FIRST SEMESTER

CORE COURSE-1A PHYSICS

Title: MECHANICS

Course Code: AUBSNI.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 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-conservation 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 itscalculations 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 ofplanets 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, Poiseulie' slaw 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. ChandandCompany 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– AUBSNI.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– AUBSNI.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)**

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; Nucleophlicity 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 absoluteconfiguration, sequence rules, D&L andR & S systemsof nomenclature. Geometric isomerism; determination of configuration of geometricisomers,E & Z systemof nomenclature.

Unit- III Alkanes and Cycloalkanes:

IUPAC nomenclature of branchedand unbranched alkanes, the alkylgroup,classification of carbon atoms in alkanes. Isomerismin alkanes,sources, methods of formation (withspecial referencetoWurtz reaction,Kolbe reaction, Corey-House reaction anddecarboxylationof carboxylic acids), physical properties and chemical reactionsof alkanes. Mechanism of free radical halogenation of alkanes: Mechanism of free-radical, halogenationsof alkanes: orientation, reactivity and selectivity.

Unit- IVArenes and Aromaticity:

Nomenclatureof benzene derivatives.The aryl group.Aromatic nucleus and side chain. Structure of benzene: Molecular formula and Kekule structure. Stabilityand carbon–carbon bond length of benzene, resonance structure, Aromaticity–theHückelrule, aromaticions.Aromatic electrophilic substitution reaction–general pattern of themechanism,role ofσand π complex. Mechanism of nitration , halogenation, sulphonationand 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– AUBSNI.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– AUBSNI.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, $\int Sin^n x\,dx$, $\int Cos^n x\,dx$, $\int x^n Sinx dx$, $\int x^n cosx dx$, $\int Sin^n x\, Cox^n x dx$, dx, dx, $\int_0^{\pi/2} Sin^n x Cox^n x$ dx.

Unit-III

Basic theory of linear differential equations, Homogeneous linear equations with constants 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, Trignometric, 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: AUBSNI.4

Credits: 2 (2L+0T+0P) | **Max. Marks: 50**
Contact hours per week: 02 | **Internal: 20**
Exam duration: 1:50 Hrs | **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: AUBSNI.5

Credits: 02 (2L+0T+0P) | **Max. Marks: 50**
Contact hours per week: 02 | **Internal: 20**
Exam duration: 1:50 Hrs | **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", Odem, E. P., W. B. Sannders Co.

Reference Books:

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

SECOND SEMESTER

CORE COURSE-1B PHYSICS

Title: ELECTRICITY & MAGNETISM

Course Code– AUBSNII.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 α E) and conductivity. Failure of Ohms law and its explanation. Invariance of charge. $0.=\partial\partial+\nabla tJ\rho$.

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 **B**. Vector potential: Definition of vector potential **A** and derivation of its expression.

Dielectrics: Dielectrics, parallel plate capacitor with a dielectric, dielectric constant, polarization and polarization vector, displacement vector **D**, molecular interpretation of Claussius-Mossotti equation, boundary conditions satisfied by **E** and **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 comparision 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. Griffth, 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 Subramanium, 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– AUBSNII.1AP

LIST OFEXPERIMENT:

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 o-+f 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 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-2B CHEMISTRY

Title: INORGANIC CHEMISTRY

Course Code– AUBSNII.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-IAtomic Structure:

Dual nature of matter; de Broglie concept. Heisenberg's uncertainty principle; its significance. Atomic orbitals, Schrödinger wave equation (noderivation); 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-IIPeriodic 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-IIIChemical 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-IVs-Block and p-Block elements:

s-Block elements: General discussion with respect to all periodic and chemical properties, diagonal relationship, salient features of hydrides, salvation 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– AUBSNII.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– AUBSNII.3A

Credits 5 (4L+1T+0P) **Max. Marks: 100**
Contact hours per week: 5 **Internal: 40**
Exam duration: 03:00 Hrs **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: AUBSNII.4

Credits 2 (2L+0T+0P)	**Max. Marks: 50**
Contact hours per week: 2	**Internal: 20**
Exam duration: 1:50 Hrs	**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. Merrriam, 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–AUBSNII.5

Credits 2 (2L+0T+0P)	**Max. Marks: 50**
Contact hours per week: 2	**Internal: 20**
Exam duration: 1:50 Hrs	**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", Odem, E. P., W. B. Sannders Co.

Reference Books:

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

THIRD SEMESTER

CORE COURSE-1C PHYSICS

Title: OPTICS
Course Code– AUBSNIII.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 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 ringes, 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.

Michels on interferometer: Its application for aprecision determination of wavelength, wavelength deference refractive index of thin transparent filmand width of spectrallines. Intensity distribution in multiplebean interference, Fabry-Perotinter ferometer & elaton, Phase Change on Reflection (Stoke's relation), Michelson's Interferrometer and its applications.

Unit IV Physical Optics-III Diffraction.

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

Physical Optics - IV Polarization. Types of polarization, Brewsters 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– AUBSNIII.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 specificrotation of the canesugar 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– AUBSNIII.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 angels (ii) law of rationality of indices(iii)law ofsymmetry.Symmetry elementsincrystals,X-raydiffractionbycrystals,. DerivationofBragg'sequation.Determination of crystalstructureof NaCl, KCl and CsCl (Laue'smethodandpowdermethod).

Unit-IIIChemicalKinetics: Chemical kinetics and its scope, rate of a reaction,factors influencingthe rate of a reaction– concentration,temperature,pressure,solvent,light,catalyst.Concentration dependence ofrates mathematicalcharacteristicsofsimplereaction –zeroorder,firstorder,secondorder,pseudo order,halflifedetermination oftheorderofreaction–differentialmethod, method ofhalflifeperiod andisolation methodsconcept ofactivation energy.

Unit-IVThermodynamics: Definitionof thermodynamicterms,system,surroundingsetc.typesof systems,intensiveand extensiveproperties,thermodynamicprocess, concept ofheatandwork, Firstlaw ofthermodynamics,definitionofinternalenergyandenthalpy. Heatcapacity–heatcapacitiesat constant volumeandatconstantpressureandtheirrelationship, Joule – Thomson coefficient and inversion temperature, Standardenthalpy offormation–Hess'slaw ofheat summation anditsapplication,Enthalpy of neutralization, bond dissociation energyand itscalculation fromthermochemical data, Kirchoff'sequation.

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 Chemistryby 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– AUBSNIII.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 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-3C MATHEMATICS

Title: REAL ANALYSIS
Course Code– AUBSNIII.3A

Credits 05 (4L+1T+0P)	**Max. Marks: 100**
Contact hours per week: 05	**Internal: 40**
Exam duration: 03:00 Hrs	**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, Logarithmeic 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 intergrals.

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: AUBSNIII.4

Credits: 02 (2L+0T+0P) | **Max. Marks: 50**
Contact hours per week: 02 | **Internal: 20**
Exam duration: 1:50 Hrs | **End Term Exam: 30**

उदेश्य-

- छात्रो 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 व्यवहारिक उपयोगिता का परिचय देना

इकाई-1हिंदी 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, निकात्तार्थी शब्दों के सूक्ष्म अर्थ -भेद, समानार्थक शब्दों के भेद, उपसर्ग, प्रत्यय

FOURTH SEMESTER
CORE COURSE-1D PHYSICS
Title: OSCILLATION AND WAVES
Course Code– AUBSNIV.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 understand the fundamentals of physics like geometrical oscillations &wave motion, electromagnetic theory, wave optics: diffraction, interferometer and holography etc.
Course Outcomes: After completion of the course, student will be able to-

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

Course Content:

Unit I Oscillations SHM: Simple Harmonic Oscillations. Differential Equation of SHM and its Solution. Amplitude, Frequency, Time Period and Phase. Velocity and Acceleration. Kinetic, Potential and Total Energy and their Time Average Values. Reference Circle. Rotating Vector Representation of SHM.

Unit II Free Oscillations of Systems with One Degree of Freedom: 1) Mass Spring system, (2) Simple Pendulum, (3)Torsional Pendulum,(4) Oscillations in a U Tube, (5) Compound pendulum: Centres of Percussion and Oscillation, and (6) Bar Pendulum.

Unit III Superposition of Two Collinear Harmonic Oscillations: Linearity and Superposition Principle. (1) Oscillations having Equal Frequencies and (2) Oscillations having Different Frequencies. Superposition of Two Mutually Perpendicular Simple Harmonic Motions with Frequency Ratios1:1 and 1:2.

Unit IV System with Two Degrees of Freedom: Coupled Oscillators. Normal Coordinates and Normal Modes. Energy Relation and Energy Transfer. Normal Modes of N Coupled Oscillators. Free Oscillations. Damped Oscillations Transient and Steady States, Power Dissipation and Quality Factor.

Wave Motion:

Plane and Spherical Waves. Longitudinal and Transverse Wave Equation. Particle and Wave Velocities, Newton's Formula for Velocity of Sound, Laplace's Correction.

Text Books:

1. Vibrations and Waves by A.P. French.(CBS Pub.&Dist.,1987)
2. The Physics of Waves and Oscillations by N. K. Bajaj (Tata McGrawHill,1988)
3. Fundamentals of Waves & Oscillations By K. UnoIngard (Cambridge University Press, 1988).

Reference Books:

1. An Introduction to Mechanics by Daniel Kleppner, Robert J. Kolenkow (McGrawHill,1973)
2. Waves: Berkeley Physics Course (Sie) by Franks Crawford (Tata McGrawHill,2007).

* Latest editions of all the suggested books are recommended.

PRACTICAL SYLLABUS

Title: OSCILLATION AND WAVES LAB

Course Code– AUBSNIV.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 specificrotation of the canesugar solution with the help of Polarimeter.
4. To study the forward characteristics of alight 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-Nelaser.
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 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-2D CHEMISTRY

Title: ORGANIC & INORGANIC CHEMISTRY

Course Code– AUBSNIV.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, methodsof formation, chemical reactions, Baeyer's strain theory and its limitations. Ringstraininsmall rings (cyclopropane and cyclobutane),theory of strainlessrings.

Aldehydes and Ketones: Nomenclature and structure of Carbonyl gropus, 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 Knoevenegel Condensations, Wittig reaction, Mannich reaction. Cannizaro 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. Allotrophy of P. Oxides and oxy-acids of both N and P. hydrides of N and P (NH_3, N2H4, 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 byCotton And Wilkinson.
10. Chemistry of Elements by Greenwood &Earnshaw.
11. Theoretical Inorganic Chemistry By Day & Selbin.

PRACTICALSYLLABUS
Title: ORGANIC & INORGANIC CHEMISTRY LAB
Course Code– AUBSNIV.2P

List of Experiments:

1. Estimation of Barium and Sulphate ions.
2. Estimation of Iron.
3. Inorganic preparation of Prussion Blue $Fe_4[Fe(CN)_6]_3$.
4. Inorganic preparation of Tetra-amine copper (II), Sulphate-Tetra ammonium Cupric sulphate $[Cu(NH_3)_4]SO_4H_2O$.
5. Inorganic preparation of Chrome alums $K_2SO_4Cr_2(SO_4)_324H_2O$.

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– AUBSNIV.3A

Credits 05 (4L+1T+0P)	**Max. Marks: 100**
Contact hours per week: 05	**Internal: 40**
Exam duration: 03:00 Hrs	**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, productof twosubgroups.

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: AUBSNIV.4

Credits: 02 (2L+0T+0P) **Max. Marks: 50**
Contact hours per week: 02 **Internal: 20**
Exam duration: 1:50 Hrs **End Term Exam: 30**

उदेश्य-

1. छात्रो 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 देनाना

इकाई-1 वर्तनी, विराम चिन्ह एवं संशोधन

- ❖ वर्तनी सम्बन्धी अशुद्धियाँ, मात्राओ 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 – अंर्तराष्ट्रीय तात्कालिक घटनाक्रमों पर लेखन
- ❖ ओपचारिक पत्राचार / अनोपचारिक पत्राचार
- ❖ राष्ट्रीय – अंर्तराष्ट्रीय तात्कालिक घटनाक्रमों पर लेखन

FIFTH SEMESTER

CORE COURSE-1E PHYSICS

Title: SEMICONDUCTOR / SOLID STATE DEVICES
Course Code– AUBSNV.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 like1D, 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-NJUNCTIONS: 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 arerecommended.

PRACTICAL SYLLABUS

Title: SEMICONDUCTOR / SOLID STATE DEVICES LAB

Course Code– AUBSNV.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– AUBSNV.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 Helmohltz 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, Elecrode 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-Hazel equation, Hydrolysis of salts.

Unit-III

Metal-Ligand bonding in Transtions Metal Complexes: Electrostatic crystal field splitting of d-orbitals in octahedral, Tetrahedral, square planar and tetragonally distorted octahedral stereochemistry, Factors affecting the crystal filled parameters, CFSC, Spectro chemical 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 $[Ti(H_2O)_6]Cl_3$ and $CuSO_4.5H_2O$ and lack of colour in $CuSO_4$ and Cu_2SO_4 in terms of d-orbital splitting.

Unit-IV

Organometallic Compounds and $\pi-$ acid Complexes: Definition type and classification of organometallic compounds, EAN and nomenclature, Ionic metal carbon bonding, Metal carbon multiple bonding, Preparation and reaction of feerocene, 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– AUBSNV.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– AUBSNV.3A

Credits 05 (4L+1T+0P)	**Max. Marks: 100**
Contact hours per week: 05	**Internal: 40**
Exam duration: 03:00 Hrs	**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.

SIXTH SEMESTER

CORE COURSE-1F PHYSICS

Title: THERMAL & LOW TEMPERATURE PHYSICS

Course Code– AUBSNVI.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– AUBSNVI.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– AUBSNVI.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: Diaatomic Molecules, Energy level of rigid rotor, selection rules, Spectral intensity, Maxell-Boltzmann distribution, Qualitative description of non-rigid rotor, Isotope effect.

Vibrational spectrum: Infrared spectrum, Energy levels of simple harmonic oscillator, Selection rules, Pure vibratuional 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: Grothus-Drapper 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 absortion of various functional groups and interpretation of IR spectra of simple organic compound.

Nuclear magnetic resonance (NMR) spectroscopy, Proton magnetic resonance (^{1}HNMR) 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– AUBSNVI.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 Chromatatography.

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-3F MATHEMATICS

Title: NUMERICAL ANALYSIS
Course Code– AUBSNVI.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 $1/3^{th}$ rule, Simpson's $3/8^{th}$ rule, Gauss Quadrate 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, 6^{th} Ed., New age International Publisher, India, 2007.

PRACTICAL SYLLABUS

Title: NUMERICAL ANALYSIS LAB
Course Code– AUBSNVI.3AP

List of Practicals (using any software)

(i) Calculate the sum 1/1+1/2+1/3+……..+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)