

FIRST SEMESTER

CORE COURSE-1A PHYSICS

Title: MECHANICS

Course Code: AUBSEL1A

Credits 05 (4L+0T+1P)

Max. Marks: 150 (Theory: 100 Practical: 50)

Contact hours per week: 06

Internal: 60 (Theory: 40 Practical: 20)

Exam duration: 03:00 Hrs (Each T & P) End Term Exam: 90 (Theory: 60 Practical: 30)

Objective: To understand the fundamentals of physics like Linear Momentum, Rotational Dynamics, Motion under Central Forces, Properties of Matter etc. Course

Outcomes: The student will be able:

- To compute basic quantities in linear and rotational mechanics
- To formulate, analyze and solve a multi-level problem in mechanics.
- To apply mathematical tools to mechanics.

Course Content:

Unit I

Conservation of Energy and Linear Momentum, work-energy theorem. Conservative and non-conservative forces and their examples. Conservation force as negative gradient of potential energy. Center of mass of a system of particles. Conservation of linear momentum and energy. Single and multistage rockets. Elastic and inelastic collisions.

Unit II

Rotational Dynamics Rigid body motion. Rotation motion, torque and angular momentum. Moment of inertia and its calculations for disc, cylinder, spherical shell and solid sphere. Flywheel, Motion of Top.

Unit III

Motion under Central Forces Concept of central force. Kepler's laws of planetary motion. Gravitational law. Gravitational potential energy and escape velocity. Two particle central force problem and reduced mass. Motion of planets and satellites.

Unit IV

Properties of Matter

Elasticity, small deformations, Hooke's law, Elastic constants and relation among them. Beam supported at the ends, cantilever. Streamline and turbulent flow, equation of continuity, viscosity, Poiseuille's law critical velocity, Reynolds's number. Surface tension and surface energy.

Text & Reference Books:

1. An introduction to mechanics, D. Kleppner, R. J. Kolenkow, McGraw-Hill.
2. Mechanics, Berkeley Physics, vol.1, C.Kittel, W.Knight, et.al. Tata McGraw-Hill. Physics, Resnick, Halliday and Walker, Wiley.
3. Analytical Mechanics, G. R. Fowles and G. L. Cassiday. Cengage Learning.
4. Mechanics, D. S. Mathur, S. Chand and Company Limited, University Physics.
5. J. W. Jewett, R. A. Serway, Cengage Learning Theoretical Mechanics, M. R. Spiegel, Tata McGraw Hill.

* Latest editions of all the suggested books are recommended.

PRACTICAL SYLLABUS

Title: MECHANICS LAB

Course Code– AUBSEI.1AP

LIST OF EXPERIMENTS:

Note: Select any ten experiments from the following list

1. To determine Ionizations potential of a gas (Soft valve)
2. To determine Plank's constant.
3. To determine the Ionization Potential of mercury.
4. To study the diode characteristics.
5. To determine Moment of inertia of a Flywheel.
6. To determine Young's Modulus in case of Uniform bending using Scale, telescope and optic lever.
7. To determine Young's Modulus in case of Cantilever using Pin and Microscope
8. To determine Modulus of Rigidity by using Torsion pendulum.
9. To determine Viscosity by the Capillary flow (Radius using Mercury pellet).
10. To determine Surface tension by using Capillary rise (Radius using Vernier microscope).
11. To verify Bernoulli's theorem.
12. To determine the frequency of A.C. mains by means of a sonometer.

Evaluation Scheme of Practical Examination:

Internal Evaluation (20 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 4-point scale which would include the practical conducted by the students and a Viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PER FORMANCE & VIVA DURING THE SEMESTER (20MARKS)				TOTAL
EXPERIMENT (05 MARKS)	FILE WORK (05MARKS)	ATTENDANCE (05MARKS)	VIVA (05MARKS)	INTERNAL (20 MARKS)

External Evaluation (30 Marks)

The external evaluation would also be done by the external Examiner based on the experiment conducted during the examination.

Experiment	File work	Viva	Total
(10 MARKS)	(10 MARKS)	(10 MARKS)	(30 MARKS)

CORE COURSE-2A CHEMISTRY

Title: ORGANIC CHEMISTRY

Course Code– AUBSEL2

Credits 05 (4L+0T+1P)

Contact hours per week: 06

Exam duration: 03:00 Hrs (Each T & P)

Max. Marks: 150 (Theory: 100 Practical: 50)

Internal: 60 (Theory: 40 Practical: 20)

End Term Exam: 90 (Theory: 60 Practical: 30)

Course Objectives:

- To review the concept of isomerism and its types.
- To develop an understanding of chemistry of hydrocarbons and their halogenated derivatives.

Unit I Basics of Organic Chemistry

Organic Compounds: Classification, and Nomenclature, Hybridization, Shapes of molecules, Influence of hybridization on bond properties. Electronic Displacements: Inductive, electromeric, resonance and mesomeric effects, hyperconjugation and their applications; Dipole moment. Homolytic and Heterolytic fission with suitable examples. Electrophiles and Nucleophiles; Nucleophilicity and basicity; Types, shape and their relative stability of Carbonations, Carbanions, Free-radicals and Carbenes. Introduction to types of organic reactions and their mechanism: Addition, Elimination and Substitution reactions

Unit- II Stereochemistry of organic compounds:

Concepts of isomerism. Types of isomerism. Optical isomerism- elements of symmetry, molecular chirality, enantiomers, properties of enantiomers, chiral and achiral molecules with two stereogenic centres, diastereomers, threo and erythro diastereomers, meso compounds, resolution of enantiomers. Relative and absolute configuration, sequence rules, D&L and R & S systems of nomenclature. Geometric isomerism; determination of configuration of geometric isomers, E & Z system of nomenclature.

Unit- III Alkanes and Cycloalkanes:

IUPAC nomenclature of branched and unbranched alkanes, the alkyl group, classification of carbon atoms in alkanes. Isomerism in alkanes, sources, methods of formation (with special reference to Wurtz reaction, Kolbe reaction, Corey-House reaction and decarboxylation of carboxylic acids), physical properties and chemical reactions of alkanes. Mechanism of free radical halogenation of alkanes: Mechanism of free-radical, halogenation of alkanes: orientation, reactivity and selectivity.

Unit- IV Arenes and Aromaticity:

Nomenclature of benzene derivatives. The aryl group. Aromatic nucleus and side chain. Structure of benzene: Molecular formula and Kekule structure. Stability and carbon-carbon bond length of benzene, resonance structure, Aromaticity—the Hückel rule, aromatic ions. Aromatic electrophilic substitution reaction—general pattern of the mechanism, role of σ and π complex. Mechanism of nitration, halogenation, sulphonation and Friedel-Crafts reaction. Ortho and para ratio. Birch reduction.

Suggested Books:

1. Stereo Chemistry by P.S. Kalsi.
2. Organic Chemistry by Paula Yurkanis Bruice.
3. Reaction Mechanism by O. P. Aggarwal.
4. Organic Chemistry by F. A. Carey, Tata McGraw Hill.
5. Organic Chemistry by Robert T. Morrison & Robert N. Boyd, Prentice Hall of India Pvt. Ltd.
6. Stereo Chemistry of Organic Compounds by Ernest L Eliel, Tata McGraw-Hill.

PRACTICAL SYLLABUS
Title: ORGANIC CHEMISTRY LAB
Course Code– AUBSEI.2P

List of Experiments:

1. Qualitative Analysis.
2. Detection of elements.
3. Detection and identification of functional groups.
4. Determination of melting point.
5. Determination of boiling point.

Evaluation Scheme of Practical Examination:

Internal Evaluation (20 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 4-point scale which would include the practical conducted by the students and a Viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PER FORMANCE & VIVA DURING THE SEMESTER (20MARKS)				TOTAL
EXPERIMENT (05 MARKS)	FILE WORK (05MARKS)	ATTENDANCE (05MARKS)	VIVA (05MARKS)	INTERNAL (20 MARKS)

External Evaluation (30 Marks)

The external evaluation would also be done by the external Examiner based on the experiment conducted during the examination.

Experiment	File work	Viva	Total
(10 MARKS)	(10 MARKS)	(10 MARKS)	(30 MARKS)

CORE COURSE-3A MATHEMATICS

Title: TRIGONOMETRY & DIFFERENTIAL CALCULUS

Course Code– AUBSEI.3A

Credits 5 (4L+1T+0P)

Contact hours per week: 5

Exam duration: 03:00 Hrs

Max. Marks: 100

Internal: 40

End Term Exam: 60

Unit-I

Limit of function, Basic properties of limits, Continuity, Properties of continuous functions, Uniform Continuity, Rolle's theorem, Lagrange's Mean value theorem, Cauchy mean value theorem, Leibniz rule and its applications to problems of type $e^{ax+b}\sin x$, $e^{ax+b}\cos x$, $(ax+b)^n \sin x$, $(ax+b)^n \cos x$, L'Hospital's rule.

Unit-II

Reduction Formulae, $\int \sin^n x dx$, $\int \cos^n x dx$,
 $\int x^n \sin x dx$, $\int x^n \cos x dx$, $\int \sin^n x \cos^n x dx$,
 $\int_0^{\pi/2} \sin^n x \cos^n x dx$.

Unit-III

Basic theory of linear differential equations, Homogeneous linear equations with constant coefficients, Non-homogeneous linear equation with constant coefficients of dependent variables, Differential equation of first order but not of first degree: Equation solvable for p, y and x, Singular solution.

Unit-IV

Function of Complex variable, Trigonometric, Exponential, Euler's theorem, Inverse Hyperbolic functions, Relation between trigonometric and Hyperbolic functions, Logarithm of a Complex quantity.

Suggested Books:

1. G.B. Thomas and R.L. Finney, Calculus, 9th Ed., Pearson Education, Delhi, 2005.
2. M.J. Strauss, G.L. Bradley and K. J. Smith, Calculus, 3rd Ed., Dorling Kindersley (India) P. Ltd. (Pearson Education), Delhi, 2007.
3. H. Anton, I. Bivens and S. Davis, Calculus, 7th Ed., John Wiley and Sons (Asia) P.Ltd., Singapore, 2002.
4. R. Courant and F. John, Introduction to Calculus and Analysis (Volumes I & II), Springer-Verlag, New York, Inc., 1989.

ABILITY ENHANCEMENT COMPULSORY COURSE-1A (AECC-1A) ENGLISH

Title: COMMUNICATIVE ENGLISH-1
(Proficiency in English)
Course Code: AUBSEI.4

Credits: 2 (2L+0T+0P)
Contact hours per week: 02
Exam duration: 1:50 Hrs

Max. Marks: 50
Internal: 20
End Term Exam: 30

Objectives: Students will develop proficiency in English which will equip them to:

- ❖ understand the demands of audience, subject, situation and purpose and the use of language for effective communication.
- ❖ analyse language in context to gain an understanding of grammar, vocabulary, spelling, punctuation and speech.
- ❖ examine authentic literary and non-literary texts and develop insight and appreciation.
- ❖ gain an understanding of study and reference skills.
- ❖ plan, draft, edit and present a piece of writing.

COURSE CONTENT:

Unit I: Descriptive Grammar

1. Tenses:

- a) Simple Present: Habitual action, General truths, Future time, Verbs of state, Verbs of perception, Verbs of sensation, Narration, Use of simple present for demonstration and commentaries, Present perfect, present perfect continuous, Present continuous also indicative of future action.
- b) Simple past: Past time reference, Present time reference, Future time reference, Past continuous, Past perfect, past, perfect continuous.

2. Function of Auxiliaries; Modals; Question form

Articles, Preposition, Phrasal verbs, Synonyms, Antonyms.

Clauses: Noun Clause; Reported Speech and Change of Voice.

Unit II: Skills in Communication

1. Negotiating a point of view – learning to talk persuasively so as to get across one's perspective.
2. Debating on an issue – agreeing / disagreeing.

References:

1. Block, C.C. (1997). Teaching the Language Arts, 2nd Ed. Allyn and Bacon
2. McKay. et. al. (1995). The Communication Skills Book, 2nd Ed. New Harbinger Publications.
3. Hornby, A.S. (2001). Oxford Advanced Learner's Dictionary, OUP
4. Thomsan, A.J. & Martinet. (2002). A Practical English Grammar. OUP
5. McKay. et al. (1995). The Communication Skills Book, 2nd Ed. New Harbinger Publications.
6. Stone Douglas (1999). Difficult conversations: How to discuss what Matters Most, New York.: Penguin Books.

**GENERIC ELECTIVE-1A (GE-1A)
ENVIRONMENTAL SCIENCE/ EDUCATION**

Title: ENVIRONMENTAL SCIENCE/ EDUCATION-1

Course Code: AUBSEI.5

Credits: 02 (2L+0T+0P)

Contact hours per week: 02

Exam duration: 1:50 Hrs

Max. Marks: 50

Internal: 20

End Term Exam: 30

Objective: To create awareness among students about environment protection.

Course Content

Unit-I

Environmental studies: Definitions and scope of Environmental Studies. Multidisciplinary nature of Environmental studies. Concept of sustainability & sustainable development.

Ecology and Environment: Concept of an Ecosystem-its structure and functions, Energy Flow in an Ecosystem, Food Chain, Food Web, Ecological Pyramid & Ecological succession,

Unit II

Natural Resources: Renewable & Non-Renewable resources; Land resources and land use change; land degradation, Soil erosion & Deforestation.

Biodiversity: Definition: genetic, species and ecosystem diversity, Conservation, Importance and Factors Responsible for Loss of Biodiversity, Bio-geographical Classification of India.

Text Books:

1. "Environmental Chemistry", De, A. K., New Age Publishers Pvt. Ltd.
2. "Introduction to Environmental Engineering and Science", Masters, G.M. Prentice Hall India Pvt. Ltd.
3. "Fundamentals of Ecology", Odum, E. P., W. B. Saunders Co.

Reference Books:

1. "Biodiversity and Conservation", Bryant, P. J., Hypertext Book.
2. "Textbook of Environment Studies", Tewari, Khulbe & Tewari, I. K. Publication.

PROFESSIONAL EDUCATION-1 (PE-1)

Title: CHILDHOOD AND DEVELOPMENT YEARS

Course Code– AUBSEI.6

Credits: 04 (3L+1T+0P)
Contact hours per week: 04
Exam duration: 3:00 Hrs

Max. Marks: 100
Internal: 40
End Term Exam: 60

Course Objectives:

- Understand the meaning, nature and scope of educational psychology.
- Understand growth and development of the learner and its importance in the learning process.
- Understand the need and problems of adolescence.
- Identify educational needs of various types of children
- Understand concept of intelligence and personality, theories of intelligence and personality and their educational implications.

UNIT 1: Child Development

- Educational Psychology: Meaning, Nature, Scope and Role of Educational Psychology in Teaching-Learning Process.
- Concept of Growth, Maturation and Development.
- Principles of Growth and Development.
- Heredity and Environment: Concept, Importance of Heredity and Environment in Child's Development.

Unit 2: Managing Individual Differences

- Individual Differences: Meaning, Dimensions (Cognitive Abilities, Interest, Aptitude, Creativity, Personality, Emotions, Values, Attitudes, Study Habits Psycho-motor Skills, Self-concept and Gender).
- Causes of Individual Differences (Race, Sex, Heredity, Social, Economic Status, Culture, Rural-Urban Home, Language Spoken and Language of Instruction).
- Characteristics, Identification and Remedial Measures for diverse learners (Creative, Slow, Gifted Learners, Learners with Specific Learning Disabilities).
- Role of Teacher to minimize Individual Differences.

Unit 3: Social, Emotional and Moral Development

- Social Development: Meaning, Stages and Factors affecting Social Development, Characteristics of Social Development during Childhood and Adolescence.
- Emotional Development: Meaning, Factors affecting Emotional Development, Characteristics of Emotional Development during Childhood and Adolescence.
- Moral Development: Meaning, Stages (Kohlberg), Factors affecting Moral Development, Characteristics of Moral Development during Childhood and Adolescence.
- Childhood and Adolescence: Meaning, Characteristics, Problems of Adolescence Period.

UNIT 4: Cognitive and Personality Development

- Cognitive Development: Meaning, Factors affecting Cognitive Development, Characteristics of Cognitive Development during Childhood and Adolescence.
- Theories of Cognitive Development (Piaget and Bruner).
- Personality Development: Meaning, Factors affecting Personality, Developmental Stages of Personality (Views of Sigmund Freud and Allport).

- Adjustment: Meaning, Types and Factors affecting Adjustment, Symptoms of Maladjustment and Role of the Teacher.

Activities (Any one of the following)

1. Prepare a report of administration and interpretation of any one psychological test, selecting one from: Personality/Adjustment/Mental Health.
2. Visit to a school and write a report on problems being faced by the students.
3. Administration of an individual test and preparing a report.

Suggested Readings

1. Aggarwal, J.C (1994). Essentials of Educational Psychology. New House Delhi: Vikas Public House.
2. Berk, L.E (2012). Child Development (6th Ed.) New Delhi: Prentice Hall of India.
3. Bhatnagar, S. (1980). Psychological Foundations of Teaching Learning and Develop Meerut: Loyal Book Depot.

SECOND SEMESTER

CORE COURSE-1B PHYSICS

Title: ELECTRICITY & MAGNETISM

Course Code– AUBSEII.1A

Credits 05 (4L+0T+1P)

Max. Marks: 150 (Theory: 100 Practical: 50)

Contact hours per week: 06

Internal: 60 (Theory: 40 Practical: 20)

Exam duration: 03:00 Hrs (Each T & P) End Term Exam: 90 (Theory: 60 Practical: 30)

Objective: To provide a detailed and through knowledge of basic concept of electricity and magnetism.

Course Outcomes: After completion of the course student will be able to understand:

- The basic concept of electric field and potential and the method of their calculation using Gauss Law.
- Basics of dielectric polarization of matter capacitor.
- The applications of magnetic field, ampere law etc.

Course Content:

UNIT-I

Ideas of Vector Calculus: Scalar and vector fields, Differentiation of vector with respect to scalars, gradient, divergence, curl operations and their meaning. Idea of line, surface and volume integrals, Gauss Divergence Theorem, Stokes theorem.

Electric Potential: Electric potential due to a dipole and quadrupole, long uniformly charged wire, charged ring, Equipotential surface, Method of Electrical images, Poisson and Laplace Equations.

UNIT-II

Electric Current and Fields of Moving charges: Current and current density. Continuity equation, Microscopic form of Ohm's law ($J \propto E$) and conductivity. Failure of Ohms law and its explanation. Invariance of charge. $\nabla \cdot \mathbf{J} = -\partial \rho / \partial t$.

Field of Moving Charges: E in different frames of reference. Field of a point charge moving with constant velocity. Field of charge that starts or stops (qualitative). Interaction between moving charge and force between parallel currents.

UNIT-III

Magnetic Fields: Ampere circuital law and its applications Hall Effect, Expression for Hall constant and its significance. Divergence and curl of magnetic field \mathbf{B} . Vector potential: Definition of vector potential \mathbf{A} and derivation of its expression.

Dielectrics: Dielectrics, parallel plate capacitor with a dielectric, dielectric constant, polarization and polarization vector, displacement vector \mathbf{D} , molecular interpretation of Clausius-Mossotti equation, boundary conditions satisfied by \mathbf{E} and \mathbf{D} at the interface between two homogenous dielectrics, illustration through a simple example.

UNIT-IV

Electrostatic Fields in Dielectrics: Polarization of matter. Atomic and molecular dipoles, induced. Dipole moment and atomic polarizability. Electric susceptibility and polarization vector, Displacement vector- Establishment of relation. Energy stored in a dielectric medium.

Magnetic Fields in Matter: Behavior of various substances in magnetic fields, Magnetic permeability and susceptibility and their interrelation comparison of Diamagnetic, Paramagnetic and Ferromagnetic Materials, Domain theory of ferromagnetism, magnetization curve, hysteresis loss.

Recommended Books: -

- Fundamentals of Electricity and Magnetism, Arthur F. Kip, International Student Edition, McGraw-Hill, Kogakusha Ltd.
- Introduction to Electrodynamics, D.J. Griffith, 3rd Edition, Prentice Hall of India.
- Electricity and Magnetism, Berkeley Physics course Vol. II, by E. M. Purcell, Mc-Graw Hill Book Company.
- Electricity and Magnetism, M. L. Narchal, Panjab University Publication Bureau Chandigarh.
- Electricity and Magnetism, A S Mahajan and A ARangwala, Tata Mc-Graw Hill Company.

- Electricity and Magnetism, Brij Lal and Subramaniam, S Chand & Co.
- Applied Mathematics for Engineers and Physicists by Pipes.
- Mathematical methods for Physicists by G. Arfken G

PRACTICAL SYLLABUS
Title: ELECTRICITY AND MAGNETISM LAB
Course Code– AUBSEII.1AP

LIST OF EXPERIMENT:

Note: Select any ten experiments from the following list:

1. To determine acceleration due to gravity (g) by Bar Pendulum.
2. To determine acceleration due to gravity (g) by Kater's Pendulum.
3. To study the Motion of a Spring and calculate (a) Spring Constant (b) acceleration due to gravity and (c) Modulus of Rigidity.
4. To determine the Frequency of an Electrically Maintained Tuning Fork by Melde's experiment.
5. To determine a Low Resistance by Carey Foster's Bridge.
6. To determine High Resistance by Leakage of a Capacitor.
7. To determine the (a) Charge Sensitivity and (b) Current Sensitivity of a B.G.
8. To determine the Ratio of Two Capacitances by de Sauty's Bridge.
9. To determine Self Inductance of a Coil by Anderson's Bridge using AC.
10. To determine Self Inductance of a Coil by Rayleigh's Method.
11. To determine the Mutual Inductance of Two Coils by Absolute method using a B.G.
12. To study the response curve of a Series LCR circuit and determine its (a) Resonant Frequency, (b) Impedance at Resonance and (c) Quality Factor Q, and (d) Band

Evaluation Scheme of Practical Examination:

Internal Evaluation (20 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 4-point scale which would include the practical conducted by the students and a Viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PERFORMANCE & VIVA DURING THE SEMESTER (20 MARKS)				TOTAL
EXPERIMENT (05 MARKS)	FILE WORK (05 MARKS)	ATTENDANCE (05 MARKS)	VIVA (05 MARKS)	INTERNAL (20 MARKS)

External Evaluation (30 Marks)

The external evaluation would also be done by the external Examiner based on the experiment conducted during the examination.

Experiment	File work	Viva	Total
(10 MARKS)	(10 MARKS)	(10 MARKS)	(30 MARKS)

CORE COURSE-2B CHEMISTRY

Title: INORGANIC CHEMISTRY

Course Code– AUBSEIL.2

Credits 05 (4L+0T+1P)

Max. Marks: 150 (Theory: 100 Practical: 50)

Contact hours per week: 06

Internal: 60 (Theory: 40 Practical: 20)

Exam duration: 03:00 Hrs (Each T & P) End Term Exam: 90 (Theory: 60 Practical: 30)

Objectives :

- To understand and appreciate the development of various atomic theories.
- To develop an understanding of principles of Atomic structure.
- To justify the need for quantum mechanical structure of atoms.
- To develop an understanding of the periodic trends, preparation and uses of s- and p-block elements and their compounds in terms of structure and bonding.
- To understand the nature of bonding and to predict the shapes of molecules.
- To construct MO energy level diagrams and predict the properties of molecules.

Course Content:

Unit-I Atomic Structure:

Dual nature of matter; de Broglie concept. Heisenberg's uncertainty principle; its significance. Atomic orbitals, Schrödinger wave equation (no derivation); significance of ψ and ψ^2 . Quantum numbers, radial and angular wave functions and probability distribution curves, shapes of s, p and d orbitals. Aufbau's principle and its Limitations Pauli's exclusion principle. Hund's rule of maximum multiplicity. Electronic configuration of elements (s, p block and first series of d-block elements). Effective nuclear charge.

Unit-II Periodic Properties:

Atomic and ionic radii, ionization potential, electron affinity, electronegativity - definition, methods of determination/ evaluation, trends of variation in periodic table and their application in prediction and explaining the chemical behavior of elements and compounds.

Unit-III Chemical Bonding:

Covalent bond-valence bond theory and its limitations; various types of hybridization and shapes of different inorganic molecules and ions. Valence shell electron pair repulsion theory (VSEPR) and shapes of NH_3 , H_2O , H_3O^+ , SF_4 , ClF_3 and other simple molecules/ ions. Molecular orbital theory as applied to diatomic homonuclear/ heteronuclear (CO and NO) inorganic molecules, difference between VB and MO theories.

Unit-IV s-Block and p-Block elements:

s-Block elements: General discussion with respect to all periodic and chemical properties, diagonal relationship, salient features of hydrides, solvation and complexation tendencies, Role of alkali and alkaline earth metal ions in bio-systems.

p-Block elements: General discussion and comparative study (all periodic and chemical properties including diagonal relationship) of groups 13 to 17 elements; chemistry of elements-hydrides, oxides & oxy-acids, and halides. Diborane – properties & structure, borohydrides, carbides, fluorocarbons, inter-halogen compounds, polyhalides and basic properties of iodine.

Suggested Books:

1. Concise inorganic Chemistry 4th Edn. By J.D.Lee .ELBS.
2. Huheey, J.E. Inorganic Chemistry, Prentice Hall 1993.
3. Cotton, F.A. and Wilkinson, G, Advanced Inorganic Chemistry, Wiley, VCH, 1999.
4. Greenwood, N.N. and Earnshaw, Chemistry of the Elements, Butterworth-Heinemann. 1997.
5. Day, M.C. and Selbin, J. Theoretical Inorganic Chemistry, ACS Publications 1962.
6. Douglas, B.E. and Mc Daniel, D.H., Concepts & Models of Inorganic Chemistry, Oxford 1970.
7. Shriver & Atkins, Inorganic Chemistry, Third Edition, Oxford Press 1994.
8. H.W. Porterfield, Inorganic Chemistry, Second Edition, Academic Press, 2005.

PRACTICAL SYLLABUS

Title: INORGANIC CHEMISTRY LAB

Course Code– AUBSEII.2P

List of Experiments:

1. Qualitative analysis.
2. Analysis of mixtures.
3. Dry tests or Preliminary tests.
4. Wet and Confirmatory tests for acid radicals.
5. Systematic wet analysis for basic radicals.

Evaluation Scheme of Practical Examination:

Internal Evaluation (20 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 4-point scale which would include the practical conducted by the students and a Viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PER FORMANCE & VIVA DURING THE SEMESTER (20MARKS)				TOTAL
EXPERIMENT (05 MARKS)	FILE WORK (05 MARKS)	ATTENDANCE (05MARKS)	VIVA (05MARKS)	INTERNAL (20 MARKS)

External Evaluation (30 Marks)

The external evaluation would also be done by the external Examiner based on the experiment conducted during the examination.

Experiment	File work	Viva	Total
(10 MARKS)	(10 MARKS)	(10 MARKS)	(30 MARKS)

Reference text:

1. Vogel, A.I.A *Textbook of Quantitative Inorganic Analysis*, ELBS.

*Latest editions of all the suggested books are recommended.

CORE COURSE-3B MATHEMATICS

Title: PARTIAL DIFFERENTIAL EQUATIONS

Course Code– AUBSEIL3A

Credits 5 (4L+1T+0P)

Contact hours per week: 5

Exam duration: 03:00 Hrs

Max. Marks: 100

Internal: 40

End Term Exam: 60

Unit-I

Differential equations and mathematical models. General, particular, explicit, implicit and singular solutions of a differential equation. Exact differential equations and integrating factors, separable equations and equations reducible to this form, linear equation and Bernoulli equations, special integrating factors and transformations.

Unit-II

Partial differential equation of I order and I degree, Origin of partial differential equation, Lagrange's method for $P.p+Q.q=R$. Partial differential equation of II order, Linear partial differential equation, its complete integral, particular integral and general solution, general solution of linear partial differential equation with constant coefficients.

Unit-III

General solution of homogeneous equation of second order, principle of super position for homogeneous equation, Wronskian: its properties and applications, Linear homogeneous and non-homogeneous equations of higher order with constant coefficients, Euler's equation, method of undetermined coefficients, method of variation of parameters.

Unit-IV

Classification of partial differential Equation, Monge's form of solution of form $Rr + Ss + Tt = V$, Application of partial differential Equation.

Suggested Books:

1. Belinda Barnes and Glenn R. Fulford, Mathematical Modeling with Case Studies, A Differential Equation Approach using Maple and Matlab, 2nd Ed., Taylor and Francis group, London and New York, 2009.
2. C.H. Edwards and D.E. Penny, Differential Equations and Boundary Value problems Computing and Modeling, Pearson Education India, 2005.
3. S.L. Ross, Differential Equations, 3rd Ed., John Wiley and Sons, India, 2004.
4. Martha L Abell, James P Braselton, Differential Equations with MATHEMATICA, 3rd Ed., Elsevier.

ABILITY ENHANCEMENT COMPULSORY COURSE-1B

(AECC-1B) ENGLISH

Title: COMMUNICATIVE ENGLISH-2

(Proficiency in English)

Course Code: AUBSEII.4

Credits 2 (2L+0T+0P)

Contact hours per week: 2

Exam duration: 1:50 Hrs

Max. Marks: 50

Internal: 20

End Term Exam: 30

Objectives : Students develop proficiency in English which equips them to:

- ❖ understand the demands of audience, subject, situation and purpose and the use of language for effective communication.
- ❖ analyse language in context to gain an understanding of grammar, vocabulary, spelling, punctuation and speech.
- ❖ examine authentic literary and non-literary texts and develop insight and appreciation.
- ❖ gain an understanding of study and reference skills.
- ❖ plan, draft, edit and present a piece of writing.

COURSE CONTENT:

Unit I: Study, Reference Skills and Skills of Communication

Note making; Note-taking; Summary writing. Comprehension Skills Extracts from literary, scientific and educational journals.

Advanced Writing Skills, writing advertisement copy; Writing a project proposal and Writing Resume, sending an application. Listening effectively; Talking about one self (likes, dislikes, interests, beliefs, personality traits, ambitions); Expressing an opinion about personal belief on a current issue. (Ability to speak fluently for 3-4 minutes. Focus would be on organized, logical, sequential presentation of thought through spontaneous speech).

Unit II: Writing for Functional Purposes; Creative Skills in Writing and Basic Phonetics

Letter-writing (Professional / Personal)

Writing dialogues, poems and essays

Sounds of English language, intonation and transcription using IPA.

Suggested Activities:

Politeness competitions- students with partners take turns in using a given number of utterances for negotiation / requests/complaints/small talk.

Students introduce themselves though using symbols/ metaphors.

Students collect newspaper/magazine cuttings on topical and/ or cultural issues of interest-write and share their opinion with peers.

References:

1. Chan. et al. (1997) Professional Writing Skills, San Anselma, CA
2. Fiderer, A. (1994) Teaching Writing: A Workshop Approach. Scholastic.
3. Block, C.C. (1997). Teaching the Language Arts, 2nd Ed. Allyn and Bacon
4. Mckay. et al. (1995). The Communication Skills Book, 2nd Ed. New Harbinger Publications.
5. Merriam, E. (1964). It Doesn't Always Have to Rhyme. Atheneum.
6. Hyland, Ken (2004) Second Language Writing. University of Michigan Press.

7. Graves, D (1992). Explore Poetry: The reading /writing teacher's companion. Heinemann
8. Stone Douglas (1999). Difficult conversations: How to discuss what Matters Most, New York.: Penguin Books.
9. Gabor Don (2001). How to start a Conversation and Make Friends, New York: Fireside.
10. Block, C.C. (1997). Teaching the Language Arts, 2nd Ed. Allyn and Bacon
11. Mckay. et al. (1995). The Communication Skills Book, 2nd Ed. New Harbinger Publications.
12. Hornby,A.S.(2001).Oxford Advanced Learner's Dictionary, OUP

GENERIC ELECTIVE-1B (GE-1B)
ENVIRONMENTAL SCIENCE/ EDUCATION

Title: ENVIRONMENTAL SCIENCE/ EDUCATION-2
Course Code–AUBSEII.5

Credits 2 (2L+0T+0P)

Contact hours per week: 2

Exam duration: 1:50 Hrs

Max. Marks: 50

Internal: 20

End Term Exam: 30

Objective: To create awareness among students about environment protection.

Course Content

Unit I

Environmental Pollutions: Types, Causes, Effects & control; Air, Water, soil & noise pollution, Nuclear hazards & human health risks, Solid waste Management; Control measures of urban & industrial wastes, pollution case studies

Climate change & Global Warming (Green house Effect), Ozone Layer-Its Depletion and Control Measures, Photochemical Smog, Acid Rain: Environment protection Act; air prevention & control of pollution act, Water Prevention & Control of Pollution Act,

Unit II

Human Communities & Environment:

Human population growth; impacts on environment, human health & welfare, Disaster Management; Earthquake, Floods & Droughts, Cyclones & Landslides, Environmental Ethics; Role of Indian & other religions & culture in environmental conservation, Environmental communication & public awareness; Case studies.

Text Books:

1. "Environmental Chemistry", De, A.K., New Age Publishers Pvt. Ltd.
2. "Introduction to Environmental Engineering and Science", Masters, G. M. Prentice Hall India Pvt. Ltd.
3. "Fundamentals of Ecology", Odum, E. P., W. B. Saunders Co.

Reference Books:

1. "Biodiversity and Conservation", Bryant, P. J., Hyper text Book
2. "Textbook of Environment Studies", Tewari, Khulbe & Tewari, I.K. Publication.

PROFESSIONAL EDUCATION-2 (PE-2)

Title: LEARNING AND TEACHING

Course Code–AUBSEIL.6

Credits: 4 (3L+1T+0P)

Contact hours per week: 4

Exam duration: 3:00 Hrs

Max. Marks: 100

Internal: 40

End Term Exam: 60

Course objectives:

The student teachers will be able to:

1. Understand the nature, characteristics of learner and principles to make teaching-learning effective and productive.
2. Explain the concept, nature of learning as a process and conditions of learning.
3. Describe the Gagne's types of learning.
4. Explain the concept, types and strategies to develop memory.
5. Understand nature, causes, factors and strategies to minimize forgetting.
6. Apply the knowledge and understanding of the learning process, principles and theories of learning with their educational Implications.
7. Describe the concept, Importance and level of transfer of learning.

Unit 1 Learner and Learning

- Changing Nature of Learner, Characteristics of Effective Learner, Guiding Principles to make Teaching-Learning Effective and Productive.
- Concept and Nature of Learning as a Process, Learning Curve, Conditions of Learning -objective, subjective and methodological, Learning and Maturation.
- Gagne's Types of Learning, Events of Instruction, Learning Outcome.
- Memory - Concept, Types and Strategies to develop Memory; Forgetting - Nature, Factors and Strategies to Minimize Forgetting.

Unit 2 Understanding the Learning Process

- Learning: Meaning, Types and Levels of Concept Development, Strategies for Concept Learning.
- Learning through Association- Classical Conditioning, learning through Consequences - Operant Conditioning, learning through Trial and Error, learning through Observation Modeling/Observational Learning, Learning through Insight-Discovery Learning and their Educational implications.
- Social Constructivist Learning - Concept of Vygotsky, Educational Implications.
- Transfer of Learning: Concept, Types and Strategies to Maximize Transfer of Learning.

Unit 3 Teacher and Teaching

- Teacher: Qualities and Role in the Changing Scenario - Transmitter of Knowledge, Model, Facilitator.
- Concept of Teaching, Principles and Maxims of Teaching

- Teaching as a Profession: Meaning of Profession, Characteristics of a Profession, Professional Ethics for the Teachers, Role of Teacher Training in Developing Professionalism in Teachers Educators.
- Relationship between Teaching and Learning, Principles of effective Teaching and Learning.

Unit IV Phases and Models of Teaching

- Phases of Teaching: Pre-active, Interactive and Post Active. Operations involved in each.
- Models of Teaching: Meaning, Need, Types and Elements of Model of Teaching, Basic Teaching Models (Glaser).
- Concept Attainment Model (Bruner) and Advance Organiser Model (Ausbel).
- Strategies of Teaching: Brainstorming, Simulation. Role Play and Gaming,

Activities - (Any one of the following)

1. A study of educational, social & cultural functions of any informal agency of education.
2. Prepare a report of educational problems of learners in any school.
3. Prepare a report of problem of SC/ST/Backward/ Minority group of children in the rural & urban area of Himachal Pradesh.

Suggested Readings

1. Bower, G H and Hilgard E R (1981) Theories of learning, Englewood Cliffs, New Jersey: Prentice Hall Inc.
2. Chauhan S.S. (1995) Advanced Educational Psychology, New Delhi: Vikas Publishing House Pvt. Ltd.
3. Mangal S.K. 2005) Advanced Educational Psychology, New Delhi. Prentice Hall of India.
4. Dandapani S. (2005). Advanced Educational Psychology, New Delhi: Anmol Publications.
5. NCERT (2005) National Curriculum Framework, New Delhi.
6. NCTE (2009) National Curriculum Framework for Teacher Education, New Delhi.

THIRD SEMESTER
CORE COURSE-1C PHYSICS

Title: **OPTICS**
Course Code– **AUBSEIII.1A**

Credits 05 (4L+0T+1P)

Contact hours per week: 06

Exam duration: 03:00 Hrs (Each T & P)

Max. Marks: 150 (Theory: 100 Practical: 50)

Internal: 60 (Theory: 40 Practical: 20)

End Term Exam: 90 (Theory: 60 Practical: 30)

Objective: To understand the fundamentals of physics like geometrical optics: diffraction, interferometer and holography etc.

Course Outcomes: After completion of the course, student will be able to-

1. Get the idea of geometrical optics including the wave motion
2. Provide basic and advanced concept of holography, interference and diffraction.

Course Content:

Unit I Geometrical Optics: Fermat's Principle: Principle of extremum path and its simple application as reflection, refraction and straight line motion of light. General theory of Image formation: Cardinal points of an optical system, general relationship, thick lens, combination of two thin lenses, nodal slide and Newton's formula, Huygens and Ramsden's eye pieces.

Unit II Physical Optics I: Interference. Interference of Light: The principle of superposition, two slide interferences, coherence requirement of the sources, optical path retardation, lateral shift off rings, Rayleigh refractometer and other applications. Thin films, Newton's ring, its application in determination of wave length, refractive index of liquid.

Unit III Physical Optics-II Interference.

Michelson interferometer: Its application for a precision determination of wavelength, wavelength difference refractive index of thin transparent film and width of spectral lines. Intensity distribution in multiple beam interference, Fabry-Perot interferometer & etalon, Phase Change on Reflection (Stokes's relation), Michelson's Interferometer and its applications.

Unit IV Physical Optics-III Diffraction.

Diffraction of Light: Fresnel diffraction, zone plate, Diffraction at straight edge. Fraunhofer Diffraction: Diffraction at slit & circular aperture, Diffraction at N-parallel slits. Resolution of images, Rayleigh criterion, resolving power of grating, telescope and prism.

Physical Optics - IV Polarization. Types of polarization, Brewster's law, Nicol's prism, Double refraction and Optical Rotation: Refraction in uniaxial crystal, its electromagnetic theory, Phase retardation, Quarter wave plate and half wave plate, double image prism., Polarimetry, Laurent half shade polarimeter, Polaroids and application of polarized light.

Text Books:

1. An Introduction to Modern Optics, Ajay K Ghatak, Tata Mc-Graw Hill Co., New Delhi
2. Engineering Physics by V S Yadav, Tata McGraw Hill

Reference Books:

1. Advanced Engineering Mathematics, Kreyszig.
2. A Text book of Light, D.N. Vasudeva, Atma Ram and Sons, New Delhi.
3. Optics, Born and Wolf.
4. Optics, K.D. Moltev, Oxford University Press.

* Latest editions of all the suggested books are recommended.

PRACTICAL SYLLABUS

Title: OPTICS LAB

Course Code– AUBSEIII.1AP

LIST OF EXPERIMENT:

Note: Select any ten experiments from the following list

1. To determine the wavelength of Sodium light by Newton's rings.
2. To determine the wavelength of Sodium light by Fresnel's biprism.
3. To determine the specific rotation of the cane sugar solution with the help of Polarimeter.
4. To determine the resolving power and dispersive power by a prism.
5. To determine the resolving power of grating.
6. To study the elliptically polarized light.
7. To determine slit width using He-Ne laser.
8. To determine the Flashing & Quenching of Neon bulb.
9. To determine the Resolving power of a telescope
10. To determine the wavelength of the sodium lamp by Michelson interferometer.
11. To determine the wave form and frequency of a given signal using C.R.O.

Evaluation Scheme of Practical Examination:

Internal Evaluation (20 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 4-point scale which would include the practical conducted by the students and a Viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PER FORMANCE & VIVA DURING THE SEMESTER (20MARKS)				TOTAL
EXPERIMENT (05 MARKS)	FILE WORK (05MARKS)	ATTENDANCE (05MARKS)	VIVA (05MARKS)	INTERNAL (20 MARKS)

External Evaluation (30 Marks)

The external evaluation would also be done by the external Examiner based on the experiment conducted during the examination.

Experiment	File work	Viva	Total
(10 MARKS)	(10 MARKS)	(10 MARKS)	(30 MARKS)

CORE COURSE-2C CHEMISTRY

Title: PHYSICAL CHEMISTRY

Course Code– AUBSEIII.2

Credits 05 (4L+0T+1P)

Max. Marks: 150 (Theory: 100 Practical: 50)

Contact hours per week: 06

Internal: 60 (Theory: 40 Practical: 20)

Exam duration: 03:00 Hrs (Each T & P) End Term Exam: 90 (Theory: 60 Practical: 30)

Unit-I Gaseous States: Postulates of kinetic theory of gases, deviation from ideal behavior, vander Waal's equation of states, relationship between critical constants and Vander Waals constants, reduced equation of state. Molecular velocities: Root mean square, average and most probable velocities, qualitative discussion of the Maxwell's distribution of molecular velocities.

Liquid State: Intermolecular forces, structure of liquids (a qualitative description) Structural differences between solids, liquids and gases. Physical properties of liquids including their methods of determination: surface tension, viscosity and refractive index.

Unit-II Solid State: Definition of space lattice, unitcell, 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 elementsincrystals,X-raydiffractionbycrystals,. DerivationofBragg'sequation.Determination of crystalstructureof NaCl, KCl and CsCl (Laue'smethodandpowdermethod).

Unit-III Chemical Kinetics: Chemical kinetics and its scope, rate of a reaction, factors influencing the rate of a reaction– concentration, temperature, pressure, solvent, light, catalyst. Concentration dependence of rates mathematical characteristics of simple reaction –zero order, first order, second order, pseudo order, half life determination of the order of reaction–differential method, method of half life period and isolation methods concept of activation energy.

Unit-IV Thermodynamics: Definition of thermodynamic terms, system, surrounding etc. types of systems, intensive and extensive properties, thermodynamic process, concept of heat and work, First law of thermodynamics, definition of internal energy and enthalpy. Heat capacity–heat capacities at constant volume and at constant pressure and their relationship, Joule – Thomson coefficient and inversion temperature, Standard enthalpy of formation–Hess's law of heat summation and its application, Enthalpy of neutralization, bond dissociation energy and its calculation from thermochemical data, Kirchoff's equation.

Suggested Books:

1. Physical Chemistry by S.C.Khetarpal, G.S, Sharma and R.K. Kalia.
2. A text Book of Physical Chemistry by K.K.Sharma and I.K. Sharma.
3. Physical Chemistry by P.N.Kapil and S.K.Guglani.
4. A text book of Biophysical Chemistry by U.N.Das.
5. Surface Chemistry by Adison, L.I.Osipow.
6. Atkins, P. W. & Paula, J. de Atkin's Physical Chemistry 8th Ed., Oxford University Press (2006).
7. Ball, D. W. Physical Chemistry Thomson Press, India (2007).
8. Castellan, G. W. Physical Chemistry 4th Ed. Narosa (2004).

PRACTICAL SYLLABUS

Title: PHYSICAL CHEMISTRY LAB

Course Code– AUBSEIII.2P

List of Experiments:

1. Measurement of density.
2. Measurement of surface tension.
3. Measurement of viscosity.

Evaluation Scheme of Practical Examination:

Internal Evaluation (20 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 4-point scale which would include the practical conducted by the students and a Viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PERFORMANCE & VIVA DURING THE SEMESTER (20 MARKS)				TOTAL
EXPERIMENT (05 MARKS)	FILE WORK (05 MARKS)	ATTENDANCE (05 MARKS)	VIVA (05 MARKS)	INTERNAL (20 MARKS)

External Evaluation (30 Marks)

The external evaluation would also be done by the external Examiner based on the experiment conducted during the examination.

Experiment	File work	Viva	Total
(10 MARKS)	(10 MARKS)	(10 MARKS)	(30 MARKS)

Reference text:

1. Vogel, A.I. *A Textbook of Quantitative Inorganic Analysis*, ELBS.

*Latest editions of all the suggested books are recommended.

CORE COURSE-3C MATHEMATICS

Title: REAL ANALYSIS
Course Code– AUBSEIII.3A

Credits 05 (4L+1T+0P)
Contact hours per week: 05
Exam duration: 03:00 Hrs

Max. Marks: 100
Internal: 40
End Term Exam: 60

Unit-I

Real sequences and their convergence, Bounded and monotonic sequences, Cauchy's first and second theorems on limits, Subsequence, Bolzano-Weierstrass Theorem, Cauchy sequence, Cauchy's general principle of convergence. Infinite series, Cauchy's general principle of series, Leibnitz Test, Convergence and divergence of infinite series, Comparison tests of positive terms.

Unit-II

Cauchy's root test, D-Alembert's ratio test, Rabbe's test, Gauss test, Logarithmic test, Cauchy integral test, Alternating series, Leibnitz test, Abel's test, Dirichlet's test.

Unit-III

Taylor's theorem, Taylor's series and Maclaurin's series expansions of exponential and trigonometric functions, Jacobians, Maxima, Minima and saddle points of functions of two variables, Lagrange's multiplier method.

Unit-IV

Riemann integration, Upper and lower Darboux sums, Riemann sums and definitions of Riemann integral through Riemann sums, Riemann integral functions, Properties of Riemann integral functions, Fundamental theorem of Calculus, Improper integrals.

Suggested Books:

1. R. Bartle and D.R. Sherbert, Introduction to Real Analysis, John Wiley and Sons,2003.
2. K.A. Ross, Elementary Analysis: The Theory of Calculus, Springer,2004.
3. A. Mattuck, Introduction to Analysis, Prentice Hall,1999.
4. S.R. Ghorpade and B.V. Limaye, A Course in Calculus and Real Analysis, Springer,2006.

ABILITY ENHANCEMENT COMPULSORY COURSE-2A (AECC-2A)

HINDI

Title: GENERAL HINDI-1

Course Code: AUBSEIII.4

Credits: 02 (2L+0T+0P)

Contact hours per week: 02

Exam duration: 1:50 Hrs

Max. Marks: 50

Internal: 20

End Term Exam: 30

उद्देश्य-

- ❖ छात्रों में भाषा को समझने तथा मूल्यांकन करने की दृष्टि बढ़ाना
- ❖ शब्द संरचना प्रक्रिया के प्रति छात्रों का ध्यानाकर्षण कराना
- ❖ छात्रों को प्रयोजनमूलक हिन्दी की व्यापकता से अवगत करवाना
- ❖ हिन्दी भाषा की व्यावहारिक उपयोगिता का परिचय देना

इकाई-1 हिंदी ध्वनियों का स्वरूप

स्वर और व्यंजन

संज्ञा, सर्वनाम, क्रिया, विशेषण, क्रिया विशेषण

वाक्य संरचना

इकाई-2 हिंदी शब्द संरचना

पर्यायवाची, समानार्थक, विलोमार्थक, अनेकार्थक, अनेक शब्दों के स्थान पर एक शब्द, समुहार्थक शब्दों के प्रयोग, निकातार्थी शब्दों के सूक्ष्म अर्थ -भेद, समानार्थक शब्दों के भेद, उपसर्ग, प्रत्यय

PROFESSIONAL EDUCATION-3 (PE-3)

Title: LANGUAGE ACROSS THE CURRICULUM

Course Code– AUBSEIII.5

Credits: 02 (1L+1T+0P)
Contact hours per week: 02
Exam duration: 1:30 Hrs

Max. Marks: 50
Internal: 20
End Term Exam: 30

Course Objectives:

The student teachers will be able to:

1. Understand the nature, importance and use of Language.
2. Acquaint with some latest methods and approaches for planning of successful language teaching.
3. Identify and be sensitive to the proficiency, interests and needs of learners.
4. Practice learner centered methods and techniques in the classroom.
5. Use technology to enrich language teaching,
6. Encourage continuous professional development.

UNIT 1 - LANGUAGE AND SOCIETY

- Meaning, Nature and Scope of Language, Role of Language in life: Intellectual, Emotional, Social, Literary and Cultural Development.
- Characteristics of Language Development.
- Factors affecting Language Learning: Physical, Psychological and Social.
- Theories of Language: Divine Gift Theory, the Pooh or the Interjectional Theory. The Ding-Dong Theory. The sing- song Theory, The Ta - Ta Theory, The Babble- Luck Theory. The Tongue-Tie Theory.

UNIT 2 - CURRICULAR PROVISIONS, POLICIES FOR LANGUAGE EDUCATION AND DEVELOPMENT OF LANGUAGE SKILLS

- Position of Languages in India; Article 343-351, 350A; of Constitution of India.
- Kothari Commission (1964-66): NPE-1986; POA-1992; National Curriculum of India. Framework-2005 (Language Education), NCFTE - 2009 (Language Education).
- Meaning, Importance and Need for development of Language Skills.
- Approaches to Language Learning: Traditional Method, Textbook Method, Communicative Method, Grammar-cum-Translation Method, Principles and Maxims of Language Learning.

Activities (Any One of the following):

1. Discuss 'Multilingualism as a Resource.
2. Analyze advertisements aired on Radio Television on the basis of language and gender,
3. Analyze few passages from Science, Social Science and Maths textbooks of Classes VI to VII and Write a Report based on Following Issues
 - a) how the different registers of language have been introduced
 - b) Does the language clearly convey the meaning of the topic being discussed?
 - c) Is the language learner-friendly?
 - d) Is the language too technical?
 - e) Does it help in language learning?

SUGGESTED READINGS

1. Valdmen (1987) Trends in Language Teaching, New York, London: Mcgraw Hill.

2. Johnson, K (1983): Communicative Syllabus Design and Methodology. Oxford: Pergamon press
3. Sharma, KL.(2012): Methods of Teaching English in India, Agra, lakshmi Narain Agarwal Publisher
4. Kohli, A.L: Techniques of Teaching English, New Delhi: Dhanpat Rai Publisher.
5. Geéta Rai (2010): Teaching of English, Meerut: R. LAL book DEPOT.
6. Praveen Sharma (2008): Teaching of English language, Delhi: Shipra Publications.
7. Joseph Mukalel C. (2011). Teaching of English Language, New Delhi: DiscoveringPublishing House.
8. Sharma Yogendra K. Sharma Madhulika (2011): Teaching of English Language, New Delhi: Kanishka Publishers, Distributors.
9. Sharma R.A. (2007): Teaching of English Education, Meerut: A. Lall Book Depot.
10. Mangal, U. (2010) Teaching of Hindi, New Delhi: Arya Book Depot.
11. National Curriculum Frame Work (2005), New Delhi: NCERT.

PROFESSIONAL EDUCATION-4 (PE-4)

Title: TEXT READINGS AND REFLECTIONS

Course Code– AUBSEIII.6

Credits: 02 (1L+1T+0P)

Contact hours per week: 02

Exam duration: 1:30 Hrs

Max. Marks: 50

Internal: 20

End Term Exam: 30

Course objectives: The student teachers will be able to:

1. Learn to read Newspaper Follow Radio, TV & Internet media critically and with understanding.
2. Form and exchange viewpoints on political and social Issues.
3. Distinguish fact, fiction and opinion in Newspaper articles.
4. Develop teachers professionally and support their aspirations as teachers.

UNIT-1 Analytical and Critical Thinking

- Analytical and Critical Thinking: Meaning and Importance for Reading and Writing. Role of Critical Reading and Critical Thinking in Enhancing Writing Skills.
- Ways of Developing Reading Skills, Importance of Developing Reading Skills; Reading Aloud and Silent Reading; Extensive Reading, Study Skills including using Thesaurus, Dictionary, Encyclopedia.
- Ways of developing Writing Skills: Formal and Informal Writing (such as Poetry, Short Story, Letter, Diary, Notices, Articles, Reports, Dialogue, Speech and Advertisement.

UNIT-II Pedagogies of Reading and Writing

- Models for Assessing the components of Reading (Phonemic Awareness, Phonics, Fluency, Vocabulary, and Text Comprehension).
- Instructional Approaches for Developing Students' Concepts of Grammar, Punctuation, Spelling and Handwriting.
- Responding to the Texts: Approach to Response Based Study (The Core of the Text, Personal Connection. Reading Beyond the Text, Revisiting the Text).
- Responding to the Contexts: Sharing Responses (Purpose of Sharing. Role of the Teacher and Benefits of Sharing)

ACTIVITIES (Any one of the following):

1. Writing a review or a summary of the text with comments and opinion.
2. Student teacher will select news paper/magazine articles on topics of contemporary issues.
3. REFLECTION EXERCISES:
 - a) Why did this particular (event, barrier, success, accident) happen?
 - b) What was the best thing I did and Why?
 - c) If I did this again tomorrow, what would I do differently?

SUGGESTED READINGS:

1. Alberta Learning (2003), Responding to Text and Context, Senior High School English Language Arts Guideto Implementation. Alberta, Canada. Retrieved from https://education.alberta.ca/media/883678/4_respond.pdf.
2. Cottrell Stella (2011) Critical Thinking Skills: Developing Effective Analysis and Argument (Palgrave study skills) Basingstoke: Palgrave Macmillan
3. Cox, Ailsa (2005) Writing Short Stories (English) London: Routledge.
4. Fisher Alec (2001) Critical Thinking: An Introduction, UK: Cambridge University press.
5. Fitkids T.J. (2011) Common Mistakes in English (With Exercises), New Delhi: Jain Book Agency.

PRACTICAL SYLLABUS
Title: OSCILLATION AND WAVES LAB
Course Code– AUBSEIV.1AP

LIST OF EXPERIMENT:

Note: Select any ten experiments from the following list

1. To determine the wavelength of Sodium light by Newton's rings.
2. To determine the wavelength of Sodium light by Fresnel's biprism.
3. To determine the specific rotation of the cane sugar solution with the help of Polarimeter.
4. To study the forward characteristics of a light emitting diode.
5. To determine the resolving power and dispersive power by a prism.
6. To determine the resolving power of grating.
7. To study the elliptically polarized light.
8. To determine slit width using He-Ne laser.
9. To determine the Flashing & Quenching of Neon bulb.
10. To determine the Resolving power of a telescope
11. To determine the wavelength of the sodium lamp by Michelson interferometer.
12. To determine the wave form and frequency of a given signal using C.R.O.

Evaluation Scheme of Practical Examination:

Internal Evaluation (20 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 4-point scale which would include the practical conducted by the students and a Viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PERFORMANCE & VIVA DURING THE SEMESTER				TOTAL
(20 MARKS)				
EXPERIMENT (05 MARKS)	FILE WORK (05 MARKS)	ATTENDANCE (05 MARKS)	VIVA (05 MARKS)	INTERNAL (20 MARKS)

External Evaluation (30 Marks)

The external evaluation would also be done by the external Examiner based on the experiment conducted during the examination.

Experiment	File work	Viva	Total
(10 MARKS)	(10 MARKS)	(10 MARKS)	(30 MARKS)

CORE COURSE-2D CHEMISTRY

Title: ORGANIC & INORGANIC CHEMISTRY

Course Code– AUBSEIV.2

Credits 05 (4L+0T+1P)

Max. Marks: 150 (Theory: 100 Practical: 50)

Contact hours per week: 06

Internal: 60 (Theory: 40 Practical: 20)

Exam duration: 03:00 Hrs (Each T & P) End Term Exam: 90 (Theory: 60 Practical: 30)

Unit - I

Cycloalkanes: Nomenclature, methods of formation, chemical reactions, Baeyer's strain theory and its limitations. Ring strain in small rings (cyclopropane and cyclobutane), theory of strainless rings.

Aldehydes and Ketones: Nomenclature and structure of Carbonyl group, Synthesis of Aldehydes and Ketones with particular reference to the synthesis of Aldehydes from acid chlorides, Synthesis of Aldehydes and Ketones using 1,3 dithianes, Synthesis of Ketones from Nitriles and from Carboxylic acids.

Aldol, Perkin and Knoevenagel Condensations, Wittig reaction, Mannich reaction. Cannizzaro reaction, Clemmensen, Wolff-kishner, LiAlH_4 and NaBH_4 reduction.

Unit-II

Alcohols: Classification and nomenclature

Monohydric alcohols- nomenclature, methods of formation by reduction of aldehydes, ketones, carboxylic acids and esters. Hydrogen bonding, Acidic nature, reactions of alcohols.

Phenols: Nomenclature structure and bonding, preparation of phenols, physical properties and acidic character. Comparative acidic strength of alcohols and phenols, mechanism of Fries rearrangement, Claisen rearrangement, Gatterman synthesis and Reimer-Tiemann synthesis.

Unit- III

Non-Aqueous Solvents: Introduction to non-aqueous solvents, their classification, effect of physical properties of the solvents on the role of solvent in chemical reactions, solvent system concept of acids and bases, studies of NH_3HF , H_2SO_4 and SO_2 as non-aqueous solvents, failure of solvent system concept and coordination model of non-aqueous solvents.

Unit-IV

Structures of diamond and graphite, Inorganic compounds of carbon (CO , CO_2 , CS_2 , CCl_4 , HCN , SiC), composition and theory of setting of cement, Catenation, silicate minerals, silanes, silicone polymers, comparison of C and Si. Allotropy of P. Oxides and oxy-acids of both N and P. hydrides of N and P (NH_3 , N_2H_4 , NH_2OH , NH_3 , P_2H_4 and PH_3). Ammonium sulphate and calcium ammonium nitrate (CAN) manufacture and uses. Oxides and oxyacids of S, hydrides and halides of sulphur. Oxides and oxyacids of halogens, hydrides of halogens.

Suggested Books:

1. Reaction and Mechanism by Singh & Mukherjee.
2. Organic Chemistry (Reaction and Mechanism) by P.S. Kalsi.
3. Finar, I. L. Organic Chemistry (Volume 1), Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
4. Finar, I. L. Organic Chemistry (Volume 2: Stereochemistry and the Chemistry of Natural Products), Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
5. Organic Chemistry by Paula Yurkanis Bruice.
6. Organic Chemistry by Baeyer and Walter.
7. Concise inorganic Chemistry 4th Edn. By J.D.Lee.
8. Inorganic Chemistry by J.E.Huheey.
9. Advanced Inorganic Chemistry by Cotton And Wilkinson.
10. Chemistry of Elements by Greenwood & Earnshaw.
11. Theoretical Inorganic Chemistry By Day & Selbin.

PRACTICALSYLLABUS

Title: ORGANIC & INORGANIC CHEMISTRY LAB

Course Code– AUBSEIV.2P

List of Experiments:

1. Estimation of Barium and Sulphate ions.
2. Estimation of Iron.
3. Inorganic preparation of Prussion Blue $\text{Fe}_4[\text{Fe}(\text{CN})_6]_3$.
4. Inorganic preparation of Tetra-amine copper (II), Sulphate-Tetra ammonium Cupric sulphate $[\text{Cu}(\text{NH}_3)_4]\text{SO}_4\text{H}_2\text{O}$.
5. Inorganic preparation of Chrome alums $\text{K}_2\text{SO}_4\text{Cr}_2(\text{SO}_4)_3\cdot 24\text{H}_2\text{O}$.

Evaluation Scheme of Practical Examination:

Internal Evaluation (20 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 4-point scale which would include the practical conducted by the students and a Viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PER FORMANCE & VIVA DURING THE SEMESTER (20MARKS)				TOTAL
EXPERIMENT (05 MARKS)	FILE WORK (05 MARKS)	ATTENDANCE (05MARKS)	VIVA (05MARKS)	INTERNAL (20 MARKS)

External Evaluation (30 Marks)

The external evaluation would also be done by the external Examiner based on the experiment conducted during the examination.

Experiment	File work	Viva	Total
(10 MARKS)	(10 MARKS)	(10 MARKS)	(30 MARKS)

CORE COURSE-3D MATHEMATICS

Title: GROUP THEORY
Course Code– AUBSEIV.3A

Credits 05 (4L+1T+0P)
Contact hours per week: 05
Exam duration: 03:00 Hrs

Max. Marks: 100
Internal: 40
End Term Exam: 60

Unit-I

Symmetries of a square, Dihedral groups, definition and examples of groups including permutation groups and quaternion groups (illustration through matrices), elementary properties of groups. Subgroups and examples of subgroups, centralizer, normalizer, center of a group, product of two subgroups.

Unit-II

Properties of cyclic groups, classification of subgroups of cyclic groups. Cycle notation for permutations, properties of permutations, even and odd permutations, alternating group, properties of cosets.

Unit-III

Lagrange's theorem and consequences including Fermat's Little theorem. Internal and External direct product of a finite number of groups, normal subgroups, factor groups. Cauchy's theorem for finite abelian groups.

Unit-IV

Group homomorphisms, properties of homomorphisms, Cayley's theorem, properties of isomorphisms, First, Second and Third isomorphism theorems.

Suggested Books:

1. John B. Fraleigh, *A First Course in Abstract Algebra*, 7th Ed., Pearson, 2002.
2. M. Artin, *Abstract Algebra*, 2nd Ed., Pearson, 2011.
3. Joseph A. Gallian, *Contemporary Abstract Algebra*, 4th Ed., Narosa Publishing House, New Delhi, 1999.
4. Joseph J. Rotman, *An Introduction to the Theory of Groups*, 4th Ed., Springer Verlag, 1995.
5. I.N. Herstein, *Topics in Algebra*, Wiley Eastern Limited, India, 1975.

ABILITY ENHANCEMENT COMPULSORY COURSE-2B (AECC-2B)

HINDI

Title: GENERAL HINDI-2

Course Code: AUBSEIV.4

Credits: 02 (2L+0T+0P)

Contact hours per week: 02

Exam duration: 1:50 Hrs

Max. Marks: 50

Internal: 20

End Term Exam: 30

उद्देश्य-

1. छात्रों में भाषा को समझने तथा मूल्यांकन करने की दृष्टि बढ़ाना
2. शब्द संरचना प्रक्रिया के प्रति छात्रों का ध्यानाकर्षण कराना
3. छात्रों को प्रयोजनमूलक हिन्दी की व्यापकता से अवगत करवाना
4. हिन्दी भाषा की व्यवहारिक उपयोगिता का परिचय देना

इकाई-1 वर्तनी, विराम चिन्ह एवं संशोधन

- ❖ वर्तनी सम्बन्धी अशुद्धियाँ, मात्राओं की अशुद्धियाँ
- ❖ वर्तनी सम्बन्धी अशुद्धियों के कारण, वर्तनी सम्बन्धी अशुद्धियों के सुधारने के उपाय
- ❖ विराम चिन्ह- पूर्णविराम, प्रश्नवाचक चिन्ह, सम्बोधन या आश्चर्य चिन्ह, निर्देशक चिन्ह, अवतरण चिन्ह

इकाई -2 लेखन सम्बन्धी कोशल

- ❖ लिखित भाषा शिक्षण के उद्देश्य
- ❖ लेखन की विभिन्न विधियों, लेखन के दोष
- ❖ निबंध लेखन, कहानी लेखन
- ❖ राष्ट्रीय – अंतरराष्ट्रीय तात्कालिक घटनाक्रमों पर लेखन
- ❖ औपचारिक पत्राचार / अनौपचारिक पत्राचार
- ❖ राष्ट्रीय – अंतरराष्ट्रीय तात्कालिक घटनाक्रमों पर लेखन

PROFESSIONAL EDUCATION-5 (PE-5)

Title: UNDERSTANDING DISCIPLINES AND SUBJECTS

Course Code– AUBSEIV.5

Credits: 02 (1L+1T+0P)

Contact hours per week: 02

Exam duration: 1:30 Hrs

Max. Marks: 50

Internal: 20

End Term Exam: 30

Course objectives:

The student teachers will be able to:

1. Understand the nature of discipline and school subjects.
2. Differentiate between school subjects and curriculum.
3. Integrate and apply concepts and theories in real classrooms

UNIT-1: Concept of Discipline

- Nature and role of Discipline knowledge in School Curriculum.
- Paradigm shift in the nature of discipline, Emergence of School subjects and disciplines from Philosophical, Social and Political Contexts.
- Needed changes in the Discipline Oriented Text Books.

UNIT-2: Quality in Classroom Learning

- Indicators of Quality Learning.
- Teaching and Learning as Interactive Process.
- Major issues in classroom learning: Catering individual differences, student-teacher interaction in the classroom.
- Learning beyond text books- other sources of learning.

Activity (Any one of the following)

1. Prepare a report mentioning the changes required in current school level text books prescribed by CBSE or HPBSE.
2. Prepare a report highlighting major issues and concerns in teaching of Mathematics or English at secondary school stage.

SUGGESTED READINGS

1. Apple, M. (1978): Ideology and Curriculum, New York: Routledge.
2. Fuller, B. (2007): Standardized Childhood, Stanford, CA: Stanford University Press.
1. Romero-Little, M.E. (2006). Honoring Our Own: Rethinking Indigenous Languages and Literary. Anthropology and Education quarterly, 37(4), 399-402.

PROFESSIONAL EDUCATION-6 (PE-6)

Title: **GUIDANCE AND COUNSELING**

Course Code– AUBSEIV.6

Credits: 02 (1L+1T+0P)
Contact hours per week: 02
Exam duration: 1:30 Hrs

Max. Marks: 50
Internal: 20
End Term Exam: 30

Course objectives:

The student- teachers will be able to:

1. Understand the meaning, objectives, need, scope and principles of guidance.
2. Develop counseling skills.
3. Organize guidance programme in the secondary schools.
4. Develop the skills to prepare case study, to diagnose and identify problems, prepare report and provide guidance accordingly.

Unit –I Concept of Guidance

- Guidance: Meaning, need and scope
- Objectives, principles, issues and problems of Guidance.
- Types of Guidance: Educational, Vocational and Personal. Role of school and Teacher in Guidance program.
- Testing Techniques (Intelligence, Aptitude, Personality Inventory and Achievement Test) and Non-testing Techniques (Observation, Interview, Case Study and Cumulative Record).

Unit –II Counselling

- Meaning, Objectives, Principles of Counselling.
- Approaches of Counseling: Directive, Non-directive and Eclectic.
- Techniques of Counseling.
- Organization of Counseling in Schools and Role of Counselor.

Activities (any one of the following):

1. Interview of a school counsellor.
2. Visit to a guidance or counselling centre and write a report.
3. Administration of individual test and preparing a report.
4. To prepare a case study,
5. Conduct a survey of the problems that are most prevalent in school which need immediate attention of a guidance counsellor and prepare a brief report.

SUGGESTED READINGS:

1. Aggarwal, J.C. Educational & Vocational Guidance and Counseling Aadhar. DoabaHouse
2. Bhatia, KK. (2002) Principles of Guidance & Counseling Ludhiana Kalyani Pub
3. MASch. (2000) Principles of Guidance and Counseling New Delhi Sarup and Sons
4. Safaya, BN (2002) Guidance & Counseling Chandigarh. Abhishek Publications
5. Sharma, Tara Chand (2002) Modern Methods of Guidance and Counseling New Delhi, Sarup and Sons
6. Shertzer, Bruce and Stone, Shelly C. (1974) Fundamentals of Counseling London Houghton Mifflin
7. Shirley, AHarmin (1987) Guidance in Secondary Schools New Delhi NCERT.

FIFTH SEMESTER

CORE COURSE-1E PHYSICS

Title: SEMICONDUCTOR / SOLID STATE DEVICES

Course Code– AUBSEV.1A

Credits 05 (4L+0T+1P)

Max. Marks: 150 (Theory: 100 Practical: 50)

Contact hours per week: 06

Internal: 60 (Theory: 40 Practical: 20)

Exam duration: 03:00 Hrs (Each T & P) End Term Exam: 90 (Theory: 60 Practical: 30)

Objective: The aim of the course is to develop physics and engineering strategies of semiconductor materials and to discuss their functionalities in modern electronic and optoelectronic devices.

Course Outcomes: After completion of the course, student will be able to understand

- Solid state materials and k-space representation etc.
- Fermi distribution, DOS and carrier transport, etc.
- The processing of semiconductor devices like 1D, 2D & 3D photonic crystals.

Course Content:

Unit I CRYSTAL AND LATTICE: Crystal lattice, Packing fraction, Crystal planes and sections, Crystal structure of Ge, Si and Ga As, B and theory of semiconductors, Metals, semiconductors and insulators, Semiconductors crystals, Effective mass concept.

CARRIER CONCENTRATIONS: The Fermi level, Electron and Hole concentration at equilibrium, Direct and Indirect recombination of electrons and holes, Hall effect, Quasi-Fermi levels.

Unit II TRANSPORT PHENOMENA: Drift and Diffusion of Carriers, Recombination, Continuity and Diffusion equations, Hynes-Shockley experiment. **P-N JUNCTIONS:** The Contact Potential, Space Charge at a junction, Steady state condition, Current at a junction, Carrier injection, Junction breakdown, Time variation of stored charge, P-N junction capacitance, Graded junction.

Unit III JUNCTION DIODES: Varactor Diode, Concept of negative resistance Devices, Tunnel Diode, Current and Voltage in an illuminated junction, Photo Diode, Photo detector, Solar Cells, Light Emitting Diode, Metal Semiconductor Junction. Principle of PIN photo detector and Avalanche photo diode, Noise in photo detectors, Detector response time, Photodiode materials.

Unit IV BIPOLAR JUNCTION TRANSISTOR (BJT): Charge transport and current in a BJT, Current transfer ratio, Terminal currents, Generalized biasing, Charge control analysis, BJT switching, Turn-on and Turn off transients, Base narrowing, Frequency limitations of a transistor. **FET, MOSFET:** Principle of Operation and I-V Characteristics of FET, MESFET, MOSFET, Threshold voltage in MOSFET.

Text Books:

1. “Solid State Electronic Devices” –B. G. Streetman, PHI
2. “Integrated Electronics”– Millman & Halkies, Tata McGraw.
3. “Physics of Semiconductor Devices” – S. M. Sze.

Latest editions of all the suggested books are recommended.

PRACTICAL SYLLABUS

Title: SEMICONDUCTOR / SOLID STATE DEVICES LAB

Course Code– AUBSEV.1AP

LIST OF EXPERIMENT:

Note: Select any ten experiments from the following list

1. To determine the Low resistance by Carey Foster's bridge with calibration.
2. To determine the Impedance of an A.C. circuit and its verification.
3. To draw forward and reverse bias characteristics of as emiconductor diode.
4. To study the characteristics of Zener Diode voltage regulation.
5. To verify the inverse square law by photo-cell.
6. To study the characteristics of a solar cell.
7. To measure the Resistivity of a Ge Crystal with Temperature by FourProbe Method (from room temperature to 200o C) and to determine the Band Gap Egforit.
8. To determine the Hall Coefficient and theHallangle of aSemiconductor.
9. To study the PE Hysteresis loop of aFerroelectricCrystal.
10. To measure the Magnetic susceptibility of Solids and Liquids.
11. To Measure the angle of dip by earth inductor.
12. To determine High resistance by substitution method.

Evaluation Scheme of Practical Examination:

Internal Evaluation (20 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 4-point scale which would include the practical conducted by the students and a Viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PER FORMANCE & VIVA DURING THE SEMESTER (20MARKS)				TOTAL
EXPERIMENT (05 MARKS)	FILE WORK (05MARKS)	ATTENDANCE (05MARKS)	VIVA (05MARKS)	INTERNAL (20 MARKS)

External Evaluation (30 Marks)

The external evaluation would also be done by the external Examiner based on the experiment conducted during the examination.

Experiment	File work	Viva	Total
(10 MARKS)	(10 MARKS)	(10 MARKS)	(30 MARKS)

CORE COURSE-2E CHEMISTRY

Title: PHYSICAL AND INORGANIC CHEMISTRY

Course Code– AUBSEV.2

Credits 05 (4L+0T+1P)

Max. Marks: 150 (Theory: 100 Practical: 50)

Contact hours per week: 06

Internal: 60 (Theory: 40 Practical: 20)

Exam duration: 03:00 Hrs (Each T & P) End Term Exam: 90 (Theory: 60 Practical: 30)

Unit I

Second law of thermodynamics: Need for the law, Different statements of the law, Carnot cycle and its efficiency, Carnot theorem, Thermodynamics scale of temperature.

Third law of thermodynamics: Concept of entropy, variation of entropy with T and V, T and P, P and V_2 , Nernst heat theorem, Evaluation of absolute entropy from heat capacity data, Entropy of real gaseous and application of third law.

Free energy and work Function: Gibb's function (G) and Helmholtz function (A) as thermodynamic state function, Maxwell relations, Standard free energies, Gibb's Helmholtz equation and its applications.

Unit II

Electrochemistry: Electrical transport-conduction in metals and in electrolyte solutions, Specific and molar conductivity variations of conductivity with concentration, Kohlrausch law, Arrhenius theory of electrolyte dissociation and its limitations, Weak and strong electrolytes, Transport number.

Electrolytic and Galvanic cells: Derivation of cell EMF, EMF of cell and its measurement, Electrode potential, Standard Hydrogen electrode, Standard electrode potential, Sign conversions.

Definitions of pH and pKa values, determination of pH using Hydrogen, Buffers mechanism of buffer action, Henderson-Hassel equation, Hydrolysis of salts.

Unit-III

Metal-Ligand bonding in Transition Metal Complexes: Electrostatic crystal field splitting of d-orbitals in octahedral, Tetrahedral, square planar and tetragonally distorted octahedral stereochemistry, Factors affecting the crystal field parameters, CFSE, Spectrochemical series, Origin of diamagnetism, paramagnetism, ferromagnetism and antiferromagnetism, Types of magnetic behaviour shown by transition elements and compound, Gouy's method for measuring magnetic susceptibility, Origin of colour in transition metal complexes, Explanation of colour in $[\text{Ti}(\text{H}_2\text{O})_6]\text{Cl}_3$ and $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$ and lack of colour in CuSO_4 and Cu_2SO_4 in terms of d-orbital splitting.

Unit-IV

Organometallic Compounds and π -acid Complexes: Definition type and classification of organometallic compounds, EAN and nomenclature, Ionic metal carbon bonding, Metal carbon multiple bonding, Preparation and reaction of ferrocene, Nature of bonding in Metal olefin and metal alkyne complexes. Formation of reaction in Carbonyl compounds of transition elements, Bonding in linear carbonyls (simple spectral evidence), structure of mono and polynuclear carbonyls.

Suggested Books:

1. Physical Chemistry by S. C. Khetarpal, G.S, Sharma and R. K. Kalia.
2. Physical Chemistry by P. N. Kapil and S. K. Guglani.
3. Castellan, G. W. Physical Chemistry 4th Ed. Narosa (2004).
4. Atkins, P. W. & Paula, J. de Atkin's Physical Chemistry 8th Ed., Oxford University Press (2006).
5. Ball, D. W. Physical Chemistry Thomson Press, India (2007).
6. Concise inorganic Chemistry 4th Edn. By J. D. Lee.
7. Inorganic Chemistry by J. E. Huheey.
8. Advanced Inorganic Chemistry by Cotton And Wilkinson.
9. Chemistry of Elements by Greenwood & Earnshaw.
10. Theoretical Inorganic Chemistry By Day & Selbin.

PRACTICAL SYLLABUS

Title: PHYSICAL AND INORGANIC CHEMISTRY LAB

Course Code– AUBSEV.2P

List of Experiments:

1. Thermodynamic: Heat of neutralization, Heat of solution.
2. Preparation of buffer solution and the determination of the pH values by the use of indicator.
3. KMnO_4 Titration.
4. Iodine Titration.
5. EDTA Titration.

Evaluation Scheme of Practical Examination:

Internal Evaluation (20 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 4-point scale which would include the practical conducted by the students and a Viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PER FORMANCE & VIVA DURING THE SEMESTER (20MARKS)				TOTAL
EXPERIMENT (05 MARKS)	FILE WORK (05 MARKS)	ATTENDANCE (05MARKS)	VIVA (05MARKS)	INTERNAL (20 MARKS)

External Evaluation (30 Marks)

The external evaluation would also be done by the external Examiner based on the experiment conducted during the examination.

Experiment	File work	Viva	Total
(10 MARKS)	(10 MARKS)	(10 MARKS)	(30 MARKS)

CORE COURSE-3E MATHEMATICS

Title: LINEAR ALGEBRA
Course Code– AUBSEV.3A

Credits 05 (4L+1T+0P)
Contact hours per week: 05
Exam duration: 03:00 Hrs

Max. Marks: 100
Internal: 40
End Term Exam: 60

Unit-I

Elementary operations on matrices and their use to find the linear dependence and independence of row and column vectors. Dimensions of row and column spaces, row rank, column rank and rank of a matrix (Normal form).

Unit-II

Eigen values, Eigen vectors and the characteristic equation of a matrix, Cayley Hamilton theorem and its use to find the inverse of a matrix, Applications of matrices to system of linear homogeneous and non-homogeneous equations, Consistency of system of linear equations.

Unit-III

Field, Vector Spaces, Subspaces, Bases and Dimension, Linear Transformation, Null Space, Range, Rank and Nullity of a linear Transformation, Matrix representation of a linear transformation, Algebra of linear transformation.

Unit-IV

Inner product Spaces-Cauchy Schwarz inequality, Orthogonal vectors, Orthogonal Complements, Orthonormal sets and bases, Bessle's inequality for finite dimensional spaces, Gram-Schmidt Orthogonalization process, Linear functional adjoints.

Suggested Books:

1. H.S. Hall and S.R. Knight: Higher algebra H.M. Publications, 1994.
2. S. Lang, Introduction to linear Algebra, 2nd Ed., Springer, 2005.
3. Stephen H. Friedberg, Arnold J. Insel, Lawrence E. Spence, Linear Algebra, 4th Ed., Prentice Hall of India Pvt. Ltd., New India, 2004.

PROFESSIONAL EDUCATION-7(PE-7)

Title: ASSESSMENT FOR LEARNING

Course Code– AUBSEV.4

Credits: 04 (3L+1T+0P)
Contact hours per week: 04
Exam duration: 3:00 Hrs

Max. Marks: 100
Internal: 40
End Term Exam: 60

Course Objectives:

The student-teachers will be able to;

1. Understand the nature of assessment and its role in teaching-learning process.
2. Understand the different perspectives of learning on assessment.
3. Realize the need for school-based assessment in schools.
4. Examine the contextual roles of different forms of assessment.
5. Understand the different dimensions of learning and the related assessment procedures, tools and techniques.

Unit-1 Perspectives on Assessment

- Concept of measurement, assessment, evaluation and their interrelationship.
- Purposes of Assessment: Prognostic, Monitoring of Learning. Providing Feedback, Selection, Promotion, Placement, Certification, Grading and Diagnostic.
- Classification of assessment: based on purpose (prognostic, formative, diagnostic and summative), nature of Interpretation (norm-referenced, criterion-referenced).
- Need for continuous and comprehensive school-based assessment: Grading: Concept, Types and Application Indicators for grading,

Unit 2 Assessment of Learning

- Dimensions of learning: cognitive, affective and performance.
- Assessment of cognitive learning: types and levels of cognitive learning: understanding and application. Thinking skills - convergent, divergent, critical, problem solving, decision making and procedures for their assessment.
- Assessment of affective learning: Attitudes, values, interests and procedures for their assessment.
- Assessment of Performance. Tools and techniques for assessment of skills.

Unit 3 Planning, Executing, Interpreting and Reporting of Assessment

- Construction/ Selection of test items: Guidelines for construction of test items.
- Guidelines for administration and scoring, Preparation of blueprint; Performing item analysis.
- Processing test performance: Calculation of percentages and central tendency measures: graphical representations; Analysis and interpretation of learners' performance; Reporting learners' performance - Progress report. Cumulative records, Portfolios.
- Means of providing remedial instruction for improving learning.

Unit 4 Issues, Concerns and Trends in Learning Assessment

- Existing Practices: Unit tests, half-yearly and annual examinations, semester system, Board examinations and Entrance tests, State and National achievement surveys, Use of question banks.
- Issues and Problems: Marking Vs. Grading. Non-detention policy, Objectivity Vs Subjectivity,

- Policy perspectives on examinations and assessment: Recommendations of NPE, 1986 and NCF, 2005.
- Trends in assessment and evaluation: Online examination, Peer assessment, Self-Assessment, Computer-based examinations and other technology-based assessment practices.

*** Activity (Any One of the Following):**

1. Construct an achievement test in any subject of your interest containing a minimum of 50 items with its marking scheme and scoring procedure, evaluation practices adopted by the school teachers.
2. Visit an elementary school and prepare a report on the assessment and prepare a report on the assessment and evaluation practices adopted by the school teachers.
3. Study the parameters / indicators followed in Continuous and Comprehensive Assessment System of CBSE and HP State Education Department. Prepare a critical report highlighting the similarities and differences in the two systems.
4. Visit a school and study how the progress reports and cumulative records of students are maintained by the teachers. Prepare a detailed report highlighting the content and format of students' progress reports and cumulative records.

***Suggested Readings:**

1. Bransford, J., Brown, AL, & Cocking. RR. (Eds.) (2000). How People Learn: Brain,
2. Mind, Experience, and School. Washington, DC: National Academy Press. Burke, K. (2005).
3. Nandra, Inder Dev Singh (2012). Learning Resources and Assessment of Learning. Patiala: 21st Century Publications.
4. Natrajan and Kulshreshta S.P. (1983). Assessing Non-Scholastic Aspects-Learners Behaviour, New Delhi: Association of Indian Universities.
5. NCERT(1985) Curriculum and Evaluation, New Delhi.

PROFESSIONAL EDUCATION-8 (PE-8)

Title: ICT IN TEACHING-LEARNING PROCESS

Course Code– AUBSEV.5

Credits: 02 (1L+1T+0P)

Contact hours per week: 02

Exam duration: 1:30 Hrs

Max. Marks: 50

Internal: 20

End Term Exam: 30

Course objectives:

The student-teachers will be able to:

1. Understand the concept and role of ICT in construction of Knowledge.
2. Acquire knowledge and understanding about National Policy on Education.
3. Identify the challenges in integration of ICT in school education.
4. Understand computer fundamentals.
5. Apply different Hardware Technologies in Modern Educational Practices.
6. Familiarize with the new trends in ICT.

UNIT I Introduction to ICT and Computer Fundamentals

- Concept of ICT: Meaning & Characteristics; Role of Information Technology in Construction of Knowledge.
- National Policy on ICT in School Education; Challenges in Integrating ICT in School Education.
- Computer Fundamentals: Meaning, Components & Types of Computer, Functions of Operating System, Application Softwares.
- Computer Application in Learning: Concept, Features and Advantages of Word (WordProcessor); Excel (Spreadsheets) and PowerPoint (Slide Preparation & Presentation).

UNIT II ICT in Teaching - Learning Process

- Hardware Technologies and their Applications: Overhead Projector (OHP); Preparing Transparencies, Slide Projector, Audio-Video Recording Instruments.
- Hardware Technologies and their applications: DLP Projector, Movie Projector, Close Circuit Television (CCTV).
- New Trends in ICT: Concept, Elements and Advantages of Smart Classroom, EDUSAT.
- Internet & Online Learning Resources (e- Library, Websites, Web 2.0 Technology and Open Educational Resources) in learning.

Activities (Any one of the following):

1. Prepare your Curriculum Vitae using computer and obtain its printout.
2. Visit an institution having interactive white board and learn its features and functioning and prepare a report.
3. Prepare a Powerpoint presentation for secondary school students.

Suggested Readings:

1. Barton, R.(2004), Teaching Secondary Science with ICT. New Delhi: McGraw-Hill International
2. Bhaskara Rao. Digumarti (2013): Vidya. Samachara Sankethika Sastram (ICT in Education). Guntur masterminds, Sri Nagarjuna Publishers.
3. Denis, Kim, Sen and Morin (2000). Information Technology - The Breaking Wave New Delhi: Tata McGraw-Hill Publishing Co. Ltd.
4. Department of School Education and Literacy. MHRD (2012). National Policy on Information and Communication Technology (ICT) In School Education, New Delhi
5. Mangal, S.K. & Uma Mangal (2009). Essentials of Educational Technology. New Delhi PHI Learning P. Ltd.

PROFESSIONAL EDUCATION-9 (PE-9)

Title: INCLUSIVE SCHOOL

Course Code– AUBSEV.6

Credits: 02 (1L+1T+0P)

Contact hours per week: 02

Exam duration: 1:30 Hrs

Max. Marks: 50

Internal: 20

End Term Exam: 30

Course Objectives:

The student teachers will be able to:

1. Understand the concept, nature and types of disabilities.
2. Identify the characteristics and need, identification of different types of disabled children.
3. Understand the concept, nature and approaches of inclusion in education.
4. Understand and reflect on models of inclusion in education.
5. Acquire knowledge and understanding about the provisions made for disabled children under SSA and RTE Act, 2009.
6. Understand different pedagogical and assessment techniques for inclusion of CWSN.
7. Employ different pedagogical approaches for inclusion of CWSN in regular schools.

Unit-1 Disabilities and Inclusion in Education

- Disability: Concept and Nature; Disabled Children: Types, Characteristics and their identification.
- Inclusion in Education: Meaning, Need, Scope and Advantages.
- Constitutional Provisions for Inclusion in Education: Sarva Shiksha Abhiyan and Right to Education Act, 2009. Infrastructural Facilities required for Inclusion in Schools: Concept of Resource Room.
- Approaches to Inclusion: Full Inclusion and Partial Inclusion; Models of Inclusion: Consultant Model, 3-Dimensional (3D) Model of Inclusion: Ways of Ensuring Community/Parents' Participation in Creating Inclusive Schools.

Unit - 2 Pedagogical and Assessment Approaches for Creating Inclusive Schools

- Pedagogical Approaches for CWSN: Curriculum Adaptation, Activity-based Learning, Developing Specially Designed Resource Materials, Collaborative and Cooperative Learning, Team Teaching.
- Assessment Approaches for CWSN: Observation, Continuous and Comprehensive Assessment (Formative and Diagnostic Assessment).
- Identifying Barriers to Learning and Participation of CWSN.
- Means of Providing Remedial Instruction and Feedback; Role of School Head and Teachers in Evolving Inclusive Practices and Developing Inclusive Values.

Activity (Any one of the following):

1. Visit a primary school in your locality and identify the pedagogical practices employed by the teachers for inclusion of CWSN. Prepare a detailed report highlighting pedagogical practices, their relevance and difficulties faced by teachers.
2. Visit a School where resource room has been established by the State Govt. Interact with the in-charge of resource room and prepare a report highlighting its layout, types of equipment and their usage by the teachers for imparting education in inclusive settings.

Suggested Readings:

1. Alur, Mithu and Bach, Michael (2009). The Journey for Inclusive Education in the Indian Sub-Continent. New York: Routledge.)

2. Das, Shankar and Kattumuri, Ruth (2013). Inclusive Education: A Contextual Working Model. New Delhi: Concept Publishing Company)
3. Friend, M. and Bursuck, W. D. (1999), Including Students with Special Needs: A Practical Guide for Classroom Teacher. Boston: Allyn and Bacon.)
4. Mangal, S. K. (2009) Educating Exceptional Children: An Introduction to Special Education. New Delhi: Prentice Hall

SIXTH SEMESTER

CORE COURSE-1F PHYSICS

Title: THERMAL & LOW TEMPERATURE PHYSICS

Course Code– AUBSEVI.1A

Credits 05 (4L+0T+1P)

Max. Marks: 150 (Theory: 100 Practical: 50)

Contact hours per week: 06

Internal: 60 (Theory: 40 Practical: 20)

Exam duration: 03:00 Hrs (Each T & P) End Term Exam: 90 (Theory: 60 Practical: 30)

Objective: To learn laws of thermodynamics, entropy, and Maxwell's thermodynamic relations.

Course Outcomes: After completion of the course, student will be able to understand

1. laws of thermodynamics, entropy, and Maxwell's thermodynamic relations etc.
2. the Kinetic theory of gases-distribution of velocities, molecular collisions in Physics.
3. The basics of real gases.

Course Content:

Unit I

Kinetic Theory of Gases: Maxwell's speed distribution, Mean free path, flow and Thermal conduction in gases. Real gases, Equation of state, Virial coefficients, Vander Waals equation, Joule Thomson effect, Inversion temperature, Thermodynamic equations for a Vander Waals gas.

Unit II

Thermodynamics: Reversible and irreversible processes, Examples of thermal, mechanical and chemical irreversibility, Carnot's cycle and Carnot's theorem. Second law of thermodynamics, Thermodynamic scale of temperature. Concept of entropy, Entropy change in reversible and irreversible processes. Entropy and disorder, Principle of increase of entropy, Entropy and unavailable energy, Entropy of ideal gases, Entropy as a thermodynamic variable, S-T diagram.

Unit III

Maxwell's Thermodynamics Equations and Radiation: Maxwell's thermodynamical equations and their applications. Energy and heat capacity equations Clapeyron equations, Application to sublimation, vaporization and freezing processes, Heat capacity of saturated vapours. The black body spectrum, Wien's displacement law, Rayleigh-Jean's law, Planck's quantum theory of radiation.

Unit IV

Some Systems at Low Temperatures: Low temperature technique, Use of liquid air and other liquefied gases, Super fluidity in HeII, Bose-Einstein Condensation in atomic clouds. Trapping and cooling of atoms, Superconductivity, Soft and Hard superconductors, Specific Heat and energy band gap for superconductors, Applications and Examples of superconductors.

Production and Measurement of Low Temperatures: Adiabatic throttling of gases, liquefaction of H₂ and He, Solidification of He. Liquid He II, Thermodynamics of phase-transition, Adiabatic demagnetization, Temperatures below 0.01K, Low temperature thermometry..

Text Books:

1. Heat and Thermodynamics: K. W. Zeemansky.
2. Thermal Physics: B.K. Agarwal.
3. Heat and Thermodynamics: Brij Lal and N. Subramanyam.
4. Solid State Physics, Pillai.

Reference Books:

1. Heat and Thermodynamics: Dayal, Verma and Pandey.

2. A Treatise on Heat: M. N. Saha and B.N. Srivastava.

* Latest editions of all the suggested books are recommended.

PRACTICAL SYLLABUS

Title: THERMAL & LOW TEMPERATURE PHYSICS LAB

Course Code– AUBSEVI.1AP

LIST OF EXPERIMENTS:

Note: Select any ten experiments from the following list

1. To determine J by Callender and Barne's constant flow method.
2. To determine the Coefficient of Thermal Conductivity of Copper by Searle's Method.
3. To determine the Coefficient of Thermal Conductivity of Copper by Angstrom's Method.
4. To determine the Coefficient of Thermal Conductivity of a bad conductor by Lee and Charlton's Disc method.
5. To determine the Temperature Coefficient of Resistance by Platinum Resistance Thermometer (PRT).
6. To calibrate a Resistance Temperature Device (RTD) to measure temperature in a specified Range using Null Method/ OffBalance Bridge with Galvanometer based measurement.
7. To study the variation of ThermoEmf of a Thermo couple with Difference of Temperature of its two Junctions.
8. To Calibrate a Thermo couple to measure Temperature in a Specified Range using Null Method.
9. Direct Measurement using an OpAmp Difference Amplifier and to determine Neutral Temperature.
10. To determine the value of Boltzmann Constant by studying Forward Characteristics of a Diode.
11. To determine the value of Stefan's Constant.

Evaluation Scheme of Practical Examination:

Internal Evaluation (20 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 4-point scale which would include the practical conducted by the students and a Viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PER FORMANCE &VIVA DURING THE SEMESTER (20MARKS)				TOTAL
EXPERIMENT (05 MARKS)	FILE WORK (05MARKS)	ATTENDANCE (05MARKS)	VIVA (05MARKS)	INTERNAL (20 MARKS)

External Evaluation (30 Marks)

The external evaluation would also be done by the external Examiner based on the experiment conducted during the examination.

Experiment	File work	Viva	Total
(10 MARKS)	(10 MARKS)	(10 MARKS)	(30 MARKS)

CORE COURSE-2F CHEMISTRY

Title: PHYSICAL AND ORGANIC CHEMISTRY

Course Code– AUBSEVI.2

Credits 05 (4L+0T+1P)

Max. Marks: 150 (Theory: 100 Practical: 50)

Contact hours per week: 06

Internal: 60 (Theory: 40 Practical: 20)

Exam duration: 03:00 Hrs (Each T & P) End Term Exam: 90 (Theory: 60 Practical: 30)

Unit-I

Spectroscopy: Regions of spectrum, Born-Oppenheimer approximation, degree of freedom.

Rotational spectrum: Diatomic Molecules, Energy level of rigid rotor, selection rules, Spectral intensity, Maxwell-Boltzmann distribution, Qualitative description of non-rigid rotor, Isotope effect.

Vibrational spectrum: Infrared spectrum, Energy levels of simple harmonic oscillator, Selection rules, Pure vibrational spectrum, Intensity, Determination of force constant and qualitative relation of force constant and bond energies, Effect of an harmonic motion and isotope on the spectrum, Idea of vibrational frequencies of different functional groups.

Electronic spectrum: Concept of potential energy curve for bonding and antibonding molecular orbital, qualitative description of selection rules and Franck-Condon principle.

Unit-II

Photochemistry: Interaction of radiation with matter, Difference between thermal and photo chemical processes.

Laws of photo chemistry: Grothius-Draper law, Stark-Einstein law, Jablonsky diagram depicting various processes occurring in the excited states, Fluorescence, Phosphorescence, Photosensitized reactions-energy transfer processes.

Physical properties and molecular structure: Polarization-Clausius-Mossotti equation, Orientation of dipoles in an electric field, Magnetic properties, Paramagnetism, Diamagnetism and Ferromagnetism.

Unit-III Spectroscopy: Ultraviolet (UV) absorption spectroscopy-absorption laws (Beer-Lambert law), Presentation and analysis of UV spectra, Types of electronic transition, Effect of conjugation, Concept of Chromophore and Auxochrome. Bathochromic, Hypsochromic and Hypochromic shift.

Infra-red (IR) absorption spectroscopy, Hook's law, selection rules, Position of IR bands, Measurement of IR spectrum, Finger print region, Characteristic absorption of various functional groups and interpretation of IR spectra of simple organic compound.

Nuclear magnetic resonance (NMR) spectroscopy, Proton magnetic resonance (¹HNMR) spectroscopy, Nuclear shielding and deshielding, Chemical shift, Spin-spin splitting and coupling constant. Interpretation of PMR spectra of simple organic molecules such as ethanol, acetaldehyde, 1,1,2-tribromomethane.

Unit-IV Photo chemistry and Heterocyclic Compounds

Scope and importance, Photochemical and Thermochemical reactions, Jablonski diagram.

Molecular orbital picture and aromatic characteristics of pyrrole, furan, thiophene and pyridine, Nucleophilic substitution reactions in pyridine derivatives, Comparison of basicity of pyridine, piperidine and pyrrole. Reactions of indole, quinoline and isoquinoline with special reference to Fisher indole synthesis and Bischler-Napieralski synthesis, Mechanism of electrophilic substitution reaction of indole quinoline and iso quinoline.

Suggested Books:

1. Physical Chemistry by S. C. Khetarpal, G.S, Sharma and R.K. Kalia.
2. A text Book of Physical Chemistry by K. K. Sharma and I. K. Sharma.
3. Physical Chemistry by P. N. Kapil and S. K. Guglani.
4. Surface Chemistry by Adison, L. I. Osipow.
5. Organic Chemistry by Paula YurkanisBruice.
6. Organic Chemistry by F. A. Carey, Tata McGraw Hill.
7. Organic Chemistry by Robert T. Morrison & Robert N. Boyd, Prentice Hall of India Pvt. Ltd.

PRACTICAL SYLLABUS
Title: PHYSICAL AND ORGANIC CHEMISTRY LAB
Course Code– AUBSEVI.2P

List of Experiments:

1. Determination of molecular weight by Rast’s method.
2. Study of Hydrolysis of Methyl Acetate in the presence of HCL acid at room temperature.
3. Identification of Sugar (Glucose, Fructose, Sucrose, Lactose) by paper Chromatography.
4. Qualitative analysis of Ions (Cu^{++} , Cd^{++} , Ni^{++} , and Co^{++}) by paper Chromatography.

Evaluation Scheme of Practical Examination:

Internal Evaluation (20 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 4-point scale which would include the practical conducted by the students and a Viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PER FORMANCE &VIVA DURING THE SEMESTER				TOTAL
(20MARKS)				
EXPERIMENT (05 MARKS)	FILE WORK (05 MARKS)	ATTENDANCE (05MARKS)	VIVA (05MARKS)	INTERNAL (20 MARKS)

External Evaluation (30 Marks)

The external evaluation would also be done by the external Examiner based on the experiment conducted during the examination.

Experiment	File work	Viva	Total
(10 MARKS)	(10 MARKS)	(10 MARKS)	(30 MARKS)

CORE COURSE-3F MATHEMATICS

Title: NUMERICAL ANALYSIS

Course Code– AUBSEVI.3A

Credits 05 (4L+0T+1P)

Max. Marks: 150 (Theory: 100 Practical: 50)

Contact hours per week: 06

Internal: 60 (Theory: 40 Practical: 20)

Exam duration: 03:00 Hrs (Each T & P) End Term Exam: 90 (Theory: 60 Practical: 30)

Unit-I

Solution of equation, Bisection method, Secant method, Regula Falsi method, Newton's method, LU decomposition.

Unit-II

Gauss Elimination method, Gauss-Jacobi method, Gauss-Siedel method, Lagrange and Newton interpolation: linear and higher order.

Unit-III

Finite difference operators, Numerical Differentiation: Newton's forward difference and backward difference method, Sterling's central difference method. Taylor's series method, Euler's method, Modified Euler's method, Runge-Kutta methods of orders two and four.

Unit-IV

Numerical Integration: Trapezoidal rule, Simpson's $1/3^{\text{th}}$ rule, Simpson's $3/8^{\text{th}}$ rule, Gauss Quadrature Formulas.

Suggested Books:

1. B. Bradie, A Friendly Introduction to Numerical Analysis, Pearson Education, India, 2007.
2. M.K. Jain, S.R.K. Iyengar and R.K. Jain, Numerical Methods for Scientific and Engineering Computation, 6th Ed., New age International Publisher, India, 2007.

PRACTICAL SYLLABUS

Title: NUMERICAL ANALYSIS LAB

Course Code– AUBSEVI.3AP

List of Practicals (using any software)

- (i) Calculate the sum $1/1+1/2+1/3+\dots\dots\dots+1/N$.
- (ii) Bisection Method.
- (iii) Newton Raphson Method.
- (iv) LU decomposition Method.
- (v) Regula Falsi Method.
- (vi) Simpson's rule.

Evaluation Scheme of Practical Examination:**Internal Evaluation (20 marks)**

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 4-point scale which would include the practical conducted by the students and a Viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PER FORMANCE &VIVA DURING THE SEMESTER (20MARKS)				TOTAL
EXPERIMENT (05 MARKS)	FILE WORK (05 MARKS)	ATTENDANCE (05MARKS)	VIVA (05MARKS)	INTERNAL (20 MARKS)

External Evaluation (30 Marks)

The external evaluation would also be done by the external Examiner based on the experiment conducted during the examination.

Experiment	File work	Viva	Total
(10 MARKS)	(10 MARKS)	(10 MARKS)	(30 MARKS)

PROFESSIONAL EDUCATION-10(PE-10)

Title: CONTEMPORARY INDIA AND EDUCATION

Course Code– AUBSEVI.4

Credits: 04 (3L+1T+0P)
Contact hours per week: 04
Exam duration: 3:00 Hrs

Max. Marks: 100
Internal: 40
End Term Exam: 60

Course objectives:

The student-teachers will be able to:

1. Understand the Constitutional Provisions for Education in India.
2. Understand the Fundamental Rights, Duties and Directive Principles of the State Policy.
3. Develop competencies to understand the various issues related to Education and remedial measures.
4. Understand the Constitutional provisions for inequality, discrimination and marginalization in UEE.
5. Understand the importance of Education for the marginalized groups
6. Acquaint with the policy initiatives, educational policies and programme in Contemporary India.

Unit -1 Education and the Indian Constitution.

- Indian Constitution: Preamble, Rights and Duties, Directive Principles of the State Policy and Aims of Education as per Constitutional Values; Constitutional Provisions for Education: Article 14, 15, 21A, 45, 46 and 51A (K).

Unit-2 Inequality, Discrimination and Marginalization in Universalization of Education.

- Equality of Educational Opportunities: Meaning, Objectives and Scope.
- Discrimination: Meaning, Factors and Constitutional Safeguards.
- Right to Education: Historical Development, Provisions, issues and Challenges in implementation.
- Education of the Marginalized Groups (Women and Socially Disadvantaged): Status, Issues and Constitutional Provisions.

Unit-3 Policy Initiatives for Universalization of Elementary Education.

- Kothari Commission (1964-66) and NPE (1986 -1992) and Recommendations for UEE.
- Operation Blackboard: Concept and Provision.
- DPEP and SSA: Objectives, Provisions, Implementation and Evaluation.
- MDM: Objectives, Implementation and Problems.

Unit :4 Emerging Concerns and Education

- Education for Environmental Conservation: Global Environmental Crises, Local Environmental Issues, Steps for Environmental Conservation and Regeneration.
- Liberalization, Globalization and Privatization and their Impact on Indian Education.
- Social Basis of Education in the Context of Society, Culture and Modernity.

Activities (Any One of the following)

1. Presentation on various National Educational Policies.
2. Preparation of reports on the State and Centrally Sponsored Schemes of Education like SSA, RMSA, MDM.
3. Conduct surveys on Educational problems at school level.

REFERENCES:

1. Aggarwal J.C.(1984). Implementation of the Major Recommendations of the Education Commission 1964-66 and The New Pattern of Education India: New Delhi: Arya Book Depot.
2. Bhakshi P.M., (1998). The Constitution of India, New Delhi: Universal Law Publishing Company.
3. Bakshi, P.M. Basu, (2010). Constitution of India (2nd ed.) Delhi: Universal Law Publishing Co.

4. The Constitution of India Bare Act (2010). Delhi: Universal law Publishing Co.
5. Govt. of India (1986). National Policy of Education, MHRD, New Delhi. Govt. of India (1992). Programme of Action (NPE). MHRD, New Delhi.
6. NCERT (1986). School Education in India. Present Status and Future Needs, New Delhi: NCERT Publication. Jan Bostock, Barry K. Gills (2013). The Globalization of Environmental Crisis. New York:Routledge, Publication.

PROFESSIONAL EDUCATION-11 (PE-11)

Title: TEACHING OF PHYSICAL SCIENCES-1

Course Code– AUBSEVI.5A

Credits: 02 (1L+1T+0P)
Contact hours per week: 02
Exam duration: 1:30 Hrs

Max. Marks: 50
Internal: 20
End Term Exam: 30

Course objective:

The student teachers will be able to:

1. Familiarize with nature of physical science.
2. Formulate instructional objectives in behavioral terms.
3. Apply various approaches and methods of teaching physical science.
4. Select and integrate various kinds of instructional media.

UNIT-I: Foundations of Physical Science

-Meaning, Nature and Scope of Physical Science.
-Aim and Objectives of Teaching Physical science; Taxonomy of Educational objectives; Writing Instructional objectives in behavioral terms.
-Importance of Physical Sciences as a Subject of the School Curriculum.
-Brief life history of Eminent Indian Scientists and their contributions-C.V.
Raman, J.C. Bose, Satyendranath Bose, Vikram sarabhai, Homi Jahangir Bhabha, A.P.J. Abdul Kalam.

UNIT-II : Curriculum, Methods and Approaches of Teaching Physical Sciences.

-Curriculum in Physical Science: Meaning, Objectives, Principles and steps of Curriculum construction.
- Process of Evaluation of Physical Science Curriculum at School Level.
-Methods of teaching Physical Science with Reference to lecture, Lecture-Cum- Demonstration, Project Method, Problem Solving Approach, Laboratory, Heuristic and Inductive-Deductive Approach, CAI.
-Activity Approaches and Non-Formal Methods of teaching Physical Science in terms of Field trips, Sciences Club, Science, Museum, Science Fairs.

Activity (Any one of the following)

1. Preparation of low cost and no cost teaching aids and studying their effectiveness a classroom transaction.
2. Developing a unit plan of own choice.
3. Prepare a report on critical analysis of physical sciences curriculum prescribed by HPBSE/CBSE for secondary school stage.

Suggested Readings:

Das, R.C. (1989): Science Teaching in Schools, New Delhi: Sterling Publishers:

Kumar, Amit (2002): Teaching of Physical Science, New Delhi: Anmol Publications,.
Mangal, S.K.(1997): Teaching of Science, New Delhi: Arya Book Depot.
Mohan, Radha (2002): Innovative Physical Science Teaching Methods. New Delhi: P.H.I.
Sharma, R.C.(1998): Modern Science of Teaching, New Delhi: Dhanpat Rai and Sons,. Vaidya,
Narendera (1996): Science of teaching for 21st Century, New Delhi: Deep and Deep Publishers.

PROFESSIONAL EDUCATION-12 (PE-12)

Title: TEACHING OF MATHEMATICS-1

Course Code– AUBSEVI.6A

Credits: 02 (1L+1T+0P)
Contact hours per week: 02
Exam duration: 1:30 Hrs

Max. Marks: 50
Internal: 20
End Term Exam: 30

Course objective:

The student teachers will be able to:

1. Understand the nature and characteristics of Mathematics.
2. Know the importance and values of teaching Mathematics.
3. Understand the relationship of mathematics with other subjects of school curriculum.
4. Understand aims and objective of teaching mathematics at school stage.
5. Stage objective in behavioral term with reference to concepts and generalizations.
6. Understand the contribution made by Indian and Western mathematician.
7. Apply various methods of teaching of mathematics.
8. Differentiate between method and techniques of teaching mathematics.

Unit 1.: Foundations of Mathematics Education.

- Mathematics: Meaning, Nature, Importance and Place of Mathematics in Daily Life and School Curriculum.
- Aims and Objectives of Teaching Mathematics: Concept and Meaning, General Aims of Teaching Mathematics, Formulation and Classification of Objectives in Behavioral terms with reference to Cognitive, Psycho-motor and Affective Domains.
- Concept of Vedic Mathematics, Contributions of Indian Mathematicians:
- Bhaskaracharya, Aryabhatta and Rtamanujam; Contributions of Western Mathematics: John Venn and Pythagoras.
- Curriculum Construction in Mathematics, Selection and Organization, Factors affecting change in Mathematics Curriculum, Process of Evaluation of Mathematics Curriculum at School Level.

Unit2: Teaching Methods/ Approaches and Techniques.

- Methods of Teaching Mathematics: Project Method, Problem Solving and Laboratory Method.
- Approaches of Teaching Mathematics: Inductive-deductive, Analytic-synthetic, Heuristic.
- Techniques and strategies of teaching Mathematics: Drill and Practice, Assignment, Homework, Supervised study, Play way Technique and Activity Based Technique.
- Strategies for Teaching of Mathematics to CWSN (Gifted, Slow Learners, Learners with Dyscalculia), Difficulties Faced by the Teachers in Teaching of Mathematics and Suggestive measures to overcome them.

Activity (Any one of the Following)

1. Prepare any one self – made working (3-dimensional) teaching model from locally available resources for the teaching of mathematics at senior secondary stage.

2. Power point presentation on any one topic of mathematics of standard VI to X.
3. Prepared a report on critical analysis of Mathematics curriculum prescribed by HPBSE/CBSE for secondary school stage.

Suggested Readings

Aggarwal S.M. (2005). Teaching of Modern Mathematics, Delhi: Dhanpat Rai and Sons.Nanda,

N.N.(1972).Teaching Mathematics, Ludhiana; Sharda Brothers.

NCERT, A Textbook of Content-cum- Methodology of Teaching Mathematics, New Delhi Rai, B.C.(1978).

Teaching of Mathematics, Lucknow; Prakashan Kendra.

Rawat, M.S. (1982).Ganit Shikshan, Agra ; Vinod Pustak Mandir.

Reymond, B. (2000). Math-tricks, puzzles and games. New Delhi: Orient Paperbacks Sharan, R., & Sharma M.

(2006). Teaching of Mathematics. New Delhi: A.P.H. Publishing Corporation.

Sidhu, K.S. (2006). The Teaching of Mathematics, New Delhi: Sterling Publishers private Ltd. Singhj, M

(2006). Modern Teaching of mathematics, New Delhi: Anmol Publications Pvt. Ltd.

Suxen, R.C. (1970). Curriculum and Teaching of Mathematics in Secondary School, New Delhi: NCERT.

PROFESSIONAL EDUCATION SCHOOL INTERNSHIP-1 (PESI-1)

Title: SCHOOL INTERNSHIP-1

(Preliminary School Engagement)

Course Code– AUBSEVI.7

Credits: NIL

Duration: 04 Weeks

Grading: Four Point

Evaluation: Internal

Objectives:

- ❖ To familiarize the student teachers to school environment, its structure, functions and processes.
- ❖ To provide field experience of assessment practices including record maintenance and report cards followed in schools at elementary and secondary levels.
- ❖ To familiarize student teachers with classroom processes and skills employed in teaching-learning process.
- ❖ To familiarize the student teachers with different types of schools existing in the community.
- ❖ Understand learners coming from diverse backgrounds.
- ❖ Analyze the availability of physical and learning facilities which function as the curriculum resources at secondary level.
- ❖ Analyze the relevance of principles of curriculum organization and transaction to actual implementation process of curriculum in schools.

Course Content:

The school internship shall be of one month (4 weeks) duration during this semester of the course. These four weeks shall include an initial phase of one week meant for orientation of student-teachers about the school, its management structure, functioning and organization of co-curricular activities. The second 10 week of practice teaching will include study of maintenance of various school records (eg. CCE records, admission-withdrawal registers, attendance records, stock registers etc.). The student-teachers will prepare separate reports on school management, its functioning and maintenance of different records by both the school authorities. The third and fourth weeks will include observation of senior teachers of the school by the student teachers. The candidates will prepare twenty observation lessons (10 in each teaching subject) and get them verified from the concerned senior teacher. Feedback will be provided to the candidates on his/her performance by the school teachers and teacher educator of the institution concerned in which the student is studying.

The student-teachers will prepare and submit following reports / lessons which will be graded by the concerned teacher educator / institution on a four points letter grading scale i.e. A, B, C and D (excellent, very good, good and satisfactory).

1. Report on school organization and management structure.
2. Report on Maintenance of various school records.
3. 20 Observation Lessons (10 per teaching Subject) of School Teachers.

Evaluation: All assessments are internal

SEVENTH SEMESTER

GENERIC ELECTIVE-2A (GE-2A) INDIAN CONSTITUTION AND HUMAN RIGHTS

Title: INDIAN CONSTITUTION AND HUMAN RIGHTS-1

Course Code: AUBSEVII.1

Credits: 02 (2L+0T+0P)

Contact hours per week: 02

Exam duration: 1:50 Hrs

Max. Marks: 50

Internal: 20

End Term Exam: 30

Objectives:

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

- i. know the importance, preamble and salient features of Indian Constitution.
- ii. appreciate the significance of Fundamental Rights, Duties and Directive Principles of State Policy.

Transaction Mode: Through Lectures, Group discussions, Interactive sessions, field activities and use of Education Technology.

Course Content:

Unit I: Meaning and Importance of the Constitution:

Preamble, Salient features, Constituent Assembly and the Spirit of the Indian Constitution.

Unit II: Fundamental Rights, Duties and Directive Principles:

Fundamental Rights, Fundamental Duties, and the Directive Principles of the state policy of the Indian Constitution.

References:

1. Pylee, M. V, Indian Constitution, OUP, New Delhi.
2. Granville Austin, Indian Constitution, OUP, New Delhi.
3. Rajani Kotari, Politics in India, OUP, New Delhi.
4. Johari, J C, Indian Government and Politics.
5. Maheswari, S. R, Local Governments in India (Latest Edition).
6. Arora, R.K, and Rajani Goyal, Indian Public Administration 1995.
7. Bhambri, C. P, Introduction to Indian Constitution.
8. Subash C Kashyap, The Working of Indian Constitution, NBT, New Delhi.
9. Subash C Kashyap, Our Parliament, NBT, New Delhi.
10. Granville Austin, Functioning of the Indian Constitution, NBT, New Delhi.
11. Bipan Chandra, India after Independence, Roopa, New Delhi. 2000.
12. Arjun Dev, Source Book on Human Rights, NCERT, New Delhi.
13. Human Rights in India: Theory and Practice, National Book Trust, 2001.

PROFESSIONAL EDUCATION-13 (PE-13)

Title: TEACHING OF PHYSICAL SCIENCES-2
Course Code– AUBSEVII.2A

Credits: 02 (1L+1T+0P)

Contact hours per week: 02

Exam duration: 1:30 Hrs

Max. Marks: 50

Internal: 20

End Term Exam: 30

Course objectives:

The student teachers will be able to:

1. Select and integrate various kinds of instructional media.
2. Organize various co-curricular activities.
3. Select appropriate text books.
4. Explain the concept of evaluation.
5. Plan lessons in physical science.

UNIT-I: Learning Resources in Physical Sciences.

-Text Books- Meaning, Types, Importance, Uses and Evaluation of Text Books.

-Laboratory Materials-Importance, Planning, Designing and Maintenance of Different type of Laboratory Materials, Common Accidents and their prevention in Science Laboratories.

-Journals, Handbooks, Student's Works Books, Display-Slides, Audio-Visual Support Material, Smart Classrooms, e- learning Resources.

-Teaching Aids: Classification of Teaching Aids and Their Description. Importance of Teaching Aids in Teaching Physical Science: Preparation and Development of Low Cost Improvised Apparatus.

UNIT-II: Planning for Teaching, Assessment and Evaluation.

-Unit and Lesson Planning: Need, Advantages, Steps, Various Approaches and Strategies of Lesson Planning.

-Meaning and Difference between Assessment and Evaluation; Evaluation in Physical Sciences-Importance and Types of Evaluation viz. Formative and Summative.

-Common Difficulties in learning Physical Science and Remedial measures-procedures in preparation of Criterion Reference and Norm Referenced Tests.

-Evaluating Outcomes of Science Teaching; Preparing Different Type of Test Items and Their Advantage and Limitations; Diagnostic Testing and Remedial Teaching.

Activity (Any one of the following)

-Seminar on contribution of eminent Indian Scientists to science and their implication in science advancement.

-Developing an action plan for organization of a science exhibition, framing guideline on a selected theme and various sub-themes.

Suggested Readings:

Das, R.C. (1989): Science Teaching in Schools, New Delhi: Sterling Publishers. Kohli, V.K. (1998): How to Teach Science, Ambala: Vivek Publishers,.

Kumar, Amit (2002): Teaching of Physical Sciences, New Delhi: Anmol Publications,.

Mangal, S.K. (1997): Teaching of Science, New Delhi: Artya Book Depot.

Mohan, Radha (2002): Innovative Physical Science Teaching Methods. New Delhi: Sharma, R.C. (1998): Modern Science of Teaching, New Delhi: Dhanpat Rai and Sons,.

Kulshreshtha, R.P. (2010): Teaching Physical Science. Meerut: R. Lall.

PROFESSIONAL EDUCATION-14 (PE-14)

Title: TEACHING OF MATHEMATICS-2
Course Code– AUBSEVII.3A

Credits: 02 (1L+1T+0P)
Contact hours per week: 02
Exam duration: 1:30 Hrs

Max. Marks: 50
Internal: 20
End Term Exam: 30

Course Objectives:

The student teachers will be able to:

1. Identify learning difficulties in Mathematics and adopt appropriate remedial measures.
2. Understand the characteristics and strategies for teaching children with special needs in Mathematics.
3. Explain the importance and uses of learning resources in Mathematics.
4. Appreciate the importance of Mathematics laboratory in learning Mathematics.
5. Understand the role of text book, exhibition and fairs in Mathematics.
6. Prepare unit and lesson plans for teaching of Mathematics.
7. Construct assessment tools for evaluation Mathematics learning.

Unit 1: Teaching and Learning Resources in Mathematics.

- Mathematics Learning Resources: Need and Importance, Importance and Organization of Mathematics Club, Mathematics Exhibition and Mathematics Fairs, and Importance and Setting up of Mathematics Laboratory/ Resource Centre.
- Importance of Various Teaching Aids in Mathematics: Developing/ Preparing Low Cost improvised Teaching Aid relevant to Local Ethos, Roles of Models, Charts, Chalk board, Instruments, Work Book, Geometry box, Educational CD/DVD ROMS, and Use of Smart Classroom.
- Text book: Qualities of a Good Text Book in Mathematics, Evaluation of Mathematics Text Book prescribed by Himachal Pradesh Board of School Education/CBSC for Elementary and Secondary Stage.
- Recreational Mathematics-Riddles, Puzzles, Beautiful Number Patterns and magic Squares.

Unit 2: Planning for Teaching and Evaluation in Mathematics.

- Unit and Lesson Planning: Meaning, Need and Importance, Principles and Steps in Lesson Planning, Essentials of a Good Lesson Plan.
- Various Approaches for Development of Composite Lesson Plans with Special Reference to Arithmetic, Algebra, Geometry, Trigonometry and Statistics.
- Evaluation in Mathematics: Meaning and types: Formative, Summative and Diagnostic, Continuous and Comprehensive Evaluation: Concept and Techniques with reference to Mathematics.
- Construction of Objective and Essay Type Tests, Development of Achievement Test in Mathematics, Qualities of a good Achievement Test (Reliability, Validity, Objectivity).

Activity (Any One of the following)

- Preparation of Case Study of Show or Gifted Learner in Mathematics.
- Preparation of Enrichment program for gifted children in Mathematics.
- Construction of Achievement Test.
- Diagnosis of Learner Difficulty in Mathematics and preparation of remedial exercise.

Suggested Readings.

- Aggarwal, S.M. (2005). Teaching of Modern Mathematics, Delhi: Dhanpal Rai and Sons.
- Nanda, N.N. (1972). Teaching Mathematics, Ludhiana; Sharda Brothers. NCERT, A Textbook of Content-cum-Methodology of Teaching Mathematics, New Delhi.
- Rai, B.C. (1978). Teaching of Mathematics, Lucknow; Prakashan Kendra.
- Rawat, M.S. (1982). Ganit Shikshan, Agra; Vinod Pustak Mandir.
- Reymond, B. (2000). Math-Tricks, Puzzles and Games. New Delhi: Orient Paper Backs Sharan, R., & Sharma, M. (2006). Teaching of Mathematics. New Delhi: A.P.H. Publishing Corporation.
- Siddizui, M.H. (2005). Teaching of Mathematics, New Delhi: A.P.H. Publishing Corporation.
- Sidhu, K.S. (2006). The Teaching of Mathematics, New Delhi: Sterling Publishers Private Ltd.
- Singh, M. (2006). Modern Teaching of Mathematics, New Delhi: Anmol Publications Pvt. Ltd.
- Suxen, R.C. (1970). Curriculum and Teaching of Mathematics in Secondary School, New Delhi: NCERT.

**PROFESSIONAL EDUCATION SCHOOL INTERNSHIP-2 & 3
(PESI-2&3)**

**Title: SCHOOL INTERNSHIP-2
(Teaching Practice)**

**Course Code– AUBSEVII.4 Skill in Teaching (School Subject-I)
AND**

Course Code– AUBSEVII.5 Skill in Teaching (School Subject-II)

Credits: 12 (06+06)

Duration: 16 Weeks in a School

Max. Marks: 300 (150+150)

**Evaluation: External 200 (100+100)
Internal 100 (50+50)**

The School Internship in teaching practice in seventh semester of the Course will be of sixteen weeks duration. The student-teachers will prepare and submit following number of lessons which will be examined by the panel of external examiner to be appointed by the University.

- 1. 40 Macro Lessons in Each Teaching Subject (Total 80 Lessons).**
- 2. 20 Observation Lessons in Each Teaching Subject (Total 40 Lessons).**

The student-teachers will produce the file containing micro teaching lessons and simulated teaching lessons, reports of other activities carried out in the school and three handwritten copies of final lesson plans in each teaching subject at the time of final teaching practice examination. The two final lessons delivered by the student teachers along with above mentioned files and reports will be examined by the panel of examiners and due weightage will be given to these records while carrying out evaluation of the student-teachers. The lists of marks of students so evaluated shall be dispatched to the Controller of Examinations and/or Assistant Registrar, Evaluation Branch, Abhilashi University, Chailchowk Mandi (H.P.) immediately after the completion of teaching practice examination. Each of the examiners will be paid remuneration for all the students so evaluated by three examiners. During practice teaching, the student teachers are required to take part in morning assembly of the school, check the home task given to the students and maintain attendance registers of school students.

EIGHTH SEMESTER
GENERIC ELECTIVE-2B (GE-2B)
INDIAN CONSTITUTION AND HUMAN RIGHTS

Title: INDIAN CONSTITUTION AND HUMAN RIGHTS-2

Course Code: AUBSEVIII.1

Credits: 02 (2L+0T+0P)

Contact hours per week: 02

Exam duration: 1:50 Hrs

Max. Marks: 50

Internal: 20

End Term Exam: 30

Objectives:

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

- i. develop an understanding of the strength of the Union Government.
- ii. understand the functioning of the State Government for the unity and the strength of the Democracy.
- iii. know the importance of local self-Government and Panchayati Raj Institutions in India.
- iv. know the meaning, significance, the growing advocacy of Human Rights.

Transaction Mode: Through Lectures, Group discussions, Interactive sessions, field activities and use of Education Technology.

Course Content:

Unit I: Union, State and Local Self Governments:

Union Government: Parliament, the President and Prime Minister: State Government: Governor and the Council of Minister: Judiciary: Functions and Powers: Panchayat Raj System.

Unit II: Human Rights:

Origin and Development of Human Rights, Growing Advocacy and Declining Trends of Human Rights, Rights of Scheduled Casts, Scheduled Tribes, Minorities, Children and Women, Human Rights Defenders, Human Rights Violation and Human Rights Organizations.

References:

1. Pylee, M. V, Indian Constitution, OUP, New Delhi.
2. Granville Austin, Indian Constitution, OUP, New Delhi.
3. Rajani Kotari, Politics in India, OUP, New Delhi.
4. Johari, J C, Indian Government and Politics.
5. Maheswari, S. R, Local Governments in India (Latest Edition).
6. Arora, R.K, and Rajani Goyal, Indian Public Administration 1995.
7. Bhambri, C. P, Introduction to Indian Constitution.
8. Subash C Kashyap, The Working of Indian Constitution, NBT, New Delhi.
9. Subash C Kashyap, Our Parliament, NBT, New Delhi.
10. Granville Austin, Functioning of the Indian Constitution, NBT, New Delhi.
11. Bipan Chandra, India after Independence, Roopa, New Delhi. 2000.
12. Arjun Dev, Source Book on Human Rights, NCERT, New Delhi.
13. Human Rights in India: Theory and Practice, National Book Trust, 2001.

PROFESSIONAL EDUCATION-15 (PE-15)

Title: **KNOWLEDGE AND CURRICULUM**

Course Code– AUBSEVIII.2

Credits: 04 (3L+1T+0P)

Contact hours per week: 04

Exam duration: 3:00 Hrs

Max. Marks: 100

Internal: 40

End Term Exam: 60

Course Objectives:

At the end of this course, students will be able to:

1. Understand the meaning and principles of curriculum.
2. Understand and appreciate curriculum as a means of development of the individual
3. Understand the foundations and evaluation of curriculum,
4. Comprehend the different models of curriculum compare the view point given by different commissions
5. Develop an understanding of the concept, need, scope and functions of school management
6. Develop an understanding of different components of human and material resources of the school

Unit I Knowledge and Education

- Knowledge: Concept, Types and Sources of Knowledge. Distinction between Knowledge and Skill, Teaching and Training, Knowledge and Information, Reason and Belief.
- Bases of Modern Child-centered Education: Concept of Activity, Discovery and Dialogue with reference to Gandhi, Sri Aurobindo, Giju Bhai and Paulo Freire.
- Education in Relation to Modern Values: Equity, Equality, Individual Opportunity and Social Justice with reference to Indian Constitution.
- Concept of Nationalism, Universalization, Secularism and their relationship to Education.

Unit II Basis and Principles of Curriculum

- Curriculum: Meaning, Nature, Need and Characteristics.
- Curriculum Development: Stages and Principles of a Curriculum.
- Bases of Curriculum: Philosophical, Psychological and Sociological.
- Approaches to Curriculum Development Subject-centred Learner-centred and Problem-centred.
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Unit III Model, Patterns and Approaches of Curriculum Designing

- Models of Curriculum Designing: Administrative Line Staff (Taxler), Grassroot-level Planning (Hilda Taba).
- Models of Curriculum Designing: Tyler's Model and Wheel's Model.
- Approaches of Curriculum Development: Concept, Advantages and Limitations of Centralized and Decentralized Curriculum Designing.

Unit IV Curriculum Evaluation

- Evaluation of Curriculum: Need, Importance and Procedure of Curriculum Evaluation.
- Recommendations of Various Commissions: University Education Commission (1948), Secondary Education Commission (1952-53), Education Commission (1964-66) and NPE (1986-1992) with regard to curriculum development.
- NCF (2005) and its recommendations with regard to curriculum evaluation.

Activities (Any one of the following):

1. Evaluation of textbook of secondary level class and prepare a report.
2. Prepare a curriculum of any subject using Hilda Taba approach.

Suggested Readings

1. Aggarwal, Deepak (2007) Curriculum Development Concept Methods and Techniques. New Delhi Book Endave.

2. Aggarwal, J.C. (1967). Education Administration, School Organization and Supervision Delhi: Arya Book
3. Aggarwal, J. C. (2003). Handbook of Curriculum and Instruction, Delhi Doaba Book House
4. Arora, G.L (1984) Reflections on Curriculum. NCERT.
5. Bhatia, K. K & Chadda D. P. C. (1980). Modern Indian Education and its Problems Ludhiana: Prakash Brothers
6. Chopra, RK (1993). Status of Teacher in India, New Delhi: NCERT

PROFESSIONAL EDUCATION-16 (PE-16)

Title: UNDERSTANDING THE SELF

Course Code– AUBSEVIII.3

Credits: 02 (1L+1T+0P)

Contact hours per week: 02

Exam duration: 1:30 Hrs

Max. Marks: 50

Internal: 20

End Term Exam: 30

Course objectives:

At the end of this course, students will be able to:

1. understand self-concept and its importance in human life
2. understand self-confidence and its importance in human life
3. understand the nature, classification, sources, and methods of inculcation of human values
4. understand the role of different agencies in promotion of human values
5. define philosophy of yoga
6. explain the psychological and physiological basis of yoga

Unit 1 The Self and Human Values

- Meaning, Nature and Importance of Self-concept and Self-Confidence in Human Life.
- Human Values: Meaning, Nature, Importance, Sources and Methods of Inculcation of human values.
- Classification of Values.
- Role of Family, Educational Institutions, Community and NGO's in Promotion of Human Values.

UNIT 2: Philosophy and Psychology of Yoga

- Yoga: meaning, nature and importance.
- Concepts of the Prakriti and Purusha (ishwar): Concept and their relation with each other in Sankhya philosophy.
- Ashtanga Yoga of Patanjali.
- Therapeutic Values of Yoga, Yogic Diet & its Impact on Health, Asanas and their effects to promote a sound physical and mental health.

Activity (Any one of the Following)

1. Preparation of Scrap Book on any six major Yoga /Asanas with their benefits.
2. Select a story/ an episode / an incident from an epic or any situation and analyse the human values integrated in it.
3. Preparation of scrap book on any five human Values.

Suggested Readings:

1. Goel, A and Goel, S.L. (2005), Human Values and Education Deep and Deep Publications Pt. Ltd. New Delhi
2. Gokak, V.K. (1973). A Value Orientation to our System of Education, New Delhi: M.M. Gulb and Sons
3. Gore. M.W. (2005) Anatomy and Physiology of Yogic Practices, Kaivalyadhama, Lonavla
4. Gayal, B.R. (1979), Document on Social, Moral and Spiritual Values in Education. New Delhi:NCERT
5. Joshi, Kireet (1976). Education for Personality Development, New Delhi: NCERT, (NIE Lecture Series)
6. Katoch S.K. (2013) Manviya Mulya, Paryavaran Aur Manvadhikar Shiksha", Chandigarh Mohindra Capital Publishers (P) Ltd.
7. NCERT. (2000), Education for Values Development, Chapter 5, In National Curriculum Framework for School Education, New Delhi.

PROFESSIONAL EDUCATION-17 (PE-17)

Title: GENDER, SCHOOL AND SOCIETY

Course Code– AUBSEVIII.4

Credits: 02 (1L+1T+0P)

Contact hours per week: 02

Exam duration: 1:30 Hrs

Max. Marks: 50

Internal: 20

End Term Exam: 30

Course Objectives:

The student-teachers will be able to:

1. Develop basic understanding and familiarity with key concepts: Gender bias, gender stereotype, empowerment, equity and equality, patriarchy, matriarchy, masculinity and feminism.
2. Understand some important landmarks in connection with gender and education in the historical and contemporary perspective.
3. Learn about gender issues in school curriculum, textual materials across discipline, pedagogical processes and its interaction with class, caste, religion and region.

Unit-1 Gender Issues and Gender Studies

- Concept of Gender: Meaning of gender equality, need and importance, Gender bias, Gender stereotypes.
- Gender equity and equality in India in relation to caste, class, religion, ethnicity, disability and region.
- Historical backdrop: Some landmarks from social reform movements of the 19th and 20th centuries with focus on women education.
- Policy Initiatives for Gender equality and women empowerment in India.

Unit –2 Gender, Education and Empowerment

- Socialization theory of gender and educational implications.
- Gender identities and socialization practices in: family, school, other formal and informal organizations.
- Schooling of girls: Inequalities and resistances, issues of access, retention and exclusion (infrastructure and hidden curriculum).
- Role of education in dealing with social Issues: Domestic violence against women, female foeticide and infanticide and dowry.

Activity:

1. Development of a project on the organizational climate of two schools' single sex and co-educational school.

References:

1. Aaker's. (1994) Feminist Theory and The Study of Gender and Education In S. Acker, Gendered Education: Sociological Reflections on Women. Teaching and Feminism, Buckingham Open University Press.
2. Bars, O. (1971) Sociology of Education Ed. 2 London: Batsford.
3. Shokeshaft, Charol (1989), Women in Education Administration, New Bury Park:Sage Publication.
4. Devendra, K (1994). Changing Status of Woman in India, New Delhi: Vikas Publishing House.
5. Gupta, AK. (1986). Women and Society. New Delhi: Sterling Publication.
6. Mangal, S.K. & Uma Mangal (2009). Essentials of Educational Technology. New Delhi PHI Learning P. Ltd.

PROFESSIONAL EDUCATION-18 (PE-18)

Title: DRAMA AND ART IN EDUCATION

Course Code– AUBSEVIII.5

Credits: 02 (1L+1T+0P)

Contact hours per week: 02

Exam duration: 1:30 Hrs

Max. Marks: 50

Internal: 20

End Term Exam: 30

Course objectives:

The student teachers will be able to:

1. Understand the concept and importance of various arts in human life.
2. Understand aims, objectives and principles of performing and visual arts.
3. Appreciate Indian folk and visual and performing arts.
4. Understand various methods and techniques of teaching creative arts.
5. Understand the importance of visits in arts exhibitions and cultural festivals.

UNIT-I Origin and Development of Art in India.

- Meaning of Art: Concept and Scope of Art.
- Origin & development of Arts in India with special reference to the performing and visual arts.
- Importance of various Arts in Life and Education.
- Aims and objective of teaching performing and visual arts, Principles of Art.

UNIT-II Methods and Approaches of Teaching Creative Arts

- Understanding Indian folk and visual and performing arts.
- Methods of teaching creative arts: a. Lecture cum Demonstration method, b. Direct Observation method. c. Method of Imagination and Free Expression.
- Importance of visits in art exhibitions and cultural festivals.
- Process of preparing canvas, Types of Colours and Paints.

Activity (Any one of the following):

Practical work to be submitted by students during the session: Size- Imperial Size Sheet. One Canvas in size 18'X 22' to be submitted along with the sheets.

1. Landscapes –1
2. Still life – 1
3. Poster-1

Suggested Readings:

1. Brown, Percy (1953). Indian Painting, Calcutta.
2. Chawla, S.S. (1986). Teaching of Art. Patiala: Publication Bureau, Punjabi University.
3. Harriet, Goldstein (1964). Art in Everyday Life. Calcutta: Oxford and IBH Publishing Company
4. Jaswani, K.K., Teaching and Appreciation of Art in Schools. Lowenfeld Viktor.
5. Creative and Mental Growth. Margaret, Marie Deneck (1976)
6. Indian Art. London: The Himalaya Publication.
7. Sharma, L.C., History of Art, Meerut: Goel Publishing House.
8. Read, Herbert. Education through Art [paperback].
9. Shelar, Sanjay. Still Life. Jyotsna Prakashan.

PROFESSIONAL EDUCATION-19 (PE-19)

Title: HEALTH AND PHYSICAL EDUCATION

Course Code– AUBSEVIII.6

Credits: 02 (1L+1T+0P)

Contact hours per week: 02

Exam duration: 1:30 Hrs

Max. Marks: 50

Internal: 20

End Term Exam: 30

Course objectives:

The student-teachers will be able to

1. Understand concept of health, hygiene and health education.
2. Differentiate between communicable and non-communicable diseases.
3. Develop skills in marking grounds for different games.
4. Understand the objectives of school health services,
5. Understand the concept and importance of physical education.

Unit-1 Health Education

- Definition of Health, Health Education, Health Instruction, Health Supervision; Aim, objectives and Principles of Health Education.
- Health Services and guidance instruction in personal hygiene.
- Communicable and Non-Communicable Diseases; Obesity, Malnutrition, Adulteration in food, Environmental sanitation; Personal and Environmental Hygiene for schools.
- Objective of school health services, Role of health education in schools, Health Services- Care of skin, Nails, Eye health service, Nutritional service, Health appraisal, Health record, Healthy school environment, first-aid and emergency care.

Unit-2 Physical Education

- Meaning, Definition and Scope of Physical Education, Importance of Physical Education in present era, Misconception about Physical Education
- Aims and objectives of Physical Education
- Importance of Tournament, Types of Tournament and its organization: structure- knock-out Tournaments, league of Round Robin Tournaments, Combinations Tournament and challenge Tournament.
- Organization structure of Athletic Meet.

Activity (Any one of the following):

Mark a Sports ground and Prepare a report mentioning dimensions, rules, regulations and specification of any one of the following games: Volleyball/ Kabaddi/Kho-Kho / Wrestling /Badminton /Table Tennis/ Basketball/ Hockey.

References:

1. Agrawal, K.C. (2001). Environmental Biology Bikaner: Nidhi publishers Ltd
2. Frank, H. & Walter, H. (1976). Tumers School Health Education. Saint Louis: The C.V.Mosby Company
3. Nemir, A (n.d.). The School Health Education. New York: Harber and Brothers. Odum, EP. (1971). Fundamental of Ecology. USA:W.B.
4. Saunders Co Broyles, F.J. & Rober, H.D. (1979). Administration of Sports, Athletic Programme: A Managerial Approach. New York Prentice Hall Inc.