

# **SYLLABUS FOR FOUR YEAR INTEGRATED B.Sc. B.Ed. COURSE**

**THIRD YEAR**



**2023-2024**

**JAI NARAIN VYAS UNIVERSITY  
JODHPUR**

**BOTANY**  
**B.Sc III Year : 2023-24**

Course/ Theory	Nomenclature	Number of Papers	Number of Periods per week	Max. Marks		Total Marks	Min. Pass Marks
				Internal	External		
Paper I	Cell Biology, Genetics, Plant Breeding and Evolution	1	2	10	40	50	40
Paper II	Ecology and Environmental Biology	1	2	10	40	50	
PRACTICAL COURSE			3 x 2	10	40	50	20

Duration of examination of each theory papers 3 hours

Duration of examination of practical (for both papers on same day) 5 hours

**Note:** Each theory paper is divided in three parts i.e. Section-A, Section –B and Section–C.

**Section-A:** Will consist of 10 compulsory questions. There will be two questions from each unit and answer of each question shall be limited up to 30 words. Each question will carry of 1 mark.

**Section –B:** Will consist of 10 questions. Each unit will be having two questions; students will answer one question from each Unit. Answer of each question shall be limited up to 250 words. Each question carries 3 Marks

**Section-C:** Will consist of total 05 questions, one question from each unit. Students will answer any 03 questions and answer of each question shall be limited up to 500 words. Each question carries 5 Marks.

## PAPER –I

### CELL BIOLOGY, GENETICS, PLANT BREEDING AND EVOLUTION

**Unit I:** History of cell biology: Concept of cell and cell theory. Cell cycle and its regulation. Mitosis and meiosis. Structural and molecular organization of cell. Structure and function of cell wall; plasmodesmata, plasma membrane; golgi complex, plastid, mitochondria, endoplasmic reticulum, peroxisomes, vacuoles and nucleus.

**Unit II:** Chromatin organization: Organization and structure of chromosomes. Concept of Nucleosomes, chromatin remodeling, Types of chromosomes and determination of sex in plants. Chromosome alteration: Structural alteration; deletion, duplication, translocation, inversion; numerical variation: aneuploidy and polyploidy. Molecular basis of mutation: Spontaneous and induced, brief account of DNA damage and repair. Introduction to epigenetics.

**Unit III:** Nature of inheritance; Laws of Mendelian inheritance and its exceptions. Crossing over and linkage analysis. DNA the genetic material: Structure and replication, brief account of DNA- protein interaction. Definition of a gene-modern Concept of gene (Promoter, coding sequences, terminator). RNA polymerases and general transcription. Regulation of gene expression in prokaryotes and basics of gene regulation in eukaryotes.

**Unit IV:** Origin of Agriculture, Centers of origin of crop plants and centers of Diversity. Concepts of Centers and Non-center (Harlan Hypothesis) Principles of plant breeding- Domestication, Introduction, Selection, Clonal propagation, Hybridization, Mutation breeding; Breeding work done on wheat; Green revolution; Assessment and Consequences; Biodiversity and Conservation of germplasm.

**Unit V:** Theories of Evolution: Catastrophism, The Lamark's theory, Darwin's theory, Evidences of organic evolution, mechanism of evolution. Origin of basic biomolecules evolution of prokaryotic and eukaryotic cell and Origin of species. Population genetics: Allele and genotype frequency, Hardy- Weinberg principles.

#### Suggested Laboratory Exercises

##### Cytology

1. Study of cell structure from onion leaf peels
2. Comparative study of cell structure in onion cells and *Hydrilla*
3. Smear preparation of root tips for different stages in *Allium* root tip
4. Cytological examination special types of chromosomes (Slides)
5. Examination of electron micrographs of eukaryotic cells and cell organelles

##### Genetics

1. Working out laws of inheritance using seed mixtures
2. Monohybrid, dihybrid and test crosses using seed samples

##### Plant Breeding

1. Demonstration of Emasculation techniques.

**Suggested Readings**

- Alberts, B., Bray, D. Lewis, J., Raff, M., Roberts, K. and Watson, I.D. *Molecular Biology of cell*. Garland Publishing Co., New York, USA
- Chaudhary, H.K. *Elementary Principles of Plant Breeding*, Oxford & IBH Publishing New Delhi.
- Gupta, P.K. *A Textbook of cell and Molecular Biology*, Rastogi Publications, Meerut, 2016.
- Gupta, P.K. *Cytology, Genetics, Evolution and plant Breeding*, Rastogi, Publication Meerut, 2016.
- Lodish, H., Berk, A., Zipursky, S.L., Matsudaira, P., Baltimore, D. and Darnell, J. *Molecular Cell Biology*, W.H. Freeman & Co. New York, USA
- Miglani, G.S. *Advanced Genetics*. Narosa publishing Co., Inc., USA
- Russel, P.J. *Genetics*. The Benjamin/ Cummings Publishing Co., Inc., USA
- Shukla, R.S. and Chandel, P.S. *Cytogenetics, Evolution and Plant Breeding*, S. Chand & Co. Ltd., New Delhi
- Singh B.D. *Textbook of plant Breeding*. Kalyani Publishers, Ludhiana, 1999
- Sinha, U. and Sinha, S. *Cytogenetics, Plant Breeding and Evolution*, Vikas Publishing House, New Delhi, 1997
- Sunstand, D.P. and Simmons, M.J. *Principles of Genetics*, John Wiley & Sons Inc., USA 2000

**PAPER -II**  
**ECOLOGY AND ENVIRONMENTAL BIOLOGY**

**Unit I:** Plants and Environment: Atmosphere (gaseous composition), water (properties of water cycle), light (global radiation, photosynthetically active radiation), temperature, soil (development, soil profiles, physico-chemical properties) and biota.

Morphological, anatomical and physiological responses of plants to water (hydrophytes and xerophytes), Halophytes and their vegetation characteristics, Temperature (thermoperiodicity and vernalization), light (photoperiodism, heliophytes and sciophytes)

**Unit II:** Population ecology: Concept and characters, growth curves, biotic potential, ecotypes and ecads. Seed: The significance, suspended animation; ecological adaptation and dispersal strategies

Community ecology and Succession: Community characteristics, frequency, density, cover, life forms and biological spectrum. Succession: concept, classification and examples (hydrosere & xerosere)

**Unit III:** Ecosystems and Productivity: Ecosystem — Structure, abiotic & biotic components, food chain, food web, ecological pyramids, energy flow, biogeochemical cycles of carbon, nitrogen, phosphorus and Sulphur.

Productivity: Primary productivity, its measurements and factors affecting primary productivity

**Unit IV:** Environmental Biology of Indian Desert: Climate, vegetation types, adaptive strategies of desert plants. Desertification: meanings, causes, critical issues & driving forces. Agroforestry and its impact on desert agriculture. Desert biodiversity, Geomorphology, Threatened plants and their classification; Rare and threatened plants of Indian Thar desert and their conservation strategies, Wildlife Sanctuaries and National Parks of Rajasthan, Invasive plants: Meaning and adaptations, Natural resources exploitation and their impact on desert environment

**Unit V:** Pollution Ecology: Definitions, classification, air, water and land pollution. Concepts of Industrial Ecology in pollution management. Global warming: Concepts and Current status.

Phytogeography: Vegetation types of India — Forest and Grasslands. Biogeographical regions of India, Remote sensing: The basics and applications in ecological studies

**Suggested Laboratory Exercises**

1. To determine minimum number of quadrats required for reliable estimation of biomass in herbaceous vegetation
2. To study the frequency of herbaceous species and to compare the frequency distribution with Raunkaier's Standard frequency diagram
3. To estimate Importance Value Index for herbaceous vegetation on the basis of relative frequency, relative density and relative biomass in protected and Gochar land
4. To measure the vegetation cover of grassland through point frame
5. To measure the above ground plant biomass in a natural field
6. To determine diversity indices (richness Simpson, Shannon-Weaver) in natural fields
7. To estimate bulk density and porosity of soil samples
8. To determine moisture contents, water holding capacity and texture of soil samples
9. To estimate qualitatively nitrate, phosphate and potassium in soil samples

10. To study the vegetation structure through profile diagram
11. To estimate transparency and pH of different water bodies
12. To measure dissolved oxygen content in polluted and unpolluted water samples
13. To estimate salinity, hardness, carbonates and bicarbonate in different water samples
14. To determine the percent leaf area injury of different leaf samples collected around polluted site
15. To estimate dust holding capacity of the leaves of different plant species
16. Invasive plants of the Campus:
  - a. Seed out put
  - b. Modes of regeneration
  - c. Adaptive ecology of : *Lantana camara*, *Parthenium hysterophorus*, *Prosopis juliflora*,
17. Plant adaptive modifications: Specimens/Slides:
  - i) Succulents: *Opuntia*, *Euphorbia*
  - ii) Salt secretion: *Atriplex*, *Chloris*
  - iii) Salt accumulation: *Suaeda*, *Salsola*, *Zygophyllum*
  - iv) Xerophytes: *Capparis*, *Leptadenia*, *Parkinsonia*
  - v) Hydrophytes: *Eichhornia*, *Nymphaea*, *Hydrilla*
  - vi) Rare/Threatened plants: *Calligonum polygonoides*, *Dipcadi erythraeum*, *Commiphora wightii*, *Tribulus rajasthanensis*, *Withania coagulans*

### **Suggested Readings**

- Dash, M.C. Fundamental of Ecology, Tata McGraw Hill Publishing Co. Ltd., New Delhi, 1996
- Kormondy, E.J. Concepts of Ecology, Prentice – Hall of India Pvt., New Delhi, 1996
- Kumar, H.D. General Ecology, Vikash Publishing House Pvt. New Delhi, 1995
- Mukherjee, B. Environmental Biology, Tata McGraw Hill Publishing Co. Ltd., New Delhi, 1997
- Odum, E.P. Basic Ecology, Sauders, Philadelphia, 1983
- Sen, D.N. Environment and Plant Life in Indian Desert, Geobios International, Jodhpur, 1982
- Sharma, P.D. Ecology and Environment, Rastogi Publications, Meerut 2018

**DEPARTMENT OF BOTANY**  
**CENTER OF ADVANCED STUDY**  
**JAI NARAIN VYAS UNIVERSITY, JOHDPUR**  
**(B.Sc. B.Ed. Part–III Practical Examination : 2023-24)**

**Time : 4 Hours**

**Max. Marks: 50**

**Min. Pass. Mark: 20**

**Q. 1. Prepare a suitable preparation of the given plant Material (A) to observe any two visible stages of mitosis. Draw labeled diagrams of the same. Submit the slide for evaluation. 12**

**Q. 2. Perform the Ecological experiments allotted to you by lots and report the results in suitable form (Major). 8**

**Q. 3. Perform the Ecological experiments allotted to you by lots and report the results in suitable form (Minor). 4**

**Q. 4. Identify and comment upon the given spots 1 to 6 (covering all disciplines of Two Theory Papers) 2x6 = 12**

1. \_\_\_\_\_

2. \_\_\_\_\_

3. \_\_\_\_\_

4. \_\_\_\_\_

5. \_\_\_\_\_

6. \_\_\_\_\_

**Q. 5. Practical record**

**4**

**Internal Assessment**

**10**

-----

**TOTAL 50**



## **PAPER -I**

### **INORGANIC CHEMISTRY**

#### ***UNIT I***

Metal-Ligand bonding in transition metal complexes:

Valence bond theory of complexes and its limitation, Crystal field theory, Crystal field splitting of energy levels in octahedral, tetrahedral and square planer complexes, crystal-field stabilization energy of octahedral complexes (Calculation Only).

#### ***UNIT II***

Hard and soft Acid Base Concept (HSAB): Classification of acid and base as hard and soft. Pearson's HSAB concept and its application.

Magnetic properties of transition metal complexes: Types of magnetic behaviour, magnetic properties of metal complexes, spin only formula, methods of determining magnetic moment and magnetic susceptibility.

#### ***UNIT III***

Stability of metal complexes: A brief outline of thermodynamic stability of metal complexes and factors affecting the stability. Kinetic stability, labile and inert complexes, colour of transition metal complexes, effective atomic number (EAN), pi acceptor ligands, experimental determination of stability constant and composition of complex (Job's Method and Bjerrum's Method).

#### ***UNIT IV***

Organometallic Chemistry: Definition, nomenclature and classification of organometallic compounds, bonding, preparation, properties and application of organometallic compounds of Li, Al, Hg and Sn (alkyls and aryl).

Bioinorganic Chemistry: Essential and trace elements in biological processes, Biological role of alkali (Na, K, Li) and alkaline earth (Mg, Ca) metals.

#### ***UNIT V***

Basic principles of Metallurgy and metallurgical processes.

Metallurgy of Copper, Zinc, Platinum and Uranium from their main ores.

## **Books Recommended:**

1. Inorganic Chemistry Part I and part II by N.C.Sogani, M.L.Sharma, G.K.Rastogi
2. Inorganic Chemistry by G.C.Shivhare, V.P.Lawania
3. Text Book of Inorganic Chemistry by P.L.Soni
4. Text Book of Inorganic Chemistry by Satya Prakash, Tuli & Madan
5. Inorganic Chemistry for B.Sc. III yr by Vikal Gupta

## **PAPER - II** **Physical Chemistry**

### **UNIT I**

#### **Thermodynamics – I**

First Law of Thermodynamics: statement, definition of internal energy and enthalpy. Joule-Thomson Effect, Joule – Thomson coefficient and inversion temperature. Calculation of  $w$ ,  $q$ ,  $dU$  &  $dH$  for the expansion of ideal gases under isothermal and adiabatic conditions for reversible process. Second Law of Thermodynamics: need for the law, different statements of the law. Carnot cycle and its efficiency, Carnot theorem. Numericals.

### **UNIT II**

#### Thermodynamics – II

Entropy: Concept of Entropy, entropy as a state function, entropy as a function of  $V$  &  $T$ , entropy as a function of  $P$  &  $T$ , entropy change in physical change, Clausius inequality, entropy as a criteria of spontaneity and equilibrium. Entropy change in ideal gases and mixing of gases. Gibbs and Helmholtz function as thermodynamic quantities, Gibbs – Helmholtz equation. Equilibrium constant and free energy. Reaction isotherm and reaction isochore. Clapeyron equation and Clausius – Clapeyron equation, applications. Third law of thermodynamics: Nernst heat theorem, Statement of third law and evaluation of absolute entropy from heat capacity data. Numericals.

### **UNIT III**

#### Phase Equilibrium

Statement and meaning of the terms – phase, component and degree of freedom, Gibbs phase rule, phase equilibria of one component system – water and sulphur systems.

Phase equilibria of two-component system: simple eutectic systems, – Pb-Ag system, desilverisation of lead.

Two Component Systems– compound formation with congruent melting point (Mg-Zn) and incongruent melting point, (FeCl<sub>3</sub>-H<sub>2</sub>O)system. Freezing mixtures.

Nernst distribution law, deviations from Nernst Law, applications to study of complex ion and solvent extraction.

#### **UNIT IV**

Electrochemistry – I

Conductance, Specific conductance and equivalent conductance. Activity, activity coefficient and ionic strength. Debye-Huckel-Onsager's equation for strong electrolytes (elementary treatment only). Transport number, definition and determination by Hittorf method and moving boundary method.

Applications of conductivity measurements: determination of degree of dissociation, determination of K<sub>a</sub> of acids, determination of solubility product of a sparingly soluble salt, Conductometric titrations and their types.

#### **UNIT V**

Electrochemistry – II.

Nernst equation, derivation of cell E.M.F. and single electrode potential, standard hydrogen electrode, reference electrodes, standard electrode potential, sign conventions. Electrolytic and Galvanic cells – reversible and irreversible cells, conventional representation of electrochemical cells. EMF of a cell and its measurements. Computation of cell EMF. Calculation of thermodynamic quantities of cell reactions ( $\Delta G$ ,  $\Delta H$  and  $K$ ). Concentration cell with and without transport (mathematical treatment), liquid junction potential, application of concentration cells, valency of ions, solubility product and activity coefficient.

Potentiometric titrations, Determination of pH using hydrogen, quinhydrone and glass electrodes. Numericals.

**Books Suggested:**

1. The Elements of Physical Chemistry, P.W. Atkins, Oxford.
2. Physical Chemistry Through problems, S.K. Dogra and S. Dogra, Wiley Eastern Ltd.
3. Principles of Physical Chemistry, B.R. Puri, L.R. Sharma and M.S. Pathania, Shobhan Lal Naginchand & Co.
4. Physical Chemistry By K.R. Genwa RBD
5. Physical Chemistry, Bahal & Tuli, S. Chand & Co. Ltd.
6. Physical Chemistry, R.C. Saraswat and A.K. Goswami, RamPrasad & Sons.
7. Physical Chemistry by Vikal Gupta.

## Laboratory Course – III

### Inorganic Chemistry:

[20]

Gravimetric analysis ( by using Silica / Sintered Crucible)

- (i) To estimate Barium as barium sulphate.
- (ii) To estimate copper as cupric oxide/ copper (I) thiocyanate.
- (iii) To estimate Zinc as Zinc oxide.

### Physical Chemistry:

[15]

#### Chemical Kinetics:

- (i) To study the hydrolysis of an ester catalyzed by an acid and determine the rate constant and order of reaction.
- (ii) To study saponification of ester and determine the rate constant and order of reaction.
- (iii) To study the reaction b/w acetone and iodine with respect to iodine and determine the rate and order of reaction.

**B.Sc. B.Ed. Third Year Integrated Course**

**Academic Session 2023-24**

**TEACHING AND EXAMINATION SCHEME**

Subject/Paper	Period/Week		Exam. Hours	Theory Paper	Summative Test
	L	P			
<b>MATHEMATICS</b>					
<b>Paper I</b>	3	-	3	60	15
<b>Paper II</b>	3	-	3	60	15

**B.Sc. B.Ed. Third Year Examination 2023-24**

**MATHEMATICS**

**Paper I : Mechanics – I**  
**(Statics and Dynamics of a Particle)**  
**Paper II : Abstract Algebra**

---

**Exam. Hours: 03:00**

**Max. Marks: 60**

**Paper - I**

**Mechanics – I**

**(Statics and Dynamics of a Particle)**

**Note:** Each theory paper is divided in three parts i.e., Section – A, Section – B and Section – C

**Section A** will consist of 10 compulsory questions. There will be two questions from each unit and answer (30 words). Each question carries 1 mark.

**Section B** will consist of 10 questions. Two questions from each unit and the examinee will answer (250 words) one question from each Unit. Each question carries 4 marks.

**Section C** will consist of 5 questions, one from each unit. The examinee will answer any 03 questions (with answer limit of 500 words). Each question carries 10 marks.

**Unit 1:** Resultant and equilibrium of coplanar forces acting on a rigid body. Friction.

**Unit 2:** Stable and Unstable equilibrium. Forces in three dimensions, Poinsot's central axis, Wrenches.

**Unit 3:** Virtual work and common catenary.

**Unit 4:** Velocities and accelerations along radial and transverse directions and along tangential and normal directions. Simple harmonic motion and motion under inverse square law.

**Unit 5:** Motion on smooth and rough plane curves, circular and cycloidal motions. Central forces and central orbits (excluding planetary motion).

## **SUGGESTED BOOKS**

S.L. Ioney : Statics

R.S. Verma : A Text Book on Statics; S. Chand & Co., New Delhi.

S.L. Loney : Dynamics of a particle & Rigid bodies.

Ray, M : A Text book on Dynamics; S. Chand & Co., New Delhi

Gokhroo, Saini & Yadav : Higher Dynamics II (Hindi Ed.); Navkar Prakashan,

Ajmer Bhargava, Agarwal : Dynamics (Hindi Ed. );Jaipur Publishing House,

Jaipur Bhargava, Agarwal, Gupta : Statics (Hindi Ed.); Jaipur Publishing

House, Jaipur Gokhroo : Statics (Hindi Ed.); Navkar Prakashan, Ajmer.



**Exam. Hours: 03:00**

**Max. Marks: 60**

**Paper - II**

**Abstract**

**Algebra**

**Note:** Each theory paper is divided in three parts i.e., Section – A, Section – B and Section – C

**Section A** will consist of 10 compulsory questions. There will be two questions from each unit and answer (30 words). Each question carries 1 mark.

**Section B** will consist of 10 questions. Two questions from each unit and the examinee will answer (250 words) one question from each Unit. Each question carries 4 marks.

**Section C** will consist of 5 questions, one from each unit. The examinee will answer any 03 questions (with answer limit of 500 words). Each question carries 10 marks.

**Unit 1:** Definition and example of groups. General properties of groups, Order of an element of a group. Permutations : Even and Odd permutations. Groups of permutations. Cyclic group, Isomorphism, Isomorphism of cyclic groups, Cayley's theorem.

**Unit 2:** Subgroups, Cosets, Lagrange's theorem, Product Theorem of subgroups, Conjugate elements, conjugate complexes, Centre of a group, Normaliser of an element and of a complex. Normal subgroups, quotient Groups, Commutator subgroup of a group. Homomorphism, Fundamental theorem of homomorphism.

**Unit 3:** Definition and kinds of rings, Integral domain, Division ring, Field, Subring of a ring, Subfield of a field. Characteristic of a ring and field.

**Unit 4:** Ideals of a ring, Quotient rings, Prime fields, Prime ideals, Field of quotients of an integral domain, Definition and examples of a vector space, subspace of a vector space, Linear combination and linear space, Linear dependence and independence of vectors. Direct product of vector spaces and internal direct sums of subspaces.

**Unit 5:** Bases and dimension of a finitely generated spaces, Quotient space, Isomorphism, Linear transformation (Homomorphism), Rank and nullity of linear transformation.

## SUGGESTED BOOKS

Sharma, G.C. : Modern Algebra; Ram Prasad & Sons, Agra.

Bansal & Bhargava : Abstract Algebra (Hindi Ed. ); Jaipur Publishing

House, Jaipur. Agarwal, R.S. : Text Book on Modern Algebra; S. Chand &

Co., New Delhi.

Gokhroo & Saini : Abstract Algebra (Hindi Ed. ); Jaipur Publishing House, Jaipur.

## B.Sc. B. Ed. – III Year

### PHYSICS 2023-24

Course	Nomenclature of Theory Papers	Number of Periods per week	Exam. Hours	Univ. Exam.	*Internal	Total
Paper I	Electronics	2	3	40	10	50
Paper II	Solid State Physics	2	3	40	10	50
PRACTICAL COURSE		3 X 2	5	40	10	50

### PAPER I: ELECTRONICS

**Unit I:** Intrinsic and extrinsic semi-conductors, Fermi levels, mass-action law; carrier injection, recombination, diffusion and diffusion length, drift and diffusion currents, continuity equation; p-n junction, potential barrier, biasing, current-voltage relation, space charge and diffusion capacitances; varactor diode; Zener diode; tunnel diode; photovoltaic effect, solar cell. Power supplies: Full wave and half wave rectifiers; ripple factor, voltage regulation; filters; Zener regulation.

**Unit II:** Network theorems – Thevenin, Norton, Maximum power transfer and Miller theorems. Bipolar junction transistors, Ebers-Moll equations; CB, CE and CC configurations, BJT characteristics; biasing and thermal stabilization, self bias; hybrid parameters of a two port network; small signal hybrid equivalent model of a BJT at low frequencies, current, voltage and power gains; input and output impedances; high frequency hybrid pi model, short circuit current gain,  $f_{\beta}$  and  $f_{\alpha}$ ; current gain with resistive load.

**Unit III:** Field effect transistors, JFET, MOSFET, construction and characteristics; FETs as voltage Controlled Devices, small signal model. Large signal amplifiers, class A, B and C operations and efficiencies; distortions; determination of second harmonic distortion; push-pull amplifiers; impedance matching.

**Unit IV:** Negative Feedback: Current and voltage negative feedbacks; effect on stability, input and output impedances, distortion, frequency response; emitter follower. Oscillators: Positive feedback, Barkhausen criterion; RC phase-shift oscillator; Hartley and Colpitts oscillators, UJT and sweep generators using UJT; Transistor as a switch and Astable multi-vibrator.

**Unit V:** Operational amplifiers, inverting and non-inverting; differential amplifiers, CMRR; measurement of OP AMP parameters; use of OP AMPs as adder, in analog integration and differentiation.

Digital circuits, Boolean algebra; AND, OR, NOT, NOR, NAND, XOR gates; logic gate circuits; realization of logic functions.

**Books suggested:**

1. J. Millman and CC Halkias: Integrated Electronics : Analog and Digital Circuits and Systems, Tata McGraw Hill.
2. A. Mottershead: Electronic Devices and Circuits – An Introduction, Prentice Hall India.

## **PAPER II: SOLID STATE PHYSICS**

**Unit I:** Crystal structure : Different terms of crystal structure, Fundamental types of lattices, Two and three dimensional lattice types; Seven system of crystals, Characteristics of sc, bcc, fcc, hcp; Miller indices, orientation of planes in cubic lattices; Distribution of Atoms in atomic planes of cubic lattices. Distance between successive planes; Von-Laue's equations of diffraction of X-rays, Bragg's Law, scattering from lattice of point-atoms. Scattering factor. Geometrical Scattering factor for sc, bcc, fcc. Reciprocal lattice and its properties.

**Unit II:** Crystal binding and lattice vibrations : Inter-atomic forces of solids. Crystal of inert gases, cohesive energy and bulk modulus. Ionic crystals, Madelung energy and bulk modulus. Covalent crystals. Hydrogen bonded crystals, Atomic radii. Concept of phonons. Vibration of monatomic lattices, lattice with two atoms per primitive cell. Local phonon modes. Density of states in one dimension, three dimensions, lattice heat capacity for Einstein model, Debye model.

**Unit III:** Free Electron theory of metals : Free electron model, Density of states of electron gas, Fermi-Dirac distribution function, effect of temperature on Fermi-Dirac distribution function, Fermi energy at absolute zero temperature and low temperature. Electron heat capacity. Thermionic emission. Boltzmann transport equation, Sommerfeld theory of electrical conductivity, Thermal conductivity, Wiedmann-Franz Law. Hall effect.

**Unit IV:** Band theory: Formation of bands and origin of energy gap, Bloch theorem, Kronig Penney model, crystal momentum and velocity of an electron. Effective mass of electrons. Electrons and holes. Number of states in a band, insulator, semi-conductor and metal. Construction of Brillouin Zones and Fermi-surfaces. Fermi levels in intrinsic, n-type and p-type semi-conductors, Mass action Law. The static dielectric constants of solids. Local electric field at an atom.

**Unit V:** Magnetism : Diamagnetism and Larmor precession, classical theory of diamagnetism, Para-magnetism and its classical theory, free electron theory. Molecular theory of ferromagnetism.

Experimental Survey of Superconductivity : Zero resistance, persistent currents, effect of

magnetic fields, flux exclusion, Intermediate state, Entropy effect, frequency effects, Gyromagnetic ratio, Isotope effect. Occurrence of superconductivity. Thermoelectric effects, thermal conductivity. High temperature oxide, superconductors and their properties. BCS theory (elementary idea without mathematical derivation), Magnetic levitation.

### **Books Suggested:**

1. Kittel: Introduction to Solid State Physics, Wiley Eastern.
2. A.J. Dekker: Solid State Physics, McMillian India.
3. L. Azaroff: Theory of Solids.

## **EXPERIMENTS FOR PRACTICAL WORK**

Note: Any 15 experiments to be performed by all the students out of following list.

1. Study of dependence of velocity of wave propagation on line parameters using torsional wave apparatus.
2.  $e/m$  by Thomson's method.
3. Measurement of inductance of coil by Anderson's bridge.
4. Measurement of capacitance and dielectric constant of a liquid and gas by De-Sauty Bridge.
5. To determine the energy Band gap in a semiconductor using junction diode.
6. Study of the characteristics of a given transistor (PNP/NPN) in common emitter configuration and find the value of parameter of given transistor.
7. Study of the characteristics of a given transistor (PNP/NPN) in common base configuration and find the value of parameter of given transistor.
8. Study the characteristics of rectifier junction diode and Zener diode.
9. Study of ripple factor for shunt capacitor, series inductor, L-section and  $\pi$  section filters using full wave rectifier circuit.
10. Study of frequency response of single stage transistor amplifier (variation of gain with frequency).
11. Study the characteristics of field effect transistor (FET).
12. Study the negative feedback effect on voltage gain, and input and output impedances of the amplifier.
13. Study of operational amplifier (OP-AMP).
14. Design and study of RC phase shift oscillator.
15. Design and Voltage study of AND, OR, NOT, NAND and NOR gates circuits using diodes and transistors.
16. Study of RC circuits as integrating and differentiating systems with Square input.
17. Study of Hybrid Solar and wind energy.
18. Transient Analysis of C-R and L-R circuit.
19. Determination of parameter of transformer.
20. Study of Nano  $\text{TiO}_2$  Solar Cell.

Note: - New experiments may be added on availability of equipments

## ZOOLOGY

Course	Nomenclature	Marks Per Paper/ Practical Board	Number of Periods per week	Internal Marks	University Examination Marks	Total for the Year	Min. Pass Marks
Paper I	Cell Biology and Genetics	Theory 50	2	Theory 10	Theory 40	50	40
Paper II	Animal Physiology and Biochemistry	Theory 50	2	Theory 10	Theory 40	50	
PRACTICAL COURSE (One Board)		Practical 50	3 X 2	Practical 10	Practical 40	50	20

Duration of each theory paper

3 hours

Duration of practical examination

4 hours

*Note:* Each theory paper is divided in three parts i.e. Section-A, Section –B & Section –C.

Section-A: Will consist of 10 compulsory questions. There will be two questions from each unit and answer of each question shall be limited up to 30 words. Each question will carry of 1 mark.

Section –B: Will consist of 10 questions. Each unit will be having two questions; students will answer one question from each Unit. Answer of each question shall be limited up to 250 words. Each question carries 3 Marks.

Section-C: will consist of total 05 questions. Students will answer any 03 questions and answer of each question shall be limited up to 500 words. Each question carries 5 Marks

### PAPER I Cell Biology and Genetics

Unit 1: Characteristics of prokaryotic and eukaryotic cells, Characteristics of cell membrane molecules, fluid-mosaic models of Singer and Nicolson, passive and active transport, Structures and functions of endoplasmic reticulum, ribosome, Golgi complex, lysosome, mitochondria, centriole, microtubules and nucleus.

Unit 2: Structure of Chromatin and Chromosomes, semiconservative mechanism of replication, elementary idea about topoisomerases, replication forks, leading and lagging strands, RNA primers and Okazaki fragments, RNA structure and types, mechanism of transcription, Genetic Code and protein synthesis.

Unit 3: Interphase nucleus and cell-cycle including regulation.

Mitosis: Phases and process of mitosis, structure and function of spindle apparatus, Theories of cytokinesis.

Meiosis: Phases and process of meiosis, synaptonemal complex, formation and fate of chiasmata recombination and significance of crossing over.

Unit 4: Mendelism: Brief history of genetics and Mendel's work: Mendelian laws, their significance and current status, linked gene inheritance.

Chromosomal aberration: Structural - translocation, inversion, deletion and duplication; Numerical - haploidy, diploidy, polyploidy, aneuploidy, euploidy, polysomy and genetic implications.

Unit 5: Genetic interaction: supplementary genes, complementary genes, duplicate genes, multiple gene interaction, ABO blood groups and their genotypes, Multiple alleles.

## **PAPER II**

### **Animal Physiology and Biochemistry**

Unit 1: Digestion; digestive enzymes, process of digestion, digestion of protein, carbohydrate and lipid

Blood: Composition and functions, Blood groups, Rh factor and their significance, blood clotting mechanism, blood pressure and cardiac cycle, respiratory pigments, cardiac muscle activity.

Unit 2: Muscle: Structure of various types of muscles and mechanism of muscle contraction

Excretion: Structure of kidney, types of nephron, mechanism of urine formation and its elimination and arginine, ornithin cycle.

Unit 3: Respiration: Structure of lung, mechanism of respiration, respiratory pigment, exchange and transport of oxygen and carbon dioxide.

Nervous System: Structure of neuron and its classification, Nerve impulse, impulse conduction and reflex action.

Unit 4: Endocrine glands: Structure and functions of various endocrine glands, diseases caused by hormonal deficiency; Mechanism of hormone action.

Unit 5: Structure of Protein and Carbohydrates; oxidation of glucose through glycolysis, Krebs cycle and oxidative phosphorylation, deamination, transamination and decarboxylation.

### **Practical**

1. Test for protein, lipid and carbohydrate.
2. Temporary acetocarmine squash preparation of chromosomes
3. Haemoglobin estimation of mammalian blood
4. Preparation of heamin crystals
5. Osmotic effect of R.B.C.
6. Preparation of mammalian blood film and identification of different types of blood cells
7. Determination of blood groups and Rh-factor
8. To determine the rate of oxygen consumption of rat
9. Analysis of urine for sugar, protein and pH
10. Estimation of E.S.R.
11. Demonstration of amylase activity
12. Estimation of packed cell volume [PCV]
13. Demonstration of working of pH meter
14. Demonstration of working of colorimeter
15. Measurement of blood pressure

### **List of Recommended Books:**

1. Srivastava, H.S. : Elements of Biochemistry, Rastogi Publications, Meerut
2. Goel, K.A. and Shastry, K.B. : Animal Physiology, Rastogi Publication, Meerut
3. Dalela, R.C. : Animal Physiology, S. Chand & Co. Ltd., New Delhi
4. Agarwal, R.A., Srivastava, Anil Kumar and Kaushal Kumar: Animal Physiology and Biochemistry, S. Chand & Co. Ltd., New Delhi
5. Kulshrestha, V.V. : Experimental Physiology, Vikas Publishing House, New Delhi
6. Samasiviah, I. et.al. : Text Book of Animal Physiology and Ecology, S. Chand & Co. Ltd., New Delhi
7. Verma, P.S., Tyagi, B.S. and Agarwal, V.K.: Animal Physiology, S. Chand & Co. Ltd., New Delhi
8. Hoar, S.: General and Comparative Physiology, Prentice Hall of India Pvt. Ltd.
9. Wood, D.W.: Principles of Animal Physiology
10. Prosser, C.B.: Comparative Animal Physiology, Satish Book Enterprise
11. Eckert, Animal Physiology. (W.H. Freeman)
12. Alberts, B. *et.al.* *The Cell* (Garland).
13. Lodish, H., *et.al.* *Molecular Cell Biology* (Freeman).
14. Gupta, P. K., Genetics, Rastogi Publications, Meerut.
15. Rastogi, Veer Bala, Cell Biology, Kedar Nath Ram Nath, Delhi.
16. De Robertis, E. D. P. and De Robertis, E. M. F.: *Cell and Molecular Biology*, Halt Saunder, Tokyo, Japan.
17. Gardner, E. J.: *Principles of Genetics*, John Wiley & Sons, New York.



*Distribution of Marks*

Maximum Marks: 50  
Minimum Pass Marks: 20

	Regular	Ex.
Physiological Experiment	15	20
Spots (four)	12	15
Biochemical test /Cell division Exp.	07	07
Viva-voce	06	08
	<hr/>	<hr/>
	40	50
Internal assessment	10	-
	<hr/>	<hr/>
Total	50	50

## Evaluation Plan for B.Sc.B.Ed III year's B.Ed. Papers

S.N	Paper	Name of the Paper	External	Internal	Total
1	First	Teaching, Learning & Assessment	70	30	100
2	Second	Gender Issues in Education	70	30	100
3	Third	Pedagogy Course I(Part I)	70	30	100
4	Fourth	Pedagogy Course II(Part I)	70	30	100
5	Fifth	Art & Aesthetics(EPC)	00	50	50
	<b>Total</b>				<b>450</b>
		<b>Other Activities</b> (1)Five Microteaching Skills to be practiced before Internship (25 Marks) (2)Co-curricular Activities (10 Marks) (3)Open Air Session Two Days (10 Marks) (4)Student-teacher's Multi-dimensional Appraisal (05 Marks)			<b>150</b>
		<b>Internship Activities</b> (1) ) One Week School Observation (10 Marks) (2) School Internship (Five Weeks) For Pedagogy Part- I & Pedagogy Part- II (30+30=60 Marks) (3) Criticism Lesson (10+10=20 Marks) (4) Action Research/Survey/Case study (Any one) (10 Marks)			
	<b>Grand Total</b>				<b>600</b>

## TEACHING SCHEME & CONTACT HOURS

Paper	Contact Hours Per Week	Marks Theory	Sessionals	Duration of Exam
Paper I	4.5hrs (45 minutes 6 periods)	70	30	3 hrs.
Paper II	4.5hrs (45 minutes 6 periods)	70	30	3 hrs.
Paper III	4.5hrs (45 minutes 6 periods)	70	30	3 hrs.
Paper IV	4.5hrs (45 minutes 6 periods)	70	30	3 hrs.
Paper V	2.15 hrs (45 minutes 3 periods)		50	

### NOTE-

1. In Third year of B.A B.Ed, School internship will be of six weeks.
2. Candidate has to practice five skills (assigned by college) in microteaching as a part of pre – internship activity. Each Skill will be performed twice as teach and reteach. They have to maintain the record of the micro lessons delivered.
3. Co-curricular & Extra-curricular activities must be spread all through the year which should also include special days' celebration.
4. To understand the local resources, people & community, an open air session of two days' will be conducted. It includes survey of that area as well as community work. Record of the work down is to be maintained.
5. Individual appraisal of the student-teachers will be done by the supervisor through a portfolio on some set criteria about their year-long activities, individual attributes & personal qualities like discipline, honesty, dedication, commitment etc.
6. Internship of 6 weeks includes initial six days for general observation of the ongoing school activities & classroom teaching of the host teachers.
7. The students will deliver at least 15 lessons of each pedagogy paper. It is expected that the students play the participative role in all school activities and take necessary responsibilities as and when required. If required they can take all vacant and required classes.
8. There will be two criticism lessons (one in each pedagogy subject) for the progressive assessment of the student-teacher.
9. The student-teacher will have to do an Action Research or Survey or a Case Study (Any one) as assigned by the concerned supervisor and will submit the report.

**The internal assessment criteria in B.Sc.B.Ed III year's B.Ed. Papers will be as follows-**

S.N	Name of the paper	Summative Assessment I(10Marks)	Summative Assessment II(10Marks)	Continuous/ formative Assessment (Activity / Practicum/ Field work)
1	Teaching, Learning & Assessment	10	10	Participation(5Marks) Documentation (5Marks)
2	Gender Issues in Education	10	10	Participation(5Marks) Documentation (5Marks)
3	Pedagogy Course I(Part I)	10	10	Participation(5Marks) Documentation (5Marks)
4	Pedagogy Course II(Part I)	10	10	Participation(5Marks) Documentation (5Marks)
5.	Art & Aesthetics(EPC)	10	10	Participation(15Marks) Documentation (15Marks)

**NOTE-**

Internal weight-age of 30 Marks will be divided as under:

1. Summative Tests: 20 Marks

(There shall be two tests its marks shall be consider for internal assessment record)

2. Candidates will conduct/prepare a report of 2 activities in each paper carrying 5 marks for activities & 5 marks for their documentation.

Participation: (5 Marks) 2.5+2.5

Documentation: (5 Marks) 2.5+2.5

3. For V Paper i.e. Art & Aesthetics(EPC)50 marks of Internal Assessment will be divided as under-  
20 Marks Two Summative Tests

15 Marks 3X5=15 (Five Activities, Practicum/Field work)

15 Marks 3X5=15 (Documentation of each Activity, Practicum/Field work)

Total = 20+ 30= 50 Marks

**B.Sc. B.Ed. III Year : 2023-24**  
**Paper-I**  
**Teaching, Learning & Assessment**

**Duration: 3 Hrs.**

**Max Marks: 70**

**Objectives:**

The student teacher will be able:

- To develop scientific attitude for the process of teaching & learning.
- To provide an overall view on teaching & learning style and ideas to enhance these activities.
- To develop insight for perfect teaching by its overall perspectives in detail.
- To understand assessing children's progress, both in terms of their psychological development and the criteria provided by the curriculum.
- Understand the different dimensions of learning and related assessment procedures, tools and techniques. Analyse, Manage and interpret assessment data.
- Assessment for culturally responsive Pedagogy in diverse classroom.  
Develop critical understanding of issues in assessment and explore, realistic, comprehensive and dynamic assessment process which are culturally responsive for use in the classroom.
- Develop enabling processes which lead to better learning and more confident and creative learners.
- Understand the critical role of assessment in enhancing learning Critiques the traditional purpose of assessment (as a mechanism to filter learners as per their abilities or potentials and thus reducing learning to a limited set of expertise that can be displayed on papers, assessment as a selective and competitive act and achievement as an outcome of individual's innate factors.)

## **COURSE CONTENT**

### **Unit-1 Micro –Teaching, Teaching Skills and Instructional Strategies-**

1. Micro teaching-Concept, meaning, characteristics, Phases, Micro-teaching cycle,
2. Teaching Skills-meaning and characteristics; Fluency in Questioning Skill, Introduction skill, skill of reinforcement, Skill of probing in Questioning, Skill of Stimulus Variation, Blackboard Writing Skill
3. Classroom instruction strategies- Introduction, Classification. Brain storming, Team teaching, Conference, Symposium, Seminar and workshop.

### **Unit -2 Effective Teaching and Teaching style:**

1. Effective Teaching: Meaning, Component and Parameters of Effective Teaching, Principles of Teaching,
2. Teacher behaviour and classroom climate (Flanders' interaction analysis system) Teacher behaviour, effect of Verbal and Non-Verbal behaviour of Teacher on students' learning.
3. Teaching for culturally diverse students, theory of culturally relevant pedagogy.
4. Creative Teaching: Meaning, concept and ways of teaching creatively.
5. Teaching Style: - Concept, Types and effect on learners' learning process, factor affecting teaching Style.
6. Use of out of class experiences of children in classroom teaching, Organisational climate and teaching.

### **Unit -3 Learning and Learning Style::**

1. Learning – Meaning, and characteristics, factors influencing learning, Types of learning (Insight, Constructivist and Social), Tradition and changes in view of the learning process a shift from teaching to learning.
2. Principles of learning, Quality of learning.
3. Unlearning to learn
4. Role of teacher in teaching-learning situations: (a) Transmitter of knowledge (b) Teacher as a Role Model (c) Facilitator for Encouraging Children to Construct knowledge (Constructivist Approach)(d) Co-learner.
5. Role of motivation in learning – Concept, Motivational Strategies to be used in classroom teaching.
6. Learning Style: - concept, Types and importance in Teaching – Learning process, factors affecting learning style.
7. Diversity among learners and learning needs (with reference to special needs).
8. Multilingual background: Concept, Multilingual background of children and its classroom implications.

### **Unit -4 Concept And Types of Assessment:-**

1. Meaning & concept of assessment, Measurement and Evaluation and Their Interrelationship, Purpose of Assessment ( Prognostic, Monitoring of Learning, Providing Feedback, Promotion , Diagnosing), Principles of Assessment, and Perspectives.
2. Classification of assessment: Base on purpose (Prognostic, Formative, summative and Diagnostic), Scope (Teacher made, Standardized) Attribute measured (Achievement, Aptitude, Attitude, etc), Nature of information gathered (Qualitative, Quantitative) Mode of response (Oral and written, Nature of interpretation (norm referenced, criteria referenced).
3. Assessment of cognitive learning : Types and levels of Cognitive learning, understanding and application, thinking skills – convergent, divergent, critical, problem solving and decision making, items and procedures for their assessment .
4. Assessment of affective learning: Attitude, values, interest, self – concept; Procedures for their assessment.
5. Continuous and Comprehensive Evaluation: Concept, Need and Process.
6. Grading: Concept, types and Application, Indicators for grading Psycho-Social dimensions of assessment.
7. Individual appraisal through portfolio.

### **Unit -5 Assessment Devices and practices:-**

1. Use of projects, Assignments, Worksheet, Practical Work, and Performance based activities, seminars and reports as assessment devices.
2. Assessment of Group Processes – Cooperative Learning and Social Skills.
3. Self, Peer and Teacher Assessment.
4. Participatory assessment and community monitoring, critical analysis of prevalent practices of assessment.
5. Typology of questions; Activities and tasks (open-ended questions, MCQ, true and false, etc.) reflecting - Problem solving, creative and critical thinking, enhancing imagination and environmental awareness.
6. Construction and Selection of items, Guidelines for administration and Scoring procedure (Manual and electronic), Construction of achievement test.
7. Analysis and interpretation of student's performance; calculation of percentage, measure of central tendency, percentile & percentile rank, graphical representations.

8. Relationship of assessment with self -esteem; motivation and identity as learner, assessment of fixed and growth mindsets.

9. Limitations of assessment- lock sided assessment, overemphasis on rote assessment, stress on rote memorization, and overemphasis on competition.

### **Group-A PRACTICUM/FIELD WORK (Any one from the following):**

1. Analysing the behaviour of your fellow student-teachers, find out how socio-cultural factors have influenced & shaped their learning.
2. Write a report about some best teachers in your past experiences & write some special features of their ways of teaching.
3. Conduct a case study of an individual (Educationally exceptional – Differently-abled).
4. Conduct an interview of 02 students of multilingual background and list the problems face by them in classroom conditions.
5. Trace out some of the odd Non-Verbal behaviour of any 05 fellow student teachers.

### **Group -B PRACTICUM/FIELD WORK (Any one from the following):**

1. Prepare a diagnostic test of any subject from upper primary to senior secondary level, give suggestions for improvement.
2. Presentation of papers on examination and evaluation policies.
3. Individual appraisal of a school student through portfolio.
4. Prepare an annual plan for continuous and comprehensive evaluation at upper primary to senior secondary level any subject.
5. Construction, administration and interpretation of self made achievement test.

### **References**

- चौबे एस.पी., 2005, बाल विकास व मनोविज्ञान के मूलतत्व Concept Publishing Company Private Ltd, Mahan Garden, New Delhi.
- भूषण भोलेंद्र, 2007-08, भौक्षिक तकनीकी, अग्रवाल पब्लिकेशन, आगरा-7
- भार्मा डॉ. आर.ए., 2008, शिक्षा के मनोविज्ञान आधार, इंटरनेशनल पब्लिसिंग हाउस, मेरठ।
- कुलश्रेष्ठ एस.पी., 2007-08, भौक्षिक तकनीकी के मूलआधार, अग्रवाल पब्लिकेशन, आगरा
- ऑवेरॉय डॉ. एस. सी., 1999, शिक्षक तकनीकी के मूलतत्व, आर्य बुक डिपो, करोलबाग, नई दिल्ली
- भार्मा आर.ए., शिक्षण अधिनम में नवीन प्रवर्तन 2005, आर. लाल बुक डिपो, मेरठ।
- भार्मा, आर.ए. 2005, शिक्षण अधिगम में नवीन प्रवर्तन, आर. लाल बुक डिपो, मेरठ।
- अस्थाना, विपिन (2009) मनोविज्ञान और शिक्षा में मापन एवं मूल्यांकन, अग्रवाल प्रकाशन, आगरा।
- पाल, हसराम एवं भार्मा, मंजूलता (2009), मापन आकलन एवं मूल्यांकन शिक्षा प्रकाशन, जयपुर।
- अनिलकुमार शिक्षा में मापन एवं मूल्यांकन रजत प्रकाशन, दिल्ली।
- पाण्डेय, भृगु (2010), शिक्षा में मापन मूल्यांकन, भवदीय प्रकाशन, कैजावाद।
- भार्मा ज्याति (2009) भौक्षिक मापन एवं मूल्यांकन, अग्रवाल प्रकाशन, आगरा।
- Bhatnagar, Dr. A.B, bhatnagar, Dr. Meehakshi, bhatnagar anurag, 2008, Development of learner and teaching learning process, R.lal book, depot, Meerut.
- East, Lorna M. Assessment as learning sage pub. 2010
- Ecclestone, Kathryn. Transforming formative assessment in life long learning. McGrawH, II. Eng. 2010
- Mathur, Dr. S.S, Mathur, Dr. Anju. 2007-2008 development of learner and teaching learning process, agrawal publication Agra.
- Paul, Black (2012). Assessment for learning McGraw.

- Rao. V.K, reddy, R.s.1992, learning and teaching commonwealth publishers, New Delhi.
- Shrama R.A., ARYA -2008, mega trends in instructional technology,(Programmed instruction E-learning, local book depot, Meerut (up)
- Siddiqui, mujedulhasan, 2009, teachings of teaching (classroom teaching). APH publishing, New Delhi.



**B.Sc. B.Ed. III Year : 2023-24**  
**Paper-II**  
**Gender Issues in Education**

**Duration: 3 Hrs.**  
**Max Marks: 70**

**Objectives:**

The student teacher will be able to:

- Develop basic understanding and familiarity with key concepts—gender, gender bias, gender stereotype, empowerment, gender parity, equity and equality, patriarchy and feminism.
- Understand the gradual paradigm shift from women's studies to gender studies and some important landmarks in connection with gender and education in the historical and contemporary period.
- Learn about gender issues in school, curriculum and textual materials across disciplines, pedagogical processes and its intersection with class, caste, religion and region.
- Understand how gender, power and sexuality are related to education (in terms of access, curriculum and pedagogy).
- Develop an understanding of the paradigm shift from women studies to gender studies, based on the historical backdrop.
- construct critically the impact of policies programmes and scheme for promotion of gender equality and empowerment.
- Apply the conceptual tools learnt regarding gender and sexuality to understand issues related to Sexual Harassment at the workplace and Child Sexual Abuse.
- Develop an understanding of different theories on gender and education and relate it to power relations. The institutions involved in socialisation processes would be analysed to see how socialisation practices impact power relations and identity formation.
- Understand how gender relates to education and schooling. The students will be able to understand on how school as an institution addresses gender concerns in curriculum, textual materials and pedagogy. It will enable the student to draw linkages between life skills and sexuality.

**COURSE CONTENT**

**Unit 1: Gender Issues: Key Concepts**

- 1. Concepts and terms - Relate them with their context in understanding the power relations: Gender, Sex, Sexuality, Patriarchy, Masculinity and Feminism**
- 2. Gender Bias, Gender Stereo typing and empowerment.**
- 3. Equity and equality in relation with caste, class, religion, ethnicity, disability and regional disparity.**

**Unit 2: Gender Studies: Paradigm Shifts**

- 1. Paradigm shift from women's studies to gender studies.**
- 2. Historical background: Some landmarks from social reform movements of the nineteenth and twentieth centuries with focus on women's experiences of education.**
- 3. Contemporary period: Recommendations of policy initiatives, commissions and committees, schemes, programmes and plans.**

### **Unit 3: Gender And Education**

- 1. Theories on Gender and Education: Socialisation, Gender difference, Structural and Deconstructive.**
- 2. Gender Identities and Socialisation Practices in: Family, Schools and Society.**
- 3. Schooling of Girls: Inequalities and resistances (issues of access, retention and exclusion).**

### **Unit 4: Gender Issues In Curriculum**

- 1. Gender, Culture and Institution: Intersection of class, caste, religion and region.**
- 2. Gender stereotypes in curriculum framework & Text-Books.**
- 3. Role of Teacher in the context of gender sensitivity.**

### **Unit 5: Gender, Sexuality, Sexual Harassment and Abuse**

- 1. Development of sexuality, including primary influences in the lives of children (such as gender, body image, role models).**
- 2. Understanding the importance of addressing sexual harassment in family, neighbourhood and other formal and informal institutions.**
- 3. Agencies perpetuating violence: Family, school, work place and media (print and electronic), Institutions redressing sexual harassment and abuse.**

### **Practicum/Field Work(Any two from the following)**

1. Observe a co-educational class room and pick out the gender biased behavior /situation/comments and conclude the report.
2. List some examples of gender discrimination in the prevalent society.
3. Conduct an interview of a girl student facing inequality and resistances in family and society and also mention how it affects her aspirations.
4. Debate on women role models in various fields with emphasis on women in unconventional roles.
5. Prepare a biography a women role model of yours and also mention how she phased out her life struggle.

### **References**

- A. banon. Robert (2010) social psychology,pearson education New Delhi
- Delpit, L.D. (2012) Multiplication is for white people: raising expectations for other people's children, the new press.
- Deng, Z (2013) School subjects and academic disciplines. In A. Luke, A. Woods &Wer(Eds.),Curriculum syllabus design and equity:A primer and model. Routledge.
- GOI.(1966).Report of the education commission:Education and national development. New Delhi: ministry of education.
- GOI (1986).National policy of education.GOI.
- GOI. (1992, 1998),National policy on education, 1986 (As modified in 1992). Retrieved from [http://mhrd.gov.in/sites/upload\\_files/mhrd/files/NPE86-mod92.pdf](http://mhrd.gov.in/sites/upload_files/mhrd/files/NPE86-mod92.pdf)
- Goswami. Acharyabalchand,(2003), vyaktiprivar and sex jaina publication Jaipur.
- Malik, C.D, (2008) social and political thought Dr. B.R. ambedkar,arise publishers and distributors, New Delhi
- Mathursavitri(2008),sociological foundation of education, kavitaprakashan,Jaipur.

- Menon, N.(2012)seeing like a feminist. India: Penguin.
  - Mudgal S.D. (2007), social work education today and tomorrow, book enclave, jaipur
  - Naik, S.C.(2005) society and environment, oxford & 1B publishing co.Pvt.ltd.New Delhi
  - Nathpramanikrathindra, (2006), gender Lhequality and women's empowerment,abhijeet publication Delhi
  - Nirantar. (2010) textbook regimes: A feminist critique of nation and identity. New Delhi
  - Runelasatypal, (2009), sociology of the Indian education, rajadthanhindigranthakadmi, jaipur
  - Sidhuramindra, (2009), sociology of education, shrisaiprintographers, New Delhi
  - [www.teachernetwork.org/tnli/accomplishment](http://www.teachernetwork.org/tnli/accomplishment)
  - [www.gender.com.ac.uk](http://www.gender.com.ac.uk)
  - [www.genderstuddies.org](http://www.genderstuddies.org).
  - [www.genderparddigm.com/publiscation/html](http://www.genderparddigm.com/publiscation/html).
  - [www.sparknotes.com/sociology/socialization/section4/rhtml](http://www.sparknotes.com/sociology/socialization/section4/rhtml).
  - [www.unicef.org/sower96/ngirls.html](http://www.unicef.org/sower96/ngirls.html).
- [www.jaipurrugs.org./about/our-story](http://www.jaipurrugs.org./about/our-story)

# **Paper-VI & VII**

## **Pedagogy of Mathematics**

### **(Part I)**

#### **OBJECTIVES:**

The students will be able to-

- Gain insight into the meaning, nature, scope and objectives of mathematics education.
- Appreciate mathematics as a tool to engage the mind of every student.
- Understand the process of developing the concepts related to Mathematics.
- Appreciate the role of mathematics in day to day life.
- Learn important mathematics: mathematics more than formulas and mechanical procedures.
- Pose and solve meaningful problems.
- Construct appropriate assessment tools for evaluation mathematics learning.
- Understand methods and techniques of teaching mathematics.
- Perform pedagogical analysis of various Topics in mathematics at secondary level.
- Understand and use I.C.T. in teaching of mathematics.
- Understand and use continuous and comprehensive evaluation, diagnostic testing and remedial teaching in Mathematics.

## **COURSE CONTENTS**

### **Unit: 1 Nature of Mathematics as a Discipline**

1. Meaning and Nature of mathematics.
2. Historical development of mathematics as a discipline Contribution of Indian and western mathematicians like Ramanujan, Aryabhata, Bhaskaracharya, Pythagoras and Euclid.
3. Constructivist approach in learning mathematics.

### **Unit: 2 Mathematics as a School Subject**

1. Importance of mathematics in school curriculum.
2. Aims and objectives of teaching mathematics at secondary level. Writing objectives in behavioral terms. Bloom's taxonomy (revised)
3. Correlation of mathematics with other school subjects.
4. Changing trends and goals of teaching mathematics with reference of NCF 2005
5. Concept mapping of themes related to mathematics.

### **Unit: 3 Planning, Methods and Techniques**

#### **1. Unit Plan and Daily Lesson Plan.**

2. Methods of teaching mathematics at secondary level –  
Lecture cum demonstration, Inductive-Deductive, Problem Solving, Project, Heuristics, Analytic & Synthetic

3. Techniques of teaching mathematics: Oral work, written work, Drill work, Home assignment.

### **Unit: 4 Pedagogical analysis and mode of learning engagement**

1. Pedagogical analysis of the units with reference to concepts, learning outcomes, activities and learning experiences and evaluation techniques of following content at secondary level i.e. planning for teaching following contents at different level -  
Number system, Measures of central tendency, Congruency and similarity, Trigonometrical ratios and identities, Area and Volume, Profit, loss and partnership, Compound interest, Graphical representation data.
2. Modes of learning engagement in mathematics
  - (a) Providing opportunities for group activities
  - (b) Designing different Working Models for concept formation
  - (c) Teaching aids and activities in laboratory work
  - (d) Reflective written assignments

### **Unit: 5 Evaluation in Mathematics**

1. Evaluation: Meaning and concept.
2. Continuous and compressive evaluation (CCE) in mathematics at secondary level
3. Diagnostic Testing, Remedial Teaching and enrichment programme for:  
Gifted Learners, Slow Learners, Learners with Discalculia,
4. Difficulties Faced by the Teacher in Teaching of Mathematics and Suggestive Measure to overcome them.
5. Construction of achievement test/question paper blue print in mathematics.

### **Practicum/Field Work(Any one of the following)**

1. Prepare a Concept map related to any theme of Mathematics and Explain how it facilitates teaching and learning.
2. Prepare a project related to Mathematics and report your steps.
3. Prepare a power point presentation on brief history and contribution of two mathematicians.
4. Conduct a group activity on any topic of mathematics and report your Experiences.
5. Observation of Mathematics class-room teaching in any secondary school and prepare a list of errors committed by students.

### **REFERENCES**

1. Mangal, S.K. Sadharan Ganit Shikshan, Arya Book Depot, New Delhi.
2. Bhatnagar A.B. New Dimensions in the teaching of Maths, Modern Publishers, Meerut.
3. Jain S.L.: Ganit Shikshan Sansthan, Rajsthan Hindi Granth Academy, Jaipur.
4. Agrawal S.M. Teaching of Modern Mathematics Dhanpat Rai & Sons, Delhi.
5. Jagadguru Swami: Vedic Mathematics, Moti Lal Banarasidas Publisher, Delhi
6. Kapur J.N. Modern Mathematics for Teachers, Arya Book Depot, New Delhi



# **Paper-VI & VII**

## **Pedagogy of Physical Sciences**

### **(Part I)**

#### **Objectives-**

Student-teachers will be able to:-

- Gain insight on the meaning, nature and scope of physical science for determining aims and strategies of teaching-learning.
- Appreciate that science is a dynamic and expanding body of knowledge;
- Trace historical background of Physical sciences.
- Identify and relate everyday experiences with learning physical science;
- Appreciate various approaches of teaching-learning of physical science;
- Perform Pedagogical analysis of various topics in Physical Sciences.
- Analyze the contents of Physical science with respect to Content, process, skills, knowledge organization and other critical issues.
- Use effectively different activities/demonstrations/laboratory experiences for teaching-learning of physical science;
- Integrate physical science knowledge with other school subjects.
- To understand meaning, concept and various types of assessment.

## **COURSE CONTENT**

### **Unit 1: Nature of Physical Sciences as a Discipline**

1. Concept, Nature Needs and Scope of Physical Sciences .
2. Historical Background Physical Sciences with special reference to India.  
Contribution of C.V. Raman, M.N. Saha, K.S.Krishnan, J.C. Bose, H.J.Bhabha, S. Chandra Shekhar and A.P.J. Abdul Kalam in the field of Physics.
3. Science as a domain of enquiry, as a dynamic and expanding body of knowledge, as a process of constructing knowledge.

### **Unit 2: Physical Sciences as a school subject**

1. Importance of Physical Science in school curriculum.
2. Aims & objectives of teaching Physical Science at school level. Writing objectives in behavioural terms. Bloom's taxonomy (revised).
3. Correlation of Physical Sciences with other School Subjects.
4. Unit Plan and Daily Lesson Plan.

### **Unit 3: Methodology of Physical Sciences-**

1. Essential Skills to Develop Scientific attitude and temper.
2. Methods and approaches : - Lecture – cum Demonstration, Team teaching, project , problem solving , Group discussion, Programmed instruction, Inductive- Deductive, Investigatory approach, Concept mapping, Collaborative learning .

#### **Unit 4: Pedagogical Analysis and Mode of Learning Engagement**

1. Pedagogical analysis of the units with reference to concepts, learning outcomes, activities and learning experiences and evaluation techniques of following content at secondary and Senior secondary level i.e. planning for teaching following contents at different level -

Light, Electricity, Magnetism, Gravitation, Laws of Motion, Work and Energy, Sound.

2. Modes of learning engagement in Physical Science-

- a. Observations and experiments in Physical sciences: interdisciplinary linkages,
- b. Relating knowledge to students daily life situations.
- c. Providing opportunities for group activities and idea Sharing
- d. Designing different working Models for concept formation
- e. Teaching aids and activities in laboratory work

#### **Unit 5: Assessment & Evaluation of Physical Sciences Learning**

1. Evaluation : Meaning and Concept.

2. Meaning, concept and construction of Achievement test,

3. Blue print: Meaning, concept, need and construction.

4. Continuous and Comprehensive Evaluation (CCE).

5. Assessment of project work (both in the laboratory and in the field ), experimental work in Physical Science.

6. Performance-based assessment; learner's record of observations, Oral presentation of learners work, portfolio.

#### **Practicum/Field Work**-Any one of the following-

1. Prepare a concept map on any topic and explain how it Facilitates Students' Learning.
2. Description and Design of an Improvised Apparatus
3. Write a reflective journal on any current issue related to physical science.
4. Planning an out of class activity to use local resources to teach Physics and report your experiences.
5. Prepare a plan to assess Students' Practical work in Physics.

#### **References**

**1. Heiss, Oburn and Hoffman: Modern Science, the Macmillan Company, New York 1961.**

**2. Thurber W. and A. Collette : Teaching Science in Today's Secondary schools, Boston Allyn and Bacon Inc., New York, 1959.**

**3. Vaidya, N. "The Impact of Science Teaching", Oxford and IBH Publishing Company, New Delhi, 1971.**

**4. Richardson, S. : "Science Teaching in Secondary Schools", Prentice Hall, USA, 1957.**

**5. Sharma, R.C. and Sukla : "Modern Science Teaching" Dhanpat Rai and Sons, Delhi, 2002.**

**6. Ravi Kumar S.K., "Teaching of Science", Mangal deep Publications 2000.**

**7. Rao Aman : Teaching of Physics, Anmol Publications, New Delhi, 1993.**

**8. Wadhwa Shalini : Modern Methods of Teaching Physics, Sarup and Sons, New Delhi,**



2001.

9. Gupta S.K. : Teaching Physics Sciences in Secondary Schools, Sterling Publishers (P) Ltd., New Delhi, 1989.

10 मंगल एस0के0 : साधारण विज्ञान शिक्षण, आय बुक डिपो नईदिल्ली 1996

11. त्यागी एस0के0 : भौतिक विज्ञान शिक्षण, साहित्य प्रकाशन, आगरा, 2000

# **Paper-VI & VII**

## **Pedagogy of Chemistry**

### **(Part I)**

#### **Objectives-**

Student-teachers will be able to:-

- Gain insight on the meaning and nature of chemistry for determining aims and strategies of teaching-learning.
- Appreciate that science is a dynamic and expanding body of knowledge.
- Appreciate the fact that every child possesses curiosity about his/her natural surroundings.
- Identify and relate everyday experiences with learning chemistry.
- Trace historical background of Chemistry..
- Appreciate various approaches of teaching-learning of chemistry.
- Analyze the contents of Chemistry with respect to Content, process, skills, knowledge organization and other critical issues.
- Perform Pedagogical analysis of various topics in Chemistry.
- Use effectively different activities/ demonstration/laboratory experiences for teaching-learning of chemistry.
- Integrate chemistry knowledge with other school subjects.
- 11.To understand meaning, concept and various types of assessment.

## **COURSE CONTENT**

### **Unit 1: Nature of Chemistry as a Discipline**

1. Concept, Nature ,Needs and Scope of Chemistry.
2. Historical Background of Chemistry with special reference to India.
3. Correlation of Chemistry with other School Subjects

### **Unit 2: Chemistry as a school subject**

1. Importance of Chemistry in school curriculum.
2. Aims & objectives of teaching Chemistry at school level. Writing objectives in behavioural terms. Bloom's taxonomy (revised).
3. Changing trends and goals of teaching Chemistry.
4. Unit Plan and Daily Lesson Plan.

### **Unit 3: Methodology of Chemistry**

1. Essential Skills to Develop Scientific attitude and temper.
2. Methods and Approaches : Lecture – cum Demonstration, Team teaching, project , problem solving, Heuristic, Group discussion, programmed instruction, Inductive- Deductive, Constructivist approach, Concept mapping, Collaborative learning.

### **Unit 4: Pedagogical Analysis and Mode of Learning Engagement**

1. Pedagogical analysis of the units with reference to concepts, learning outcomes, activities and learning experiences and evaluation techniques of following content at secondary and Senior secondary level i.e. planning for teaching following contents at different level -

Solutions, colloids, chemical equilibrium, electrochemistry, mechanical and thermal properties of matter, chemical bonding and molecular structure, periodic table, Atom and molecules, Chemical Reactions, Acid, Bases and Salt, Carbon and Its Compounds, metal and non-metal etc.)

2. Modes of learning engagement in Chemistry-

- a. Observations and experiments in Chemistry: interdisciplinary linkages,
- b. Relating knowledge to students' daily life situations.
- c. Providing opportunities for group activities and idea Sharing
- d. Teaching aids and activities in laboratory work.

### **Unit 5: Assessment & Evaluation of Chemistry learning**

1. Evaluation : Meaning and Concept.

2. Meaning, concept and construction of Achievement test, Diagnostic testing and remedial teaching.

3. Blue print: Meaning, concept, need and construction.

4. Continuous and Comprehensive Evaluation (CCE) in Sciences.

5. Assessment of project work (both in the laboratory and in the field ), experimental work in Chemistry.

6. Performance-based assessment; learner's record of observations, field diary, Oral presentation of learners work, portfolio;

### **Practicum/Field Work-( Any one of the following)**

1. Perform Some Simple Experiment to clarify any Concept in Chemistry and to develop Observation Skills. Prepare a report of entire activity.
2. Organization of exploratory activities to develop scientific attitude and temper. Report your Experiences
3. Plan an innovation method of teaching chemistry so as to facilitate the correlation of content with other subjects/ day to day life. Teach that lesson in class and report complete activity with your experiences.
4. Write a reflective journal on some innovative trends in Chemistry teaching and their importance in Achieving aims of teaching chemistry at different level.
5. Prepare a diagnostic test and apply it in school, after discussion with concerning teacher and give remedial measures.

### **References-**

1. Yadav, M.S. 1995, Teaching of Chemistry, Anmol Publication, New Delhi.
2. Megi, J.S. & Negi, Rasuita, 2001, Teaching of Chemistry.
3. Yadav, M.S. 2000: Teaching Science at Higher level, Anmol Publications, New Delhi.
4. Misra, D.C. : Chemistry Teaching, Sahitya Preparation, Agra
5. Khirwadbar, Anjab 2003: Teaching of Chemistry by Modern Method, Sarup & Sons. New Delhi.

6. Das, R.C., 1985: Science Teaching in Schools, Sterling publishers Pvt. Limited. New Delhi
7. Venkataih, S., 2001: Science Education in 21st Century, Anmol Publishers, New Delhi.
- 8 Rao, D.B., 2001: World conference on Science Education Discovery publishing work, New Delhi.
9. Singh,U.K&Nayab, A.K. : 2003 : Science Education, Commonwealth Publishers, Daryaganj, New Delhi.
10. Singh,Y.K.& Sharma Archnesh, 2003 : Modern Methods of Teaching Chemistry A.P.H. Publishing corporation, Daryaganj,New Delhi.

## **Paper-VI & VII**

### **Pedagogy of Biological Science**

#### **(Part I)**

#### **Objectives-**

Student-teachers will be able to:-

- Develop insight on the meaning and nature of biological science for determining aims and strategies of teaching- learning.
- Appreciate that science is a dynamic and expanding body of knowledge.
- Appreciate the fact that every child possesses curiosity about his/her natural surroundings.
- Identify and relate everyday experiences with learning of biological science.
- Appreciate various approaches of teaching- learning of biological science.
- Explore the process, skill in science and role of laboratory in teaching- learning.
- Use effectively different activities / experiments/ demonstrations / laboratory experiences for teaching-learning of biological science.
- Integrate the biological science knowledge with other school subjects.
- Analyze the contents of biological science with respect to Content, process, skills, knowledge organization and other critical issues.
- Perform Pedagogical analysis of various topics in Physical Sciences.
- Develop process-oriented objectives based on the content themes/units.
- To understand meaning, concept and various types of assessment.

### **COURSE CONTENT**

#### **Unit 1: Nature of Biological Science as a Discipline**

1. Meaning, Concept, Nature, Need and Scope of Biological science .
2. Historical development of Biological science as a discipline. Contribution of Indian and western Biologist like HargobindKhurana, Mohinder Singh Randhawa, Salim Ali, Mendel, Darwin, and Lamark in the field of Biology

### 3. Correlation of Biological Science with other School Subjects

#### **Unit 2: Biological Science as a school subject**

1. Importance of Biological science in school curriculum.
2. Aims & objectives of teaching Biological science at school level. Writing objectives in behavioural terms. Bloom's taxonomy (revised).
3. Changing trends and goals of teaching Biology
4. Unit Plan & Daily Lesson Plan.

#### **Unit 3: Methodology of Biological science**

1. Methods : Lecture–cum Demonstration, Team teaching, Project , Problem solving, Programmed instruction, Collaborative learning.
2. Approaches : Inquiry approach, Concept mapping, Constructivist approach.

#### **Unit 4: Pedagogical Analysis and mode of learning Engagement**

1. Pedagogical analysis of the units with reference to concepts, learning outcomes, activities and learning experiences and evaluation techniques of following content at secondary and Senior Secondary level i.e. planning for teaching following contents at different level - Biological science for environment and health, peace, equity, origin of life and evolution, biodiversity, Photosynthesis, Life processes and factors affecting it.
2. Modes of learning engagement in Biological Science-
  - a. Observations and experiments in biological sciences: interdisciplinary linkages,
  - b. Providing opportunities for group activities
  - c. Designing different working Models for concept formation.
  - d. Teaching aids and activities in laboratory work

#### **Unit 5: Assessment & Evaluation in Biological Sciences**

1. Evaluation : Meaning and Concept.
2. Meaning, concept and construction of Blue print, test items and Achievement test.
3. Continuous and Comprehensive Evaluation (CCE)
4. Assessment of project work in biology (both in the laboratory and in the field), experimental work.
5. Performance based assessment: learners' record of observations, field diary, herbarium and collection of materials.

#### **Practicum/Field Work (Any One of the following)-**

1. Preparation of Scrap book to show the Contribution of any two Biologist
2. Conduct any activity among students for linking child's natural curiosity with natural phenomena like weather, flora and fauna; contexts. Report your Observations.
3. Preparation/ designing programmed instruction material on any topic of Biology to facilitate learners for self–study.
4. Prepare a low cost or waste material based experiment for secondary/ senior secondary schools.
5. Prepare a plan to assess Students' Practical work in Biology.

#### **References-**

1. Sood, J.K., 1987: Teaching Life Sciences, Kohali Publisher, Chandigarh.
2. Sharma, L.M., 1977: Teaching of Science & Life Science, Dhanpat Rai & Sons, Delhi
3. Kulshrestha, S.P., 1988: Teaching of Biology, Loyal Book Depot, Meerut
4. Yadav K., 1993: Teaching of Life Science, Anmol Publisher, Daryaganj Delhi.
5. Yadav, M.S., 2000 : Modern Methods of Teaching Science, Anmol Publishers, Delhi.
6. Singh, U.K. & Nayab, A.K., 2003: Science Education Commonwealth Publishers, Daryaganj, New Delhi
7. Venkataih, S., 2001: Science education in 21st century Anmol Publishers, Delhi
8. Yadav, M.S. (Ed.), 2000 : Teaching Science at Higher Level, Anmol Publishers, Delhi
9. Ediger, Marlow & Rao, D.B., 2003 : Teaching Science Successfully Discovery Publishing House, New Delhi
10. Mangal, S.K., 1996: Teaching of Science, Arya Book Depot, New Delhi
11. Dave, R.H., 1969 : Taxonomy of Educational objectives & Achievement Testing, London University Press, London.
12. Sood, J.K., 1989 : New Directions in Science Teaching, Kohli Publishers, Chandigarh.

## **Paper-VI & VII**

### **Pedagogy of General Sciences**

#### **(Part I)**

#### **Objectives-**

Student-teachers will be able to-

- Understand General Science as an interdisciplinary area of learning.
- Understands aims and objectives of teaching General Science at different levels.
- Explore different ways of creating learning situations for different concepts of science:
- Formulate meaningful inquiry episodes, problem-solving situations, investigatory and discovery learning projects based on upper primary, secondary and higher secondary stages.
- Facilitate development of scientific attitudes in learners.
- Examine different pedagogical issues in learning science. 6. Stimulate curiosity, inventiveness and creativity in science.
- Develop ability to use science concepts for life skills.
- Develop competencies for teaching, learning of science through different measures.
- Construct appropriate assessment tools for evaluating learning of science.
- Understands the CCE pattern of Evaluation.

# COURSE CONTENT

## **Unit 1: Nature of General Science as a Discipline**

1. Meaning, Nature ,Concept, Needs and scope of General science .
2. Science as a domain of enquiry, as a dynamic and expanding body of knowledge, science as a process of constructing knowledge. Science as an interdisciplinary area of learning , science for environment, health, peace & equity and society.
3. Correlation of General Science with other School Subjects.

## **Unit 2: General science as a school subject**

1. Importance of General science in school curriculum.
2. Aims & Objectives of teaching General science at secondary level. Writing objectives in behavioural terms. Bloom's taxonomy(revised).
3. Changing trends and goals of teaching General Science with reference to N.C.F. 2005.
4. Unit Plan & Daily Lesson Plan.

## **Unit 3: Methodology of General Science**

1. Methods : Lecture-cum Demonstration, Project, Problem solving,Heuristic and Laboratory.
2. Approaches : Constructivist, Concept mapping, Experiential Learning.

## **Unit 4: Pedagogical Analysis and Mode of Learning Engagement**

1.Pedagogical analysis of the units with reference to concepts, learning outcomes, activities and learning experiences and evaluation techniques of following content at secondary level i.e. planning for teaching following contents at different level -

- a. Physics –Light, Electricity, Gravitation, Sound.
- b. Chemistry– Atom And molecules, Chemical Reactions, Acid ,Bases and Salt, Carbon and Its Compounds, metaland non-metals.
- c. Biology –Cell and its Structure, Life processes, Diversity in living organisms.
- d. Environmental Science– Our Environment , natural resources and its management.

### **2. Modes of learning engagement in General Science-**

- a. Providing opportunities for group activities and observations.
- b. Teaching aids and activities in laboratory work.

## **Unit 5: Evaluation of General Sciences**

1. Evaluation: Meaning and Concept.
2. Meaning, concept and construction of Achievement test, diagnostic test and remedial teaching.
3. Blue print: Meaning, concept, need and construction.
4. Continuous and Comprehensive Evaluation (CCE) in Sciences.
5. Difficulties Faced by the teacher in evaluation process and suggestive measures to overcome them.

**Practicum/Field Work-** (Any one of the following)

1. Visit Ayurveda college/ science labs to address lauding their working process and draft a report on their contribution to prosperity.
2. Prepare a concept map on any theme of General Science and explain its importance for Teaching and learning.
3. Collect Information about Indian Cultural traditions and find out the scientific basis or hidden concern for life and preservation of environment.
4. Being a Science teacher how you will remove superstitions from the Society. Report your Strategic planning.
5. Prepare a diagnostic test and apply it in school, after discussion with concerning teacher and give remedial measures.

### **References-**

1. Sood, J.K. (1987): **Teaching Life Sciences, Kohli Publishers, Chandigarh.**
2. Sharma, L.M. (1977): **Teaching of Science and Life Sciences, DhanpatRai& Sons, Delhi.**
3. Kulshreshtha, S.P. (1988): **Teaching of Biology, Loyal Book Depot, Merrut**
4. Yadav, K. (1993): **Teaching of Life Science Anmol Publishers, Daryaganj, Delhi.**
5. Yadav, M.S. (2000): **Modern Methods of Teaching Sciences, Anmol Publishers, Delhi**
6. Singh, U.K. &Nayab, A.K. (2003) : **Science Education Commonwealth Publishers, Daryaganj, New Delhi**
7. Venkataih, S. (2001): **Science Education in 21st Century, Anmol Publishers, Delhi.**
8. Yadav, M.S. (Ed.) (2000): **Teaching Science at Higher Level, Anmol Publishers, Delhi.**
9. Edger, Marlow &Rao, D.B. (2003): **Teaching Science Successfully, Discovery Publishing House, New Delhi.**
10. Mangal, S.K. (1996): **Teaching of Science, Arya Book Depot, and New Delhi.**
11. Dave, R.H.: (1969): **Taxonomy of Educational Objectives and Achievement Testing, London University Press, London.**
12. Sood. J.K. (1989): **New Directions in Science Teaching, Kohli Publishers, Chandigarh.**



**B.Sc. B.Ed. III Year : 2023-24**  
**Paper –V**  
**Art and Aesthetics (EPC)**

**Max Marks: 50**

**Objectives:**

The student teacher will be able to:

- Understand the important concepts and Prepare unit plan, Lesson plan and yearly plan for different classes.
- Critically evaluate existing school syllabus and textbooks.
- Prepare suitable teaching aids and use them in the classroom effectively.
- Fulfilment of an individual' s potentials through fine art.
- Deepen understanding, appreciation and skills in one chosen medium through self- work and evaluate self as an artist and art educator.
- Appreciate and engage with a diverse range of art processes, products and performances – folk and classical through exposure and exchange.
- Experiment and create pieces of art using different medium. Focus on colours, textures, composition and thematic content.
- Understanding basics of different Art forms - impact of Art forms on the human mind.
- Enhance artistic and aesthetic sensibility among learners to enable them to respond to the beauty in different Art forms, through genuine exploration, experience and free expression.
- Enhance skills for integrating different Art forms across school curriculum at secondary level

**COURSE CONTENT**

**Unit – 1 Understanding Art, Music, Dance & Drama**

1. Meaning, Nature and Scope of art, and aesthetics, Indian Folk art ,Creative Art, Knowledge of Indian Craft Traditions and its relevance in education , Knowledge of Indian Contemporary Arts and Artists; Visual Arts

2. The History of music, Drama and Dance in Indian context

3. Introduction to music: संगीतपरिचय : ध्वनि-स्वर, सप्तक, अलंकार, लय-तालएवाद्य-तन्तु, अवनद्ध, सुशिर, धनलोकसंगीत, लोकगीत, लोकवाद्य।

4<sup>ए</sup> प्दजतवकनबजपवद जव कंदबमरु नृत्य कलाकाइतिहास, लोकनृत्य।

5<sup>ए</sup> प्दजतवकनबजपवद जव कतंउरु नाटक की विभिन्नविधाएँ-मंचीय नाटक, नुक्कडनाटकएएकांकीए मूकाभिनय नाटक, एकाभिनय, इंप्रोवाइजेशन नाटक के अंश-मंचीय अंश, नेपथ्य अंश, पुतली-नाटककामाध्य, निर्माण प्रक्रिया, संचालन प्रक्रिया।

**Unit – 2 Nature and Scope**

1. Art teaching at secondary level of school education

a) The place of art in general education.

b) Education Values of Art and its relationship with other school subjects.

c) Role of Art is Indian culture and values.

d) Art and Society

- e) Contribution of Art Teaching
2. Importance, Aims and Objective of Art Teaching (Bloom's approach to specify the outcomes).
3. Co-relation with other Subject
4. Developing Aesthetic Values through Music, Dance and Drama.

### **Unit – 3 Methods and Techniques**

1. Approaches and Methods of teaching Art- Demonstration method.Lecture cum demonstration, Experimental method, Project method, Text book, Question-answer techniques, Dramatization, Discussion, Group work and Assignments,Drama as a teaching technique..
- 2.Use of ICT in art teaching.
- 3.Arts, Drama and Music in the classroom.

### **Unit –4 Teaching-learning resources & Planning of Art And aesthetic Education**

- 1.Types of primary and secondary resources: data from field, textual material, journals, magazines, newspaper, People as resource; the significance of oral data.
- 2.Meaning, Concept, need and preparation of lesson plan, unit plan and annual plan.
- 3.Curriculum in Art for school instruction. Mughal art style, Rajasthani art style, pahari art style
4. Teaching Aids- Meaning, Importance and types of teaching Aids, Art laboratory (its need, organization, equipments)

### **Unit – 5: Evaluation of Art, Music, Dance & Drama**

- 1.Qualities of a good Art and AstheticTeacher.
- 2.Continuous and Comprehensive Evaluation (CCE) in art and asthetic education.
- 3.Characteristics of Assessment in art education: Types of questions best suited forexamining/assessing/ aspect of art education; Questions for testing quantitative skills, Questions for testing qualitative skill; Open-ended questions.
- 4.Blue print: Meaning, concept, need and construction.
5. Practical Evaluation and its importance

### **Practicum/Field work(Any five from the following taking care that it should cover atleast one activity from Art, Music And Drama each) :-**

- 1.Local field trip for understanding the stone carving art to understand them in reference to their cultural and historical importance compile a report of the same.
- 2.Exploration and experimentation with different methods of Visual Arts like Painting/ block printing/ collage/ clay modelling/ paper cutting and folding, etc.
- 3.Make five different teaching materials using different type of teaching aids (chart, Model, Power Point, O.H.P. transparencies of Art subject.
- 4.Prepare and organise a street play/NukkadNatak on any emerging social issue.
- 5.Make a pictorial presentation of local musical instruments with its historical and cultural significance.
- 6.Prepare a report and analyse how handicraft factories design their products, manage their resources, including raw materials, its marketing and various aspects of environmental concerns.
7. Meet some folk dance artist of the local vicinity and interview them on the point that how they evolved into an artist.

8. Perform the *TRITAAL AND KAHRAWA* in *DUGUN & TRIGUN* in the presence of your Music teacher and take a performance appraisal report from them.
9. Collect some folk songs in which there is a description of nature and analyse them.
10. Collect some songs which are sung on any marriage celebration.
11. Viewing/listening to live and recorded performances of Classical and Regional Art forms & compile your personal feelings on it.
12. Local field trip for understanding working process of any art work or Art gallery/art form & mention experiences.
13. Documentation of the processes of any one Art or Craft form with the pedagogical basis such as weaving or printing of textiles, folk performances in the community.
14. While you were in internship if you found any student worth evaluating on any of the aesthetic arts (Music, Dance, Drama) make an individual portfolio & submit it in college.
15. Draw Caricatures of three renowned Historical personalities.
16. Pick out art based articles and paintings from famous newspapers and compile the collected information.

### **References:**

- AAMS: Memorandum on the teaching of Art London.
- Arya Jaides: Kala KeAdhyapana, VinodPustakMandi, Agra.
- GeargeConard: The process of Art education in the elementary school Practice Hall, inc.England, Cliets No.1, 1964.
- Jeswani K K (1950) Teaching and appreciation arts in schools, Atma Ram and sons Delhi
- Kala Shikshak :Vol. No. 4 April, 1966, Special Number, Art Education, Published by Department of Education, Rajasthan, Bikaner.
- KrishnamurtyJ(1973) Education & Significance of life, B I Publications Bombay.
- KrishnamurtyJ(1973) Education & Significance of life, B I Publications Bombay.
- Ruth Dunneth :‘Art and child personality’, Methuen and Co. Ltd. London 1945.
- Singh ChitraLekha, Arts Education, VinodPustalMandir, Agra
- Veer Ram Avtaar, BhartiyaSangeetkaltihaash,(2001) Radha Publication, Delhi