summarizing.

➢ Process writing- analysis of children's writing to understand their conception and personality, writing with a sense of purpose, writing to learn and understand.

UNIT –V Reading and Reflecting on text

➢ Nature of texts- expository v/s narrative texts, transactional v/s reflective texts

➢ Scheme theory- text structures and examining content area.

➢ Kinds of text-Textbooks, narratives, autobiographies, field notes, ethnographies.

➢ Some practical activities to be conducted in a class -……………….
  a. Read a text and prepare a summer
  b. Read a document and organize a discussion on it c. Expressing views on an editorial of a news paper

SESSIONAL WORK

Any two of the following:

➢ Find out the different languages spoken by the students and prepare a plan to use multilingualism as a teaching strategy.

➢ Identify speech defects of a student and make a remedial strategy.

➢ Organize an activity based game to motivate students for creative questioning and present its report.

➢ Read any empirical, conceptual, historical work or a policy document or studies about schools, teaching, learning or different peoples experiences and submit reading reflections.

➢ Plan a participatory transaction strategy for language acquisition.

➢ Prepare abstracts of any two articles published in reputed Journals.

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Course- 63 सामान्य हिन्दी

पाठ्य पुस्तकें

गद्य–वीथी : संपादक – डॉ. ओमप्रकाष शर्मा
प्रकाशक – माया प्रकाषन मंदिर, त्रिपोलिया बाजार, जयपुर 2.

कथा दषक : संपादक – डॉ. परमानंद पांचाल
प्रकाशक – राजस्थान प्रकाषन, 28–29, त्रिपोलिया बाजार, जयपुर 3. हिन्दी

भाषा ज्ञान : संपादक – डॉ. हरिचरण शर्मा
प्रकाशक – अनुभव प्रकाषन, शालीमार बाग, जयपुर

पाठ्य विषय – पाँच इकाइयों में विभक्त होगा।

इकाई – 1

गद्य–वीथी पुस्तक से संक्षेपण एवं 'कथादषक' पुस्तक से पल्लव संबंधी ज्ञान।
दोनों पुस्तकों से सामान्य तथ्यात्मक प्रष्नों का ज्ञान।

इकाई – 2
शब्द ज्ञान
शब्द पर्याय और विलोम शब्दों का ज्ञान।
अनेकार्थी एवं समश्रुत शब्दों का ज्ञान।

इकाई – 3
पत्र लेखन और पत्रों के प्रकार संबंधी ज्ञान।
अंग्रेजी से हिन्दी अनुवाद का ज्ञान।
हिन्दी में पदनाम संबंधी ज्ञान। (अंग्रेजी से हिन्दी पदनाम)

इकाई – 4
मुहावरे – लोकोक्तियाँ
शब्द शुद्धि और वाक्य शुद्धि
पारिभाषिक शब्दावली
अनेक शब्दों के लिए एक शब्द

इकाई – 5
देवनागरी लिपि की विषेषताएं
देवनागरी लिपि एवं वर्तनी का मानक रूप
कम्प्यूटर में हिन्दी का अनुप्रयोग – एक प्रारंभिक परिचय।

Course : 64 INTERNSHIP PROGRAMME (School Internship Phase-I)

School Internship is designed to lead to the development of broad repertoire of perspectives, professional capacities, teacher dispositions, sensibilities and skills. During the internship, a student-teacher shall work as a regular teacher and participate in all the school activities, including planning, teaching and assessment, interacting with school teachers, community members and children.

Objectives –

After completion of the Internship the student - teachers will be able to –

➢ Develop the understanding of the school and its management.

➢ Develop the ability to plan and manage the class-room teaching.

➢ Develop the sensibility towards diverse needs of learners in school.

➢ Develop ability to discharge various responsibilities expected from a teacher.

➢ Organize and conduct the co- curricular activities.

➢ Get acquainted with various school records maintained by the school.

➢ Maintain records expected from a teacher.

➢ Develop skills of conducting community contact programmes.

➢ Get acquainted with the functioning of SMC.

Execution of the Internship Programme

The internship programme shall be divided into 2 years. In the first year, 4 weeks will be allotted. This will include one week of school observation and three weeks of practice - teaching during which each student - teacher has to teach 2 periods per day (one period each for 2 pedagogy subjects). Besides teaching, the student - teacher has to complete his/her tasks and assignments related to the courses mentioned in the first year. The three weeks practice teaching will also include the delivery of criticism lessons (one in each pedagogy subject) and also observation of 5 lessons of peers of each of the two subjects. This practice of teaching programme is adopted so as to give a proper training of teaching skills and thorough guidance to the student-teachers by the subject lecturer.

Practice Teaching

S. No.	Activity	Marks
1.	Practice Teaching in both the pedagogy subjects in Schools (for three weeks) (At least 13 lessons in each subject)	100+100=200
2.	Peer Group Lesson Observation(ordinary+criticism-5 lesson in each	05+05=10
3.	Criticism Lessons (1-1 in both pedagogy subjects)	10+10=20
4.	Test (Blue print + question paper + Evaluation Key +Remedial Teaching)	10+10=20
	Total Marks	**250**

Course 65-   EXTERNAL ASSESSMENT
ONE FINAL LESSON OF PEDAGOGY OF A SCHOOL SUBJECT

The weightage of final lesson will be 100 marks. Final lesson will be conducted at the end of third academic year i.e. after the completion of 1st phase of internship.

During the final practical examination each candidate will have to teach one Lesson in any one of the two teaching subjects. However, he shall have to prepare lesson plan in both the teaching subjects and should be prepared to deliver lesson in both the subjects if required.

The Board of examiners for external examination will consist of :-

➢ The Principle of the college concerned.

➢ One senior member of the college.

➢ Two external examiners appointed by the university.

Note: - The selection of the faculty member and two examiners be such that, as for as possible, Board of Examiners represent all the three faculties-Humanities, Languages and Science

S.NO.	EXTERNAL EVALUATION(I YEAR)	TOTAL MARKS
1.	Course 65- Final Lesson (Final Practical Exam)	100
	Total Marks	**100**

Course: 66- PHYSICS
PAPER- I QUANTUM MECHANICS AND SPECTROSCOPY

UNIT – I

➢ **Background of Quantum Mechanics**: Limitations of classical theory, black body spectrum, photo-electric effect, laws of photo electric emission, Einstein's photoelectric equation, Compton's effect, de-Broglie's hypothesis of matter waves, Davisson-Germen experiment.

➢ **Wave and Particle theory:** Wave-particle duality, Heisenberg uncertainty principle and its physical significance, gamma ray microscope thought experiment, diffraction of a beam of electron through a single slit, photon interpretation of two slit experiment, particle in a box, Bohr's orbit, estimating minimum energy of a confined particle using uncertainty principle, energy-time uncertainty principle, non-existence of electron in nucleus, photon emission from an excited atom.

➢ **Wave function, Schrodinger equation and Quantum Mechanical operators:** Wave function, operator algebra, position, momentum and energy operators, time dependent and time independent Schrodinger equation, physical interpretation of wave function, normalization and orthogonality of wave function, equation of continuity and its interpretation, postulates of quantum mechanics, eigen value equation, Hermitian operator and its properties, expectation value of operators, Ehrenfest theorem, commutation relation

UNIT – II

➢ **Applications of Schrodinger equation:** Energy eigen values and eigen functions for a particle in an infinite potential well, in a three dimensional rigid box, degeneracy of energy level, particle in a shallow potential well, tunneling in one dimension-across a rectangular potential barrier, alpha decay.

➢ **Applications of operator method**: Simple harmonic oscillator (classical and quantum view), Eigen function and Eigen value, probability function and probability density, parity, zero point energy, creation and annihilation operator.

UNIT - III

➢ **Angular momentum in Central force:** Central force, spherically symmetric potential, separation of variable method, solution of Schrodinger wave equation by separation of variable method, orbital angular momentum for quantum system, Ladder operator and their commutation relation, eigen value and eigen function of L^2 and Lz. Angular momentum and magnetic moment of electron due to orbital motion, Bhor mageton.

➢ **Schrodinger equation for hydrogen atom**: In spherical polar coordinate system, solution of equation into angular and radial part by separation of variable method, significance of various quantum numbers, probability function, and energy eigen values.

UNIT - IV

> **Mono-valent and divalent atoms:** Four quantum numbers and their physical significance, coupling schemes, spectral terms arising from coupling, s, p, d, f, notation, selection rules, half life of excited states, width of a spectral line, doublet fine structure of hydrogen lines, fine structure of Hα line, different series in alkali spectra.

> **Effect of magnetic field on energy levels:** Gyromagnetic ratio for orbital motion and spin motion of an electron, vector model of the atom, Lande's g-factor, Stern and Gerlach experiment, normal and anomalous Zeeman effect.

UNIT - V

> **X-ray spectra:** Properties, feature and origin of continuous X-ray spectrum, Duane and Hunt law, characteristic X- rays, Kossel's explanation, Moseley's law, X-ray absorption spectra, absorption edges, fine structure of X-ray levels, Auger effect.

> **Molecular Spectroscopy:** Formation of molecular orbitals, H_2^+ ions, H_2 molecule, electronic levels, characteristic of molecular spectra. Pure rotation spectra, rotational energy levels, selection rule, isotope effect. Vibration spectra: energy levels, vibrational spectrum, selection rule, an harmonic oscillator, fine structure of vibration-rotation bands, P, Q, R branches, isotopic effect, Raman effect, electronic spectra, sequences and progressions, statement of Frank- Candon principle

Text and Reference Books:

> Quantum Mechanics by Singh and Bagde
> Modern Physics by Beiser
> Quantum Mechanics by Rajput
> Quantum Mechnics, Atomic and Molecular Physics (Hindi) by Kalra, Kakani and Saraswat
> Quantum Mechnics, Atomic and Molecular Physics by Saraswat and Tiwari

Course: 66 - PHYSICS
PAPER-II SOLID STATE AND NUCLEAR PHYSICS

UNIT – I

➢ **Crystal geometry:** Solid state of matter, amorphous and crystalline materials, lattice translation vectors, crystal lattice, unit cell, different types of symmetry operations like rotation, inversion and reflection, classification of crystals, coordination number, radius ratio, lattice constant, packing fraction, crystal planes and Miller indices, typical crystal structures.

➢ **Crystallography:** Diffraction of X-rays by crystals, Bragg's X-ray spectrometer, Laue's method, rotating crystal method, Debye-Scherrer methods, reciprocal lattice its properties and importance, Laue's formulation of X-ray diffraction, Brillouin zones.

UNIT - II

➢ **Crystal binding:** Covalent binding and its origin, ionic binding, energy of binding, transition between covalent and ionic binding, Born - Haber cycle, metallic binding, Vander Waal's binding, hydrogen bond.

➢ **Conduction in metals:** Classical and Einstein's theory of specific heat, Debye theory of specific heat, Electrical conductivity, Thermal conductivity of metals and Wiedmann-Franz law, Drude-Lorentz theory, electrical and thermal conductivity, Sommerfeld's free electron model, Fermi-Dirac distribution, plasma frequency, D.C. and A.C. conductivity.

UNIT - III

➢ **Conduction in semiconductors:** Band theory of solids, origin of the energy gap, Bloch function and Bloch theorem, Kronig - Penny model, distinction between metals, insulators and semiconductors, types of semiconductor and mechanism of current flow in them, effective mass, carrier concentrations in thermal equilibrium in intrinsic semiconductor, law of mass action, Fermi level in intrinsic semiconductor, drift current density, mobility, electrical conductivity of semiconductor, variation of conductivity with temperature in semiconductor, elementary idea about Hall effect, Magneto-resistance.

➢ **Charge transport in semiconductors:** Charge densities in extrinsic semiconductor, Fermi level in n- and p-type extrinsic semiconductor, ionization energy of impurity atoms, carrier concentration of doped semiconductor, conductivity control of semiconductors by impurities, diffusion current and total current in semiconductors, Einstein relation.

UNIT - IV

➢ **Nuclear structure and properties:** Elements of nucleus, proton-electron, neutron-positron and antiproton-neutron hypothesis, basic properties: charge, mass, size, spin, magnetic moment, nuclear quadrupole moment, mass defect and packing fraction, nuclear binding energy, binding energy per nucleon and its observed variation with mass number

of the nucleus, Coulomb energy, volume energy, surface energy, other corrections, explanation of the binding energy curve, liquid drop model of the nucleus.

> **Radioactivity:** Discovery of radioactivity of nucleus, properties of α, β and γ rays, laws of radioactive disintegration, decay constant, half and mean life, radioactive series, α and β particle spectra, Geiger-Nuttal law, theories of α and β decay, nuclear radiations, physical, chemical and biological effect of radiations, radiation therapy, nuclear energy levels, controlled and uncontrolled chain reaction, nuclear fission and fusion, atomic bomb, nuclear reactor, Fermi and transuranic elements.

UNIT - V

> **Nuclear radiation detector and accelerators:** Characteristic curve, ionization chamber, Geiger-Müller counter, resolving time, dead time, quenching effect cloud chamber, cyclotron, synchro-cyclotron, electron-synchrotron.

> **Rutherford scattering and nuclear reactions:** Rutherford's scattering formula, curve, ionization chamber, Geiger- Müller counter, resolving time, dead time, elastic and inelastic scattering, radiative capture, disintegration process, many-body reaction, conservation laws like energy, linear momentum, angular momentum, charge, mass number in nuclear reactions, value of energy in nuclear reactions, nuclear reaction cross section, artificial nuclear transmutations, transmutation by α -particles, by neutrons and by deuterons, difference between chemical and nuclear reactions.

> **Particle Physics:** Elementary idea about of primary and secondary cosmic rays, various quantum numbers related to elementary particles (lepton number, baryon number, hypercharge, strangeness), different conservation laws for different types of interactions.

Text and Reference Books:

✓ Atomic and Nuclear Physics by A.B. Gupta.
✓ Introduction to Modern Physics by Mani and Mehta.
✓ Modern Physics by Beiser.
✓ Nuclear Physics by S.N. Ghosal
✓ Solid State, Nuclear and Particle Physics by Saraswat and Mandot
✓ Solid state,Nuclear and Particle Physics (Hindi) by kalra, kakani and Mandot

Course: 66- PHYSICS
PAPER-III   ELECTRODYNAMICS and RELATIVITY

UNIT – I

➢ **Motion of charged particle: E** as an accelerating and deflecting field, motion of electron in uniform and non- uniform electric field, Bethe's law, velocity selector, Thomson's parabola method, Bainbridge mass spectrograph, magnetic focusing.

➢ **Faraday's law for electromagnetic induction:** Faraday's law integral and differential forms, self-inductance of a solenoid and of a straight conductor, energy stored in an inductor and in the magnetic field, displacement current,equation of continuity, modified form of Ampere's law, Maxwell's equation for time-dependent electromagnetic field in vacuum and in material media, boundary conditions.

UNIT – II

➢ **Electromagnetic potentials:** Magnetic vector and magnetic scalar potential, Poisson's equation for **A** in terms of current density, differential and integral form of Ampere's circuital law, solution of Poisson's equation for line surface currents, Coulomb and Lorentz gauge transformations, Lorentz law in terms of potentials.

➢ **Maxwell's equations and electromagnetic waves:** Differential and integral form of Maxwell's equation their proof and physical significance, Plane-wave solution for Maxwell's equation, orthogonality of **E**, **B** and propagation vector, characteristic impedance, poynting vector, energy density, pointing theorem, momentum of electromagnetic waves, polarization of electromagnetic waves.

UNIT – III

➢ **Electromagnetic waves in media:** Kinetic and dynamic properties of reflection and refraction, reflection and refraction of the boundary of two media, and at a plane boundary of dielectrics, Fresnel's relation, reflection and transmission coefficient, Brewster angle, degree of polarization, modified field equation, attenuation of the wave, reflection and transmission through a conducting surface, total internal reflection.

➢ **Radiation from accelerated charges:** Retarded potential, Linear Wiechert potential, radiation from an oscillating dipole, radial and spherical power of electromagnetic radiation, radiation pressure equation in free space and medium.

UNIT – IV

➢ **Special theory of relativity:** Galilean transformations, Galilean invariance, Newtonian relativity, Michelson- Morley experiment, postulates of special theory of relativity, Lorentz transformation equation, length contraction, time dilation, experimental verification of time dilation, relativistic addition of velocities, aberration of light, Doppler effect in light, Red and blue shift.

UNIT – V

➢ **Relativistic Dynamics:** Relativity of mass, mass energy equivalence, relativistic formula for momentum and energy, time-like, space-like and light-like intervals, Minkowski space, four vectors their linear product and different type of four vector.

Text and Reference Books:

✓ Introduction to Electrodynamics by Griffiths.
✓ Introduction to Electrodynamics by Reitz and Manifold.
✓ Electrodynamics by Gupta and Kumar.
✓ Electrodynamics, Electromagnetic waves and relativity by Saraswat
✓ Electromagnetics by Laud
✓ Electrodynmics, Electromagnetic Waves and Relativity (Hindi) by Kalra, Kakani and Bhandari.

Course: 66- PHYSICS
PAPER-IV PHYSICS PRACTICAL

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   50 Marks

      For each experiment, distribution of marks will be as follows:

Figure:	3 Marks
Formula/Theory:	4 Marks
Observation table along with least count:	10 Marks
Calculation and Result:	6 Marks
Precautions and source of error:	2 Marks

(ii) Viva voce   10 Marks

(iii)   Record   15 Marks

Total   **75 Marks**

For X-student each practical will be of 25 marks and viva voce will be of 25 marks.

Section-A
1. To determine the value of Cauchy Constants of a material of a prism.
2. To determine the wavelength of Laser light using Diffraction of Single Slit.
3. To determine the Brewster's angle of prism.
4. To verify the Malus law.
5. To determine the wavelength of monochromatic light using Michelson's interferomenter.
6. Determination of e/m, specific charge of an electron by helical method.
7. Determination of Planck's constant by photo conductivity method.
8. Verification of Fresnels law of reflection by a plane surface.
9. To analyze elliptically polarized light by photoelectric cell/Babinets compensator.
10. Determination of viscosity of a fluid by rotation viscometer.
11. Study of ferromagnetic material by plotting hysteresis curve of the specimen by Ballistic galvanometer/CRO.
12. Study of Photoelectric effect and to determine electronic charge and work function
13. To determine value of Boltzmann constant using V-I characteristic of PN diode.
14. To determine work function of material of filament of directly heated vacuum diode.
15. To setup the Millikan oil drop apparatus and determine the charge of an electron.
16. To study of Faraday's law

Section -B

1. To design an astable multivibrator.
2. To design a monostable multivibrator.
3. To design a CE amplifier of a given gain (mid-gain) using voltage divider bias.
4. To design an inverting amplifier of given gain using OP-Amp and study its frequency response.
5. To design a non-inverting amplifier of given gain using OP-Amp and study its frequency response.
6. To study a precision differential amplifier of given I/O specification using OP-Amp.
7. To investigate the use of an op-amp as a differentiator
8. To design a Wien Bridge Oscillator using an op-amp.
9. To draw the characteristic curve of negative feedback amplifier.
10. Design and construction of phase shift oscillator.
11. Study the characteristics of a Field effect Transistor and to determine mutual conductance, output resistance and voltage gain.
12. Study clipping and clamping using diode.
13. Study detection efficiency of a diode by direct method.
14. Study amplitude modulation with the help of CRO
15. Study variation of output power with load impedance in Push-Pull amplifier.
16. Study frequency response of a transformer coupled amplifier.
17. To measure the Dielectric Constant of a dielectric Materials with frequency
18. To determine the Hall coefficient of a semiconductor sample.

Any other experiment can be set as per the availability in the laboratory.

Course: 67 CHEMISTRY
Paper- I INORGANIC CHEMISTRY

UNIT – I

- **Hard** and **Soft Acids** and **Bases (HSAB)** : Classification of acids and bases as hard and soft .Pearson's-base HSAB strength and concept, hardness and softness acid. Symbiosis, theoretical basis of hardness and softness, electro-negativity and hardness and softness.
- **Metal-Ligand Bonding in Transition Metal Complexes :** Limitation of valence bond theory, an elementary idea of crystal field theory, crystal field splitting in octahedral, tetrahedral and square planar complexes, factors affecting the crystal-field parameters, John- Teller effect.

UNIT – II

- **Magnetic Properties of Transition Metal Complex :** Types of magnetic behaviour, methods of determining magnetic susceptibility, spin-only formula. L-S coupling, correlation of m and meff values, orbital contribution to magnetic moments, application of magnetic moment data for 3d- metal complexes.

- **Electronic Spectra of Transition Metal Complexes :** Types of electronic transitions, selection rule for d-d transitions, spectroscopic ground states, spectro-chemical series. Orgel-energy level diagram ^{9}states, discussion for the d'electronic and spectrumd of $[Ti(H_2O)_3]^3$ complex ion.

UNIT – III

- **Bioinorganic Chemistry :** Essential and trace elements in biological processes, metallo-porphyrins with special reference to haemoglobin and myoglobin. Biological role of alkali and alkaline earth metal ions with special reference to Ca^{2+}.
- **Electro analytical Methods :** EMF measurements, pH、- determination using hydrogen, glass, quinhydrone, antimony and calomel electrodes, potentiometric titrations.

- **Volumetric Estimation :** Theory of oxidation - reduction titrations. Theory of complexometric titrations.

UNIT – IV

- **Organometallic Chemistry** - Definition, nomenclature and classification of organometallic compounds. Preparation, properties, bonding and applications of alkyl and aryl of Li, Al, Hg, Sn and Ti, a brief account of metal - ethylenic complexes and homogeneous hydrogenation, mononuclear carbonyls and the nature of bonding in metal carbonyls.

➢ **Thermodynamic and Kinetic Aspects of Metal Complexes** - A brief outline of thermodynamic stability of metal complexes and factors affecting the, stability, Substitution reactions of square planar complexes.

UNIT – V

➢ **Molecular Symmetry and Group Theory :** Symmetry elements, molecular point groups, group theory and basic properties, similarity transformation and classes, orthogonality theorem, multiplication tables and characters tables of C_{2v} and C_{2v} groups.

➢ **Mathematical Techniques :** Least square treatment applied to linear equation $y = my + c$, correlation coefficient, S_m and S_c.

Text and Reference Books:-

✓ Group theory and its chemical applications : P.K. Bhattacharya.
✓ Inorganic chemistry : J.E. Huyee, Principles of Structure and Reactivity, 3rd Ed.
✓ Selected topics in inorganic chemistry : W.U. Malik, G.D. Tuli and R. Madan.
✓ Principles of Inorganic Chemistry : D. Banerjee.
✓ Modern Aspect of Inorganic Chemistry : H.J. Emeleus and A.G. Sharpe.
✓ Inorganic Chemistry (Hindi ed.) : Ameta, Sharma and Metha.

Course: 67 CHEMISTRY
Paper- II ORGANIC CHEMISTRY

UNIT I

➤ **Electromagnetic Spectrum : Absorption Spectra** : Ultraviolet (UV) absorption spectro-scopy- absorption laws (Beer-Lambert Law), molar absorptivity, presentation and analysis of UV spectra, types of electronic transition, effect of conjugation. Concept of chromophore and auxochrome. Bathochromic, hypsochromic, hyperchrornic and hypochromic shifts. UV spectra of conjugated enes and enones.

➤ I**nfrared (IR) absorption spectroscopy-** molecular vibrations, Hooke's intensity and position of *JR* bands, measurement of *JR* spectrum, fingerprint region, characteristic absorptions of various functional groups and interpretation of JR spectra of simple organic compounds.

➤ **Nuclear Magnetic Resonance (NMR) spectroscopy :** Proton Magnetic Resonance (PMR) spectroscopy, nuclear shielding and desheilding, chemical shift and molecular structure, spin- spin splitting and coupling constants, areas of signals, interpretation of PMR spectra of simple organic molecules such as ethyl bromide, ethanol, acetalclehyde,1,1,2-tribromoethane, ethyl acetate, toluene and acetophenone.

➤ Problem pertaining to the structure elucidation of simple organic compounds using UV,*JR* and PMR spectroscopic techniques.

UNIT II

➤ **Heterocyclic compounds :** Introduction, molecular orbital picture and aromatic characteristics of pyrrole, furane, thiophene and pyridine, method of synthesis and chemical reactions with particular emphasis on the mechanism of electrophilic substitution. Mechanism of nucleophilic substitution reactions in pyridine derivatives, comparision of basicity of pyridine, piperidine and pyrrole.

➤ Introduction to condensed five and six membered heterocycles, preparation and reactions of indole, quinoline and isoquinoline with special reference to Fischer Indole synthesis, Skraup's-synthesis Napieralsk isynthesisand. Mechanism Bischlerof electrophilic substituion reactions of indole, quinoline and isoquinoline.

UNIT III

➢ **Organic synthesis via Enolates** - Acidity of alpha hydrogen, alkylation of diethylmalonate and ethylacetoacetate, synthesis of ethyl acetoacetate, Claisen condensation. Keto - Enol tautomensm of ethyl acetoacetate, alkylation of 1,3-dithianes, alkylation and acylation of enamines.

➢ **Carbohydrates** - Classification and nomenclature, monosaccharides, mechanism of osazone formation, interconversion of glucose and fructose, chain lengthening and chain shortening of aldoses, configuration of glucose and fructose, erythro and threo diastereomers. Conversion of glucose into mannose, formation of glycosides, ether and esters. Determination of ring size of glucose and fructose, Cyclic structure of D (+) - glucose. Mechanism of mutarotation.

➢ An introduction to disaccharide (maltose, sucrose and lactose) and polysaccharides (starch and cellulose) without involving structure determination.

UNIT IV

➢ **Amino Acids, Peptides, Proteins** and **Nucleic Acids** - Classification, structure and stereochemistry of amino acids, acid-base behavior, isoelectric point and electrophoresis. Preparation and reactions of a-amino acids.

➢ Structure and nomenclature of peptides and proteins, classification of proteins, peptide structure determination, and group analysis, selective hydrolysis of peptides. Classical peptide synthesis, solid-phase peptide synthesis. Structures of peptide and proteins. Levels of protein structure. Protein denaturation! renaturation.

➢ **Nucleic acids:** Introduction, constituents of nucleic acids. Ribonucleosides and ribonucleotides. The double helical structure of DNA.

➢ **Fats, Oils** and **Detergents** - Natural Fats, edible and industrial oils of vegetable origin, common fatty acids, glycerides, hydrogenation of unsaturated oils, saponification value, iodine value, acid value, soaps synthetic detergents, alkyl and aryl suiphonates.

➢ **Photochemistry-** Principles: electronic excitation, excited states, modes of dissipation of energy , energy transfer and quantum efficiency, photoreduction and photochemistry of butadienes

UNIT V

➢ **Synthetic Polymers** - Addition or chain - growth polymerization, free radical vinyl Polymerization, ionic - vinyl polymerizations Ziegler-Natta polymerization and vinyl polymers. Condensation or step-growth polymerization, polyesters, polyamides, phenol formaldehyde resins, urea-formaldehyde resins, epoxy resins and polyurethanes. natural and synthetic rubbers.

➢ **Synthetic Dyes** - Colour and constitution (electronic concept), classification of dyes. Chemistry and synthesis of methyl orange, Congo red, Malachite green, Crystal violet, Phenolphthalein, Fluorescein, Alizarin and Indigo.

Text and Reference Books:-

- ✓ Organic Chemistry, Vol. I and II, S.M. Mukherji, S.P. Singh and R.P. Kapoor, Wiley Eastern Ltd.
- ✓ A Text Book of Organic Chemistry, Vol. I and II, K.S. Tewari, S.N. Mehrortra and N.K. Vishnoi.
- ✓ Organic Chemistry, M.K. Jain and S. Sharma.
- ✓ A Text Book of Organic Chemistry, Vol. I and II, O.P. Agarwal.
- ✓ A Text Book of Organic Chemistry, Raj. K. Bansal.
- ✓ Organic Chemistry, Vol. I and II, I.L. Finar.
- ✓ Organic Reaction and their Mechanisms, P.S. Kalsi.
- ✓ Introduction of Petrochemicals, Sukumar Maiti.
- ✓ Organic Chemistry (Hindi Ed.) Suresh Ameta, Punjabi and Sharma.
- ✓ Organic Chemistry, Morrison and Boyd, Prentice Hall.
- ✓ Fundamentals of Organic Chemistry, Solomons, John Wiley.
- ✓ Organic Chemistry, P.L. Soni.
- ✓ A Text Book of Organic Chemistry, V.K. Ahluwalia and Maduri Goyal, Narosa Publishing House   Pvt. Ltd.

Course: 67 CHEMISTRY
PAPER- III PHYSICAL CHEMISTRY

UNIT-I

- ➢ **Elementary Quantum Mechanics** : Black-body radiation, Planck's radiation law, photo-electric effect, heat capacity of solids, Bohr's model of hydrogen atom (no derivation) and its defects, Compton effect. Sinusodial wave equation, Hamiltonian operator, Schrodinger wave equation and its importance, physical interpretation of the wave function, postulates of quantum mechanics, particle in one-dimensional box.

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

- ➢ Molecular orbital theory, basic ideas- criteria for forming M. 0. from A. 0., construction of M. 0's- H2byion, calculation LCAO of energy levels from wave functions, physical picture of bonding and antibonding wave function their characteristics. Hybrid orbitals- sp, sp^2, sp^3, calculation of coefficie in these hybrid orbitals.

- ➢ Introduction to valence bond model of H2, M.O. and V. B. models.

UNIT-II

- ➢ **Spectroscopy** - Introduction: electromagnetic radiation, regions of the spectrum basic features of different spectrometers statement of the Born- Oppenheimer approximation degrees of freedom.

- ➢ **Rotational Spectrum** - Diatomic molecules. energy levels of a rigid rotator (semi-classical principles) selection rules, spectral intensity, distribution using population distribution (Maxwell - Boltzmann distribution) determination of bond length, qualitative description of non-rigid rotor, isotope effect.

- ➢ **Vibrational Spectrum** - Infrared spectrum, energy level of simple harmonic oscillator, selection rules, pure vibrational spectrums intensity, determination of force constant and qualitative relation of force constant and bond energies, effect of anharmonic motion and isotope on the spectrum, idea of vibrational frequencies of different functional groups.

- ➢ **Raman spectrum:** Concept of polarizability, pure rotational and pure vibrational Raman spectra of diatomic molecules, selection rules.

- **Electronic Spectrum** - Concept of potential energy curves for bonding and antibonding molecular orbitals, qualitative description of selection rules and Franck Condon principle.Qualitative description of s, p and n M.O., their energy levels and the respective transitions.

UNIT-III

- **Photochemistry** - Interaction of radiation with matter, difference between thermal and photochemical processes, laws of photochemistry, Grotthus - Drapper law, Stark - Einstein law, Jablonski diagram depicting various processes occurring in the excited state, qualitative description of fluorescence, phosphorescence non-radiative process (internal conversion, intersystem crossing), high and low quantum yields, photosensitization photochemical equilibrium, photoionization photodimerisation of anthracene, photoinhibition. chemical actinometry.

- **Solutions, Dilute Solutions** and **Colligative Properties :** Ideal and non-ideal solutions, methods of expressing concentrations of solutions, activity and activity coefficient. Dilute solution: colligative properties. Raoult'selativelalo**w**,ering rof vapour pressure, molecular weight determination, Osmosis, law of osmotic pressure and its measurement.

- Determination of molecular weight from osmotic pressure, elevation of boiling point and depression of freezing point, thermodynamic derivation of relation between molecular weight and elevation in boiling point and depression in freezing point, experimental methods for determining various colligative properties, abnormal molar mass, degree of dissociation and association of solute, Vant-Hoff factor.

UNIT IV

- **Ionic Conductance** - Electrical transport, conduction in metal and electrolytes, solutions, specific conductance, equivalent conductance and molecular conductance, effect of dilution on conductance, migration and its applications of ions, K transport numbers and its determination by Hittorfs method and moving boundary methods, ionic mobility, application of conductivity measurement, conductometric titrations.

UNIT V

➢ **Chemical Kinetics and Catalysis** - Rate of reaction, factors influencing the rate of reaction, concentration, temperature, pressure, solvent, light and catalysis, order of a reaction, zero-order, first order and second order reaction, half life and mean life, conductometric, potentiometric, polarimeteric and spectrophotometric methods of determination of order of reactions, method of integration, half life method and isolation method, experimental methods of kinetics, elementary idea about opposing, parallel, consecutive and chain reaction, effect of temperature on reaction rates. Arrhenius equation, concept of activation energy and its (hard sphere model), transition state theory.

➢ Theory of unimolecular reactions, catalysis, theory and mechanism, classification of catalysis, enzyme catalysis and its mechanism.

Text and Reference Books:-

✓ Principles of Physical Chemistry : B.R. Puri and L.R. Sharma.
✓ A Text Book of Physical Chemistry : A.S. Negi and S.C. Anand.
✓ A Text Book of Physical Chemistry : Kundu and Jain.
✓ Physical Chemistry (Hindi Ed.) :Suresh Ameta, R.C.Khandelwal, R. Ameta and J. Vardia, Himanshu Pub.

Course: 67 CHEMISTRY

Paper- CHEMISTRY PRACTICAL

	Exercise	Marks
1	Synthesis of Inorganic complex and organic compound	15
2	Analysis by Colorimetry /Solvent extraction/Ion exchange method	10
3	Qualitative analysis : Organic mixture analysis	10
4	One Physical experiment	15
5	Vice-voce	10
6	Records	10
	Total	75

(1)Synthesis of Inorganic complexes and organic compounds

Any one of the following preparation may be asked in the examination keeping in view that not more than five students are given the same preparation in a batch of 20 students and nature of preparation should be equally distributed both from the organic and inorganic list.

• Inorganic Complexes

✓ Preparation of sodium trisoxalato ferrate (III)

✓ Preparation of Ni-DMG complex.

✓ Preparation of cis-and trans-bisoxalato diaquo chromate (III) ion.

✓ Cuprous chloride

✓ Sodium thiosulphate

✓ Ferrous sulphate from Kipp's waste

✓ Mercury tetrathiocyanate

• Organic Synthesis

✓ Acetylation of salicylic acid aniline, glucose and hydroquinone, benzoylation of aniline and phenol.

✓ Aliphatic electrophilic substitution : Preparation of iodo form from ethanol and acetone.

✓ Aromatic electrophillic substitution -Nitration -

 (1) Preparation of m-dinitrobenzene from nitrobenzene.

 (2) Preparationofpnitroacetanilidefromacetanilide

✓ Halogenation –

 (1) Preparation of p-bromoaccetanilide from acetanilide

 (2) Preparation of 2,4,6-tribromophenol from phenol.

➢ Diazotization/coupling - Preparation of methyl orange and methyl red.

➢ Oxidation-Preparation of benzoic acid from toluene

➢ Reduction **:** Preparation of anilinefromnitrobenezene. Preparation of m-nitroaniline from m-dinitrobenzene.

➢ **Analysis by Colorimetry**

✓ To verify Beer - Lambert law for KMnO4/K2Cr2O7 and determine the concentration of the given solution of the substances.

✓ Estimation of iron colorimetrically.

✓ Estimation of phosphate colorimetrically.

➢ **Solvent Extraction :** Separation and estimation of Mg (II) and Fe (II).

➢ **Ion Exchange** : Separation and estimation of Mg (II) and Zn (II).

➢ **Qualitative Analysis**:Analysis of an organic mixture containing two solid components separable by water, dil. NaHCO3 and dil. NaOH.

➢ **Physical Chemistry Experiment** : Any one of the experiments may be given in the examination.

- **Conductometry**

  ✓ To determine the strength of the given acid conductometrically using standard alkali solution.

  ✓ To determine the solubility and solubility products of a sparingly soluble electrolyte conductometrically.

  ✓ To study the saponification of ethyl acetate conductometrically.

  ✓ To determine the ionization constant of a weak acid conductometrical**y.**

- **Potentiometry**

  ✓ To titrate potentiometrically the given ferrous ammonium sulphate solution using KMnO4/K2Cr2O7 as titrate and calculate the redox potential of Fe^{3+}/Fe^{3+} system on the hydrogen scale.

  ✓ To determine the strength of a given solution of HCl/CH3COOH by titrating with standard NaOH solution potentiometrically/pH metrically.

- **Refractometry, Polarimetry**

  ✓ To verify law of refraction of mixtures (e.g. of glycerol and water) using Abbe's refractometer.

  ✓ To determine the specific rotation of a given optically active compound

➤ **Adulteration** - Food stuffs, Effluent analysis, water analysis

Text and Refrences Books:-

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.

Course: 68 ZOOLOGY
Paper- I ANIMAL PHYSIOLOGY, BIOCHEMISTRY AND IMMUNOLOGY

UNIT-I
➢ Light microscopic structure and functions of gastrointestinal tract, liver and pancreas.Digestion and absorption of food in alimentary canal.
➢ Metabolism of carbohydrates: Glycolysis, decarboxylation of pyruvic acid, Kreb's cycle, electron transport system and oxidative phosphorylation; Glycogenesis and glycogenolysis.

UNIT-II
➢ Metabolism of Proteins: Transamination, deamination and Urea cycle
➢ Metabolism of lipids: Biosynthesis of saturated fatty acids and B- oxidative pathways of fatty acids; formation of ketone bodies.
➢ Light microscopic structure and functions of Lungs,
   Respiration: Mechanism of respiration, vital capacity of lungs, transport of gases, dissociation curve of oxyhaemoglobin and control of respiration, chloride shift.

UNIT-III
➢ Blood: Structure and function of blood cells, ABO blood groups and Rh factor, mechanism of blood clotting.
➢ Ultrastructure of cardiac and skeletal muscles .Physiology of muscle contraction.
➢ Light microscopic structure and functions of Kidneys.
   Excretion: Structure and function of nephron, control of renal function.

UNIT-IV
➢ Nerve Physiology: Ultrastructure of neuron, synapse, conduction of nerve   impulse and neuromuscular junctions.
➢ Light microscopic structure and functions of testis and ovary.
   Reproductive Physiology: Hormonal control of testicular and ovarian function with reference to estrous and menstrual cycle.
➢ Light microscopic structure, functions and disorders of endocrine glands - pituitary,   pancreas, adrenal, thyroid and parathyroid.

UNIT-V
➢ Immunology: Definition, types of immunity, innate and acquired, humoral and cell-Mediated.
➢ Cells of immunity: macrophages, lymphocytes (B and T types), T-helper cells, T-killer cells, plasma cells and memory cells.
➢ Antibody: definition, structure and functions of each class of immunoglobulins.
➢ Antigen: antigenecity of molecules, haptens. Antigen - antibody reactions, precipitatio reaction, agglutination reaction, neutralizing reaction and phagocytosis.

Course: 68 ZOOLOGY

PAPER- II ECOLOGY AND BIOSTATISTICS

UNIT-I

➢ Terminology and scope of Ecology
➢ Habitat and niche
➢ Ecosystem: Components of ecosystem, energy flow and nutrient cycles, food chain, food web and ecological pyramids.
➢ General idea of population and community ecology

UNIT-II

➢ Freshwater environment: Physico-chemical features and biotic communities, productivity and eutrophication.
➢ Marine environment: Characteristics, zonation, fauna and their adaptation, deep sea and estuarine fauna.
➢ Terrestrial environment: General characteristics of desert, grass land and forest ecosystems.

UNIT-III

➢ Environmental pollution: Biodegradable and non-biodegradable pollutants.
➢ Air Pollution: Source, nature, prevention and control, green house effect, ozone depletion and global warming.
➢ Water pollution: Source, nature and abatement.
➢ General account of noise pollution and radioactive pollution.

UNIT-IV

➢ Conservation of natural resources: Wild life management, brief idea of national parks and wildlife sanctuaries of India. Threatened and endangered species of India.
➢ Environmental planning and environmental impact assessment.
➢ Brief account of environmental Acts and Legislations (enacted after 1970)

UNIT-V

➢ Concepts and applications of Biostatistics.
➢ Frequency distribution, graphical presentation, mean, mode, median, standard deviation and standard error.
➢ Correlation, T-test, Chi-square test.
➢ Shanon and Weinner diversity index.

Course: 68 ZOOLOGY

Paper-III ETHOLOGY AND EVOLUTION

UNIT-I
- Introduction and history of Ethology.
- Methods of studying behaviour.
- Neuroanatomical, neurophysiological, neurochemical, focal and scan sampling techniques.
- Human Ethology, general aspects.
- Orientation taxes and kinesis
- Brief idea of learning.

UNIT-II
- Social organization with reference to dominance, hierarchy, social competition and territoriality.
- Reproductive behaviour with reference to courtship, mating, parental investment and stickle back fish (sexual dimorphism).
- Elementary idea of role of pheromones and hormones in insects and vertebrates in relation to behaviour.

UNIT-III
- Origin of life
- History of evolutionary thought, Lamarckism and Neo-Lamarckism
- Darwinism and Neo-Darwinism
- Evidences of organic evolution.
- Concept of micro and megaevolution.

UNIT-IV
- Variation: Kinds and sources, role in evolution.
- Isolation and speciation, definition, isolating mechanism, origin of species and processes of speciation.
- Adaptation: Definition, kinds of adaptations, adaptive radiation, convergence and divergence
- Geological time scale.

UNIT-V
- Brief account of zoogeographical regions of world.
- Fossils and their evolutionary significance.
- Phylogeny of horse.
- Evolution

Course: 68 ZOOLOGY
PAPER- ZOOLOGY PRACTICAL

➢ **ETHOLOGY AND EVOLUTION** :

  ➢ Study of homology and analogy from suitable specimens/ pictures.
  ➢ Study of Darwin's Finches with diagrams / cutouts.
  ➢ Antennal grooming behaviour of cockroach.
  ➢ Visit to a zoo/natural habitat of wild animals.
  ➢ Demonstration of social behaviour of honey bee colony.
  ➢ Adaptive modifications in the feet of birds.
  ➢ Adaptive modification in the beak of birds.
  ➢ Adaptive modification in the mouth parts of insects.

➢ **BIOCHEMICAL,PHYSIOLOGICAL AND ECOLOGICAL EXERCISES :**

  ➢ Various biochemical tests of
  a) Proteins
  b) Carbohydrates
  c) Lipids
  ➢ RBC and WBC counts.
  ➢ Estimation of haemoglobin.
  ➢ Blood groups (ABO and Rh).
  ➢ Measurement of blood-pressure.
  ➢ Abnormal values of constituents of urine.
  ➢ Water analysis: pH, alkalinity, chloride and transparency.
  ➢ Soil analysis : texture, moisture, organic and inorganic contents.

➢ **DIGITAL ANIMALS: LABELLING & IDENTIFICATION OF VARIOUS ORGANS**
  Scoliodon : Cranial nerves and brain.
➢ **MUSEUM SPECIMENS/SLIDES SHOWING ADAPTATIONS** :
  Students are required to write about specific adaptations of following animals in relation to habit and habitat only:

  ➢ **Cursorial** : *Acinonyx jubatus, Equus caballus, Moschus moschiferous.*
  ➢ **Flight:**   *Columba livia, Pteropus, Draco,   Exocoetus, Papilio.*
  ➢ **Arboreal**:   *Chamaeleon, Hyla, Preshytis.*
  ➢ **Aquatic**:   *Physalia , Chiton, Hydrophis, Labeo, Anguilla, Notopterus*
  ➢ **Fossorial**: *Pheretima, Teredo, Chaetopterus, Talpa, Lepus, Ichthyophis, Naja.*
  ➢ **Parasitic:** *Taenia, Fasciola, Enterobius, Ascaris, Schistosoma, Hirudinaria, Pediculus, Ixodes.*

REFERENCE BOOKS (LATEST EDITIONS) :

➢ **ANIMAL PHYSIOLOGY**
  ✓ William S. Hoar, General and Comparative Physiology, Prentice Hall of India Pvt. Ltd.
  ✓ Wood, D.W., Principles of Animal Physiology.
  ✓ Prosser CL., Comparative Animal Physiology, Satish Book Enterprise.
  ✓ Eckert, Animal Physiology. (W.H. Freeman).

- ✓ Ganong : Review of Medical Physiology (Lange).

- ➢ **BIOCHEMISTRY**
- ➢ Stryer, L : Biochemistry (Freeman)
- ✓ Conn et al : Outlines of Biochemistry (Wiley)
- ✓ R.K. Murray et al, Harpers Biochemistry, Lang Medical Book.

- ➢ **IMMUNOLOGY**
- ✓ Roitt I: Essential Immunology (ELBS)
- ➢ Kuby : Immunology (W.H. Freeman).

- ➢ **ECOLOGY**
- ✓ Odum, E.P. : Ecology (Amerind).
- ✓ Odum, E.P. : Fundamentals of Ecology (Saunders).
- ✓ Ricklefy : Ecology (W.H.Freeman).

- ➢ **BIOSTATISTICS**
- ✓ Green, R.H. Sampling design and statistical methods for environmental biologists. John Wiley and Sons New York.
- ✓ Snedecor, G.W. and W.G. Cochran. Statistical methods. Affliated East- West Press, New Delhi (Indian Ed.)
- ✓ P.N. Arora and P.K. Malhan. Biostatitics, Himalaya Publishing House, Bomba

- ➢ **ETHOLOGY**
- ➢ Drickamer & Vessey: Animal Behaviour, Concepts, Processes and Methods (Wadsworth).
- ➢ Grier : Biology of Animal Behaviour (Mosby College)
- ✓ Immelmann : Introduction to Ethology (Plenum Press)
- ✓ Lorenz : The Foundation of Ethology (Springer-Verlag)
- ✓ Manning : An Introduction to Animal Behaviour (Addison-Wesley)
- ✓ Reena Mathur : Animal Behaviour, Rastogi Publications, Merrut.

- ➢ **EVOLUTION**
- ✓ Dobzhansky, Ayala, Stebbins & Valentine : Evolution (WH Freeman).
- ✓ Dobzhansky : Genetics and Origin of species (Columbia University Press)
- ✓ Major : Population, Species and Evolution
- ✓ White : Animal Cytology and Evolution.
- ✓ Moody : Introduction to Evolution
- ✓ Savage : Evolution (Holt, Reinhart and Winston).

- ➢ **PRACTICAL**
- ✓ Verma, PS, A manual of practical Zoology Vertebrates S.Chand and Co. Ltd., Ram Nagar, New Delhi(English and Hindi Editions).
- ✓ Lal, SS : Practical Zoology Vertebrates, Rastogi Publication, Meerut(English and Hindi Editions).
- ✓ Verma PS & Srivastava PC, Advanced Practical Zoology, S.Chand & Co

Course: 69- BOTANY
Paper- I ECOLOGY, ENVIRONMENTAL BIOLOGY AND BIOSTATISTICS

UNIT-I

➢ Definition and aims of ecological studies. Factors affecting plant growth and distribution - climatic, edaphic, biotic and topographic. Ecosystem concept - structure and function: food chain, food web, trophic levels, ecological pyramids, energy flow and biogeochemical cycles.(C,N,P,S).

UNIT-II

➢ Plant population - natality, mortality, age and sex ratio, factors affecting population growth, growth curves. Plant Community - concept and characters (frequency, density, abundance, cover and basal area) phenograms, life forms, and biological spectrum. Plant succession- xerosere, hydrosere.

UNIT-III

➢ Pollution : air, water, land, noise and radioactive; their control, green house effect, acid rain, ozone depletion, biomagnifaction and eutrophication. Conservation and management of natural resources, endangered plants of Rajasthan and their conservation; biosphere reserves, National Parks and Sanctuaries, Chipko movement.

UNIT-IV

➢ Biodiversity and its Conservation. Mega diversity and Hot spots in India Morphological, Anatomical and Physiological adaptations of hydrophytes, xerophytes and halophytes; Plant indicators

UNIT-V

➢ Major biomes of the world with special reference to desert and grassland. Phytogeographical regions of India, endemism, continental drift theory, land bridges, migration. Biostatistics**:** Definition, Applications and merits and demerits- Mean (Arithmetic mean), Median (for grouped and ungrouped data), Mode, Standard deviation and chi square te

Course: 69- BOTANY

Paper- II PLANT PHYSIOLOGY AND BIOCHEMISTRY

UNIT-I

Plant-water relations: diffusion and osmosis; DPD, turgor pressure, wall pressure, concept of water potential, ascent of sap, transpiration, mechanism of opening and closing of stomata and guttation. Mineral nutrition: role of macro- and micro- elements and their deficiency symptoms.

UNIT-II

Photosynthesis: photosynthetic pigments, photophosphorylation, light absorption and mechanism of CO_2 fixation in C_3 and C_4 plants. Brief account of CAM plants and photorespiration. Factors affecting photosynthesis.

UNIT-III

Respiration: Aerobic and anaerobic respiration; Glycolysis and Krebs cycle; electron transport mechanism, oxidative phosphorylation; pentose phosphate pathway.

UNIT-IV

Basics of enzymology: Discovery, nomenclature, classification and characteristics of enzymes; mechanism of action and enzyme kinetics. Brief account of biological nitrogen fixation. Lipid metabolism: Characteristics, biosynthesis, alpha and β- oxidation ; glyoxylate cycle.

UNIT-V

Plant growth regulators: Auxins, gibberellins, cytokinins, abscisic acid and ethylene. Discovery, physiological effects and their roles in agriculture and horticulture. Seed dormancy; photoperiodism and vernalization. Principle and applications of pH meter, centrifuge and chromatography.

Course: 69 BOTANY

Paper- III MOLECULAR BIOLOGY AND PLANT BIOTECHNOLOGY

UNIT-I

➢ DNA the genetic material: Structure and different forms of DNA; Replication of DNA. Central dogma, reverse transcription, genetic code and RNA processing(brief account).

UNIT-II

➢ RNA: Types, Transcription and translation. RNA polymerases, Regulation of gene expression in prokaryotes (operon concept).

UNIT- III

➢ Basics of recombinant DNA Technology: History and definition**,** Methods of genetic recombination in bacteria (Transformation, Transduction and Conjugation). restriction enzymes (types and their properties), Gene cloning vectors: types of vectors (pBR322, pUC, YAC). *Neurospora* genetics. *Agrobacterium*-mediated gene transfer in plants, Direct methods of gene transfer: electroporation, chemical methods, biolistics, microinjection, macro injection.

UNIT- IV

➢ Basic techniques, tools and applications of plant tissue culture: Sterilization, explants, Culture media (MS), Methods of Micropropagation (Axillary bud proliferation, Adventitious shoot bud differentiation and somatic embryogenesis). Various stages of Micropropagation: establishment of cultures, Multiplicationof In vitro established cultures, rooting (*In vitro* and *ex vitro*) and hardening of plantlets, Callus and Protoplast culture, Virus free plants Haploids, endosperm culture, Somaclonal variants, synthetic seeds. Cryopreservation

UNIT- V

➢ Electrophoresis, DNA sequencing, DNA fingerprinting. PCR,. Blotting techniques, Secondary metabolites (Alkaloids) and Bioreactors, Protein profiling and its significance. Production of biodegradable plastics, GM Plants. IPR.

Course: 69 BOTANY
Paper-BOTANY PRACTICAL

PAPER – I ECOLOGY, ENVIRONMENTAL BIOLOGY AND BIOSTATISTICS

A. Plant adaptive modifications : Specimens / Slides.

1. Succulents : *Opuntia, Euphorbia*
2. Halophytes : *Tamrix/ Salsola*
3. Xerophytes : *Cocoloba, Parkinsonia, Acacia, Capparis,*
4. Hydrophytes : *Eichhornia, Hydrilla*

B. Soil analysis
1. Soil texture
2. Soil moisture
3. Water holding capacity
4. Soil pH
5. Qualitative tests of nitrate, phosphate and carbonate.

C. Water analysis
1. Hardness of water
2. Water temperature
3. Visibility of light in water column.
4. Carbonate, bicarbonate and chloride test.

D. Ecological instruments
1. Maximum/minimum thermometer.
2. Hair hygrometer
3. Anemometer
4. Lux meter
5. pH meter

E. Field exercises
1. Determination of minimum size of a quadrat by species area curve method.
2. Determination of frequency, density and abundance of different species present in the community by quadrat method.

PAPER- II   PLANT PHYSIOLOGY AND BIOCHEMISTRY

1. Demonstration of colloidal systems: Suspension, Emulsion, Brownian movement.
2. To observe streaming movement of protoplasm (*Hydrilla*)
3. Perform of phonomenon of plasmolysis using *Rhoeo discolor* leaves.
4. Perform of phonomenon of osmosis by potato osmoscope.
5. Perform of opening and closing of stomata.
6. Calculation of stomatal index and stomatal frequency of mesophyte and Xerophytes.
7. Perform of unequal transpiration using cobalt chloride paper.

8. Perform of rate of transpiration using photometer(s).
9. Perform that oxygen is evolved during photosynthesis by inverted funnel method.
10. Effect of various wave-lengths of light on the process of photosynthesis.

11. Perform that light, CO_2 and chlorophyll are necessary for photosynthesis by Moll's half leaf Experiment.
12. Determine the value of respiratory quotient (RQ) of different respiratory substrates.
13. Separation of amino acids/plant pigments by paper chromatography.
14. Perform of activity of respiratory enzymes (Peroxidase, Catalase, Dehydrogenase) in plant tissues.
15. Introduction and demonstration of following instruments/ techniques : pH meter, centrifuge, colorimeter, chromatography.
16. Phytochemical tests of the following : starch, cellulose, sucrose, glucose/ fructose, proteins, fat, oxalic acid, malic acid, citric acid, tannins, ascorbic acid, anthocyanins.

PAPER - III MOLECULAR BIOLOGY AND BIOTECHNOLOGY

1) Introduction to tools and techniques: Laminar flow bench, Autoclave and filter sterilization.
2) Preparation of culture media and solutions of nutrients and growth regulators.
3) Inoculation techniques: explant preparation and aseptic transfer.
4) Anther culture.
5) Preliminary exercise on isolation and culture of plant protoplasts.
6) Exercises for cloning of plants.
7) DNA isolation and gel electrophoresis.
8) Tests and separation of secondary metabolities.
9) Experiments on antibiotic resistance
10) Demonstration of Agarose gel electrophoresis.
11) Demonstration of molecular techniques: PCR and Blotting
12) Study through photographs: somatic embryogenesis,   endosperm   and   embryo culture,protoplast   isolation   and   culture   and   micropropagation

Course: 70   MATHEMATICS
Paper- I REAL ANALYSIS

UNIT – I
Real number system:

- Sets, Types of sets, Finite and Infinites sets , Equivalent sets, Subsets, Nature of subsets of a countable set, Upper and Lower bounds of a set, Superemum and infimum of a set and their properties.

- Function, Basic properties of limit, Limit of a function of one and two variables (not theorem), Continuous function and their theorems (Composite of continuous function, Boundedness theorem, Mostest theorem, Intermediate value theorem).

- Open interval, Closed interval, Neighborhood of a number. Real line R-Interior points and limit points of a set in R, Open sets and closed sets in R and their properties, Bolzano – Weierstrass theorem for set.

UNIT – II

- Sequence**:** Bounded sequence, Monotonic sequence, limit of a sequence, Convergent sequence, Properties of convergent sequence, Subsequence and it's properties, Cauchy sequence and it's properties, Cauchy general principle of convergence, Examples of convergent sequences.

- Series**:** Convergence and divergence of an Infinite series of real numbers, The necessary and sufficient conditions, Various tests of convergence: Comparison test, Practical Comparison test, P- test, Ratio Comparison test, D'Alembert ratio test, Rabbe's test, De morgan and Bertrand's test, Logarithmic test, Gausses test, Alternating series and Leibnitz test .

UNIT-III

- Riemann Integration**:** Partition of a closed interval, Norm of the partition, Upper and Lower Darboux sum, theorems on Darboux sums, Upper and Lower Riemann integrals, Riemann integrability of a bounded function in a closed interval, the necessary and sufficient condition for R integrability in terms of

Darboux sums, various basic examples of Rirmann integration.

UNIT – IV

➤ Fourier Series**:** Periodic functions, Even and odd functions, Representation of Fourier series, Determination of Fourier coefficients , Dirichlet's condition for the expansion of fourier series, Fourier series for even and odd functions, Various problems on fourier serious. Fourier's half range series.

UNIT – V

➤ Improper Integrals**:** Improper integral, Kinds of improper integral, Convergence of various types of improper integral, Comparison test, P-test, Abel's test, Dirichlet's test and Quotient test for convergence of improper integral.

REFERENCE BOOKS (LATEST EDITIONS) :

- ✓ T. M. Apostol : Mathematical Analysis.
- ✓ R. R. Goldbeg : Real Analysis
- ✓ Walter Rudin : Principles of Mathematical Analysis
- ✓ P.K. Jain & S. K. Kaushuik : An introduction to Real Analysis.
- ✓ D. Somasundaram & B. Chaudhary : A First Course of Mathematical Analysis.
- ✓ Bhargava & Goyal : Real Analysis.
- ✓ Gokhroo & B.Chaudhary : Real Analysis.
- ✓ Sharma & Purohit : Elements of Real Analysis.

Course: 70 MATHEMATICS
PAPER- II ADVANCED ALGEBRA

UNIT – I

➢ Rings, Definition and examples of various kinds of rings, Integral domain, Division ring, Field, Characteristic of a ring and integral domain, Subring and subfield with examples. Left and right ideals with examples and properties, Quotient ring, Homomorphism and isomorphism in rings, Kernel of homomorphism, Fundamental theorem of ring homomorphism. Embedding of a ring into a ring with unity.

UNIT -II

➢ Definition and various examples of vector spaces, subspaces and examples, Intersection, Sum and direct sum of two subspaces, Linear span, Linear dependence, Independence and their basic properties and problems.

UNIT - III

➢ Basis, Dimension and examples, Finite dimensional vector spaces, Existence theorem for a basis, Extension theorem, Invariance of the number of elements of a basis set, Existence of complementary subspaces of a subspace of a finite dimensional vector space, Dimension of sum (and direct sum) of two subspaces, Quotient space and its dimension.

UNIT- IV

➢ Linear transformations, Rank and Nullity of a linear transformation, Sylvester law of nullity, To obtain a matrix from a linear transformation and vice-versa and their problems relating to the same and different bases. The algebra of linear transformations, Dual space and dual basis and dimension of dual space.

UNIT – V

➢ Bilinear form, Symmetric and anti symmetric forms, Quadratic form, Matrix representation of bilinear form, Degenerate and non-degenerate forms.

Text and Reference Books:

✓ Surjeet Singh and Quazi Zarneeruddi   : Modern Algebra

✓ I.N.Herstein : Topics in Algebra.

✓ R.S.Agrawal : Algebra.

✓ Gokhroo, Saini : Advance Abstract Algebra.

✓ Shanti Narayan : A Text-Book of Modern Abstract Algebra.

✓ Hoffman and Kunze : Linear Algebra, (Second Edition).

Course – 70 MATHEMATICS

Paper- III (Optional): Any one of the following papers –

NOTE: Candidates who have offered Statistics as an optional subject will not be permitted to offer the paper III – 324 (C) .

(A) - NUMERICAL ANALYSIS

UNIT – I

➢ Finite Differences, Difference formulae, Fundamental theorem of the difference calculus, Differences table, The operator E, Properties of operators E and Δ. Relation between operator E of finite differences and differential coefficient D of differential calculus, Factorial notation, Methods of representing any given polynomial in factorial notation.

UNIT –II

➢ Interpolation: Graphic method, curve fitting method, Newton -Gregory formula for forward interpolation, Newton-Gregory formula for backward interpolation, Interpolation with unequal interval, Newton's formula for unequal interval, Lagrange's interpolation formulae for unequal interval.

UNIT – III

➢ Central difference operator, Gauss's interpolation formulae, Various problems on Gauss forward formula, Gauss backward formula, Stirling's formula and Bessel's formula, Newton -Gregory formula for numerical differentiation

UNIT –IV

➢ Numerical Integration: General quadrature formula for equidistant ordinates, Nume rous examples on trapezoidal rule, Simpson's one-third rule, Simpson's three-eight rule and Weddle's rule.
➢ Inverse interpolation: Lagrange's method, Iteration or successive approximation method, Method of reversion series.

UNIT – V

➢ Ordinary differential equations of first order: Methods of solving ordinary differential equation of first order (Picard's method of successive approximations, Euler's method, Modified euler's method, Taylor's series method, Milne's series method, Runge - Kutta method)

Text and Reference Books:

- C. E. Froberg   :Introduction to Numerical Analyse

- M.K.Jain, S.R.K.Iyenger   :Numerical methods: Problems & solutions and R.K. Jain

- H.C. Saxena   : Numerical Analysis

- Goyal, Mittal   : Numerical Analysis

- Goyal, Mittal   :Numerical Analysis (Hindi ed.)

- Goyal, Mittal   :Numerical Analysis (Hindi ed.)

(B) : MATHEMATICAL QUANTITATIVE TECHNIQUES

UNIT – I

- ➢ Linear programming, Basic assumptions of Linear programming, Application area of Linear programming, Formulating a problem as a Linear programming model, Graphical method for solving Linear programming, Some special cases in Linear programming: Infeasible solution, Multiple optimal solution, Unbounded Solution.

UNIT – II

- ➢ Linear programming: Simplex method, Basic terms involved in simplex procedure, Computational aspect of simplex method, Maximization and minimization problems, Duality, Characteristics of the dual problem, Advantages of duality.

UNIT-III

- ➢ Transportation problem: Formulating of Transportation models, North -west corner method (NWCM), Least cost method (LCM), Vogel's approximation method (VAM), Test for optimality, The modified distribution (MODI) method.

UNIT-IV

- ➢ Assignment problem: Mathematical model of Assignment problem, Hungarian Assignment method (Minimization case), Multiple optimal solutions, Maximization case in Assignment problem, Unbalanced Assignment problem.

UNIT - V

- ➢ Project network analysis: Critical path method (CPM), Advantages and drawbacks of CPM, Programme evaluation and review technique (PERT), Optimistic time, Most likely time, Pessimistic time, Advanta ges and drawbacks of PERT.

Text and Reference Books:

- N.D. Vohra   : Quantitative Technique

- V.K. Kapoor   : Operations Research

- G. Hadley   : Linear Programming

- Goyal, Mittal   : Operations Research

- S.D. Sharma   : Operations Research

(C): MATHEMATICAL STATISTICS

UNIT –I

➢ Probability: Definitions of Probability, Addition and Multiplication laws, Conditional probability , Independent events, Baye's Theorem, Random variable, Distribution function, Probability mass & density functions, probability distribution, Joint, marginal and conditional probability functions.

UNIT II

➢ Mathematical expectation and Moments, Addition & Multiplication laws of expectation, Covariance, Expectation and Variance of linear combination of random variables, Moment generating, Cumulant generating & characteristic functions.

UNIT –III

➢ Theoretical Probability distributions - Binomial, Poisson, Rectangular, Normal, Exponential, Gamma and Beta distributions. Area property of Normal distribution.

UNIT –IV

➢ Concept of Population and Random sample, Random numbers, Parameter, Statistic, Sampling distribution and standard error, Sampling of attributes. Large Sample tests for mean and proportion. Tests of significance based on t, F and Chi-square distributions.

UNIT –V

➢ Curve fitting by the principle of least squa res, fitting of straight line, P arabola, k^{th} degree polynomial, Exponential and power curves. Scatter diagram, Bivariate linear correlation and regression

Text and Reference Books:

✓ Mathematical Statistics, J. N. Kapur & H.C. Saxana, S. Chand & Co., New Delhi.

✓ Fundamentals of Mathematical Statistics, V. K. Kapoor & S.C. Gupta, Sultan Chand & Sons, New Delhi.