LEARNING OUTCOME

DEPARTMENT OF BOTANY

SEMESTER -II

COURSE OUTCOME OF B.SC BOTANY (HONS)

Course	Paper	Learning outcome
CC – III	Mycology and phytopathology	1. The students learn about the General characteristics; Affinities with plants and animals; Thallus organization; Cell wall composition; Nutrition; and Classification of Fungi. 2. The students acquire knowledge about the reproduction and life cycle of different classes of fungi. 3. The students learn about Occurrence; General characteristics; Range of thallus organization; reproduction of lichen further VAM and their significance. 4. The students assimilate adequate knowledge in understanding role and application of fungi in biotechnology;food industry; Agriculture (Biofertilizers); and Biological control. 5. The students acquire skill in understanding about plant pathology.
CC –IV	Morphology & Anatomy of Angiosperms	1. The students became familiarize themselves with angiosperms like its taxonomy, morphology, embryology. 2. The students also became familiarize themselves with the anatomy of angiosperms.

COURSE OUTCOME OF B.SC BOTANY (GENERAL)

Course	Paper	Learning outcome
CC -1B	Plant ecology and Taxonomy	1. The students became familiarize with concept of Ecology 2. The students became competent in understanding Phytogeography. 3. The students gain knowledge about Plant taxonomy.

LEARNING OUTCOME

SEMESTER -IV

COURSE OUTCOME OF B.SC BOTANY (HONS)

Course	Paper	Learning outcome
CC 8:	Palaeobotany & Palynology	1. The students being taught aboutPalaeobotany and Palynology.
CC 9:	Biomolecules and Cell Biology	1. The students absorb conceptual knowledge in understanding about Biomolecules and Cell Biology.
CC : 10	Molecular Biology	1. The students acquire basic concept about Molecular Biology.
SEC-2	1. Biofertilizers or 2. Herbal Technology or 3. Nursery & Gardening or 4. Floriculture or 5. Plant Diversity andHuman Welfare	❖ The students acquire skill about different types of Biofertilizers and their applications. ❖ The students acquire skill about Herbal Technology. ❖ The students are able to develop skill in Nursery and Gardening. ❖ The students acquire skill in understanding Floriculture techniques and its applications. ❖ The students accommodate with basic concept about plant diversity and different types of Human Welfare

COURSE OUTCOME OF B.SC BOTANY (GENERAL)

Course	Paper	Learning outcome
CC – 1D	Plant physiology and Metabolism	❖ The students became proficient in understanding the plant physiological process and plant metabolism.
SEC - 2	1. Medicinal Botany or 2. Floriculture	❖ The students became competent in gathering knowledge about Medicinal Botany ❖ The students acquire skill in understanding Floriculture techniques and its applications.

LEARNING OUTCOME

SEMESTER VI

COURSE OUTCOME OF B.SC BOTANY (HONS)

Course	Paper	Learning outcome
CC 13	Genetics and Plant Breeding	❖ The students acquire basic concept ofMendelian genetics and its extension,extrachromosomal inheritance, linkage crossing over, chromosome mapping,mutation, Evolutionary genetics,plant breeding and crop improvement.
CC 14	Plant Biotechnology	❖ The students became familiarize with concept of about tissue culture, recombinant DNA technology,cloning and application of biotechnology.
DSE 3	1. Phytoremediation and immunology or 2. Plant evolution and Biodiversity or 3. Marine biology and Phycotechnology	❖ The students acquire knowledge about Phytoremediation and immunology. ❖ The students become acquainted of Plant evolution and Biodiversity. ❖ The students being taught about Marine biology and phycotechnology.
DSE 4	1. Horticultural Practices and Post Harvesting Technology or 2. Industrial and environmental Microbiology	❖ The students acquire knowledge about Horticultural practices and Post Harvesting Technology. ❖ The students became proficient in understanding about Industrial and environmental Microbiology.

COURSE OUTCOME OF B.SC BOTANY (GENERAL)

Course	Paper	Learning outcome
DSE 1B	1. Cell Biology,Genetics and Molecular Biology. or 2.Research Methodology. or 2. Dissertation	❖ The students acquire knowledge about cell organelle, mutation, linkage crossing over, mitosis meiosis, cell wall, cell membrane, cell cycle. ❖ The students become familiarize about different types of research methodology related to biology.
SEC - 4	1. Ethnobotany.or 2. Mushroom cultivation technologyor 3. Intellectual property rights	❖ The students became competent in gathering knowledge about Ethnobotany. ❖ The students can develop skill about Mushroom cultivation and Technology. ❖ The students acquire skill about Intellectual property rights.

LEARNING OUTCOME
SUBJECT: CHEMISTRY

COURSE OUTCOMES

STREAM: HONOURS
SEMESTER: 2

Course Code:CC-3

Course Title: ***Inorganic Chemistry-I***

Topic: ***Atomic Structure***

Upon completion of this topic, learners should be able to:

- Outline the historical developments of atomic theory.
- Describe the structure of the atom.
- Write the postulates of different atomic theory.
- Derive the Rydberg equation using Bohr's atomic model.
- Determine the wavelength and frequency of radiation of emission spectrum.
- Write Heisenberg's uncertainty principle and its significance.
- Write Scrodinger's wave equation and significance of Ψ and Ψ^2.
- Describe four quantum numbers and their significance.
- Draw s, p, d and f orbitals.
- Write Pauli's exclusion principle, Hund's rules of maximum multiplicity, Aufbau principle.
- Write the electronic configuration of atoms.
- Derive the term symbols of atoms.

Topic: ***Chemical Periodicity***

Upon completion of this topic, learners should be able to:

- Outline the historical developments of Periodic Table.
- Describe the modern IUPAC periodic table.
- Calculate the effective nuclear charge using Slater's rule.
- Write the variation of atomic and ionic radius down the groups and along the periods.
- Write the variation of ionization energy down the groups and along the periods.
- Write the variation of electron affinity down the groups and along the periods.

LEARNING OUTCOME

- Write the variation of electronegativity down the groups and along the periods.
- Describe the different scales of electronegativity.
- Explain relativistic effect, secondary periodicity, lanthanide contraction and diagonal relationship.

Topic: *Acid-Base*

Upon completion of this topic, learners should be able to:

- Write down auto-ionization equilibrium and acid-base neutralization reactions in liquid sulfur dioxide, liquid ammonia and liquid hydrogen fluoride.
- Define acid and base as enumerated in different concepts on acid-base.
- State the merits and demerits of different concepts on acid-base.
- Exemplify the following terms: amphi-protic solvent, conjugate acid-base pair, differentiating and leveling solvents, co-solvating agent.
- Justify the statement, "conjugate base of a weak acid is strong and vice versa".
- Classify the following as acid, base and neutral species according to electronic theory of acid-base: N2, BCl3, NH4+, SO2, DMF, DMSO, RCN
- Explain the utility of acidity function. State its relation with pH of dilute solution.
- Write the equation taking care of the ionic and covalent contribution in relation to the acid-base interaction. State the significance of the equation.
- Enumerate the rules used to predict the successive pKa values and thus the acid strength of the oxy-acids. Give examples how these rules could be used to predict the structure of oxy-acids.
- Comment on the statement, "Steric factors and dative Π-bond formation have significant influence on acid-base behavior of certain species".
- Correlate the hard and soft nature of donor and acceptor atoms with their polarizing power and polarizability.
- Explain the SHAB principle in the light of FMO diagram.
- Describe briefly the periodic variation of acid-base behavior with plausible explanation.
- Explain with suitable examples: hardness of transition metal ions vary

with oxidation state.

- Apply pauling rules to calculate the acid dissociation constant(s) of different oxo-acids.
- Clarify the statement with suitable examples, "Acidity of aqua ions are function of their charge and radius".
- Explain with the help of suitable concept on acid-base, the distribution of different elements in the nature.
- State how catalytic behavior of certain oxides could be related with the Lewis and Brönsted acid nature of certain oxides.

Topic: *Redox Reactions and Precipitation Reactions*

Upon completion of this topic, learners should be able to:

- Describe briefly the electronic theory of oxidation and reduction with suitable examples.
- State the difference between electrolytic cell and galvanic cell.
- Define the terms: Positive electrode, Negative electrode, Standard potential, and Formal potential.
- Narrate a brief account on salt bridge.
- Construct the galvanic cell and write electrode reactions.
- Derive the cell reaction and determine the value of cell emf, and equilibrium constant from given standard electrode potential values.
- Establish Nernst equation for any galvanic cell.
- Show how concentration affects the direction of reaction in a galvanic cell.
- Explain the effect of change of pH, precipitation and complex formation on formal potential of different redox couples using appropriate examples.
- Follow the course of a redox titration and to calculate the potential values at different stages of the titration.
- Justify the role of a redox indicator and the use of phosphoric acid in the titration of ferrous iron by potassium permanganate and potassium dichromate.
- Enumerate different information that is got from Latimer and Frost

diagrams.

- Comment on the possibility of comproportionation and disproportionation reactions.
- Understand the terms, solubility product, common ion effect, lattice energy and solvation energy and their relation with the solubility of different compounds.
- Clarify the possibility and condition of precipitation.
- Explain the steps of group analysis in relation to inorganic qualitative analysis.

Course Code: CC-4

Course Title: *Organic Chemistry-II*

Upon completion of this course, learners should be able to:

- Get knowledge about various thermodynamic parameters e.g. equilibrium, free energy, enthalpy and entropy factor of a chemical reaction.
- Calculate enthalpy change of a chemical reaction via bond dissociation energy (BDE).
- Apply the involvement of the thermodynamic parameters in case of intermolecular & intramolecular reactions.
- Concept of organic acids and bases.
- Understand the effect of structure, substituent and solvent on acidity and basicity of organic molecules.
- Compare between gas-phase and solution phase acidity and basicity of organic molecules.
- Compare between nucleophilicity and basicity.
- Apply HSAB principle in various chemical reactions.
- Explain thermodynamic principles in acid-base equilibria.
- Illustrate different types of tautomerism including prototropy,anionotropy, ring-chain tautomerism and valence tautomerism.
- Prove the presence of both keto and enol forms in solution.

LEARNING OUTCOME

- Apply thermodynamic principles in tautomeric equilibria.
- Get idea about various parameters in reaction kinetics – representation of rate law of a chemical reaction, rate constant, free energy of activation, order and molecularity of a reaction.
- Draw free energy profile diagrams for one-step, two-step and three-step chemical reactions.
- Draw energy profile diagrams for a catalyzed and uncatalyzed reaction and explain the role of a catalyst in a chemical reaction.
- Explain electrophilic and nucleophilic catalysis with proper examples.
- Make out kinetic control and thermodynamic control of reactions.
- Elaborate both primary and secondary kinetic isotopic effect with evidences.
- Describe principle of microscopic reversibility.
- Carry out halogenation of alkanes via free radical mechanism.
- Explain the formation of one regioisomer over the other in the light of Hammond's postulate.
- Learn nucleophilic substitution reactions at sp3 centre with mechanism.
- Explain the effects of solvent, substrate structure, leaving group and nucleophiles on substitution reactions.
- Explain the involvement of NGP in the treatment of cancer.
- Describe the role of crown ethers and phase transfer catalysts in nucleophilic substitution reactions.
- Perform synthesis of alkenes and alkynes involving different kinds of elimination reaction with mechanism.
- Explain the conditions leading to the formation of Saytzeff & Hofmann elimination products.
- Compare between substitution and elimination reactions.
- Represent the chirality arising out of stereoaxis.
- Exemplify the atropisomerism, buttressing effect and prostereoisomerism.
- Illustrate the concept of (pro) n-chirality: topicity of ligands and faces.
- Represent the pro-R/pro-S, pro-E/pro-Z and Re/Si descriptors; pro-r and pro-s descriptors of ligands.

LEARNING OUTCOME

- Describe conformational nomenclature.
- Elucidate eclipsed, staggered, gauche, syn and anti; dihedral angle, torsion angle; Klyne-Prelog terminology; P/M descriptors.
- Determine the conformation of conjugated systems (s-cis and s-trans)
- Describe gauche-butane interaction.
- Epitomize pro-r and pro-s descriptors of ligands on propseudoasymmetric centre.

LEARNING OUTCOME

SEMESTER: 4

Course Code: CC- 8

Course Title: *Physical Chemistry-III*

Topic: *Colligative Properties*

Upon completion of this topic, learners should be able to:

- Define the ideal and non-ideal solution.
- Know about vapour pressure.
- State Raoult's Law.
- Define and explain colligative properties and nature of solute and solution.
- Define different type of colligative properties (relative lowering of vapour pressure, elevation of boiling point, depression o freezing point and osmotic pressure) and Raoult's law for each colligative property.
- Derive thermodynamic derivation using chemical potential for four colligative properties.
- Know the methods use for experimental determination of four colligative properties.
- Understand the important application of four colligative properties.
- Describe the abnormal colligative properties.
- Calculate Van't Hoff factor for associated and dissociated solutes.

Topic: *Phase Rule*

Upon completion of this topic, learners should be able to:

- Understand the EXACT meaning of terms, viz. phase, component and degree of freedom.
- Use accurate values of C, P and F in practical cases.
- State and derive Gibb's phase rule.
- Explain phase diagrams of water, CO_2 and sulphur.
- Derive Clayperon, Clausius-Clayperon and Duhem-Margules equations.
- Interpret phase diagrams of two and three-component systems.
- Expound consolute temperature (CST), triple point, eutectic mixture, eutectic point, polymorphism, enantiotropy and monotropy.

- Derive Konowaloff's rule.
- Apply Lever rule to explain phase diagrams of different two-component systems.

Topic: *Electrical Properties*

Upon completion of this topic, learners should be able to:

- Understand chemical potential, activity and activity coefficients of ions in solution.
- Describe Debye-Hückel limiting law qualitatively.
- Calculate the activity coefficient for electrolytes using Debye-Hückel limiting law.
- Derive the mean ionic activity coefficient from the expression of ion-atmosphere interaction potential.
- Write the applications and limitations of Debye-Hückel limiting law.
- Write Faraday's laws of electrolysis.
- Construct cell from half-cell potential.
- Determine the cell potential.
- Derive Nernst equation.
- Calculate the thermodynamic parameters G, H and S.
- Explain reversible and irreversible cells with examples.
- Define liquid junction potential and figure out its removal.
- Exemplify standard electrodes like hydrogen electrodes and calomel electrodes.
- Understand electrochemical series and its applications.
- Enumerate the advantages using calomel electrode over hydrogen electrode as standard electrodes.
- Describe the determination of pH of a solution using hydrogen electrode and quinhydrone electrode.

Topic: *Quantum Chemistry*

Upon completion of this topic, learners should be able to:

LEARNING OUTCOME

- Have a clear idea about angular momentum, commutation rules and quantization of square of total angular momentum and z-component.
- Able to conceptualize the theory of rigid rotor model of diatomic molecules.
- Convert Cartesian coordinates into spherical polar coordinates.
- Gather knowledge about how to separate variables.
- Set up Schröidinger equation for He, Li, etc.
- Apply LCAO-MO treatment for H_2^+.
- Compare between LCAO-MO and VB treatments of H_2.
- Calculate average and most probable distances of electron from nucleus.
- Experience using mathematical tools to construct approximate quantum mechanical models.
- Apply principles of quantum mechanics to calculate observables on known wave functions
- Work independently with key questions and problems in quantum chemistry.

Course Code: CC-9

Course Title: *Inorganic Chemistry-III*

Topic: *Chemistry of s and p Block Elements*

Upon completion of this topic, learners should be able to:

- Outline the relative stabilities of different oxidation states of representative elements.
- Point out the anomalous behaviour of first member of each group.
- Describe allotropy and catenation properties of elements.
- Describe the structure, bonding, preparation, properties and uses of beryllium hydrides, beryllium halides, boric acid, borates, boron nitrides, borohydrides (diborane) and graphitic compounds.
- List the oxides and oxoacids of nitrogen, phosphorus, sulphur and chlorine.
- Describe the structure and properties of sulphur-nitrogen compounds.
- Enumerate the basic properties of halides.
- Write the preparation, structure and properties of polyhalides, interhalogen compounds, polyhalides, pseudohalides.

LEARNING OUTCOME

- Write the properties and use of fluorocarbons and chlorofluorocarbons and their adverse effect on ozone layer.

Topic: *Noble Gases*

Upon completion of this topic, learners should be able to:

- Describe the occurrence, uses and interest of nobel gases.
- Define and explain clathrate compounds of nobel gases and their application.
- Discuss the preparation, structure, nature of bonding and properties of XeF_2, XeF_4 and XeF_6.
- Know about xenon-oxygen compounds and their application.

Topic: *Inorganic Polymers*

Upon completion of this topic, learners should be able to:

- Define inorganic polymer and differentiate with organic polymer.
- Discuss the synthesis and structure of some important inorganic polymer such as borazine, silicones, siloxanes, silicates and phosphazens.
- Understand the application of such inorganic polymers.

Topic: *Coordination Chemistry-I*

Upon completion of this topic, learners should be able to:

- Present a brief history of the emergence of coordination chemistry.
- Differentiate between double and complex salts.
- Untangle Werner's theory of coordination complexes.
- Classify ligands into different categories.
- Define and furnish examples of various kinds of ligands.
- Explicate classical and non-classical binding modes of ligands and correlate denticity and hapticity.
- Show different binding modes of a ligand.
- Justify the binding of ambidentate ligands with the aid of SHAB principle, symbiotic effect and competitive pi-bonding.
- Rationalize synergic bonding and synergic effect.
- Compare and contrast between pi-acid ligands and pi-complexing ligands.
- Explain chelate effect and compare with the macrocyclic effect.
- Write a note on inner-metallic complexes.

LEARNING OUTCOME

- Name coordination complexes obeying the rules set by IUPAC.
- Expound different types of isomerism in square planar and octahedral complexes.

Course Code: CC-10

Course Title: *Organic Chemistry-IV*

Upon completion of this topic, learners should be able to:

- How electromagnetic radiation interact with matters.
- Understand different types of electronic transition.
- Determine the degree of unsaturation from molecular formulae.
- Differentiate between the pair'schromophore/auxochrome and bathochromic/hypsochromic shifts.
- Calculate the $\lambda_{max}$and ε_{max}
- Identify the functional group from an unknown compound.
- Enumerate change on IR stretching frequencies of the following effect e.g. conjugation, electronic effects, mass effect, bond multiplicity, ring-size, solvent effect, H-bonding.
- Understand basic principles of Proton Magnetic Resonance.
- Identify chemical and magnetic equivalence.
- Characterize different environment of hydrogen atoms in ^{1}H-NMR spectra.
- How to determine the structure of organic molecules using UV-Vis, IR and NMR spectroscopic technique.

Topic: *Nitrogen compounds, Rearrangement reactions, Retrosynthesis, Asymmetric synthesis & Ring synthesis*

Upon completion of this topic, learners should be able to:

- Be familiar with different types of nitrogen containing organic compounds *e.g.* amine, nitro, nitrile, isonitrile, diazonium salts and azo compounds.
- Synthesize (incorporate) those above mentioned nitrogen containing functionalities and encounter with various types of reactions they undergo.
- Interconvert between different functional groups.

LEARNING OUTCOME

- Differentiate between different types of amines and nitro compounds through visual colour change reactions.
- Understand different kind of rearrangement reactions including rearrangement to electron-deficient carbon, rearrangement to electron-deficient nitrogen, rearrangement to electron-deficient oxygen, aromatic rearrangements, migration from nitrogen to ring carbon, rearrangement reactions by green approach *etc*.
- Carry out retrosynthetic analysis to synthesize an unknown compound following FGI and FGA strategy.
- Identify synthon, synthestic equivalent and retron.
- Understand synthesis of an organic compound through protection-deprotection strategy and polarity-inversion technique.
- Understand the basic concepts of stereoselective and stereospecific reactions; diastereoselectivity and enantioselectivity.
- Understand asymmetric reduction and nucleophilic addition to carbonyl compounds using Felkin- Anh model.
- Synthesize large rings by applying high dilution technique.

Course Code: SEC-2

Course Title: *Pharmaceutical Chemistry*

Upon completion of this course, learners should be able to:

Topic: *Pharmaceuticals Chemistry*

- Understand how a drug is discovered and what are the different stages a molecule must successfully overcome to become a drug candidate.
- Easily classify drugs based on their mechanism of action.
- Follow retrosynthetic approach to synthesize analgesics agents, antipyretic agents, anti-inflammatory agents, antibiotics, antibacterial agents, antifungal agents, antiviral agents, Central Nervous System agents, cardiovascular drugs, anti-leprosy drugs, and HIV-AIDS related drugs.
- Differentiate between Aerobic and anaerobic fermentation.

LEARNING OUTCOME

- Understand the production of certain antibiotics *e.g.* Penicillin, Cephalosporin, Chloromycetin and Streptomycin; amino acids *e.g.* Lysine and Glutamic acid; Vitamins *e.g.* Vitamin B_2, Vitamin B_{12} and Vitamin C.

LEARNING OUTCOME

SEMESTER: 6

Course Code: CC-13

Course Title: *Inorganic Chemistry-V*

Topic: *Bioinorganic Chemistry*

Upon completion of this topic, learners should be able to:

- Classify the biological elements into essential, beneficial, major, trace, ultratrace, hard and soft elements.
- Write the role of different metal ions in biological systems.
- Describe the metal ion transport across biological membrane(Na^+/K^+-ion pump).
- Draw the active site structures of Haemoglobin, Myoglobin, Hemocyanine and Hemerythrin and write their role in oxygen transport in biological systems.
- Write the functions and structures of different enzymes like Cytochromes, Ferredoxins, carbonic anhydrase, carboxyanhydrase and nitrogenase.
- Enumerate the effects of toxic metal ions.
- Define chelation therapy and write its application in removal of toxic metal ions from human body.
- Describe photosynthesis by Z-scheme.
- Draw the active site structures of Photosystem-I and Photosystem-II.

Topic: *Organometallic Chemistry*

Upon completion of this topic, learners should be able to:

- Get acquainted with the history of organmetallic chemistry.
- Give a brief account of the important discoveries in the field of organmetallic chemistry.
- Explain the stabilization of lower oxidation states of metals in presence of pi-acid ligands.
- Exemplify pi-acid ligands and the prerequisites for the formation of complexes with such ligands.

LEARNING OUTCOME

- Apply 18 electron rule to explain the stability carbonyl and nitrosyl complexes.

- Justify the formulation of carbonyl and nitrosyl complexes.

- Draw the structural formula of complexes with CO and different oxidation states of NO.
- Furnish the binding modes of CO and NO.
- Unravel the tautomeric equilibria between bridged and non-bridged structures of carbony complexes.
- Differentiate between linear and bent nitrosyls.
- Comment on the criteria for the formation of bridging and non-bridging carbonyl complexes.
- Use the ir stretching frequency as the diagnostic tool to identify the nature of binding in carbonyl and nitrosyl complexes.
- Write reactions regarding the syntheses and reactivity of carbonyls and nitrosyls.

Topic: *Organometallic Chemistry, Catalysis by Organometallic Compounds*

Upon completion of this topic, learners should be able to:

- Prepare Zeise's salt and ferrocene.
- Explain the structures of Zeise's salt and ferrocene.
- Show different electrophilic substitution reactions of ferrocene.
- Conceptualize reactions of organometallic complexes *e.g.* substitution, oxidative addition, reductive elimination and insertion reactions.
- Study the industrial processes *e.g.* alkene hydrogenation using Wilkinson's Catalyst, Hydroformylation reaction, Wacker Process, Fischer Tropsch reaction and Ziegler-Natta catalysis for olefin polymerization.

Topic: *Reaction Kinetics and Mechanism*

Upon completion of this topic, learners should be able to:

- Classify inorganic reactions in respect of reaction pathways.
- Identify labile and inert complexes.

LEARNING OUTCOME

- Correlate lability and inertness with electronic configuration.
- Rationalise the apparent contradiction between themodynamic stabily and kinetic lability.
- Segregate ligand substitution reactions in terms of reaction rate.
- Characterise intimate and stoichiometric mechanisms.
- Differentiate between associative, dissociative and intermediate reactions.
- Explain relative lability and inertness of coordination complexes with LFSE while undergoing ligand substitution reactions.
- Apply different factors affecting intimate mechanism of octahedral substitution reaction in explaining different experimental observations.
- Clarify steric and electronic effects in identifying the mechanism of octahedral substitution reactions.
- Explicate linear free energy relationship.
- State the theories for the determination of activation parameters.
- Use the values of activation parameters to suggest mechanism of octahedral substitution reactions.
- Comment on DCB mechanism in respect of octahedral substitution reaction.
- Define trans effect, cis effect, spectator ligands.
- Expound the polarization theory and pi-bonding theory to explain trans effect.
- Explore the steric course of square planar substitution reactions.
- Interpret nucleophilicity parameter to explain sequence of rate of substitution reactions in square planar complexes.

Course Code: CC-14

Course Title: *Physical Chemistry-IV*

Topic: *Molecular Spectroscopy*

Upon completion of this topic, learners should be able to:

- Understand the mechanism of interaction of electromagnetic radiation with molecule.
- State Born-Oppenheimer approximation.

LEARNING OUTCOME

- Identify the different spectrum region and their corresponding name of molecular spectroscopy.
- Describe and explain the criteria of interaction mechanism with electromagnetic radiation and molecule for vibrational, rotational, Raman and proton NMR spectroscopy.
- Understand classical and quantum mechanical spectroscopic energy equation for vibrational, rotational spectroscopy of different type of diatomic molecules and their selection rules.
- Draw and explain the energy diagram and line appear in the spectrum.
- Know about anharmonicity, Morse potential, dissociation energy, fundamental frequency, overtone, hot band.
- Calculate the degree of freedom for polyatomic molecule.
- Understand the application of different spectroscopy in our real life and higher study.

Topic: *Photochemistry*

Upon completion of this topic, learners should be able to:

- Understand the meaning of ptotochemistry and differentiate with thermal reaction
- State the laws of photochemistry.
- Differentiate between photophysical and photochemical process.
- Describe of vibrational-electronic spectra according to Franck-Condon principle.
- Determine of molar extinction coefficient from Lambert Beer law and limitation of Lambert Beer law.
- Understand the importance of quantum yield and the reasons behind high and low quantum yield.
- Write the steps of mechanistic pathways of decomposition of some organic and inorganic compounds in presence of light.
- Draw the Jablonsky diagram and justify the different processes.
- Discuss and explain the mechanism and essential conditions for fluorescence, phosphorescence process and decay of excited states.

LEARNING OUTCOME

- Have a clear idea about photosensitizer reaction and photochemical equilibrium.
- Understand the importance and applications of photochemical reactions in biological systems and industrial processes.

Topic: *Surface Phenomena*

Upon completion of this topic, learners should be able to:

- Define surface tension, surface energy and surface free energy.
- Explain work of cohesion and work of adhesion.
- Apply capillary rise phenomena in explaining different problems.
- Justify spreading of liquid over other surfaces.
- Comment on temperature dependence of surface tension.
- State variation of surface tension with concentration.
- Know about the experimental determination of surface tension of a liquid.
- Use the surface tension phenomena to explain different incidents observed in nature.
- Differentiate between absorption and adsorption.
- Compare between physisorption and chemisorptions.
- Understand the transition from physisorption to chemisorptions.
- Explain potential energy diagram of physisorption and chemisorptions.
- Cassify adsorption isotherm.
- Derive Freundlich and Langmuir adsorption isotherms.
- Elaborate on B.E.T. equation (assumptions, significance, variation).
- Interpret different types of adsorption isotherms in the light of B.E.T. equation.
- Explain heterogeneous catalysis with the conception of adsorption.
- Draw the line of contrast between crystalloids, colloids and suspension.
- Exemplify colloids in terms of the physical states of the dispersion medium and dispersed phase.
- Identify the types of emulsions.
- Manifest the origin of charge and stability of lyophobic colloids.
- Compare between peptization, coagulation and flocculation.
- Analyze Stern double layer and zeta potential.
- Illustrate electrokinetic phenomena happening in colloidal mixtures.

- Unravel the method of determination of Avogadro Number by Perrin's method.
- Expound micelle formation.

Course Code: DSE-3

Course Title: ***Polymer Chemistry***

Topic: ***Introduction and history of polymeric materials, Functionality and its importance, Properties of Polymers***

Upon completion of this topic, learners should be able to:

- Classify polymers from different angles.
- Understand nomenclature of polymers.
- Identify molecular forces and chemical bonding present in polymers.
- Explain the basis of formation of synthetic polymers.
- Classify polymerization processes.
- Relate between functionality, extent of reaction and degree of polymerization.
- Introduce preparation, structure, properties and application of certain polymers *e.g.* polystyrene and styrene copolymers, poly(vinyl chloride) and related polymers, Polycarbonates, Polyamides and related polymers. Phenol-formaldehyde resins (Bakelite, Novolac).
- Have clear ideas about conducting polymers *e.g.* polyacetylene, polyaniline, poly(p-phenylene sulphide), polypyrrole, polythiophene.

Topic: ***Kinetics of Polymerization, Determination of Molecular Weight of Polymers, Glass Transition Temperature (Tg), Determination of Tg and Polymer Solution***

Upon completion of this topic, learners should be able to:

- Derive expressions of rate equations for step growth and radical chain growth polymerization.
- Write steps of mechanistic pathways for the formation of addition and condensation polymers.

LEARNING OUTCOME

- Determine degree of polymerization and kinetic chain length.
- Calculate number average and weight average molecular weights and also polydispersity index.
- Apply different methods for the determination of molecular weights of polymers.
- Understand distribution of molecular weights of polymers.
- Enumerate change of thermodynamic parameters of polymerization processes.
- Identify the factors that control solubility of polemers.
- Define glass transition temperature.
- Justify the variation of physical state of polymers of different kinds with temperature.
- State the significance of free volume theory in the application of polymers.
- Differentiate between T_g and melting point.

Course Code: DSE-4

Course Title: ***Dissertation followed by power point presentation***

Upon completion of this topic, learners should be able to:

- Submit a brief write-up on the selected topic.
- Create a PPT using various computer tools.
- Deliver a lecture on a topic using power point presentation.
- Write a description on a particular topic.

LEARNING OUTCOME
SUBJECT: CHEMISTRY
COURSE OUTCOMES
STREAM: GENERAL

SEMESTER-2

Course Code: GE-2 / CC-1C

Course Title: *States of Matter & Chemical Kinetics, Chemical , Bonding and Molecular Structure, p-Block Elements*

Kinetic Theory of Gases and Real gases

Upon completion of this topic, learners should be able to:

- Explain the concept of pressure and temperature from Kinetic Theory of gases.
- State the postulates of kinetic theory of gas.
- Derive the equations of states for an ideal gas and a real gas.
- Describe physical basis for the kinetic theory of gases.
- Represent the laws from kinetic theory of gases.
- State the assumptions for Maxwell's law of distribution of molecular speed.
- Explain the relationship between partial pressures and the total pressure as described in Dalton's law of Partial Pressure.

Liquids

Upon completion of this topic, learners should be able to:

- Explain surface tension and its determination through stalagmometer.
- Describe viscosity and principle of determination of coefficient of viscosity using Ostwald viscometer.
- Illutrate the effect of temperature on surface tension and coefficient of viscosity of a liquid.

Solids

Upon completion of this topic, learners should be able to:

- Be familiar with different forms of solids, crystal systems, unit cells, Bravais lattice types, Symmetry elements.
- Know two laws of crystallography - Law of constancy of interfacial angles, Law of rational indices.
- Assign Weiss and Miller indices of different planes and interplanar distance.

- Formulate Bragg's law.
- Describe the structures of NaCl, KCl and CsCl qualitative.
- Describe various types of defects in crystals.
- Define Glasses and liquid crystals.

Chemical Kinetics

Upon completion of this topic, learners should be able to:

- List reasons for studying chemical kinetics.
- Discuss the factors that affect the rate of chemical reactions.
- Differentiate between order and molecularity of a chemical reaction.
- Describe the general form of a (differential) rate law and how the rate of a chemical reaction depends on the concentrations of species that appear in the rate law.
- Determine the "overall reaction order" for a chemical reaction using the (differential) rate law.
- Derive a general expression for the unit of rate constant and to find the unit of rate constant for zero, 1^{st}, 2^{nd} and 3^{rd} order reaction.
- Explain why reactant molecules must have a certain minimum amount of kinetic energy when they collide in order for a chemical reaction to occur.
- Write the temperature dependence of reaction rate(Arrhenius equation).
- Signify "activation energy".

Inorganic Chemistry

Chemical Bonding and Molecular Structure

Upon completion of this topic, learners should be able to:

- Know the general characteristics of different kinds of bonding.
- Interpret energy considerations in ionic bonding, lattice energy and solvation energy.
- Establish the Born-Landé equation for calculation of latticeenergy, Born-Haber cycle and its applications.
- Describe polarizing power and polarizability.

LEARNING OUTCOME

- Illustrate Fajan's rules, ionic character in covalent compounds, dipole moment and percentage ionic character.
- Elucidate VB Approach: Shapes of some inorganic molecules and ions on the basis of VSEPR.
- Define hybridization with suitable examples of linear, trigonal planar, square planar, tetrahedral, trigonal bipyramidal and octahedral arrangements.
- Know the general concept of resonance and resonating structures in various inorganic and organic compounds.
- Illustrate MO Approach: Rules for the LCAO method, bonding and antibonding MOs and their characteristics for s-s, s-p and p-p combinations of atomic orbitals
- Describe MO treatment of homonuclear diatomic molecules of 1st and 2nd periods.
- Describe MO treatment of heteronuclear diatomic molecules such as CO, NO and NO^+.
- Differentiate VB and MO approaches.

Comparative study of p-block elements

Upon completion of this topic, learners should be able to:

- Explain Group trends in electronic configuration, modification of pure elements, common oxidation states, inert pair effect.
- Elucidate Group 13 to 17 and their important compounds.

LEARNING OUTCOME

SEMESTER-4

Course: GE-4 / CC-1D

Course Title: Solutions, Phase equilibria, Conductance, Electrochemistry & Analytical and Environmental Chemistry

Solutions

Upon completion of this topic, learners should be able to:

- Define ideal and non-ideal solution.
- Know about vapour pressure.
- State Raoult's law for ideal and non-ideal solution.
- Draw and explain the curve for ideal and non-ideal solution accordingly Raoult's law.
- Draw and explain the vapour pressure composition and temperature composition curve for ideal and non-ideal solution.
- Discuss different types of distillation process.
- State Lever rule.
- Define and discuss azeotropes.
- Define and explain critical solution temperature.
- Discuss the effect of impurity on partial miscibility of liquids.
- Know about immiscibility of liquids and State the principle of steam distillation.
- Discuss Nernst distribution law and its application.

Phase Equilibria

Upon completion of this topic, learners should be able to:

- Understand the meaning phase, component and degree of freedom of a system.
- Exemplify different systems and explain the phase, component and degree of freedom of each system.

LEARNING OUTCOME

- Understand the criteria of phase equilibrium.
- Use accurate values of C, P and F in practical cases.
- State and derive Gibb's phase rule.

Conductance & Electromotive force

Upon completion of this topic, learners should be able to:

- Write Faraday's laws of electrolysis.
- Construct cell from half-cell potential.
- Determine the cell potential.
- Derive Nernst equation.
- Calculate the thermodynamic parameters G, H and S.
- Explain reversible and irreversible cells with examples.
- Define liquid junction potential and figure out its removal.
- Exemplify standard electrodes like hydrogen electrodes and calomel electrodes.
- Understand electrochemical series and its applications.
- Enumerate the advantages using calomel electrode over hydrogen electrode as standard electrodes.
- Describe the determination of pH of a solution using hydrogen electrode and quinhydrone electrode.

Chemical Analysis

Upon completion of this topic, learners should be able to:

- State the steps involved in gravimetric analysis.
- Demonstrate the general rules followed during precipitation step of gravimetric analysis.
- Define co-precipitation, post-precipitation, digestion/aging, peptization and coagulation.
- Indicate the importance of proper washing and aging procedures of precipitates in gravimetric analysis.
- Identify the requirements of a solution to be chosen as an ideal wash liquid.

LEARNING OUTCOME

- Calculate gravimetric factor and to use them in the gravimetric estimation of different elements and groups prescribed in the syllabus.
- Illustrate the criteria of primary and secondary standard solutes.
- Disclose the principles of acid-base, redox and complexometric titrations.
- Exemplify acid-base, redox and chelometric indicators.
- Rationalize the principle of estimation of Na_2CO_3 and $NaHCO_3$ in a mixture.
- Justify the reason of using EDTA as the chelometric titrant.
- Classify complexometric titrations.
- Elucidate chromatography and retention factor.
- Arrange different chromatographic techniques based on the principles involved and use of stationary & mobile phases.
- Discern column chromatography and thin layer chromatography.
- Point out the applications of chromatographic techniques.

Environmental Chemistry

Upon completion of this topic, learners should be able to:

- Understand composition and structure of atmosphere.
- Determine variousair pollutants and how they creates problem in our environment.
- Understand ozone layer depletion and green house effect.
- Characterize the role of water in our environment; causes and effects of water pollution.
- Understand the way we can minimize the water pollution.
- How to determine the DO, COD, BOD, TDS and hardness parameters of water.

Course Code: SEC-2

Course Title: *Pharmaceuticals Chemistry*

After completion of the course, the learners will be able to:-

- Understand how a drug is discovered and what are the different stages a molecule must successfully overcome to become a drug candidate.

LEARNING OUTCOME

- Easily classify drugs based on their mechanism of action.
- Follow retrosynthetic approach to synthesize analgesics agents, antipyretic agents, anti-inflammatory agents, antibiotics, antibacterial agents, antifungal agents, antiviral agents, Central Nervous System agents, cardiovascular drugs, anti-leprosy drugs, and HIV-AIDS related drugs.

LEARNING OUTCOME

SEMESTER-6

Course Code: DSE-1B

Course Title: *Functional Group Organic Chemistry and Industrial Chemistry*

Functional Group Organic Chemistry

Upon completion of this topic, learners should be able to:

- Identify the various types of carboxylic acids and their synthesis procedure.
- Distinguish between BAc2 and AAc2 mechanisms.
- Understand the conversation, derivative preparation and interconversion of various acids.
- State the significance of different forms of amines.
- Understand the synthesis and derivative preparation of amines, nitro compounds and amino acids.
- Classify the carbohydrates and distinguish them by structure and properties.
- Apply different methods for synthesis of carbohydrates.
- Define mutarotation.
- Be familiar with different types of nitrogen containing organic compounds *e.g.* amine, nitro, nitrile, isonitrile, diazonium salts and azo compounds.
- Synthesize (incorporate) those above mentioned nitrogen containing functionalities and encounter with various types of reactions they undergo.
- Interconvert between different functional groups.
- Differentiate between different types of amines and nitro compounds through visual colour change reactions.

Industrial Chemistry

Upon completion of this topic, learners should be able to:

- Understand the meaning of polymer.
- Discuss different type of polymers.
- Discuss synthesis, physical properties and importance of polyethylene, polystyrene, phenol formaldehyde, polyvinyl chloride, polyester and nylon-66.
- Define synthetic rubber and fiber.
- Understand the meaning of paint, binder.

LEARNING OUTCOME

- Discuss primary constituents of paints, formulation of paints, and solvent for paints.
- Discuss oil based paints, latex paints and alkyd resin paints.
- Define varnish.
- Discuss constituents of varnishes and formulation of varnishes.
- Understand synthetic dye.
- Discuss synthesis and structure of methyl orange, congo red, malachite green and crystal violet.
- Discuss necessity of drugs and pharmaceuticals.
- Discuss preparation and important use of aspirin, paracetamol, sulphadiazine and metronidazole.
- Differentiate between fats and oils.
- Write the industrial production of vanaspati and margarine.
- Describe the production of toilet and washing soaps, enzyme-based detergents, detergent powder, liquid soaps.
- Write the production, applications and residual toxicity of gammaxane, parathion, DDT.
- Discuss in detail about food flavour, food colour, food preservatives, artificial sweeteners, acidulants, alkalies, edible emulsifiers and edible foaming agents.

Course Code: SEC-4

Course Title: *Polymer Chemistry*

After completion of the course, learners will be able to:-

- Classify polymers from different angles.
- Understand nomenclature of polymers.
- Identify molecular forces and chemical bonding present in polymers.
- Explain the basis of formation of synthetic polymers.
- Classify polymerization processes.
- Relate between functionality, extent of reaction and degree of polymerization.
- Understand the mechanism and kinetics of step growth and radical chain growth polymerization.

LEARNING OUTCOME

- Determination of molecular weights of polymers M_n and M_W by viscometry and osmometry.
- Introduce preparation, structure, properties and application of certain polymers *e.g.* polystyrene, poly(vinyl chloride), phenol-formaldehyde resins (Bakelite, Novolac).
- Have clear ideas about conducting polymers *e.g.* polyacetylene.

SEMESTER-II

Course Outcome of paper CC-III

Paper Name: Electricity and Magnetism

Teacher: Dr Dayamoy Bisui and Dr Sutanu Kumar Chandra

Electric Field and Electric Potential: Electric field: Electric field lines. Electric flux, Gauss' Law with applications to charge distributions with spherical, cylindrical and planar symmetry. Conservative nature of Electrostatic Field. Electrostatic Potential. Laplace's and Poisson equations. The Uniqueness Theorem. Potential and Electric Field of a dipole. Force and Torque on a dipole. Electrostatic energy of system of charges. Electrostatic energy of a charged sphere. Conductors in an electrostatic Field. Surface charge and force on a conductor. Capacitance of a system of charged conductors. Parallel-plate capacitor. Capacitance of an isolated conductor. Method of Images and its application to: (1) Plane Infinite Sheet and (2) Sphere.

Dielectric Properties of Matter: Electric Field in matter. Polarization, Polarization Charges. Electrical Susceptibility and Dielectric Constant. Capacitor (parallel plate, spherical, cylindrical) filled with dielectric. Displacement vector D. Relations between E, P and D. Gauss' Law in dielectrics.

Magnetic Field: Magnetic force between current elements and definition of Magnetic Field B. Biot-Savart Law and its simple applications: straight wire and circular loop. Current Loop as a Magnetic Dipole and its Dipole Moment (Analogy with Electric Dipole). Ampere's Circuital Law and its application to (1) Solenoid and (2) Toroid. Properties of B: curl and divergence. Vector Potential. Magnetic Force on (1) point charge (2) current carrying wire (3) between current elements. Torque on acurrent loop in a uniform Magnetic Field.

Magnetic Properties of Matter: Magnetization vector (M). Magnetic Intensity (H). Magnetic Susceptibility and permeability. Relation between B, H, M. Ferromagnetism. B-H curve and hysteresis.

Learning Outcome of the topic "Electromagnetic Induction"

LEARNING OUTCOME

1. Faraday's Law and Lenz's Law.
2. Self Inductance and Mutual Inductance.
3. Reciprocity Theorem.
4. Energy stored in a Magnetic Field.
5. Introduction to Maxwell's Equations. Charge Conservation and Displacement current.

After completion of the topic **"Electromagnetic Induction"** it is expected the students will acquire the knowledge, skills and ability to:

1. Understand and explain the fundamental concepts of Faraday's Law, Lenz's Law, Self Inductance and Mutual Inductance, Reciprocity Theorem, Energy stored in a Magnetic Field, Maxwell's Equations, Charge Conservation and Displacement current and their role in Physics and applied contexts.
2. About the advantages of Electromagnetic Induction in context of AC or DC electrical power generation using mechanical energy source.
3. They will have the capacity to understand that electromagnetic induction is the production of an electromotive force across an electrical conductor in a changing magnetic field.
4. They will able to understand the applications of EM induction, including electrical components such as inductors and transformers, and devices such as electric motors and generators.

Learning Outcome of the topic "Electrical Circuits"

1. AC Circuits, Kirchhoff's laws for AC circuits.
2. Complex Reactance and Impedance.
3. Series LCR Circuit: - Resonance, Power Dissipation, Quality Factor and Band Width.
4. Parallel LCR Circuit.

After completion of the topic "**Electrical Circuits"** it is expected that the students will acquire the knowledge, skills and ability to:

1. Understand and explain the fundamental concepts of AC Circuits, Kirchhoff's laws for AC circuits, Complex Reactance and Impedance, Series LCR Circuit; Resonance, Power Dissipation, Quality Factor and Band Width and Parallel LCR Circuit
2. They will be capable of analyzing AC circuit in practical purpose by using Kirchhoff's laws for AC circuits with the concept of Complex Reactance and Impedance.
3. The usefulness and importance of Series and parallel LCR Circuit, Resonance, Power Dissipation, Quality Factor and Band Width in the field of electromagnetic communication system viz, in radio, radar, TV and Mobile etc.

LEARNING OUTCOME

Learning Outcome of the topic "Network theorems"

1. Ideal Constant-voltage and Constant-current Sources.
2. Network Theorems: Thevenin theorem, Norton theorem, Superposition theorem, Reciprocity theorem, Maximum Power Transfer theorem. Application to dc circuits.

After completion of the topic "**Electrical Circuits"** it is expected the students will acquire the knowledge, skills and ability to

1. Understand the concept of an ideal Voltage and current sources, constant Voltage and current sources and practical Voltage and current sources.
2. Understand the usefulness of Thevenin theorem, Norton theorem, Superposition theorem, Reciprocity theorem, Maximum Power Transfer theorem for dc circuit analysis.
3. They become familiar with the superposition theorem and its unique ability to separate the impact of each source on the quantity of interest.
4. Become able to apply Thévenin's theorem to reduce any two-terminal, series-parallel network with any number of sources to a single voltage source and series resistor.
5. Become familiar with Norton's theorem and how it can be used to reduce any two-terminal, series-parallel network with any number of sources to a single current source and a parallel resistor.
6. Understand how to apply the maximum power transfer theorem to determine the maximum power to a load and to choose a load that will receive maximum power and become aware of the reduction of power consumption in our everyday life.

Learning Outcome of the topic "Ballistic Galvanometer"

1. Torque on a current Loop.
2. Ballistic Galvanometer: Current and Charge Sensitivity.
3. Electromagnetic damping, Logarithmic damping and CDR.

After completion of the topic and experiment on "**Ballistic Galvanometer"** it is expected that the students will acquire the knowledge, skills and ability to:

1. Understand the ballistic galvanometers and how they can be used to measure charges.
2. Built electrical circuits.
3. Understand the accuracy and precision to which charge can be measured
4. Investigated damped oscillations using a Ballistic Galvanometer
5. Accurate measurement of charge, current and voltage in electrical circuits which is a key to the development of experimental physics. At the heart of nearly all electrical and electronic apparatus is a device which measures voltage or current. Often we are trying to measure very small effects, so accurate measurements are crucial. In this practical you will be using a galvanometer to measure

extremely small currents. You will learn how current and voltage are divided across different components of a circuit.

Course Outcome for paper CC-IV

Paper Name: Waves and Optics

Teacher: Debakinandan Majee

1. Superposition of Collinear Harmonic oscillations:

Linearity and Superposition Principle. Superposition of two collinear oscillations having (1) equal frequencies and (2) different frequencies (Beats). Superposition of N collinear Harmonic Oscillations with (1) equal phase differences and (2) equal frequency differences.

Learning Outcomes of the Chapter:

On successful completion of this chapter students will:

1. Understand the concept of superposition principle
2. Identify the conditions for the superposition of two waves
3. Calculate the resultant amplitude and phase due to superposition of two S.H.M.'s of same frequency and different frequency
4. Calculate the resultant amplitude and phase due to superposition of N S.H.M.'s of same frequency and different frequency
5. Understand the concept of Beat
6. Understand the application of Beat

2. Superposition of two perpendicular Harmonic Oscillations:

1. Graphical and Analytical Methods.
2. Lissajous Figures with equal an unequal frequency and their uses.

Learning Outcomes of the Chapter:

On successful completion of this chapter students will:

LEARNING OUTCOME

1. Calculate the resultant amplitude and phase due to superposition of two perpendicular S.H.M.'s of same frequency and different frequency by analytical method
2. Understand the concept of Lissajous figures
3. Use Lissajous figures to understand simple harmonic vibrations of same frequency and different frequencies
4. Use CRO in the laboratory to study Lissajous figures of sinusoidal wave of equal an unequal frequency

3. Wave Motion:

Plane and Spherical Waves.
Longitudinal and Transverse Waves. Plane Progressive (Travelling)Wave.
Wave Equation. Particle and Wave velocities. Differential Equation.
Pressure of a Longitudinal Wave.
Energy Transport. Intensity of Wave.
Water Waves: Ripple and Gravity Waves.

Learning Outcomes of the Chapter:

On successful completion of this chapter students will:

1. Compare particle motion and wave motion in different types of wave
2. Understand the concept of plane and spherical waves
3. Distinguish between Longitudinal and Transverse waves
4. Derive the relation between particle velocity and wave velocity
5. Derive the differential form of Wave equation
6. Using the separation of variable methods to solve physical problems
7. Calculate the energy density of progressive wave
8. Understand the concept of Intensity of wave
9. Calculate the pressure of Longitudinal Waves.
10. Understand the concept of variations of pressure at nodal and antinodal points

4. Velocity of Waves:

Velocity of Transverse Vibrations of Stretched Strings.
Velocity of Longitudinal Waves in a Fluid in a Pipe.
Newton's Formula for Velocity of Sound. Laplace's Correction.

Learning Outcomes of the Chapter:

On successful completion of this chapter students will:

LEARNING OUTCOME

1. Derive the velocity of transverse waves along a stretched string
2. Derive the velocity of longitudinal waves in fluid
3. Compare the velocities of longitudinal and transverse waves in string
4. Derive the Newton's formula for the velocity of sound in air
5. Understand the concept of Laplace's correction of Newton's formula
6. Understand the effect of density, pressure, temperature, and humidity of the gas on the velocity of sound

5. Superposition of Two Harmonic Waves:

Standing (Stationary) Waves in a String: Fixed and Free Ends.
Analytical Treatment. Phase and Group Velocities.
Changes with respect to Position and Time.
Energy of Vibrating String. Transfer of Energy.
Normal Modes of Stretched Strings. Plucked and Struck Strings. Melde's Experiment.
Longitudinal Standing Waves and Normal Modes.
Open and Closed Pipes. Superposition of N Harmonic Waves.

Learning Outcomes of the Chapter:

On successful completion of this chapter students will:

1. To understand how stationary waves are produced by superposition of incident and reflected waves in string fixed at the both ends
2. Know the different modes of vibrating in the string and find out how different harmonic can be produced
3. Obtain half and full-range Fourier series of simple functions
4. Understand the concept of Fourier theorem and its application
5. Derive the relation between phase and group velocity
6. Obtain boundary conditions of a longitudinal vibration in bars free at one end also fixed at both the ends
7. The laws of vibrations of stretched string can be verified with Melde's experiments.

6. Wave Optics:

Teacher: Bharat Chandra Dalui

Electromagnetic nature of light.

Definition and properties of wave front.

Huygens Principle.Temporal and Spatial Coherence.

Learning Outcomes of the Chapter:

On successful completion of this chapter students would understand:

Light is unified form of electricity and magnetism. What is Huygen's principle about wave? What are wavelets? What is wave front? Why Huygen's principle was neglected for long time though it was published in 1679 just after Newton's corpuscular theory published in 1665?

Interference:

Division of amplitude and wavefront. Young's double slit experiment. Lloyd's Mirror and Fresnel's Biprism. Phase change on reflection: Stokes' treatment. Interference in Thin Films: parallel and wedge-shaped films. Fringes of equal inclination (Haidinger Fringes); Fringes of equal thickness (Fizeau Fringes). Newton's Rings: Measurement of wavelength and refractive index.

Learning Outcomes of the Chapter:

Students would know that interference by division of amplitude occur when light reflected from surface or refracted through a medium. Interference by Lloyd's mirror and Fresnel's bi-prism are the example of division of amplitude. Phase change on reflection of light occurs when light incident from rarer medium to denser medium and it would be explained by Stokes' treatment. They would know that Huygens' wave theory first experimentally verified in 1801by Thomas Young. They would know the necessity of studying interference fringes by thin film. Why measurement of wavelength, in our laboratory, by Newton's rings experiment is not matched with literature would be explained.

7. Interferometer:

Michelson Interferometer-(1) Idea of form of fringes (No theory required), (2) Determination of Wavelength, (3) Wavelength Difference, (4) Refractive Index, and (5) Visibility of Fringes. Fabry-Perot interferometer.

Learning Outcomes of the Chapter:

How interference fringe form by Michelson interferometer would be explained. Students would know Michelson interferometer is famous for three experiments: the Michelson-Morley ether-drift experiment; the first systematic study of the fine structure of spectral lines and first direct comparison of the wavelength of spectral lines with the standard metre. Students would be informed about present miniaturization of Michelson interferometer.

Why fringe formed by Fabry-Perot interferometer is better than that of Michelson interferometer would be understood.

8. Diffraction:

Kirchhoff's Integral Theorem,
Fresnel-Kirchhoff's Integral formula. (Qualitative discussion only)

Learning Outcomes of the Chapter:

Students would know Kirchhoff's integral theorem and Fresnel-Kirchhoff's integral formula.

9. Fraunhofer diffraction:

Single slit. Circular aperture, Resolving Power of a telescope.
Double slit. Multiple slits. Diffraction grating. Resolving power of grating.

Learning Outcomes of the Chapter:

Basic condition of Fraunhofer diffraction is infinite distance between source and screen. How it is done in the laboratory would be understood by the students. Students would have idea about fringe formation by single slit, circular aperture, double slit and by multiple slits. They would know diffraction grating is just a multiple slits.

10. Fresnel Diffraction:

Fresnel's Assumptions. Fresnel's Half-Period Zones for Plane Wave. Explanation of Rectilinear Propagation of Light. Theory of a Zone Plate: Multiple Foci of a Zone Plate. Fresnel's Integral, Fresnel diffraction pattern of a straight edge, a slit and a wire.

Learning Outcomes of the Chapter:

Students would understand the requirement of Fresnel's assumption. They would know about Fresnel's half-period zones for diffraction ofplane wave. How rectilinear propagation of light is explained by Fresnel's diffraction theory would be understood by the students. They would have idea about fringe Fresnel diffraction pattern of Fresnel diffraction for a straight edge, a slit and a wire.

11. Holography:

LEARNING OUTCOME

Principle of Holography. Recording and Reconstruction Method. Theory of Holography as Interference between two Plane Waves. Point source holograms.

Learning Outcomes of the Chapter:

Students would know the theory of holography is the Interference between two Plane Waves. They would understand i**f** both the amplitude and phase of the original wave could be reconstructed somehow, the resulting light field (havingsame frequencies) would be indistinguishable from the original. This means that the re-formed image in perfect three dimensionality, exactly as if the object were there before actually generating the wave. They would know the method of recording and reconstruction. For recording and reconstruction they would gain knowledge of point source hologram.

LEARNING OUTCOME

SEMESTER-IV

Course Outcome for paper CC-VIII

Paper Name: Complex Analysis

Teacher: Dr Jyotipratim Ray Chaudhuri

This course is intended for students using mathematics at a high level in theoretical physics.

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Topics covered include:

1. Complex Algebra
2. Complex differentiability
3. Complex integration
4. Cauchy integral theorems
5. Taylor and Laurent series representation
6. Isolated singularities
7. Residue theorem and applications to real integration

Learning Outcomes

Upon successful completion, students will have the knowledge and skills to:

1. Explain the fundamental concepts of complex analysis and their role in Physics, modern mathematics and applied contexts
2. Demonstrate accurate and efficient use of complex analysis techniques.
3. Demonstrate capacity for mathematical reasoning through analyzing, proving and explaining concepts from complex analysis.
4. Apply problem-solving using complex analysis techniques applied to diverse situations in physics, engineering and other mathematical contexts.

Laplace and Fourier Transforms

Laplace transforms:

Definition of Laplace transform, Laplace transform of elementary functions, properties of Laplace transform, Laplace transform of elementary and some special functions: unit step function, Dirac-

LEARNING OUTCOME

Delta function and periodic functions, inverse Laplace transform: definition and properties, inverse Laplace transform by partial fraction, convolution theorem, using standard results, application of Laplace transform to linear differential equations.

Fourier transforms:

Fourier integrals, Fourier sine and cosine integrals, Fourier transform, Fourier sine and cosine transform, inverse Fourier transforms, transform of elementary functions. Solution of linear differential equation by Fourier transforms technique. Dirac Delta function and Fourier transform.

Learning Outcomes

1. Students will be able to know the use of Laplace transform in system modeling, digital signal processing, process control, solving Boundary Value Problems.
2. Students will be able to use Fourier transform in communication theory and signal analysis, image processing and filters, data processing and analysis, solving linear differential and partial differential equations such as wave equation. They can also learn wave packet dynamics which is important in the field of both classical and quantum physics.

Course Outcome for paper CC-VIII (Practical)

Paper Name: Complex Analysis

Teeacher: Taniya Chatterjee

This course would introduce students with the basic knowledge of computers their applications in solving common and scientific problems, the course include scientific programming languages, scientific word processing and graphical analysis.

Learning Objective

This Course Enables the Student to

1. Understand the linear equations, vector spaces, matrices, linear transformations, determinants, eigenvalue, eigenvectors, etc.

2. Learn to use Laplace transform methods to solve differential equations.

3. Introduce the Fourier series and its application to the solution of partial differential equations.

Learning Outcomes

Upon successful completion of this course it is intended that a student will be able to:

1. Students will demonstrate competence with the basic ideas of linear algebra including concepts of linear systems, independence, theory of matrices, linear transformations, bases and dimension, eigenvalues, eigenvectors and diagonalization.

2.Use the method of Laplace transforms to solve initial-value problems for linear differential equations with constant coefficients.

3.Solve a Cauchy problem for the wave or diffusion equations using the Fourier Transform

Course Outcome for paper CC-IX

Paper Name: Elements of Modern Physics

Teacher: Dr Sutanu Kumar Chandra

After completion of this course, students will be able to

A. Basic Quantum Mechanics

1. Understand how classical physics is unable to explain the new experimental phenomena like black body radiation. They will also learn how Max Planck explained this idea by his revolutionary idea of Planck's radiation theory.
2. Understand how explanation of Photoelectric effect by Einstein's light quantum hypothesis with the concept of photon gives support to Planck's quantum theory.
3. Understand how radiation behaves like a particle in phenomena: photoelectric effect and Compton Effect.
4. Learn how Quantum physics emerged as a new science to explain all these phenomena.
5. Understand the wave particle duality and matter waves given by de Broglie and know the Davison –Germer experiment in support of this theory.
6. Acquire the basic idea of quantum physics from the two slit experiment.
7. Learn the concept of wave packet and Heisenberg's uncertainty principle.
8. Understand the gamma ray microscope thought experiment in support of this principle.

9. Learn how uncertainty principle is applicable in several areas of atomic and nuclear physics.
10. Understand how as a main corner equation in quantum mechanics; Schrodinger equation was developed from plausibility arguments.
11. Learn about the meaning of wave function and its probabilistic interpretation given by Max Born.
12. Derive the continuity equation for the probability current density and how to normalize a given wave function.
13. Learn about the boundary conditions to a given wave function.
14. Understand the operator formalism, eigen value equation and expectation value of a dynamical variable.
15. Understand how to apply the Schrodinger equation in case of particle in a box/ infinite potential well/quantum dot.
16. Be acquainted with the behavior of quantum particle by solving time independent Schrodinger equation in one dimensional step potential and potential barrier and learn how to apply quantum mechanics to predict the future behavior of the particle.

B. Introductory Nuclear Physics

1. Learn about the properties of the nucleus and its constituents.
2. Gain knowledge of the binding energy per nucleon based on semi-empirical mass formula.
3. Get some idea about the nuclear forces and its stability related to it.
4. Be acquainted with the two basic models of nucleus: Liquid drop model and Shell model.
5. Learn about radioactive rays and distinguish the three types of radioactive paricles: alpha, beta and gamma.
6. Explain the radioactive disintegration with the idea of half life and mean life.
7. Understand the decay process of alpha, beta and gamma and the energy spectrum related to them.
8. Understand the neutrino hypothesis given by W. Pauli to explain the energy released in beta decay.
9. Learn about two import nuclear phenomena; Fission and Fusion and acquire a brief idea of nuclear power reactor.
10. Describe the different types of lasers, its principle and properties of laser beam.

Course Outcome for paper CC-X

Paper Name: Analog Systems and Applications

LEARNING OUTCOME

1. Semiconductor Diodes:

P and N type semiconductors. Energy Level Diagram. Conductivity and Mobility, Concept of Drift velocity. PN Junction Fabrication (Simple Idea). Barrier Formation in PN Junction Diode. Static and Dynamic Resistance. Current Flow Mechanism in Forward and Reverse Biased Diode. Derivation for Barrier Potential, Barrier Width and Current for Step Junction.

Learning Outcomes of this Chapter:

Students would understand about the conductivity of intrinsic semiconductor. They would also know necessity of enhancing conductivity of semiconductor i.e. the necessity of doping. They would have an idea about motion of electrons through semiconductor. PN junction formation and barrier formation in unbiased diode would be understood. Students would also know the energy band diagram of unbiased diode and what happens in energy band diagram in biased diode. They would also understand that the dynamic resistance is very low in forward biased diode and very high in reverse biased diode.

2. Two-terminal Devices and their Applications:

Rectifier Diode: Half-wave Rectifiers. Centre-tapped and Bridge Full-wave Rectifiers, Calculation of Ripple Factor and Rectification Efficiency, capacitor filter, Zener Diode and Voltage Regulation. Principle and structure of (1) LEDs, (2) Photodiode and (3) Solar Cell.

Learning Outcomes of this Chapter:

After having concept of Half-wave Rectifiers, Centre-tapped Full-wave Rectifiers and Full-wave Bridge Rectifiers, students would understand that Full-wave Bridge Rectifiers is the best for conversion from Alternating Current (AC) to Direct Current (DC). They would also know the utility of capacitor filter for better DC current. They use Zener diode for voltage regulation. **The best outcome of this chapter is the ability of making a power supply for household use.** The students would have the concepts of principle and structure of (1) LEDs, (2) Photodiode and (3) Solar Cell.

3. Bipolar Junction transistors:

n-p-n and p-n-p Transistors. Characteristics of CB, CE and CC Configurations. Current gains α and β Relations between α and β. Load Line analysis of Transistors. DC Load line and Q-point. Physical Mechanism of Current Flow. Active, Cutoff and Saturation Regions.

Learning Outcomes of this Chapter:

LEARNING OUTCOME

Students would have the concepts of structure and function of n-p-n and p-n-p Transistors. By knowing the amplification factor β students would be able to understand how a small current (I_B) controls a high current (I_C). Students would be able to understand about three operation region: Active, Cutoff and Saturation Regions. Transistors operate in active region for amplifiers. Transistors operate in Cutoff and Saturation regions for digital electronics and for oscillators.

4. Amplifiers:

Transistor Biasing and Stabilization Circuits. Fixed Bias and Voltage Divider Bias. Transistor as 2-port Network. h-parameter Equivalent Circuit. Analysis of a single-stage CE amplifier using Hybrid Model. Input and Output Impedance. Current, Voltage and Power Gains. Classification of Class A, B & C Amplifiers.

Learning Outcomes of this Chapter:

Students understand necessity of transistor Biasing and stabilization Circuits and how to do it. For pedagogy they know fixed bias of a transistor and its drawbacks. We make the students understand how the Q-point is rock solid in Voltage Divider Bias (VDB). Why rock solid Q-point is necessary for operating transistor in amplifier. Analysis of a single-stage CE amplifier using Hybrid Model required for understanding higherstage CE amplifier. Students would able to calculate Current, Voltage and Power Gains of amplifier. After having concept of Class A, B & C Amplifiers, students would understand that Class C Amplifier is the best amplifier.

5. Coupled Amplifier:

Two stage RC-coupled amplifier and its frequency response.

Learning Outcomes of this Chapter:

How output gain of second stage is the product of individual two stages of RC-coupled amplifier is one of the outcomes and by induction it is also understandable that the output of multistage RC-coupled amplifier is the product of all individual outputs. The second outcome is the frequency dependency of overall output in very low and high frequency.

6. Feedback in Amplifiers:

Effects of Positive and Negative Feedback on Input Impedance, Output Impedance, Gain, Stability, Distortion and Noise.

Learning Outcomes of this Chapter:

LEARNING OUTCOME

Students would understand what positive feedback is. They would know how positive feedback is used in self-sustained oscillators maintaining Barkhausen Criterion. Four types of negative feedback would be understood by the students. They would know the effect of negative feedback on Input Impedance, Output Impedance, Gain, Stability, Distortion and Noise. Relationship between bandwidth and negative feedback would be understood.

7. Sinusoidal Oscillators:

Barkhausen's Criterion for self-sustained oscillations. RC Phase shift oscillator, determination of Frequency. Hartley & Colpitts oscillators.

Learning Outcomes of this Chapter:

How self-sustained oscillator works fulfilling Barkhausen's Criterion is the main key idea in this chapter. How oscillators convert Direct Current (DC) to Alternating Current (AC). Thermal noise is the main cause of initial starting current. The phase shift in the transistor must be balanced by the feedback circuit for sustained oscillator. Wien bridge oscillator, basically a RC Phase shift oscillator operates for low to moderate frequencies, in the range 5Hz to about 1MHz. In Wien bridge oscillator the 180^0 phase shift is balanced by three RC lag circuits. The Colpitts oscillator operates from 1MHz frequencies to 500MHz frequencies. Hartley oscillator is useful in the frequency range of Collpits oscillator but only difference is in the feedback circuit. In Hartley oscillator feedback is taken from inductor instead of capacitor as in Collpits oscillator. For sharp oscillator frequency and better accuracy for the use of like wrist watch crystal oscillator is used.

8. Operational Amplifiers (Black Box approach):

Characteristics of an Ideal and Practical Op-Amp. (IC 741) Open-loop and Closed-loop Gain. Frequency Response. CMRR. Slew Rate and concept of Virtual ground.

Learning Outcomes of the Chapter:

Students know about characteristics of an Ideal and Practical Op-Amp(Operational Amplifiers). They would have idea about open-loop and closed-loop gain of IC 741. Students would be able to find the power bandwidth of an op-amp using slew rate.

9. Applications of Op-Amps:

LEARNING OUTCOME

Inverting and non-inverting amplifiers, Adder, Subtractor, Differentiator, Integrator, Log amplifier, Zero crossing detector, Wein bridge oscillators.

Learning Outcomes of the Chapter:

Students would be able to design, analyze and fabricate inverting amplifiers, non-inverting amplifiers, adder, subtractor, differentiator and integrator. They would also able to fabricate Wein bridge oscillator using Op-Amps.

SEMESTER-VI

Course Outcome for paper CC-XIII

Paper Name: Electromagnetic Theory

Teacher: Dr Bharat Chandra Dalui

1. Maxwell's Equations:

Review of Maxwell's equations. Displacement Current. Vector and Scalar Potentials. Gauge Transformations: Lorentz and Coulomb Gauge. Boundary Conditions at Interface between Different Media. Wave Equations. Plane Waves in Dielectric Media. Poynting Theorem and Poynting Vector. Electromagnetic (EM) Energy Density. Physical Concept of Electromagnetic Field Energy Density, Momentum Density and Angular Momentum Density.

Learning Outcomes of the Chapter:

James Clerk Maxwell modified Ampere's law. Ampere's law is valid for steady current. But it is not valid for time-varying field. Maxwell modified Ampere's law by introducing the term Displacement Current for time varying field in1865. From Maxwell's equations students would learn that a time-varying electric (**E**) field generates a magnetic (**B**) field, which is everywhere perpendicular to the direction in which the electric field changes. In the same way, a time-varying magnetic (**B**) field generates an electric (**E**) field, which is everywhere perpendicular to the direction in which the magnetic field changes. Consequently, we might anticipate the general transverse nature of the electric as well as magnetic fields in an electromagnetic disturbance. The changing electric and magnetic fields are always in phase. Students would understand the necessity of introduction of scalar and vector potential in electromagnetic wave instead of electric and magnetic fields. Energy flows in electromagnetic waves are equally shared by electric and magnetic fields. Energy flow in electromagnetic field would be understood by Poynting theorem.

2. Electromagnetic Wave in Unbounded Media:

Plane EM waves through vacuum and isotropic dielectric medium, transverse nature of plane EM waves, refractive index and dielectric constant, wave impedance. Propagation

through conducting media, relaxation time, skin depth. Wave propagation through dilute plasma, electrical conductivity of ionized gases, plasma frequency, refractive index, skin depth, application to propagation through ionosphere.

Learning Outcomes of the Chapter:

Students would understand that propagation plane EM wave through vacuum is just like wave propagation through medium. They would know that electric and magnetic field EM waves are perpendicular to each other and direction of propagation of EM waves is perpendicular to the plane containing electric and magnetic field. They would also know that amplitude of electric field is velocity of light times greater than the amplitude of magnetic field. How refractive index of a dielectric medium is related to the permittivity of the medium would be understood by the students. They have to understand how EM waves propagate through conductive media.

3. Electromagnetic Wave in Bounded Media:

Boundary conditions at a plane interface between two media. Reflection & Refraction of plane waves at plane interface between two dielectric media-Laws of Reflection & Refraction. Fresnel's Formulae for perpendicular & parallel polarization cases, Brewster's law. Reflection & Transmission coefficients. Total internal reflection, evanescent waves. Metallic reflection (normal Incidence).

Learning Outcomes of the Chapter:

Students would know whether parallel and perpendicular components of electric field of EM waves are continuous or not at a plane interface between two media. They would know Laws of reflection and refraction of plane waves at plane interface between two dielectric media. Students would able to know how electric fields perpendicular to the plane of incidence and parallel to the plane of incidence are polarized. This polarization principle is known as Fresnel's Formulae in honor of Fresnel. They know for specific angle of incidence of EM waves, it would be polarized. This specific angle is called Brewster's angle and the law is called Brewster's law. They know that sum of coefficient of reflection and coefficient of transmission is unity. It proves the conservation of energy. Students would know no energy is transmitted in the rarer medium in case of total internal reflection.

4. Polarization of Electromagnetic Wave:

Description of Linear, Circular and Elliptical Polarization. Propagation of E.M. Waves in Anisotropic Media. Symmetric Nature of Dielectric Tensor. Fresnel’s Formula. Uniaxial and Biaxial Crystals. Light Propagation in Uniaxial Crystal. Double Refraction. Polarization by Double Refraction. Nicol Prism. Ordinary & extraordinary refractive indices. Production & detection of Plane, Circularly and Elliptically Polarized Light. Phase Retardation Plates:

Quarter-Wave and Half-Wave Plates. Babinet Compensator and its Uses. Analysis of Polarized Light.

Learning Outcomes of the Chapter:

In this chapter students gain huge knowledge about propagation of light through transparent non-conducting crystals. The displacement current is not directly proportional to electric field in these crystals. The directions of electric fields of light in these crystals are not same in all directions. This direction dependent property of the crystals is expressed in terms of permittivity of the material that is dielectric constant. The dielectric tensor is symmetric about its diagonal. According to axis of symmetry of light propagation the crystals are divided into two groups: uniaxial and biaxial Crystals. Students would know about polarization by double refraction and by nicol prism: One polarized light is called ordinary ray or O-ray and other ray called extra ordinary ray or e-ray. Students would gain the knowledge of production and detection of plane, circularly and elliptically polarized light using phase retardation plates like Quarter-Wave and Half-Wave Plates and Babinet Compensator.

5. Rotatory Polarization:

Optical Rotation. Biot's Laws for Rotatory Polarization. Fresnel's Theory of optical rotation. Calculation of angle of rotation. Experimental verification of Fresnel's theory. Specific rotation. Laurent's half-shade polarimeter.

Learning Outcomes of the Chapter:

Students would know about optically active material. They would know how plane of polarization of light rotates when it passes through optically active medium. The amount of optical rotation depends on the concentration of active material and the length of the container of active solution. How optical rotation is associated with concentration and length of the tube containing of active solution would be understood by students.

6. Wave Guides:

Planar optical wave guides. Planar dielectric wave guide. Condition of continuity at interface. Phase shift on total reflection. Eigenvalue equations. Phase and group velocity of guided waves. Field energy and Power transmission.

Learning Outcomes of the Chapter:

Students would know that waveguides are the structures that guide the electromagnetic or sound wave in specific direction with minimum loss of energy. Field energy transmission is the transmission of electrical energy without wires. In a wireless power transmission system, a transmitter device, driven by electric power from a power source, generates a

time-varying electromagnetic field, which transmits power across space to a receiver device, which extracts power from the field and supplies it to an electrical load. The technology of wireless power transmission can eliminate the use of the wires and batteries, thus increasing the mobility, convenience, and safety of an electronic device for all users. Power transmission is the movement of energy from its place of generation to a location where it is applied to perform useful work.

7. Optical Fibres:

Numerical Aperture. Step and Graded Indices (Definitions Only). Single and Multiple Mode Fibres (Concept and Definition Only).

Learning Outcomes of the Chapter:

Students would know that optical fibres are extra ordinary transparent and solid with gradual or step decreasing refractive indices from axis to periphery. They would understand total internal reflection is the principle of optical fibre. They would have idea about diameter of core and cladding of single and multiple mode fibres . They would know single mode optical fibre is used for today's internet communication. They understood that LASER and optical fibre jointly made the internet faster. Without optical fibre modern telecommunication and broadcasting beyond of our imagination.

Course Outcome for paper CC-XIV

Paper Name: Statistical Physics

Teacher: Dr Jyotipratim Ray Chaudhuri

Course content

Probability distribution of microstates in thermal equilibrium. Microcanonical, canonical, and grand canonical ensembles. Connection to thermodynamics. Ideal gas, interacting classical gases. Lattice vibrations, photons, and Planck's law of radiation. Quantum statistics. Non-relativistic fermions and bosons at high and low temperatures. Bose-Einstein condensation.

Learning outcomes

The course provides an introduction to statistical physics, mainly for systems in thermal equilibrium. The student should understand quantum and classical statistical mechanics for ideal systems, and be able to judge when quantum effects are important. The student should understand the connection between microphysics and thermodynamics.

LEARNING OUTCOME

Course Outcome for paper DSE-6

Paper Name: Nuclear and Particle Physics

Teacher: Dr Dayamoy Bisui and Debakinandan Majee

General Properties of Nuclei: Constituents of nucleus and their Intrinsic properties, quantitative facts about mass, radii, charge density (matter density), binding energy, average binding energy and its variation with mass number, main features of binding energy versus mass number curve, N/A plot, angular momentum, parity, magnetic moment, electric moments, nuclear excites states. (10 Lectures)

Nuclear Models: Liquid drop model approach, semi empirical mass formula and significance of its various terms, condition of nuclear stability, two nucleon separation energies, Fermi gas model (degenerate fermion gas, nuclear symmetry potential in Fermi gas), evidence for nuclear shell structure, nuclear magic numbers, basic assumption of shell model, concept of mean field, residual interaction, concept of nuclear force.

Radioactivity decay: (a) Alpha decay: basics of α-decay processes, theory of α- emission, Gamow factor, Geiger Nuttall law, α-decay spectroscopy. (b) β-decay: energy kinematics for β-decay, positron emission, electron capture, neutrino hypothesis. (c) Gamma decay: Gamma rays emission & kinematics, internal conversion.

Learning Outcomes of the topic "Nuclear Reactions"

1. Types of Reactions
2. Conservation Laws
3. Kinematics of reactions, Q-value, reaction rate
4. Reaction cross section
5. Concept of compound and direct Reaction, resonance reaction,
6. Coulomb scattering (Rutherford scattering).

After completion of the topic **"Nuclear Reactions"** it is expected the students will acquire the knowledge, skills and ability to

1. Identify and define various types of nuclear changes or processes including fission, fusion and decay reactions. Use proper isotopic notation to write down and balance a nuclear reaction.

2. Understand the concept of rate of change and half life in the context of nuclear decay.

LEARNING OUTCOME

3. The course expands the knowledge of students especially, the various applications of nuclear physics. The course builds a foundation for the students to carry out research in the field of nuclear physics, high energy physics, nuclear astrophysics, nuclear reactions and applied nuclear physics

Learning Outcomes of the topic "Interaction of Nuclear Radiation with matter"

Energy loss due to ionization (Bethe-Block formula), energy loss of electrons, Cerenkov radiation. Gamma ray interaction through matter, photoelectric effect, Compton scattering, pair production, neutron interaction with matter.

After completion of the topic **"Interaction of Nuclear Radiation with matter"** it is expected the students will acquire the knowledge, skills and ability to

Understand the effects of radiation on matter are determined primarily by the energy of the radiation, which depends on the nuclear decay reaction that produced it.
Instead, the kinetic energy of the radiation is transferred to the atom or molecule with which it collides, causing it to rotate, vibrate, or move more rapidly.

. Learning Outcomes of the topic Detector for Nuclear Radiations:

Gas detectors: estimation of electric field, mobility of particle, for ionization chamber and GM Counter. Basic principle of Scintillation Detectors and construction of photomultiplier tube (PMT). Semiconductor Detectors (Si and Ge) for charge particle and photon detection (concept of charge carrier and mobility), neutron detector.

After completion of the topic "**Detector for Nuclear Radiations**" it is expected the students will acquire the knowledge, skills and ability to

1. Understand the different types of radiation detectors and their operation, development of analytical and synthesis reasoning skills, problem-solving and critical analysis of data and results.

2. To become familiar with the different Methods of detection of nuclear radiation
a) Geiger tube: a very common **radiation** detector that usually gives an audio output.
b) Photomultiplier: a device that converts light into electrical signals.
c) Basic principle of Scintillation Detectors and construction of photomultiplier tube (PMT).
d) Semiconductor Detectors (Si and Ge) for charge particle and photon detection (concept of charge carrier and mobility), neutron detector.

LEARNING OUTCOME

Learning outcome of the topic "Particle Accelerators"

Accelerator facility available in India: Van-de Graaff generator (Tandem accelerator), Linear accelerator, Cyclotron, Synchrotrons.

After completion of the topic **"Particle Accelerators"** it is expected the students will acquire the knowledge, skills and ability to

1. Understand basic principle of Particle accelerators.

2. Realize that the **Particle accelerators** play an important role in national security, including cargo inspection, stockpile stewardship and materials characterization. Early applications of accelerators to inspect nuclear fuels used commercial low-energy electron linear accelerators to induce photo-fission reactions.

3. Particle accelerators are designed to propel particles via electromagnetic fields and pack them into beams. The energy sector benefits from accelerators as well as these can be used for the treatment of nuclear waste and maybe, in the future, in the production of clean, cheap and safe energy via nuclear fusion.

Learning outcome of the topic "Particle Physics"

Particle interactions; basic features, types of particles and its families. Symmetries and Conservation Laws: energy and momentum, angular momentum, parity, baryon number, Lepton number, Isospin, Strangeness and charm, concept of quark model, color quantum number and gluons.

After completion of the topic **"Particle Physics"** it is expected the students will acquire the knowledge, skills and ability to

1. Understand the classification of fundamental nuclear particles
2. Recognise and name the six flavours of lepton and the six flavours of quark.
3. Understand that all leptons and quarks have corresponding antiparticles
4. Appreciate that quarks and antiquarks combine to form baryons, antibaryons and mesons.
5. Write balanced strong interactions, understanding the role of gluons
6. Write balanced weak interactions, understanding the role of W and Z bosons

Course Outcome of Paper DSE-7

LEARNING OUTCOME

Paper Name: Astronomy and Astrophysics

Teacher: Dr Sutanu Kumar Chandra

After completion of this course, students will be able to

1. Gain knowledge of the scales and units required to measure important physical quantities in Astronomy.
2. Measure and compare brightness and luminosity of the astronomical objects.
3. Understand how astronomers measure distance, size, mass, temperature and luminosity of the astronomical object.
4. Be acquainted with the method to locate the position of the astronomical object using different types of celestial coordinate systems.
5. Calculate the apparent solar time at a given mean solar time on any day and understand how modern calendar was developed.
6. Be familiar with different types of optical telescopes and detectors that help us to measure radiant flux from stars and other objects.
7. Learn about the mounting of the astronomical telescopes regarding various celestial coordinate systems.
8. Understand the Virial theorem and thermodynamic equilibrium and its importance in astrophysics.
9. Be acquainted with several features of the Sun and several observed solar activity of it and explain the origin behind these solar activities.
10. Describe the Terrestrial and Jovian planets of the Solar system and compare them with respect to several important characteristics.
11. Understand the Nebular model of the Solar system to explain the origin behind their formation and evolution.
12. Understand how to analyse stellar spectra and correlate them with the characteristic features.
13. Know how to classify the star on the basis of luminosity and temperature on H-R diagram.
14. Learn about the galaxy, our home galaxy; Milky Way by its structure, motion and properties.
15. Understand about the several spiral arms of the spiral galaxy and also gain knowledge of the various constituents of the galaxy; the stars, globular clusters, compact stars and the interstellar medium.

Course of B.Sc. General Programme

Semester-II

Teacher: Poulami Chatterjee

A. Course Content

1. Vector Analysis
2. Electrostatics
3. Magnetism
4. Electromagnetic induction
5. Maxwell's equation and electromagnetic wave propagation

B. Learning outcomes

1. Students can apply the knowledge of electricity and magnetism in natural processes related to technological advances.

2. Students can design experiments to explore physical principals.

3. Students can analyze different problems in electromagnetism using mathematical methods involving vectors and simple calculus.

3. Students can assess the contribution of physics to understand the natural phenomena towards building their scientific mind.

LEARNING OUTCOME

Semester-IV

Course Outcome of Paper CC-1D

Paper Name-Waves and Optics

Paper Name: Waves and Optics

Teacher: Debakinandan Majee

1. Superposition of Collinear Harmonic oscillations:

Linearity and Superposition Principle. Superposition of two collinear oscillations having (1) equal frequencies and (2) different frequencies (Beats). Superposition of N collinear Harmonic Oscillations with (1) equal phase differences and (2) equal frequency differences.

Learning Outcomes of the Chapter:

On successful completion of this chapter students will:

7. Understand the concept of superposition principle
8. Identify the conditions for the superposition of two waves
9. Calculate the resultant amplitude and phase due to superposition of two S.H.M.'s of same frequency and different frequency
10. Calculate the resultant amplitude and phase due to superposition of N S.H.M.'s of same frequency and different frequency
11. Understand the concept of Beat
12. Understand the application of Beat

Superposition of two perpendicular Harmonic Oscillations:

1. Graphical and Analytical Methods.
2. Lissajous Figures with equal an unequal frequency and their uses.

Learning Outcomes of the Chapter:

On successful completion of this chapter students will:

LEARNING OUTCOME

1. Calculate the resultant amplitude and phase due to superposition of two perpendicular S.H.M.'s of same frequency and different frequency by analytical method
2. Understand the concept of Lissajous figures
3. Use Lissajous figures to understand simple harmonic vibrations of same frequency and different frequencies
4. Use CRO in the laboratory to study Lissajous figures of sinusoidal wave of equal an unequal frequency

Wave Optics

Teacher: Bharat Chandra Dalui

Wave Optics:

Electromagnetic nature of light. Definition and Properties of wavefront. Huygens Principle.

Learning Outcomes of the Chapter:

On successful completion of this chapter students would understand:

Light is unified form of electricity and magnetism. What is Huygen's principle about wave? What are wavelets? What is wave front? Why Huygen's principle was neglected for long time though it was published in 1679 just after Newton's corpuscular theory published in 1665?

Interference:

Division of amplitude and wavefront. Young's double slit experiment. Lloyd's Mirror and Fresnel's Biprism. Phase change on reflection: Stokes' treatment. Interference in Thin Films: parallel and wedge-shaped films. Fringes of equal inclination (Haidinger Fringes); Fringes of equal thickness (Fizeau Fringes). Newton's Rings: Measurement of wavelength and refractive index.

Learning Outcomes of the Chapter:

Students would know that interference by division of amplitude occur when light reflected from surface or refracted through a medium. Interference by Lloyd's mirror and Fresnel's bi-prism are the example of division of amplitude. Phase change on reflection of light occurs when light incident from rarer medium to denser medium and it would be explained by Stokes' treatment. They would know that Huygens' wave theory first experimentally verified in 1801by Thomas Young. They would know the necessity of studying interference fringes by thin film. Why measurement of wavelength, in our laboratory, by Newton's rings experiment is not matched with literature would be explained.

Michelson Interferometer:

Michelson Interferometer-(1) Idea of form of fringes (No theory required), (2) Determination of Wavelength, (3) Wavelength Difference, (4) Refractive Index, and (5) Visibility of Fringes.

Learning Outcomes of the Chapter:

How interference fringe form by Michelson interferometer would be explained. Students would know Michelson interferometer is famous for three experiments: the Michelson-Morley ether-drift experiment; the first systematic study of the fine structure of spectral lines and first direct comparison of the wavelength of spectral lines with the standard metre. Students would be informed about present miniaturization of Michelson interferometer.

Diffraction:

Fraunhofer diffraction: Single slit; Double Slit.Multiple slits & Diffraction grating. Fresnel Diffraction: Half-period zones. Zone plate. Fresnel Diffraction pattern of a straight edge, a slit and a wire using half-period zone analysis.

Learning Outcomes of the Chapter:

Basic condition of Fraunhofer diffraction is infinite distance between source and screen. How it is done in the laboratory would be understood by the students. Students would have idea about fringe formation by single slit, circular aperture, double slit and by multiple slits. They would know diffraction grating is just a multiple slits. Students would understand the requirement of Fresnel's assumption. They would know about Fresnel's half-period zones for diffraction of plane wave.

LEARNING OUTCOME

Semester-VI

Course Outcome of Paper DSE-1B

Paper Name-Digital and Analog Circuits and Instrumentation

Teachers: Debakinandan Majee

Dr Bharat Chandra Dalui

UNIT-1:

Digital Circuits: Difference between Analog and Digital Circuits. Binary Numbers. Decimal to Binary and Binary to Decimal Conversion, AND, OR and NOT Gates (Realization using Diodes and Transistor). NAND and NOR Gates as Universal Gates. XOR and XNOR Gates.

De Morgan's Theorems. Boolean Laws. Simplification of Logic Circuit using Boolean Algebra. Fundamental Products. Minterms and MaxtermsConversion of a Truth Table into an Equivalent Logic Circuitby (1) Sum of Products Method and (2) Karnaugh Map.

Binary Addition.Binary Subtraction using 2's Complement Method).Half Adders and Full Adders and Subtractors, 4-bit binary Adder- Subtractor.

Learning Outcomes of this Chapter:

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

Convert different type of codes and number systems which are used in digital communication and computer systems.

Realise combinational circuits for given application

Implement combinational logic circuits using programmable logic devices

Illustrate reduction of logical expressions using Boolean algebra, Karnaugh -map and tabulation method and implement the functions using logic gates

Use the basic concepts of number system, gates, to design digital combinational circuits including arithmetic circuits such as half adder, full adder

UNIT-2:

Semiconductor Devices and Amplifiers: Semiconductor Diodes: p and n typesemiconductors.BarrierFormationin PN Junction Diode. Qualitative Idea of Current Flow Mechanism in Forward and Reverse Biased Diode.PN junction and its characteristics. Static and Dynamic Resistance. Principleand structure of (1) LEDs (2) Photodiode (3) Solar Cell. (5Lectures) Bipolar Junction transistors: n-p-n and p-n-p Transistors. Characteristics of CB, CE and CC Configurations. Active, Cutoff, and Saturation Regions. Current gains α and β. Relations between α and β. Load Line analysis of Transistors. DC Load line and Q-point. Voltage Divider Bias Circuit for CE Amplifier. h-parameter Equivalent Circuit. Analysis of a single-stage CE amplifier using Hybrid Model. Input and Output Impedance. Current, Voltage and Power Gains. Class A, B, and C Amplifiers.

Learning Outcomes of this Chapter:

Students would understand about the concept of p and n type semiconductor and conductivity of intrinsic semiconductor. They would also know necessity of enhancing conductivity of semiconductor i.e. the necessity of doping. They would have an idea about motion of electrons through semiconductor. PN junction formation and barrier formation in unbiased diode would be understood. Students would also know the energy band diagram of unbiased diode and what happens in energy band diagram in biased diode. They would also understand that the dynamic resistance is very low in forward biased diode and very high in reverse biased diode

The students would have the concepts of principle and structure of (1) LEDs (2) Photodiode (3) Solar Cell

Students would have the concepts of structure and function of n-p-n and p-n-p Transistors. By knowing the amplification factor β students would be able to understand how a small current (I_B) controls a high current (I_C). Students would be able to understand about three operation region: Active, Cutoff and Saturation Regions. Transistors operate in active region for amplifiers. Transistors operate in Cutoff and Saturation regions for digital electronics and for oscillators.Able to design amplifier circuits using BJTs and observe the amplitude frequency responses of common amplifier circuits. Students would able to calculate Current, Voltage and Power Gains of amplifier. After having concept of Class A, B & C Amplifiers, students would understand that Class C Amplifier is the best amplifier.

LEARNING OUTCOME

UNIT-3:

Operational Amplifiers (Black Box approach): Characteristics of an Ideal and Practical Op-Amp (IC 741), Open-loop & Closed-loop Gain.CMRR, concept of Virtual ground. Applications of Op-Amps: (1) Inverting and Non-inverting Amplifiers, (2) Adder, (3) Subtractor, (4) Differentiator, (5) Integrator, (6) Zero Crossing Detector.

Sinusoidal Oscillators: Barkhausen's Criterion for Self-sustained Oscillations. Determination of Frequency of RC Oscillator.

Learning Outcomes of this Chapter:

Students should be able to understand and analyze the IC-741 operational amplifier and its characteristics
Discuss the general properties of op-amp
Define the terms input offset voltage, input offset current, CMMR
Calculate the closed-loop voltage gain for a noninverting and inverting amplifier circuit
Analyze or design a subtractor circuit
Design a practical integrator circuit
Design a practical differentiator circuit

Learning Outcomes of this Chapter:

How self-sustained oscillator works fulfilling Barkhausen's Criterion is the main key idea in this chapter. How oscillators convert Direct Current (DC) to Alternating Current (AC). Thermal noise is the main cause of initial starting current. The phase shift in the transistor must be balanced by the feedback circuit for sustained oscillator. Wien bridge oscillator, basically a RC Phase shift oscillator operates for low to moderate frequencies, in the range 5Hz to about 1MHz. Wien bridge oscillator is a RC phase shift oscillator. In Wien bridge oscillator the 180^0 phase shift is balanced by three RC lag circuit.

UNIT-4:

Instrumentations: Introduction to CRO: Block Diagram of CRO. Applications of CRO: (1) Study of Waveform, (2) Measurement of Voltage, Current, Frequency, and Phase Difference.

Power Supply: Half-wave Rectifiers. Centre-tapped and Bridge Full-wave Rectifiers Calculation of Ripple Factor and Rectification Efficiency, Basic idea about capacitor filter, Zener Diode and Voltage Regulation

Timer IC: IC 555 Pin diagram and its application as Astable& Monostable Multivibrator

Learning Outcomes of this Chapter:

LEARNING OUTCOME

Students should be able to explain the basic features of oscilloscope and different types of oscilloscopes

Apply the complete knowledge of various electronics instruments to measure the physical quantities in the field of science

After having concept of Half-wave Rectifiers, Centre-tapped Full-wave Rectifiers and Full-wave Bridge Rectifiers, students would understand that Full-wave Bridge Rectifiers is the best for conversion from Alternating Current (AC) to Direct Current (DC). They would also know the utility of capacitor filter for better DC current. They use Zener diode for voltage regulation. **The best outcomes of this chapter are the ability of making a power supply for household use.**

Students should be able to explain the operation of the 555 timer as a monostable and an astablemultivibrator

They understand and analyse the IC-555 and its characteristics.

LEARNING OUTCOME

DEPARTMENT OF MATHEMATICS

COURSE OUTCOMES FOR EVEN SEMSTERS

SEMESTER –II

BMH2CC03(Real Analysis)

This course will enable the students to:

i) Understand many properties of the real line $\mathbb{R}$ and learn to define sequence in terms of functions from $\mathbb{R}$ to a subset of $\mathbb{R}$.
ii) Recognize bounded, convergent, divergent, Cauchy and monotonic sequences and to calculate their limit superior, limit inferior, and the limit of a bounded sequence.
iii) Apply the ratio, root, alternating series and limit comparison tests for convergence and absolute convergence of an infinite series of real numbers.

BMH2CC04(Differential Equation and Vector Calculus)

Upon successful completion of BMH2CC04, a student will be able to:

i) Find the complete solution of a non-homogeneous differential equation as a linear combination of the complementary function and a particular solution.
ii) Perform basic application problems described by second order linear differential equations with constant coefficients.
iii) Understand power series method for solving differential equations of first and second order.

LEARNING OUTCOME

SEMESTER –IV

BMH4CC08(Riemann Integration and Series of Function)

Upon successful completion of BMH4CC08, a student will be able to:

i) Understand Riemann Integrability and theorems on Riemann integrability.

ii) Recognize the difference between point wise and uniform convergence of a sequence of functions. Illustrate the effect of uniform convergence on the limit function with respect to continuity, differentiability, and integrability.

iii) Study improper integration using Riemann integration.

iv) Study of Power Series and Taylor's Series.

BMH4CC09(Multivariate Calculus)

This course will enable the students to:

i) Learn conceptual variations while advancing from one variable to several variables in calculus.
ii) Apply multivariable calculus in optimization problems.
iii) Inter-relationship amongst the line integral, double and triple integral formulations.
iv) Realize importance of Green, Gauss and Stokes' theorems in other branches of mathematics.
v) Verify the value of the limit of a function at a point using the definition of the limit in R^n
vi) Find the extreme value in n dimensions.

BMH4CC10(Ring Theory and Linear Algebra I)

This course will enable the students to:
i)Define ring and subrings and also study different properties of them.
ii) Study of ideals and concept related to ideal.
iii) Study of various integral domain in ring.
iv) Study field.
v) Study Ring Homomorphisms.
vi) Study vector space and subspace.
vii) Understand Transformation between two vector spaces.
Viii) Use computational techniques

BMH4SEC21(Graph Theory)

After the completion of the course, Students will have a strong background of graph theory which has diverse applications in the areas of computer science, biology, chemistry, physics and engineering.
and algebraic skills essential for the study of vector spaces.

LEARNING OUTCOME

SEMESTER –VI

BMH6CC13(Metric Spaces and Complex Analusis)

This course will enable the students to:

i) Visualize stereographic projection of complex plane on the Riemann sphere.

ii) Understand the significance of differentiability and analyticity of complex functions leading to the Cauchy Riemann equations.
iii) Learn the role of Cauchy Goursat theorem and Cauchy integral formula in evaluation of contour integrals.
iv) Apply Liouville's theorem in fundamental theorem of algebra.

v) Understand the convergence, term by term integration and differentiation of a power series.

vi) Learn Taylor and Laurent series expansions of analytic functions, classify the nature of singularity, poles and residues and application of Cauchy Residue theorem.

vii) Understand the Euclidean distance function on R^n and appreciate its properties and state and use the Triangle and Reverse Triangle Inequalities for the Euclidean distance function on R^n .

viii) Explain the definition of continuity for functions from R^n to R^m and determine whether a given function from R^n to R^m is continuous.
ix) Explain the geometric meaning of each of the metric space.
x) Distinguish between open and closed balls in a metric space.
xi) Define convergence for sequences in a metric space and Determine whether a given sequence in a metric space converges.
xii) Explain the compactness of a metric space.

BMH6CC14(Ring Theory and Linear Algebra II)

This course will enable the students to:
i) Understand the concepts of vector spaces, subspaces, bases, dimension and their properties.
ii) Relate matrices and linear transformations, compute eigen values and eigen vectors of linear transformations.
iii) Learn properties of inner product spaces and determine orthogonality in inner product spaces.
iv) Realise importance of adjoint of a linear transformation and its canonical form.
v) Learn in detail about polynomial rings, fundamental properties of finite field extensions, and classification of finite fields.

LEARNING OUTCOME

BMH6DSE33(Group Theory II)

This course will enable the students to:

i) Understand the basic concepts of group actions and their applications.

ii) Recognize and use the Sylow theorems to characterize certain finite groups.

iii) Understand automorphisms for constructing new groups from the given group. iv)Learn external direct product.
v) Group actions, Sylow theorems and their applications to check nonsimplicity.

BMH6DSE43(Mechanics II)

Upon successful completion of BMH2CC04, a student will be able to:

i) Interpret Newton's laws of motion, Galilean transformation and understand limitations of Newtons laws in solving problems.
ii) Learn constraints and their classifications, Lagrange,s equation of motion for holonomic system, Gibbs-Appell's principle of least constraint.
iii) Understand equilibrium of fluid in a given field of force, equilibrium of floating bodies, pressure of heavy homogeneous liquid.
iv) Study of convective equilibrium, stress and strain in continuum body.

Dr. D. Ghosh, Head; Dr. K. Jana, Prof. A. Biswas

LEARNING OUTCOME

DEPARTMENT OF MATHEMATICS

PROGRAM OUTCOMES

Our Department produce Graduate in Mathematics who will:

- be well grounded in the basic manipulative skills level of Algebra, Geometry, Mathematical Analysis, Optimization, Mechanics, Computer Programming(using C Language) etc.
- develop an understanding of the underlying unifying structures of mathematics (i.e., Algebraic structure, Logical structure,) and the relationships among them.
- develop and understand the value of proof, the single factor that distinguishes mathematics from all other disciplines, and will demonstrate proficiency in writing and understanding proofs.
- be able to transmit mathematics ideas both orally and in writing.
- gain exposure to a variety of areas of mathematics and related fields such as Computer Science, Physics, Chemistry, Biology, Commerce and Economics.
- gain experience investigating the real world problems and learn to how to apply mathematical ideas and models to those problems.
- develop the ability to read and learn mathematics on their own. Such maturity is a much a function of how mathematics is learned as it is of what mathematics is learned. understand the historical and contemporary role of mathematics and be able to place the discipline properly in the context of other human intellectual achievement.
- know how and when to use technology.
- become involved with professional organizations and will network with successful former graduates of our programs. Such as exposure will aid them in establishing professional contacts, in gaining insight about future employment prospects, and in tailoring their education to complement their career goals

Dr. Ghosh , Head, Dr. K. Jana Prof. A. Biswas

LEARNING OUTCOME

DEPARTMENT OF PHYSIOLOGY

Course Outcomes And Programme Outcomes For Semester-II, IV, VI (Honours)

Semester-II

Paper name	Course outcome	Program outcome
CC-3 (PHYSIOLOGY OF NERVE AND MUSCLE CELLS)	**Theory :**	
	Excitable Tissue: Nerve	Students will learn about the structure of nerve fibre, classification,functions,Cytoskeletal elements and axoplasmic flow, Propagation of nerve impulse in different types of nerve fibers,properties of nerve fibre, degeneration and regeneration in nerve fiber,ionic basis of nerve impulse generation, Thermal changes of nerve during activity, Structure, classification and functions of neuroglia cells.
	Excitable Tissue: Muscle	How many types of muscles present in our body, their individual structures and properties and how muscles work in our body to do movements.
	Synaptic and junctional transmission	Students will learn about the Synapses types, structure, synaptic transmission of the impulse, Neurotransmitters, co transmitters and neuromodulators, vi. Synaptic Plasticity and learning, the neuromuscular junction : structure, transmission, end- plate potential, MEPP and post-tetanic potentiation. Motor unit and Motor point.
	Initiation of impulses in sense organ	Students gain knowledge regarding neurotransmitters and receptors
	Practical :	
	Isolation and Staining of nerve fibres with node ofRanvier($AgNO_3$) and muscle fibre (H and E)	To know location of node of Ranvier of nerve fibresand structure of muscle fibres by using toad as an experimental animal.
	Kymographic recording of mechanical responses of gastrocnemius muscle to a	

	single stimulus and two successive stimuli	Students gain knowledge regarding practical application of nerve muscle physiology.
	Kymographic recording of effect of variation of temperature on single twitch	
	Kymographic recording of effect of variation of load on single twitch	
CC-4(CHEMISTRY OF	**Theory :**	
BIOMOLECULES)	Carbohydrate	Students will learn about the definition, classification, structure and properties of Carbohydrates.
	Protein and lipid	Students gain knowledge regarding the biochemistry and application of lipids and proteins in daily life.
	DNA and RNA	To know about the genetic instruction carrier of our body.
	Practical:	
	Qualitative tests for the identification of physiologically important substances	Students gain knowledge regarding the biochemistry of various substances present in human body

LEARNING OUTCOME

SEMESTER-IV

Paper name	Course outcome	Program outcome
CC-8 (ENERGY BALANCE , METABOLISM AND NUTRITION)	**Theory :**	
	Carbohydrate metabolism	Students gain knowledge regarding the biochemical pathways, regulation and energetics of carbohydrate metabolism.
	Protein metabolism	Students gain knowledge regarding the biochemical pathways, regulation and energetics of protein metabolism.
	Fat and Cholesterol metabolism	Students gain knowledge regarding the biochemical pathways, regulation and energetics of lipid metabolism.
	Integration of carbohydrate fat and protein metabolism	Students gain knowledge regarding the biochemical pathways of electron transport chain..
	Nutrition	Students gain knowledge regarding the nutritional aspects and food style
	Practical :	
	Quantitative estimation of glucose, sucrose, amino nitrogen, lactose,	Students gain knowledge regarding measurement of amount of substances in solution
CC-9 (GASTROINTESTINAL FUNCTION)	**Theory :**	
	Digestion and absorption	Students gain knowledge regarding the biochemical pathways, enzymatic activities and absorptive functions of various food stuffs.
	Regulation of gastrointestinal function	Students gain knowledge regarding the gastrointestinal physiology and pathology like ulcer, gallstone etc.
	Practical :	

	Kymographic recording of normal movements of rat's intestine in Dale's apparatus Effects of hypoxia, acetylcholine and adrenaline on normal intestinal movements	Students gain knowledge regarding the practical of gastrointestinal physiology and effects of various pharmacological substances on intestine of rat.
CC-10 (RESPIRATION)	**Theory :**	
	Pulmonary function	Students will learn about the anatomy of the Lungs, mechanics of breathing, gas Exchange in the

		lungs and pulmonary Circulation.
	Gas transport between the lungs and the tissues	Students will learn about the mechanism of oxygen Transport and carbon Dioxide Transport.
	Regulation of respiration	Students will learn about the neural control of Breathing, chemical Control of Breathing and nonchemical Influences on Respiration.
	Respiratory adjustments in health and disease	Students will learn about the effects of exercise, various Forms of Hypoxia, Oxygen Treatment, Respiratory Abnormalities and Artificial Respiration
	Practical :	
	Measurement of peak expiratory flow rate	Students will learn about the capacity of lung
	Measurement of oxygen saturation by pulse oxymeter before and after exercise	Students will learn about the oxygen level in blood during rest and exercise
	Measurement of forced expiratory volume (FEV) in first second	Students will learn about the lung volume.
SEC-2A OR 2B(CLINICAL BIOCHEMISTRY OR HEMATOLOGICAL TEACHNIQUES)	**SEC-2A,Practical :**	
	Photo-cholorimetric estimation of blood constituents	Students gain knowledge regarding the practical of blood constituents and ratios of human subjects**.**
	Measurement of blood glucose, blood inorganic phosphate, serum total protein, serum albumin globulin ratio, serum amylase.	
	or	
	SEC-2B,Practical :	
	Preparation of blood smear and identification of cells	Students gain knowledge regarding the practical of blood constituents and ratios of human
	Determination of haematocrit value, MCV, MCH, MCHC,	

	bleeding time, clotting time	subjects along with LFT.
	Measurement of haemoglobin in blood, preparation of serum, estimation of SGPT and SGOT	

LEARNING OUTCOME

SEMESTER-VI

Paper name	Course outcome	Program outcome
CC-13(REPRODUCTION)	**THEORY:**	
	Introduction	Students will learn about the human reproductive system
	Sex differentiation and development	Students will learn about the mechanism of human Sex differentiation and development
	Pituitary gonadotropins and prolactin	Students will learn about the role of Pituitary gonadotropins and prolactin in various human reproductive process
	The male reproductive system	Students will learn about the anatomy of male reproductive system, mechanism of spermatogenesis
	The female reproductive system	Students will learn about theanatomy of female reproductive system, mechanism of oogenesis, menstrual cycle
	Pregnancy	Students will learn about the various changes during pregnancy
	Lactation	Students will learn about the mechanism of lactation
	Physiological concept of planned family	Students will learn about the various family planning process and its mechanism
	PRACTICAL:	
	Study of estrous cycle	Students will learn about theestrous cycle in rat
	Staining and identification of kidney and ureters,estimation of estrogen by spectrophotometric method	Students will learn about the histological structures of kidney and ureters
	Pregnancy test from human urine by kit method	
	THEORY:	
	Introduction	Students gain knowledge regarding renal physiology.

LEARNING OUTCOME

CC-14(FORMATION AND EXCRETION OF URINE)	Function of Malpighian corpuscles and renal tubule and counter current mechanism	Students gain knowledge regarding Formation, dilution of urine and various physiological functions of kidney.
	Water excretion	
	Acidification of the urine and bicarbonate excretion	
	Regulation of Na+ and Cl- excretion	
	Diuretics	
	Disorder of renal function	
	Filling of the bladder	Students gain knowledge regarding micturition process.
	Emptying of the bladder	
	Non-excretory function of kidney	Students gain knowledge regarding various physiological functions of kidney

LEARNING OUTCOME

	PRACTICAL:	
	Identification of normal and abnormal constituents of urine.	Students gain knowledge regarding the practical of urine constituents
DSE 3A: HUMAN NUTRITION AND DIETETICS	Constituents of food and their significance.	Students gain knowledge regarding various aspects of daily consumed foodstuffs
	Basal metabolic rate -factors, determination by Benedict-Roth apparatus.	Students gain knowledge regarding measurement of Basal metabolic rate
	Respiratory quotient. Specific dynamic action.	Students gain knowledge regarding various aspects of nutritional status
	Basic concept of energy and units. Calorific value of foods. Body calorie requirements – adult consumption unit	
	Dietary requirements of carbohydrate, protein, lipid and other nutrients.	Students gain knowledge regarding various aspects of Dietary requirements of foods
	Balanced diet and principles of formulation of balanced diets for growing child, adult man and woman, pregnant woman and lactating woman.	Students gain knowledge regarding dietary requirements and formulation
	Nitrogen balance, essential amino acids, biological value of proteins.	Students gain knowledge regarding various aspects of nutritional study
	Supplementary value of protein.	
	Protein efficiency ratio and net protein utilization of dietary proteins.	
	Dietary fibres.	Students gain knowledge regarding importance of fibres
	Vitamins.	Students gain knowledge regarding importance of vitamins

LEARNING OUTCOME

	Principle of diet survey.	Students gain knowledge regarding importance of survey
	Composition and nutritional value of common food stuffs.	Students gain knowledge regarding importance of nutritional values
	Physiology of starvation and obesity.	Students gain knowledge regarding physiology of starvation and obesity
	Sources and physiological significances of vitamins and minerals.	Students gain knowledge regarding importance of vitamins and minerals

	Space nutrition.	Students gain knowledge regarding physiology of nutritional aspects in space.
DSE-4A:TOXICOLOGY	**THEORY**	
	Toxin and toxicology Factors affecting toxicity LD50,LOD 50,ED50,NOEL,LOEL Concept of acute and chronic effect	Students gain knowledge regarding toxicological basis of any substances.
	Birth defect and teratogens	Students gain knowledge regarding the carcinogenic substances that causes birth defects
	Concept of biomagnification and bioconcentration	Students gain knowledge regarding environmentally harmfull substances concentrate in environment
	Popular food additives and food adulterants	Students gain knowledge regarding substances that added intentionally or accidentally in food and the method for detecting the presence of that substance in food.
	Prevention of food adulterants act,1954	Students gain knowledge regarding the action which was taken by the government for the use of adulterants.
	Other food toxicants	Students gain knowledge regarding the bad effect of different toxicant that use daily in our life.
	PRACTICAL	
	Kymographic recording of effect of hg,pb,as compound on the contraction of perfused hear of toad and intestinal movements of rat in dales's bath	Students gain knowledge regarding bad effects of heavy metals on health.
	Histochemical studies	Students gain knowledge regarding bad effects of adulterants on different organs or tissues.

LEARNING OUTCOME

Course Outcomes And Program Outcomes For Semester-II, IV, VI(General)

SEMESTER-II

Paper name	Course outcome	Program outcome
CC-1B(DIGETION AND METABOLISM)	**THEORY:**	
	Digestive system	Students gain knowledge regarding the biochemical pathways, enzymatic activities and absorptive functions of various food stuffs and gastrointestinal physiology
	Nutrition	Students gain knowledge regarding the nutritional aspects and food style
	Metabolism	Students gain knowledge regarding the biochemical pathways, regulation and energetics of carbohydrate, protein and fat metabolism.
	PRACTICAL:	
	Qualitative biochemical experiment	Students gain knowledge regarding the biochemistry of various substances present in human body
	Quantitative biochemical experiment	Students gain knowledge regarding measurement of amount of substances in solution

SEMESTER-IV

Paper name	Course outcome	Program outcome
CC-1D(ENDOCRINOLOGY,RENAL PHYSIOLOGY,SKIN AND BODY TEMPERATUREREGULATION	**THEORY:**	
	Endocrine system	Students will know about the structure of various endocrine glands and role of various hormones.
	Renal physiology	Students gain knowledge regarding renal physiology and formation of urine
	Skin and regulation of body temperature	Students gain knowledge regarding physiology of skin

		and thermal homeostasis
	PRACTICAL:	
	Identification of normal and abnormal constitute of urine	Students gain knowledge regarding the practical of urine constituents

LEARNING OUTCOME

SEMESTER-VI

Paper name	Course outcome	Program outcome
DSE-1B(REPRODUCTIVE	**THEORY:**	
PHYSIOLOGY AND SENSORY PHYSIOLOGY)	Reproductive physiology	Students will know about the anatomy of male and female reproductive system, various physiological mechanisms and role of reproductive system.
	Sensory physiology	Students gain knowledge regarding physiology of special senses like vision, audition, taste and smell
	PRACTICAL:	
	Human experiments	Students gain knowledge regarding physiology of Human experiments
SEC-IV	**SEC-IVA**	
	THEORY:	
	Work physiology	Students gain knowledge regarding physiology of exercise
	OR	
	SEC-IVB	
	THEORY:	
	Environmental physiology	Students gain knowledge regarding physiology of environment.

ZOOLOGY HONOURS

(SEM- II, IV and VI)

COURSE OUTCOMES

The course outcomes of different papers of semester II, IV and VI are presented below. After completion of these semester students will be able to-

SEMESTER	COURSE CODE	COURSE TITLE	COURSE OUTCOMES
SEM- II	CC-T3	Non-Chordates II	i. Acquire knowledge about evolution of coelom and metamerism. ii. Gain knowledge about classification of phylum Annelida, Arthropoda, Mollusca and Echinodermata. iii. Develop an idea about different types of larval forms of Echinodermata. iv. Understand nervous system and torsion in Gastropoda. v. Have knowledge about social life in termite. vi. Build an idea about characteristics of phylum Hemichordata and relationship with non-chordates and chordates.

	CC- T4	Cell Biology	i. Understand the basic structure of Prokaryotic and Eukaryotic cells, Viruses, Viroid, Prion and Mycoplasma. ii. Learn a brief idea about molecular motors. iii. Gain knowledge about different types of transport across membrane. iv. Build an idea about accessory proteins of microfilament and microtubule. v. Know about Endoplasmic Reticulum, Golgi Apparatus, Lysosomes, Mitochondria, Peroxisome and Centrosome. vi. Differentiate Euchromatin and Heterochromatin. vii. Get knowledge about Cell cycle and its regulation. viii. Develop an idea about Cell Signaling.

LEARNING OUTCOME

SEM- IV	CC- T8	Comparative Anatomy of Vertebrates	i. Acquire knowledge on the axial and appendicular skeleton, jaw suspension and visceral arches. ii. Understand different structure, function and derivatives of integument in amphibian, birds and mammals. iii. Develop an idea about respiratory organs in fish, amphibian, birds and mammals.

			iv. Classify receptors. v. Understand the general plan of circulation, comparative account of heart and aortic arches. vi. Have knowledge about evolution of urinogenital ducts. vii. Learn the comparative anatomy of stomach. viii. Know about Cranial nerves in mammals.
	CC- T9	Animal Physiology: Life Sustaining Systems	i. Develop an idea about structural organization and functions of gastrointestinal tract and associated glands. ii. Build an idea about transport of oxygen and carbon dioxide in blood. iii. Differentiate blood groups. iv. Have knowledge about mechanism of urine formation. v. Explain structure and working of conducting myocardial fibres. vi. Gain knowledge about basic steps and regulation of haemopoiesis. vii. Aware about osmoregulation in aquatic vertebrates.

	CC- T10	Immunology	i. Differentiate Innate and Adaptive Immunity. ii. Describe cells and organs of the Immune system. iii. Gain knowledge about structure and functions of different classes of immunoglobulins. iv. Realize Immunoassays. v. Differentiate various types of hypersensitivities. vi. Build an idea about T cell development and selection. vii. Explain the types, properties and functions of cytokines. viii. Have knowledge about various types of vaccines. ix. Aware about complement system.

	SEC-T3	Medical Diagnostic techniques	i. Understand different diagnostics methods used for analysis of blood. ii. Gain knowledge about infectious diseases. iii. Perceive the concept of antibiotic sensitivity test. iv. Build an idea about non-infectious diseases. v. Develop an idea about clinical

			biochemistry. vi. Differentiate benign and malignant tumours. vii. Know about diagnostic methods used for urine analysis.
SEM -VI	CC -T13	Developmental Biology	i. Gain knowledge about phases of development, cell-cell interaction, differentiation and growth, differential gene expression. ii. Learn about implications of developmental biology. iii. Realize development of brain and Eye in Vertebrate. iv. Know about implantation of embryo in humans. v. Elaborately discuss modes of regeneration, epimorphosis, morphallaxis and compensatory regeneration. vi. Explain gametogenesis. vii. Analyze planes and patterns of cleavage.
	CC -T14	Evolutionary Biology	i. Understand chemogeny, RNA world, Biogeny, origin of photosynthesis, evolution of eukaryotes. ii. Acquire knowledge about geological time scale.

			iii. Perceive the origin and evolution of Man. iv. Aware about Phylogenetic trees. v. Develop an idea about sources of variations. vi. Analyze population genetics. vii. Build an idea about fossil records of Hominids. viii. Compare isolating mechanisms and also modes of speciation.
	DSE -T5	Animal Behaviour	i. Gain knowledge about origin and history of Ethology. ii. Appreciate contribution of Karl Von Frish, Ivan Pavlov, Konrad Lorenz and NikoTinbergen. iii. Learn about photoperiod and regulation of seasonal reproduction of vertebrates. iv. Classify biological rhythms. v. Know about adaptive significance of biological clocks. vi. Elaborately discuss Social and Sexual Behaviour. vii. Explain altruism.

	DSE -T7	Endocrinology	i. Understand the general idea of endocrine systems, classification, characteristics and transport of hormones. ii. Acquire knowledge about hormonal regulation of parturition. iii. Aware about neurosecretions and neurohormones. iv. Learn about estrous cycle in rat and menstrual cycle in human. v. Explain the mechanism of action of steroidal, non-steroidal hormones with receptors. vi. Gain knowledge on disorders of endocrine glands. vii. Build an idea about structure and functions of hypothalamus and hypothalamic nuclei.

LEARNING OUTCOME

GEOGRAPHY HONOURS (SEM- II, IV, VI)

COURSE AND PROGRAM OUTCOMES

COURSE OUTCOMES

The course outcomes of different papers of Semester II, IV & VI are presented below. After completion of these Semester students will be able to-

SEMESTER	COURSE CODE	COURSE TITLE	COURSE OUTCOMES
SEM- II	**CC-3** Th	**Human Geography**	• Acquire knowledge on the evolution of humans & racial groups of the world. • Develop an idea about space & society. • Understand the process of cultural diffusion, human- environmental relation. • Have knowledge about social morphology of India, types & pattern of settlement. • Learn population-resource region, demographic transition model
	CC-4 Th+Pr	**Cartogram, Survey & Thematic Mapping**	• Develop an idea about different types of thematic mapping techniques & their utilities. • Interpret landuse map, Climograph, Hydhergraph, Ergograph & Age-Sex Pyramid. • Represent data on map by various methods. • Gain knowledge about different survey instruments & mathematical procedure of traversing & contouring. • Handle survey instruments- Prismatic compass, Dumpy level & Theodolite & measure height and bearing of objects.

LEARNING OUTCOME

SEM- IV	**CC- 8** Th	**Regional Planning & Development**	• Gain knowledge about concept & classification of region, types, principles & techniques of regional planning, Metropolitan areas & region. • Analyze the needs of regional planning especially multi-level planning in India. • Differentiate growth from development. • Build an idea about theories & models of regional development (Growth pole, Growth foci & Core-periphery). • Have knowledge about human development, regional disparity & inequality. • Aware about regional development & imbalances in India & also about the function of NITI Aayog.
	CC- 9 Th	**Economic Geography**	• Understand the concept of economic geography. • Gain knowledge about different types of economic activities, factors affecting location of economic activities. • Learn location theories of Von Thunen & Alfred Weber. • Differentiate primary, secondary & tertiary activities & various agricultural systems. • Assess the role of Highways in economic development of India & also role of WTO & OPEC in international trade.

	CC -10 Th+ Pr	**Environmental Geography**	• Understand different approaches to environmental studies & man-nature relation in different stage of human civilization. • Perceive the concept, structure & function of ecosystem. • Realize environmental issues on agriculture, waste management, air & water pollution. • Appraise Bio-diversity, environmental program & policies on forest & wetland. • Construct questionnaire for perception survey on environmental problems & Leopold Matrix. • Measure soil pH, NPK & interpret air quality from secondary data.
	SEC-2 Practical	**Field Work**	• Design questionnaire on particular research problem. • Take part in field survey. • Construct maps & thematic diagrams. • Prepare field report.
SEM -VI	**CC -13** Th	**Evolution of Geographical thought**	• Define geography & acquire knowledge about scope & content of geography. • Perceive development of geographical thought from ancient to modern period. • Appreciate contribution of Humbolt, Ritter & different schools. • Analyze quantitative revolution. • Build an idea about determinism, possibilism & Neo-determinism. • Compare systematic geography with regional geography.

	CC -14 Th+ Pr	**Disaster Management**	• Classify hazard and disasters. • Assess risk & vulnerability of different hazards. • Know about the processes of preparedness, capacity building. • Prepare hazard map. • Aware about the factors, vulnerability & consequences of earthquake, landslide, cyclone & fire & also know how to manage these hazards. • Prepare project report on Hazards.
	DSE -3 Th	**Resource Geography**	• Understand importance of resource geography and its relation with other sub-disciplines. • Classify resource & know about functional theory. • Aware about resource depletion & methods of resource conservation. • Explain the concept of Limits to
			Growth & sustainable development. • Gain knowledge on distribution & utilization of various resources.

	DSE – 4 Th	**Soil & Bio-Geography**	• Gain knowledge about soil forming factors, soil profile & properties of soil. • Illustrate Zonal, Azonal & Intrazonal soil, Podzol & Laterite soil formation & profile characteristics. • Classify Indian & Russian soil. • Know about soil degradation & management. • Elaborately discuss Bio-geography, Biosphere, Ecology, Ecosystem, Environment, Habitat, Niche, Ecotone, Biotopes, Biomes, Food chain etc. • Explain Bio-Geo Chemical cycle, Energy flow in ecosystem & factors of plant growth. • Analyze causes & consequences of threat to Bio-diversity & know about conservation of it.

PROGRAM OUTCOMES

Upon completion of above Semesters students will be able to demonstrate the following-

1. Understand the unifying theme of both human & physical geography & history of the subject.
2. Have a working knowledge of the discipline's diverse conceptual & methodological approaches.
3. Explain the relationship between nature & society & analyze the pattern of human habitation.
4. Aware about hazard & disasters, able to acquire management skills of disasters.
5. Understand functioning of global economics, regional development & disparity.
6. Develop sustainable approach to conserve natural system & maintain ecological balance.

LEARNING OUTCOME

7. Train in map making techniques & cartography & Carry out field survey & prepare report.
8. Finally apply geographical knowledge in day to day life.

GEOGRAPHY GENERAL COURSE (SEM- II, IV &VI)

COURSE & PROGRAM OUTCOMES

The course outcomes of different papers of Semester II, IV & VI are presented below. After completion of these Semester students will be able to-

SEMESTER	COURSE CODE	COURSE TITLE	COURSE OUTCOMES
SEM -II	**CC –IB** **Th+Pr**	**Physical Environment & Surveying**	• Have knowledge on elements of weather & climate, composition & layers of atmosphere. • Identify forms of precipitation, types of rainfall & cyclone. • Recall Koppen's climatic classification. • Gain knowledge on soil properties, soil forming factors & processes, Biosphere, Ecology, Ecosystem, Environment, Biomes, Habitat, Niche etc. • Gain knowledge about different survey instruments & mathematical procedure of traversing & contouring. • Handle survey instruments- Prismatic compass, Dumpy level & Plane Table.

LEARNING OUTCOME

SEM -IV	**CC- ID** **Th+Pr**	**Environmental Geography**	• Understand different approaches to environmental studies & man-nature relation in mountain & coastal region. • Realize air & water pollution. • Know about MAB, forest & wildlife policy of India. • Appraise Chipko movement & Ramsar sites in India. • Construct questionnaire for perception survey on environmental problems. • Measure soil pH, organic carbon & map wetland & forest from

			Topographical sheet.
	SEC -2 **Th**	**Regional Planning & Development**	• Gain knowledge about concept & classification of region & regional planning. • Build an idea about HDI. • Summarize agricultural & Industrial development in India. • Appraise the importance of DVC. • Prepare questionnaire for field survey.
SEM -VI	**DSE- IB** **Th+Pr**	**Disaster Management**	• Classify hazard and disasters. • Assess risk & vulnerability of different hazards. • Know about the processes of preparedness, capacity building. • Prepare hazard map. • Aware about the factors, vulnerability & consequences of earthquake, landslide, cyclone & fire & also know how to manage these hazards. • Prepare project report on Hazards.
	SEC -4 **Pr**	**Rocks & Minerals & their Megascopic Identification**	• Differentiate rocks & minerals. • Aware about the process of collection & preservation of rocks & minerals. • Know the characteristics of rocks & minerals. • Identify rocks & minerals.

PROGRAM OUTCOMES

Upon completion of above Semesters students will be able to demonstrate the following-

1. Have a working knowledge of the discipline's diverse conceptual & methodological approaches.
2. Explain the relationship between nature & society & analyze the pattern of

human habitation.

3. Aware about hazard & disasters, able to acquire management skills of disasters.
4. Understand functioning of global economics, regional development & disparity.
5. Develop sustainable approach to conserve natural system & maintain ecological balance.
6. Train in map making techniques & cartography & Carry out field survey & prepare report.
7. Finally apply geographical knowledge in day to day life.

DEPARTMENT OF ECONOMICS
B.SC HONOURS IN ECONOMICS
Semester –II

Course: CC3: Introductory Macroeconomics

Course Outcome

This is the first core course of Macroeconomics, an important branch of the economics syllabus. This course introduces students to the basic concepts in Macroeconomics which deals with the economy as a whole. This course familiarizes students about the concepts of the national income of a country. Students are introduced to the definition, measurement of the macroeconomic variables like, GDP, NI, consumption, savings, investment and balance of payments etc. This course explains Keynesian consumption function and saving function along with the properties. It also discusses alternative theories of Keynesian consumption function, viz. Permanent income hypothesis, Absolute income hypothesis, Life cycle hypothesis, Relative income hypothesis. This course includes the Simple Keynesian model of income determination. From this course, students learn about various aspects of money market, viz. motives for holding money, Keynesian liquidity preference theory, loanable fund theory, details of supply of money and demand for money etc. In the last part of this course, students learn about the interaction between commodity and money market, specifically the ISLM model and its related comparative static analysis, and also relative effectiveness of fiscal and monetary policies in terms of ISLM model.

This course aims to introduce the broad conceptual frameworks of the macroeconomics which will enable students to learn and understand real economic phenomenon like GDP, National Income, inflation, money market, commodity market. After completion of this course students will be able to critically evaluate various macroeconomics policies.

Course: CC4: Mathematical Economics –I

Course Outcome

LEARNING OUTCOME

Mathematics is an essential ingredient of Economics. Mathematical tools are extensively used in solving economic problem.

- Helps to understanding the role of mathematics in economic and in economic analysis.
- From this courses, students learn about the basic concept of set, types of various function (like quadratic, Polynomial, Exponential etc.), total and partial differentiation, Sequences and series.
- Apply some mathematical methods to economic theories (Utility maximization subject to budget constraint – output maximization subject to cost constraint – Cost minimization subject to output constraint).
- They also know how to determine the Slope and curvature of indifference curve and Isoquant.
- Determination of the slope of Total product curve, Average product curve and Marginal product curve.
- Understanding the relationship between AP and MP, AR and MR, AC and MC.
- Derivation of cost functions from production function.
- Derivation of supply curve under firm and industry level, long run supply Conditions under CRS, DRS and IRS system.
- Provide a clear idea of different types of market and equilibrium in the respective market mathematically.
- Provide knowledge about Domer's Analysis of Growth and the Cobweb Model.

Semester IV

Course: CC8: Selected Features of Indian Economy

Course Outcome

This course explains the characteristics of the Indian Economy. This course helps the students to understand the various issues of the Indian economy, particularly. The first section of this course introduces economic development post-independence in India. It starts with major features of the economy at independence - its planning and development goals and strategies, viz. Public sector vs. Private sector, Consumer goods vs. Capital goods, Import substitution vs. Export promotion etc. In the second section this course gives the ideas of the demographic trends and issues like education, health and malnutrition in India. Issues like poverty, inequality and unemployment exists in this course which helps to know the Indian economy better. In the later part, this course includes various macroeconomic policies and its impact on Indian economy. Some of the important policies that this course covers are tax reforms since 1991, RBI's monetary policies, bank nationalization and its achievements, banking and insurance sector reforms since 1991, capital market and its reforms since 1991etc. This course concludes with policies and performances of agriculture and industry in Indian economy.

At the end of this course, students will be able to understand the different development policies adopted in India post-independence period and to evaluate its impact on Indian economy.

Course: CC9: Statistical Methods – II

Course outcome

- To understand the concept of classical and Axiomatic definition of Probability.
- To understand the concept of Mutually Exclusive, Exhaustive and Equally Likely Events.
- Explain the Conditional Probability, theorem of Compound Probability.
- State and prove the Bayes' Theorem.

- To understand the Probability Mass Functions, Probability Density Functions and Expectation and Variance of Random Variables.
- To understand Uniform, Binomial, Poisson, Normal Distributions and also find out their Mean, Variance and Moment Generating Functions.
- To carry over the testing of hypothesis procedure to find the validity and the representative character of a particular sample derived from a given population.
- To understand Null hypothesis, Alternative Hypothesis, Confidence Intervals, Testing of Hypothesis, P-value, Type-I and Type-II Errors.
- Students will learn how to apply statistical testing of hypothesis in decision making.
- Estimate Maximum Likelihood Estimators and explain most desirable properties of the Maximum Likelihood Estimators.

Course: CC10: Development Economics

Course Outcome

This core course introduces students to the basics of development economics. It starts with different concepts of development- sustainable development, participatory development, inclusive development, human development etc. This section also highlights the different broad indicators of development – Per capita income, PQLI, Human development index, Gender development index, Human poverty index etc. This course also stresses on the different characteristics of underdevelopment, various obstacles of development, various theories to achieve development like critical minimum effort thesis, low level equilibrium model, economic development with unlimited supplies of labour in dual economy etc. and also highlights different development strategies and choice between Capital intensive vs. Labour intensive technique. In the last section, this course focuses on the different concepts of poverty and inequality.

At the end of this course, student will be able to understand different concepts of development, growth, poverty, inequality etc.

Semester VI

Course: CC13: Basic Econometrics

Course Outcome

- To understand the importance of the study of econometrics
- Explain most desirable properties of an econometric model.
- To understand Classical linear regression model and its Assumptions.
- The quantitative measurement of the relationship between two variables and between more than two variables and its application in economics.
- To become familiar with the method of ordinary least square and their properties.
- Estimate simple linear regression models using OLS technique.
- Estimate and interpret the parameters of multiple regressions.
- Work out solutions for violations of classical assumptions.
- Specify dummy variables to reflect shifts and links in relationships.

Course: CC14: Field Survey and Project Report

Course Outcome

This course introduces the students to undertake an independent research project or group projects and submit a term paper between 4000-5000 words at the end of the project. The proposed guideline is to arrange a Field visit for collection for data by the students. The selection of the topic should be from the subjects covered in the undergraduate economics honours syllabus. Research projects will boost independent thinking among the students. Training of report writing is an important dimension of this course. The project report should ideally cover the following

areas: Introduction, Motivations, Literature Review, Objectives, Methodology, Results, Policy Suggestion and Bibliography.

At the end of this course, student will be able to understand a glimpse of economics research and how to interpret, represent dataset and to apply econometric methods to identify research objectives. Moreover, student will be knowledgeable enough to write a project report.

Course: DSE 3: Political Economy

Course Outcome

This course explores the evolution of political economy framework. It starts with classical political approach of Adam Smith, Ricardo and Marx, economic thoughts of Gandhi, Nehru, Gokhle, Netaji and Rabindranath Tagore and their criticism etc. Students will be exposed to different political systems- Physiocracy, Mercantilism, Feudalism, Capitalism and Socialism, their basic features and functioning, transition from Feudalism to Capitalism and Capitalism to Socialism and the stages of Growth of Marx & Rostow. Students will also learn various social changes like a) Marxian theory of value, Quantitative and qualitative aspect of value; Components of value, Value of Constant and variable capital; Surplus value, Circuit of capital, surplus value and organic composition of capital Commodity fetishism; the reserve army of labour b) Simple reproduction. The law of falling rate of profit, Theories of crises: The under consumption crises, realization crises and disproportionality crises. c) Emergence of socialism; social mode of extraction of surplus value; socialist pricing.

At the end of this course, student will be able develop critical thinking by learning elements of economic thoughts.

Course: DSE 4: Entrepreneurship Development

Course Outcome

LEARNING OUTCOME

- To understand the functions and characteristics of an entrepreneur.
- To understand the Problem of Rural entrepreneurship in India.
- To understand different theories and experiment (Motivation theories, Maslow's need Hierarchy Theory and Kakinada Experiment).
- Explain the Stages of growth, types of growth strategies etc.
- Explain the causes and consequences of industrial sickness.

- Analysis the business environment in order to identify business opportunities.
- Explain the important of marketing and the role of financial institutions in business venture.

DEPARTMENT OF COMMERCE
COURSE & PROGRAM OUTCOMES
B.COM HONOURS UNDER CBCS (SEM- I, II, III, IV, V &VI)
COURSE OUTCOMES

The course outcomes of different papers of Semester I, II, III, IV, V & VI are presented below:

After completion of these Semesters the students will able to:

SEMESTER	COURSE CODE	NATURE	COURSE TITLE	MENTORS
I	1.1	AECC-1	Environmental Studies	Kinkini Bhattacharjee, Utpal Das, Sadananda Halder, Sk. Shakeel,

COURSE OBJECTIVES: The objective of Environmental Studies is to develop a world population that is aware of and concerned about the environment and its associated problems among students. This study has the knowledge, skills, attitudes, motivations and commitment towards solutions of current problems and prevention of new ones.

In view of this aim, Environmental Studies should form an integral part of the educational process, be centered in practical problems and be of an interdisciplinary or multidisciplinary character.

COURSE OUTCOMES:

- To acquire depth of knowledge in definition, nature, scope and importance of environmental studies.
- Articulate the interconnected and interdisciplinary nature of environmental studies.
- Understand how the environment influences plant growth and crop yields and ways to modify environment to improve plant growth.
- Define natural resources, distinguish between different types of natural resources and create a personal inventory of consumption of natural resources.
- Understand the concepts of sustainable development and use of resources for sustainable development.
- Able to define and describe different types of ecology and ecosystem.
- To have a conceptual idea about energy flow model.

LEARNING OUTCOME

- Demonstrate ability to critically and systematically integrate knowledge and perspectives to analyze, assess and deal with complex biological problems, issues and situations within the field of biodiversity.
- Have a broad idea about different Ecosystem services.
- To understand the nature, causes, effects and control measures of different types of pollution.
- Have a broad idea about solid waste management and how to manage disaster.
- To understand theConstitutional provisions for protecting environment .
- Identifying the causes of Climate Change, Global warming, ENSO, Acid rain, Ozone layer depletion.
- To learn aboutEnvironmental Laws and The Wild life protection Act, 1972.
- To understand the rapid population growth and its impact on environment.
- Broad idea about different environmental movements in India.
- Environmental education field studies help teachers and students build and strengthen relationships.
- Field work experiences enhance students' thinking about environment and relate them.

SEMESTER	COURSE CODE	NATURE	COURSE TITLE	MENTORS
I	1.2 CH	CC - 1	Financial Accounting - I	Dr. Arun Kumar Patra, Sadananda Halder, Sk. Shakeel

COURSE OBJECTIVES: The objective of this paper is to help students acquire conceptual knowledge of the financial accounting and to impart skills for recording various kinds of business transactions.

COURSE OUTCOMES:

- To acquire the conceptual knowledge how to keep and why to keep the records of financial transactions on the basis accounting principles, Indian Accounting Standards and International Financial Reporting Standards.
- To acquire the conceptual knowledge of conventions, entity and going concern concept, and other ideas like- money measurement, periodicity, accruals, consistency conservatism,

materiality full disclosure etc.

- To help the students to acquire the knowledge about the concept and history of single entry system.
- To make them aware the drawbacks of single entry system and how it does differs from double entry system.
- To help them how to prepare accounts from single to double entry system.
- To help them to acquire the conceptual knowledge about the sectional and self balancing ledger.
- To facilitate them to develop the knowledge of processing and recording of Adjustment accounts.
- To help the students to acquire the knowledge about the concept consignment sale, consignor and consignee.
- To facilitate them how to keep records and determine consignment profits in the books of consignor using the concept of goods send at cost or at invoice price.
- To make them aware the impact of ordinary commission and Del credere commission on sales calculating consignment profit.
- To help them how to keep records in the books of consignee.
- Understanding the significance of claim for loss of stock and loss of profit
- Comprehend with the terms Loss of Profit, standing charges and increased cost of working
- Compute the amount of claim for loss of stock and loss of profit
- Students will understand the process of preparation of final account of admission, retirement and death of partners.
- Be able to analyse the profit/loss of firm at¬ time of pre and post admission, retirement and death of partners.
- Able to understand accounting treatment¬ of Goodwill during admission, retirement and death of partner.
- Final Account of Partnership firms with¬ various adjustments.

SEMESTER	COURSE CODE	NATURE	COURSE TITLE	MENTORS
I	**1.3 CH**	**CC- 2**	**Business Management**	**Utpal Das, Sadananda Halder, Sk. Shakeel**
COURSE OBJECTIVES: The objective of the course is students acquired the knowledge and				

skills that prepare them to plan, build and run a successful business enterprise. Students also learn how to lead and work effectively with people within a organization successfully. The main objective of management is to secure maximum outputs with minimum efforts & resources. Management is basically concerned with thinking & utilizing human, material & financial resources in such a manner that would result in best combination. This combination results in reduction of various costs. Through proper utilization of various factors of production, their efficiency can be increased to a great extent which can be obtained by reducing spoilage, wastages and breakage of all kinds, this in turn leads to saving of time, effort and money which is essential for the growth & prosperity of the enterprise. Management ensures smooth and coordinated functioning of the enterprise. This in turn helps in providing maximum benefits to the employee in the shape of good working condition, suitable wage system, incentive plans on the one hand and higher profits to the employer on the other hand. Management serves as a tool for the upliftment as well as betterment of the society. Through increased productivity & employment, management ensures better standards of living for the society. It provides justice through its uniform policies.

COURSE OUTCOMES:

- Demonstrate knowledge of the theories, concepts and findings of the Faculty specializations
- Discuss and communicate the management evolution and how it will affect future managers.
- Strategic and critical thinking in relation to business and commerce related issues.
- Observe and evaluate the influence of historical forces on the current practice of management.
- Identify and evaluate social responsibility and ethical issues involved in business situations and logically articulate own position on such issues.
- Explain how organizations adopt to an uncertain environment and identify techniques managers use to influence and control the internal environment.
- Practice the process of management's four functions: planning, organizing, leading, and controlling.

LEARNING OUTCOME

- Identify and properly use vocabularies within the field of management to articulate one's own position on a specific management issue and communicate effectively with varied audiences.
- Evaluate leadership styles to anticipate the consequences of each leadership style.
- Gather and analyze both qualitative and quantitative information to isolate issues and formulate best control methods.
- Analyze effective application of PPM knowledge to diagnose and solve organizational problems and develop optimal managerial decisions.
- Understand the complexities associated with management of human resources in the organizations and integrate the learning in handling these complexities.
- Select and use appropriate resources to collect business data that will ultimately translate into information for decision-making.
- Use the marketing information management concepts, systems, and tools needed to obtain, evaluate, and disseminate information for use in making marketing decisions.
- Conduct research to identify and analyze client needs and desires and make marketing recommendations regarding business decisions and use appropriate leadership skills and styles to maximize employee productivity.
- Practice critical and creative thinking to improve the decision making process.
- Conduct research to identify new business trends and customer needs.
- Use quantitative measurements to solve business problems related to payroll, taxes, percentages, future value of money and to be able to make better business decisions.

SEMESTER	COURSE CODE	NATURE	COURSE TITLE	MENTORS
I	1.4 CH	GE-1	Business Mathematics	Kinkini Bhattacharjee, Dr. Arun Kumar Patra

COURSE OBJECTIVES: The objective of this course is to familiarize the students with the basic mathematical

tools and with an emphasis on applications to business and economic situations.

This course provides complete skill to understand basic function of Mathematics and their use in Business and Finance. After completing the course, student will be able to solve business and finance problems. It examines aspects of business and marketing with regards to basic statistical analysis. It is very essential to develop the students' ability to deal with numerical and quantitative issues in business

COURSE OUTCOMES:

- Able to calculate and describe different problems of indices and Logarithms.
- Broad idea about set theory and able to sole critical problems in set theory.
- Define different types of matrix and able to calculate problems in matrices.
- Able to solve system of linear solutions using Cramer's Rule method.
- Define mathematical functions and their different types and mathematical forms.
- Evaluate limits of functions from their graphs or formulas.
- Analyze and apply the notions of continuity and differentiability to algebraic functions.
- Calculate maxima and minima of a function.
- Calculate different problems in differentiation using their formula.
- To acquire conceptual knowledge of Integration.
- Understand the concepts of definite integration.
- Able to formulate linear programming problem and solve them graphically.
- Apply the correct measures in the cases of uniqueand multiple optimal solutions, Unbounded solutions, infeasibility, and redundant constraints.

LEARNING OUTCOME

SEMESTER	COURSE CODE	NATURE	COURSE TITLE	MENTORS
II	2.1	AECC-2	Communicative English/MIL	
COURSE OBJECTIVES:				
COURSE OUTCOMES:				

SEMESTER	COURSE CODE	NATURE	COURSE TITLE	MENTORS
II	2.2 CH	CC-3	Cost Accounting-I	Dr. Arun Kumar Patra, Sadananda Halder, Sk. Shakeel

COURSE OBJECTIVES: The students understand clearly to reduce and control the cost during the course of production because cost is a vital aspect in the modern business. To provide knowledge about the ascertainment the profitability of each of the products and advise the management to maximize its profits.

COURSE OUTCOMES:

- Familiarize with cost concepts and teach the fundamentals of cost accounting as a separate system of accounting.
- Demonstrate knowledge of the theories, concepts and findings of the Faculty specializations
- Helps to gather knowledge on preparation of cost sheet in its practical point of view
- To acquire conceptual knowledge of the cost accounting and to impart skills for recording various kinds of business
- Apply cost accounting concepts and methods to interpret actual financial statements for evaluating the financial position and performance of organizations.
- Determinations of Measurement of actual business income by production cost, per unit cost of accounts.
- Broadly describing about advantages cost accounting and its importance in the present business scenario.

- Broadly describing about role of cost accountant and its importance for determine the actual accounts.
- To facilitate the idea and meaning of material control with pricing methods
- Develop the knowledge about remuneration and incentives
- To introduce the concept of overhead cost

SEMESTER	COURSE CODE	NATURE	COURSE TITLE	MENTORS
II	2.3 CH	CC-4	Business Law	Utpal Das, Sadananda Halder, Sk. Shakeel

COURSE OBJECTIVES : In this program discuss the fundamentals concepts, principles and rules of law that apply to business transactions and includes the function and operation of the courts, business crimes, contract law, the sale of goods act, limited liability partnership act to business activities and recent developments in business law.

COURSE OUTCOMES:

- Familiarize with the relevance of business law to individuals and business and the role of law in an economic, political and social context.
- Make the students understand about business and corporate law
- Identify the fundamental legal principles behind contractual agreements.
- To acquire problem solving techniques and to be able to present coherent, concise legal argument.
- Understand the legal and fiscal structure of different forms of business organizations and their responsibilities as an employer.
- Broadly describing about the sale of goods act and its nature.
- Broadly describing about partnership act and limited liability partnership act and their relationship.
- Develop knowledge on contract and various types of contracts
- To help the students to understand the concept of sale of goods

- Make the students understand about companies and its types
- To equip the students with proper knowledge about Foreign exchange

SEMESTER	COURSE CODE	NATURE	COURSE TITLE	MENTORS
II	2.4 CH	GE-2	Business Statistics	Kinkini Bhattacharjee, Dr. Arun Kumar Patra

COURSE OBJECTIVES: The objective of this course is to familiarize the students with the basic statistical tools with an emphasis on applications to business and economic situations.

The overarching objective of Statistics in Business is for students to describe data and make evidence based decisions using inferential statistics that are based on well-reasoned statistical arguments. The main objective of Business Statistics is to make inferences about certain characteristics of a population in the business domain whether the population is people, objects or collections of information.

COURSE OUTCOMES:

- To acquire depth of knowledge in algebra, analysis or statistics.
- Students will formulate complete, concise and correct mathematical proofs.
- Understand about data collection procedure.
- To have a conceptual idea about diagrammatic presentation of frequency distribution.
- To acquire conceptual knowledge of the Measures of Central Tendency.
- Broadly describing about Mean, Median and Mode and calculate their numerical problems.
- Understand the concepts of Partition values and composite mean.
- Able to compute Range of a set of data, the standard deviation for both grouped and ungrouped data and able to interpret the significance of standard deviation.
- Apply the correct measures of dispersion to any given variable based on that variable's level of measurement.
- To have a conceptual idea about Moments, Skewness and Kurtosis.
- To understand the meaning of Bivariate data and Scatter diagram, Different types Scatter

diagram.

- Calculate and interpret the correlation between two variables. Determine whether the correlation is significant.
- Calculate the simple linear regression equation for a set of data and know the basic assumptions behind regression analysis.
- Determine whether a regression model is significant.
- To understand the concept if Index Numbers, explain its uses and different methods.
- Identifying the nature of the phenomenon represented by the sequence of observations and forecasting.
- To learn about different methods of time series analysis.
- To understand the variability of the time series.
- To identify the regular and irregular oscillations of the time series.

LEARNING OUTCOME

SEMESTER	COURSE CODE	NATURE	COURSE TITLE	MENTORS
III	3.1 CH	CC - 5	Computer Applications in Business	Sadananda Halder, Utpal Das, Sk Shakeel

COURSE OBJECTIVES: The objective of the course is to provide Computer skills and knowledge for commerce students and to enhance the student understand of usefulness of information technology tools for business operations.

To understand the structure function and characteristics of Computer systems. To understand the design of the various functional units and components of Computers. To explain the function of each element of a memory hierarchy. To identify and compare different methods for computer input output systems. To identify, understand and apply different number system and codes. Describe how the CPU process data and instructions and controls the operation of all other devices. Provide student knowledge of memory management and deadlock handling algorithms. Provide basic knowledge of relational database management system. To provide knowledge of data models and scheme in DBMS. The objective of data management system to know how to design, manipulate and manage data base. The objective of word processing is to teach students to identify word processing terminology and concepts create technical documents, format and edit documents, use simple tools and utilities and print documents. Students to identify spreadsheet terminology; create formulas and functions; use formatting features; and generate charts, graphs and report. To make the students to learn about the application of Computers Accounting Systems using Tally.

COURSE OUTCOMES:

- Students are able to understand the basic concept of computer and its characteristics.
- Students acquire about generation of Computers and types of Computers.
- Students are able to understand window and menu commands and how they are used.
- They are able to demonstrate how to organize files and documents on a USB / hard drive.
- Describe the use of computer and why computers are essential components in business.
- Learners understand the principles and implementation of computer arithmetic.

LEARNING OUTCOME

- Students will be able to identify and explain components of a computer system.
- Design a simple CPU with applying the theary concept.
- The learners are able to different between RAM and ROM memory.
- Students understand the primary and secondary storage system.
- Understand the concept of input and output device of Computer how it works.
- Students are able to explain details functions of Input and Output device.
- Students are able to understand the concept of operating system and identify its primary functions.
- Distinguished between operating systems software and application systems software.
- Students will be able to work effectively with a range of current, standard office productivity software applications.
- Students will be able to understand the knowledge of number system.
- Students will classify the different types of number system.
- Students should pair upto develop an algorithm to convert any number system to decimal and back.
- Students gain detailed knowledge of internet, URL, and IP address.
- Students understand how the TPP/PC Protocols relate to the internet.
- They are able to explain the elements of an IP address.
- Students understand the advantages of TCP,FTP, TELENT, HTML, DTHML, and XML and application of them.
- Students will be able to distinguish between hypertext markup language and Dynamic Hypertext markup language.
- Students learn how routers are used throughout the Internet .
- They learn how to determine your own TCP/IP configuration.
- Students learn how to develop a simple web page using HTML.
- Students understand basic concept of database and Data Base Management System(DBMS).
- Students are able to identify and describe the components of Database management

system.

- Students are able to identify and explain the levels of abstraction in database management system.
- Students will be able to identify the names and functions of the word interface components and word processing software.
- Learners are able to identify the purpose of the commands on the menu bar.
- Understand the features of the document inserting graphics, tables,pictures, charts etc and using different formatting styles.
- They understand checking the document for sppelling and grammar errors.
- Aquire knowledge of work with buttons onn the toolbar.
- Students will be able to identify the document format by reference to the file extension.
- Students learn how to use templates and wizards.
- Students are able to understand the process of mail merge and apply mail merge facility to send a document to different person.
- Explain the importance of choice topic;
- Chooses own's topic; Design scenario for presentation;
- Prepare the presentations with suitable visual materials;
- Increase audience understanding; Build credibility and add a sense of reality;
- Students are able to identify the different components of the excel worksheet.
- Students understand how to open an existing workbook and create a new workbook .
- They can create and navigate through multiple spreadsheet in a file .
- They will also have knowledge insert and format text information in spreadsheet cells.
- Access skills that enable students to insert and format date and time information in spreadsheet cells.
- Students also acquire skills to copy and/or move information from one or more cells to another part of the spreadsheet .
- Students will be able to apply and modify cell formatting for currency, date and percentage values .

LEARNING OUTCOME

- Building basic worksheet by entering Text, numbers and formulas.
- They can use spreadsheet software to prepare organisational documents.
- Students get idea to use spreadsheet software for financial and other business application requiring mathematical calculations.
- They familiar to use spreadsheet software to prepare various charts -pie, bar, line, column and area.
- They can create various types of charts based on data sets define in a spreadsheet .
- Learners are able to use the print function to create a printable copy of data stored on an Excell spreadsheet.
- Students will be able to perform financial analysis through spreadsheet.
- Students would gather the knowledge of Computer Accounting system and its importance.
- Students are able to identify various components of Tally and Tally software.

SEMESTER	COURSE CODE	NATURE	COURSE TITLE	MENTORS
III	3.2 CH	CC - 6	Cost Accounting-II	Sk Shakeel, Dr. Arun Kumar Patra, Utpal Das

COURSE OBJECTIVES: To understand the various methods and techniques involved in cost ascertainment and to be able to analyze and evaluation information for cost planning, control and decision making.

COURSE OUTCOMES:

- To acquire conceptual knowledge of Job costing and Batch costing.
- Broadly describing about principles, process and equitability, advantages and limitation of Job Costing
- To understand the meaning and features of Batch Costing.
- To learn Preparation of Statement of Cost under Batch Costing, Economic Batch Quantity.
- To acquire conceptual knowledge of Contract Costing.
- Broadly describing about Recording of Contract Cost, Progress payments, Retention money, Escalation clause to understand the meaning and features of Batch Costing.
- To learn the Preparation of Contract Account, Contractee Account and Extracts of Balance Sheet, Profit or Loss on incomplete contract.
- To acquire conceptual knowledge of Process Costing.

LEARNING OUTCOME

- To understand the concept of normal process loss, abnormal process loss and abnormal gain in cost accounting.
- To understand the concept Joint product and By-product, apportionment of joint cost.
- Broadly describing about method of apportioning–physical unit method, average unit cost methods, contribution margin method.
- To learn the Preparation of Process Costing and treatment of by-products cost in cost accounting.
- To acquire conceptual knowledge of Standard Costing.
- To understand the concept of standard costs.
- To understand the concept of material and labour standards.
- Broadly describing about advantage and criticism of standard costing.
- To acquire conceptual knowledge of Marginal Costing.
- To understand the concept of marginal costing, comparison between direct costing
- To understand the concept of absorption costing.
- Broadly describing about cost-volume-profit analysis, profit volume chart, break-even analysis, and graphical presentation of break-even chart.
- Broadly describing about limitation of break-even analysis, methods of breakeven analysis, margin of safety, angle of incidence
- To learn the Preparation of cost-volume-profit analysis, profit volume chart, break-even analysis.

SEMESTER	COURSE CODE	NATURE	COURSE TITLE	MENTORS
III	3.3 CH	CC - 7	Financial Accounting-II	Dr. Arun Kumar Patra, Dr. Nirmalendu Sarkar, Sadananda Halder

COURSE OBJECTIVES: Objective of this course is to acquire conceptual knowledge of financial accounting and to provide knowledge about the technique for preparing accounts in different business organization. The student will be in position to understand treatment of specific transaction like royalty, hire-purchase and branches etc. This will also help in gaining Apply accounting techniques and methods for the formation, dissolution, partner changes, earnings distribution, and liquidation of partnerships

COURSE OUTCOMES:

LEARNING OUTCOME

- Understand the salient features and nature of Hire purchase transactions
- Journalize the Hire purchase entries both in the books of hire purchaser and the hire vendor
- Learn methods of accounting of Hire purchase transactions
- Ascertain various missing values, required while accounting the hire purchase transactions, on the basis of given information
- Calculate the record the value of repossessed goods and also to calculate the profit on resale of such goods
- Understand the installment payment system and also how it is different from hire purchase transactions.
- To understand the methods for maintaining branch accounts and its respective accounting treatment, ascertain profit/loss made by Branch and take corrective measures against unprofitable branches.
- Gain knowledge about allocation of expenses and incomes among the departments, to analyse individual profit made by the departments, to find out unprofitable departments and take corrective measures for the same.
- Allocate common expenditures of the organization among various departments on appropriate basis.
- Deal with the inter-departmental transfers and their accounting treatment
- Calculate the amount of unrealized profit on unsold inter-departmental stock-in-hand at the end of the accounting year.
- Work on problems based on inter-departmental transfers at profit and calculation of unrealized profit on the remaining stock at the end of the accounting year
- Prepare financial accounts for partnership firms in different situations of admission, retirement, death and insolvency of the partners.
- Prepare financial statements for partnership firm on dissolution of the firm.
- Employ critical thinking skills to understand the difference between the dissolution of the firm and dissolution of partnership.

LEARNING OUTCOME

- Understand the various types of capital structure of the company and their representation in the balance sheet.
- Evaluate the different situations of capital issue to public like issue at premium, issue at discount, forfeiture of shares etc
- Demonstrate an understanding about the profits of the company and their division.
- Preparation of financial accounts with profits before incorporation.
- Understand the valuation of shares and goodwill and prepare financial statements accordingly
- Enabling the students to understand the features of Shares and Debentures
- Develop an understanding about redemption of Shares and Debenture and its types
- To give an exposure to the company final accounts
- To provide knowledge on Goodwill
- Students can get an idea about internal reconstruction

SEMESTER	COURSE CODE	NATURE	COURSE TITLE	MENTORS
III	3.4 CH	SEC - 1	E - Commerce	Utpal Das, Sk Shakeel, Sadananda Halder

COURSE OBJECTIVES: This course introduces the concepts, vocabulary, and procedures associated with E-Commerce and the Internet. The student gains an overview of all aspects of E-Commerce. Topics include development of the Internet and E-Commerce, options available for doing business on the Internet, features of Web sites and the tools used to build an E-Commerce web site, payment options, security issues, and customer service.

COURSE OUTCOMES:

- Demonstrate an understanding of the foundations and importance of E-Commerce
- Analyze the impact of E-Commerce on business models and strategy
- Describe the infrastructure for E-Commerce
- Describe the key features of Internet, Intranets and Extranets and explain how they relate to each other

LEARNING OUTCOME

- Identify the forces behind e-commerce
- Explain about Information Technology Act 2000
- Clarify the Digital Signature and digital signature certificates
- Analyze the electronic governance
- Describe the Appellate Tribunal Offences
- Explain about cyber crimes
- Discuss about models and methods of e-payments
- Demonstrate an understanding of the payments gateway and online banking
- Analyse about functions of online banking systems
- An outline about risks of online business and e-payments.

SEMESTER	COURSE CODE	NATURE	COURSE TITLE	MENTORS
III	3.5 CH	GE-3	Principles of Economics	Kinkini Bhattacharjee,

COURSE OBJECTIVES: The objective of this course is to acquaint the students with the basic principles of Economics. Students will understand theories and principles in microeconomics including price theory, market structure, factor markets, consumer theory, selected macroeconomic principles etc. Apply these principles to analyze economic issues.

By studying both microeconomics (the behavior of consumer and companies) and macroeconomic (large-scale economic factors, such as national production, employment, inflation and interest rates), they will learn to think like an economist and understand how a modern market economy functions.

COURSE OUTCOMES:

- Explain how supply and demand are relationships between the price of a product and the quantity of the same.
- Demonstrate how changes in the determinants of supply and demand affect the equilibrium price and quantity of a good or service.
- Explain the concept of elasticity and explain various kinds of elasticity using common

economic variables.

- Describe how consumers maximize total utility within a given income using the Utility Maximizing Rule.
- Able to define the term production, production function, AR, MR etc.
- To explain diminishing marginal product and diminishing marginal returns.
- Differentiate between short run and long run costs, explicit and implicit costs.
- Define and explain economies and diseconomies of scale, returns to scale.
- Define various types of markets and the characteristics of Perfect Competition.
- Understand the difference between the firm and industry. Explain and illustrate the difference between the demand curve for a perfectly competitive firm and that for a competitive industry.
- Define the characteristics of monopoly and explain sources and barriers to entry.
- Differentiate between a single price monopolist and a price discriminating monopolist.
- Describe the incomes earned by the factors of production (land, labour, capital, entrepreneurship) wages, interest, rents and profit.
- Use the Lorenze Curve to analyze the distribution of income and wealth.
- Explain the concepts of Macroeconomics and its interrelations with microeconomics.
- Apply the principle of macroeconomics in explaining the behavior of Macroeconomic variables at national as well as global level.
- Define inflation and explain how the rate of inflation is calculated.
- Identify the consequences of inflation

LEARNING OUTCOME

SEMESTER	COURSE CODE	NATURE	COURSE TITLE	MENTOR
IV	4.1 CH	GE-4	Indian Economy	Kinkini Bhattacharjee

COURSE OBJECTIVES: This course seeks to enable the student to grasp the major economic problems inIndia and their solution. On completion the course students will be able to develop ideas of the basic characteristics of Indian Economy, its potential on natural resources. Understand the importance, causes and impact of population growth and its distribution, translate and relate them with economic development.

COURSE OUTCOMES:

- Able to differentiate between developed and under developed economy.
- Define the concept of human development and try to explain its indicators.
- To learn about the occupational structure after independence.
- Able to explain the agrarian scenario and also industrial structure at that time.
- Grasp the importance of planning undertaken by the government of India.
- Have knowledge on the objectives, failure and achievement of economic reforms in India. Analyze demographic constraints which hamper growth.
- Explain the relation between population change and economic development. Explain the issues which related to agricultural sector.
- Developing understanding of the students related to different sectors of Indian economy.

SEMESTER	COURSE CODE	NATURE	COURSE TITLE	MENTORS
IV	4.2 CH	CC-8	Financial Accounting-III	Dr. Arun Kumar Patra, Dr. Nirmalendu Sarkar , Sadananda Halder

COURSE OBJECTIVES: The objective of this paper is to help students to acquire conceptual knowledge of the corporate accounting and to impart skills for recording various kinds of corporate transactions.

COURSE OUTCOMES:

- To acquire the conceptual knowledge how to keep the records of redemption of the various types of Pref. Share depending upon the agreement at the time of issue, e.g. at par,

at discount or at a premium.

- To acquire the conceptual and practical knowledge recording of issue and redemption of various types of Debentures.
- To help the students to impart the knowledge of recoding of corporate transactions.
- To help them to think about the optimal capital structure, and the degree of using debt capital depending upon the cost of debt capital and cost of preference capital.
- To acquire the conceptual knowledge how to keep the records how to keep corporate financial statements under companies Act 2013.
- To help them to understand the importance of introduction of Schedule –III
- To make them aware regarding the provision of Dividend, transfer to reserve out of current profit or past reserve and impact on tax.
- To acquire the conceptual knowledge of Goodwill
- To help them how to calculate value of the goodwill under different methods.
- To make them aware that there is no uniqueness of the value of goodwill, it depends upon the various factors to be considered under different method.
- To help them to calculate value of each shares under different methods e.g. Assets - Backing method, Yield-Basis Method, Fair Value Method, ROCE Method and Price Earning Method.
- To develop their leadership shill while Trading of Shares in different Stock Exchange.
- To acquire the conceptual knowledge how to keep the records of corporate transaction for Internal and External reconstruction of companies.
- To make them understand the differences between Internal and external reconstruction of companies.
- To help them how to treat the accumulated losses, arrear preference dividend and surrender of shares while preparing Reconstruction Account.
- To acquire the conceptual knowledge how to keep the records of Holding Company and its subsidiaries companies as per Companies Act 1956.
- To help them how to deal the requirements of Sec-212 i,e. legal requirements for

presenting information to the members of the Holding Company.To make them understand the advantages and disadvantages of holding company.

- To make them aware how to deal with various key items while preparing Consolidated Balance Sheet, Such as Investment Account, Pre-acquisition profit, post acquisition profit, Goodwill/Cost of control, Inter-Companies transactions, Minority Interest, Unrealized profit on stock, Issue of Bonus Share, Revaluation of fixed assets etc.

SEMESTER	COURSE CODE	NATURE	COURSE TITLE	MENTORS
IV	4.3 CH	CC-9	Marketing Management & Human Resource Management	Sadananda Halder, Utpal Das

COURSE OBJECTIVES: The objectives of the course are to provide basic knowledge of concepts, principles, tools and techniques of marketing and human resource management. Students will learn main functions et marketing in consumer behavior, market segmentation, marketing research and managing the product.

Students can analyze skill in identification and resolution of problems Pertaining to marketing management. It takes a managerial perspective- exposing student to the tasks and decisions faced by marketing managers including target market selection, competitive positioning and the formulation of Product. Students will learn meaning of human resource management, human resource planning in a corporate sector, performance appraisal and job design. This course will help the students to develop strategies for effective management of Human Resource and enable them to meet human resource challenges in present scenario.

COURSE OUTCOMES:

- Students grasp the basic concept of human resource management.
- Learn the basic nature and scope of HRM.
- They can analyze the different types of HR policies.
- They have a fair knowledge of the charging role of Human Resource management in a changing environment.
- Students will be able to analyze the evolution of HRM.

LEARNING OUTCOME

- Students can distinguish between human resource management and human resource development.
- They should be able to effective manage and plan key human resource function within organizations.
- To develop the understanding of the concept of job analysis.
- To asses or forecast future skill requirements of the organization's overall objectives.
- Students gain detailed knowledge of job analysis including what it is and how it's used.
- Students are able to identify list the steps in the recruitment and selection process.
- Students are able to identify the necessary characteristics of different laws pertaining to industrial Relations.
- Students understand the basic concept of marketing.
- They can identify evidence of marketing in every day.
- They describe the role of marketing in building and managing customer relationship.
- Students explain briefly the concepts of marketing mix.
- Learners can examine the role of a marketing plan as a guiding document for marketing activities.
- Discuss critically the components of marketing environment.
- Students will be able to evaluate the legal social and economic environments of business.
- Learners will be able to describe about service marketing.
- Students are able to broadly describing the effectiveness of online marketing and its determinants.
- Students will demonstrate how knowledge of consumer behaviour can be applied to marketing.
- They are able to identify and describe the Major factors that influence consumer purchasing decisions.
- Learners are able to apply the individual behaviour concepts for making people related decisions at work place.
- They will be able to elaborate the importance of sub culture and global consumer culture as marketing opportunities.
- Learners understand the concept of marketing research.
- They explain the relation between marketing management and marketing research.
- Students can analysis the phases of the market research process that are included in a market research proposal. Identify the role of research design in the market research proposal.
- They are able to discuss the purpose of segmentation and target in marketing.
- Describe the process of selecting an appropriate segmentation approach and deciding which customer segments to target for marketing activities.

LEARNING OUTCOME

- Show how targeting influences each element of the marketing mix.
- Students learn the definition of positioning
- They can analyze the process of selecting a positioning and differentiation strategy.
- Student will be able to apply the fundamental concepts of product and brand development and management.
- They are able to explain what a product is and the importance of products in the marketing mix.
- Learner understands how products can be classified and the nature of the product and product mix.
- Broadly describing the role of Packaging in the brand building process.
- Brand promotion strategies to promote the Brands.
- Describe the importance of name selection in the success of a Brand and various branding elements.
- Identify the various levels of Packaging for new products.
- Students will be able to illustrate the conceptual idea of the unique marketing requirements of each stage of product life cycle.

SEMESTER	COURSE CODE	NATURE	COURSE TITLE	MENTORS
IV	4.4 CH	SEC-2	Entrepreneurship	Utpal Das, Sadananda Halder

COURSE OBJECTIVES: The purpose of the course is that the students acquire necessary knowledge and skills required for organizing and carrying out entrepreneurial activities, to develop the ability of analyzing and understanding business situations in which entrepreneurs act and to master the knowledge necessary to plan entrepreneurial activities. The objective of the course is, further on, that the students develop the ability of analyzing various aspects of entrepreneurship – especially of taking over the risk, and the specificities as well as the pattern of entrepreneurship development and, finally, to contribute to their entrepreneurial and managerial potentials.

COURSE OUTCOMES:

- Evaluate the nature of entrepreneurship and the entrepreneur in the successful, commercial application of innovations
- Confirm an entrepreneurial business idea

LEARNING OUTCOME

- Identify personal attributes that enable best use of entrepreneurial opportunities
- Explore entrepreneurial leadership and management style.
- Analyze about the role of an entrepreneur in economic growth
- Categorize various types of entrepreneur ship
- Appraise the Concept of business groups
- Classify the role of business houses
- Analyze family business in India
- Differentiate between family business and general business
- Explain MSMEs and MSMEs, Medium and Large business
- Discuss about Women Entrepreneurship and Women Entrepreneurship problems and prospects in the role of business
- Analyze about Public and private system of stimulation
- Explain and understand stimulation
- Generalize sustainability of entrepreneurship
- Detect various support system to the entrepreneur
- Explain Central Government in promoting entrepreneurship
- Classify State Government in promoting entrepreneurship
- Differentiate between Central Government and State Government in promoting entrepreneurship
- Interpret Central and State Government incentives, subsidies, grants
- Describe various types of banks and Distinguish between them
- Explain the significance of writing the business plan and contents of business plan
- Discuss the project planning and compose project report
- Discuss the various aspects of project report
- Classify feasibility studies and Appraise mobilizing resources for start up business
- Understanding the resources accommodation and utilities
- Describe preliminary contracts with vendors and others
- Compare principal customers and Conclude contract management

- Justify basic start up problems

SEMESTER	COURSE CODE	NATURE	COURSE TITLE	MENTORS
IV	4.5 CH	CC-10	Corporate Laws	Sk. Shakeel, Utpal Das, Sadananda Halder

COURSE OBJECTIVES : The objectives of the course is to impart basic knowledge of the provisions of Companies Act and Depositories Act, case studies and its consequences, and the regulations of corporate laws are required to be discussed.

To gain basic knowledge in Corporate Laws and to understand the concepts of regulatory compliance, and to give an exposure to some of the important laws essential and relevant for a business entity. To demonstrate an overview of laws related to Companies. To provide knowledge, comprehension and principles of Corporate. To gain an in-depth knowledge of corporate functions in the context of Companies Act & related Corporate Laws.

COURSE OUTCOMES:

- Apply principles of Corporate law in a rigorous and principled manner.
- Analyze the impact of Corporate law from a policy perspective, in the context of social and cultural diversity.
- Understand the principles of Corporate Laws relevant for compliance and decision-making
- To acquire conceptual knowledge of the various types of company like one person, small and dormant company.
- To acquire conceptual knowledge of the Memorandum of Association and Articles of Associations.
- Broadly describing about prospectus, red hearing prospectus and misstatement of prospectus.
- Identify and evaluate types of directors, director identity number and their legal positions.
- To learn the Qualification, Disqualification, Appointment, Position, Rights, Duties, Power, Resignation, Liabilities, Removal and Resignation of director.

LEARNING OUTCOME

- To understand the meaning of share, types of shares, rules regarding issue of debentures.
- Understand the concept of Buyback, Sweat Equity, Bonus, Right, Capital Reduction, and Share Certificate

LEARNING OUTCOME

SEMESTER	COURSE CODE	NATURE	COURSE TITLE	MENTORS
V	5.1 CH	CC-11	Taxation - I	Sk. Shakeel, Dr. Arun Kumar Patra, Sadananda Halder

COURSE OBJECTIVES: To provide basic knowledge and equip students with application of principles and provisions of Income-tax Act, 1961

COURSE OUTCOMES:

- To understand the concept of Assessee, Previous year, Assessment year, Person, Income, Sources of income, Heads of income, Gross total income, Total income, Maximum marginal rate of tax, Capital Gains
- To understand the concept of Residential Status and Incidence of Tax.
- Broadly describing Incomes which do not form part of Total Income Except section 10AA.
- To understand the concept of agricultural and non-agricultural Income
- To understand how to determine the Residential Status and Incidence of Tax.
- Broadly describing assessment of tax liability when there are both agricultural and non-agricultural incomes
- To understand the meaning of salary
- To understand how to compute income from salary.
- Broadly describing assessment of salary income
- To understand the meaning of perquisites
- To understand the meaning of head House Property
- To understand how to compute income from the head House Property.
- Broadly describing assessment of House Property income
- To understand the meaning of Profits and Gains of Business or Profession
- To understand how to Compute income from the head Profits and Gains of Business or Profession.
- Broadly describing assessment of Profits and Gains of Business or Profession

LEARNING OUTCOME

SEMESTER	COURSE CODE	NATURE	COURSE TITLE	MENTORS
V	5.2 CH	CC-12	Auditing	Sadananda Halder, Sk. Shakeel, Utpal Das

COURSE OBJECTIVES: The objective of this course is to provide knowledge of auditing principles, procedure and techniques in accordance with current legal requirements and professional standards. This course is intended to acquaint the student with auditing standards and the general procedures required in conducting an audit .The purpose of an audit is to render an opinion as to the fair presentation of the financial statements.

Apply auditing concepts and techniques to develop an appropriate plan for a financial statement audit . Explain how the auditor's understanding of business information systems and internal control concepts and techniques is used in audit risk assessment and planning. To identify the stages of an audit from planning to conclusion. Determine the appropriate audit report for a given audit situation. This course is a study of techniques available for gathering, summarizing, analizing and interpreting the data presented in financial statements and procedures used in verifying the fairness of the information.

COURSE OUTCOMES:

- Students are provided with knowledge of basic concept of Auditing.
- Students are able to explain and discuss auditing principles and its relationship with different disciplines .
- Student can explain the advantages of Auditing .
- Have knowledge about audit planning and execution
- Students can describe the major types of audits and auditor's.
- Students are able to apply all the standard audit procedure.
- Student is able to identify all the stages of an audit.
- Student will explain the internal audit process including the professional standards applicable to the internal audit profession.
- Know how to prepare and use working papers, such as checklists.
- Acquired knowledge of audit documentation and audit evidence .
- Students acquired knowledge about vouching of cash credit transactions, verification of

Assets and liabilities.

- Students will be able to comprehend the knowledge about appointment, rights, duties and responsibilities of auditor.
- Students will be able to understand the provisions relating to rotational retirement.
- Students can distinguish between the respective roles and responsibilities of directors and internal and external auditors.
- Student will interpret and analyze the relevant provisions of companies Act 2013.
- Student can demonstrate the accounting knowledge and skills in Auditing.
- Students will be able to Draftin good form an audit report.
- Students can distinguishe between Audit Report and Audit certificate.
- Learners will be able to broadly describing the provisions of companies Act,2013, regarding contents of Audit Report.
- Students are able to mention guiding factors to establish True and Faiir view of the financial statement.
- Students will be able to acquire the knowledge of Legal framework for Bank Audit .
- Learners are able to identify the bank Audit approach for Revenue items.
- Students will know the feature of Audit of account and auditors report.
- They are able to explain the structure on internal control procedures in Banks .
- Students learn about Non-performing Assets.
- Design the audit process for a particular audit programme,how control risks are assessed and controlled.
- Students will be able to explain the procedure for preparation ofaudit report.
- Learners can apply auditing practices to different nature of concerns.
- Students can explain the role of an Auditor in Audit of Educational institutions.
- Learners are able to identify the steps for Audit of Educational institutions.
- Students are able to understand the basic concept of cast Audit, management Audit and tax audit, social audit and Environmental Audit.
- Students can knows special features of cost audit , management audit and tax audit.

LEARNING OUTCOME

- Learners can distinguish between management Audit and cost Audit.
- Students will be able to state the objectives of Environment Audit,tax Audit and social Audit .
- They can describe the provisions of the companies Act 2013 regarding cost Audit.
- They will learn to analyse the provisions of the Income tax Act,regarding Tax Audit.
- Express themselves and their ideas better than today in terms of technical points in accounting and auditing.

SEMESTER	COURSE CODE	NATURE	COURSE TITLE	MENTORS
V	5.3.1 CH	DSE - 1	Management Accounting	Sk. Shakeel, Sadananda Halder, Dr. Arun Kumar Patra

COURSE OBJECTIVES: To impart knowledge to the students about the use of financial, cost and other data for the purpose of managerial planning, control and decision making.

COURSE OUTCOMES:

- To understand the meaning, objective, Scope, Functions, Advantages, Limitations of Management Accounting,
- To understand the techniques and need of Management Accounting
- To get a brief knowledge of role of management accountant
- To learn the difference between Financial Accounting and Cost Accounting
- To understand the meaning, objective, advantages, and disadvantages of Comparative financial statement
- To understand the meaning objective, advantages, and disadvantages of common size financial statement
- To understand the computation of comparative financial statement and common size financial statement
- To understand the concept of ratio analysis, its objectives, advantages and limitations

LEARNING OUTCOME

- To understand the Computation and interpretation of important accounting ratios
- To Prepare financial statements and statements of proprietors' fund from the given ratios
- To get familiar with solvency ratios, liquidity ratios, proprietary ratios and other ratios for key decision making.
- To understand the concept of funds
- To understand the process of preparation of cash flow statement as per Indian Accounting Standard (IndAS): 7.
- To get familiar with Indian Accounting Standard (IndAS): 7.
- To understand the concept of budget
- To understand the concept of budgeting and budgetary control
- To understand the concept of Budget administration, Functional budgets, Fixed and flexible budgets, Zero base budgeting
- To get the knowledge of preparation of budget and understand its importance.

SEMESTER	COURSE CODE	NATURE	COURSE TITLE	MENTORS
V	5.4.1 CH	DSE - 2	Indian Financial System	Sadananda Halder, Utpal Das, Sk. Shakeel

COURSE OBJECTIVES: The objective of the course is to provide the student a basic knowledge of financial markets and institutions and to familiarise them with major financial services in India.

This course allows students to provide basic knowledge about the finance concept, markets and various services provided in these markets. The syllabus is structured in a way which provide adequate information about role of intermediaries and its regulating bodies. To provide information about the prevailing financial system in India. This course aims at providing the students the intricacies of Indian financial system for better financial decision making

COURSE OUTCOMES:

- Students will be able to understand various concept of Financial market and Financial

institutions.

- Studentswill be able to understand the functions and working of the components and intermediaries of the financial system .
- They are able to drafting of organisation structure of Indian financial system.
- Students can gain skills for using the various tools in the financial market.
- Students can explain the role of financial intermediaries in an economy.
- Students will be able to distinguish between the organised and unorganised financial institutions in a financial system.
- Students are able to build relationship with various financial institutions and intermediaries.
- Students will be able to identify and explain Indian Financial Sector reforms under liberalisation.
- Students can be define the money markets and instruments.
- Students should know a detailed knowledge of the functioning of the money market.
- Students are able to identify the role of RBI in adjustment of liquidity in money market.
- Understand the functioning of RBI in controlling Financial system in Indian.
- Students can explain the basic concepts about capital market .
- Students get overall idea about an overview of the functioning and instruments of the various capital market segments.
- Students will be able to understand the evolution, working, and role of Debt market in India.
- To increase the level of understanding and analyzing of the Indian enquity market.
- Students can explain the relationship between the new issue market and secondary market.
- Students will be able to identify and explain utility and the Role of stock Exchange or share market.
- They will get in-depth knowledge on important stock exchange in India.
- Students also acquire skills to present a Report on functioning of stock Exchange.
- Student are able to identify the functions of commercial banks.

LEARNING OUTCOME

- To enrich students understanding of the fundamental concepts and working of financial service institutions.
- It enable students to analyze the Roles of commercial Banks in project finance and working capital finance.
- Students would have an overview of development financial institutions in India.
- Learners will be able to describe the Role of DFIsin Indian Economy.
- Students are introduced to the mutual Fund.
- Students will know the important role of mutual funds and effectively participate in the development process.
- Students will learn about the financial services Industry.
- Learners will be able to understand the different financial services available in India.
- Students are able to demonstrate an awareness of the current structure and regulation of the Indian financial services sector.
- To introduce the concept of merchant Banking and the role of merchant bankers in issue of various financial instruments.
- Students familiar with pre and post issue management in merchant banking.
- Learners will be able to distinguish between merchant Bank and Commercial Bank.
- Students are able to identify and explain regulations on merchant Banking.
- Students will be able to follow List the detail structure of Non-banking Financial Institution.
- Students will be able to distinguish between leasing and Hire-purchase.
- It will help students in understanding securitisation for Housing finance.
- Student are able to familiarise with the different features and methods of ventrue capital finance.
- Learners will be able to identify and describe the stages of ventrue capital financing.
- Students will be able to detail explain the basic concepts of Factoring and Forfeiting service.

LEARNING OUTCOME

SEMESTER	COURSE CODE	NATURE	COURSE TITLE	MENTORS
VI	6.1 CH	CC-13	Fundamentals of Financial Management	Dr. Arun Kumar Patra, Dr. Nirmalendu Sarkar, Sadananda Halder

COURSE OBJECTIVES : The financial management is generally concerned with procurement, allocation and control of financial resources of a concern. The objectives can be- to ensure regular and adequate supply of funds to the concern. To ensure adequate returns to the shareholders this will depend upon the earning capacity, market price of the share, expectations of the shareholders. To ensure optimum funds utilization. Once the funds are procured, they should be utilized in maximum possible way at least cost. To ensure safety on investment, i.e, funds should be invested in safe ventures so that adequate rate of return can be achieved. To plan a sound capital structure- There should be sound and fair composition of capital so that a balance is maintained between debt and equity capital.

COURSE OUTCOMES:

- Demonstrate the applicability of the concept of Financial Management to understand the managerial Decisions and Corporate Capital Structure
- Apply the Leverage and EBIT EPS Analysis associate with Financial Data in the corporate
- Analyze the complexities associated with management of cost of funds in the capital Structure
- Demonstrate how the concepts of financial management and investment, financing and dividend policy decisions could integrate while identification and resolution of problems pertaining to LSCM Sector
- Demonstrate how risk is assessed
- Provide an in-depth view of the process in financial management of the firm
- Develop knowledge on the allocation, management and funding of financial resources.
- Improving students' understanding of the time value of money concept and the role of a financial manager in the current competitive business scenario.
- Enhancing student's ability in dealing short-term dealing with day-to-day working capital decision; and also longer-term dealing, which involves major capital investment decisions and raising long-term finance.

LEARNING OUTCOME

SEMESTER	COURSE CODE	NATURE	COURSE TITLE	MENTORS
VI	6.2 CH	CC-14	Taxation-II	Sk Shakeel, Dr. Arun Kumar Patra

COURSE OBJECTIVES: The objectives of the course are to impart knowledge about business require considerations of the taxation implications. This course is designed to provide ability to interpret and apply taxation legislation, judicial interpretations and general taxation practices. This is a key course to pursue a career in professional accounting. To provide basic knowledge and equip students with application of principles and provisions of Income-tax Act, 1961and GST.

COURSE OUTCOMES:

- Impart knowledge on the provisions of income tax law and practice and make students compute the assessment practices.
- Demonstrate knowledge of the overall taxation process.
- To acquire conceptual knowledge of the set off and carry forward of losses.
- Determinations of Measurement of total income after setting off income or losses from other heads of income.
- Understand the concept of tax liability of an individual.
- Broadly describing about tax rebates and reliefs.
- Broadly describing about deductions under different heads under sections 80C to 80U from gross total income.
- Understand the concepts of GST, GST Council, GSTN, Types of GST.
- Procedure for issuing invoice, payment of GST, registration under GST and different types of GST return.

SEMESTER	COURSE CODE	NATURE	COURSE TITLE	MENTORS
VI	6.3.2 CH	DSE - 3	Tax Procedures and Management	Sadananda Halder, Sk Shakeel

COURSE OBJECTIVES: The objective of the course is to provide basic knowledge of business tax procedures and management Under different provision of the Income Tax. To expose the student to the latest provision of Income Tax Act. It prepare students for in professionally in

taxation finance and accounting and provide a solid base in the field of taxation.

To provide master and reinforce skills in calculating tax savings and in applying methods of tax planning in companies and financial institutions. Understanding the tax planning and assessment procedures for individual, firms and companies. Identify and analyze about the assessment, Procedures, TDS and advance payment of tax and application in various situation. To express the learners to the latest provisions of income tax Act. To give awareness about the application of technology on Income Tax assessment. To provide knowledge of various income tax authorities and their powers. To impact deep knowledge about the latest provisos of Income tax Act. To develop application and analytical skill at the provisions of Income Tax law for Income Tax planning and management. To give knowledge about preparation of computation of incomes and submission of Income tax return. It provides opportunity to learn Indian taxation system and enhance their skills in the field of Tax procedure and management. Students capability to apply theoretical knowledge in practical situation will be increased.

COURSE OUTCOMES:

- To learn tax planning concepts and apply the same.
- Students will get working knowledge regarding legitimate way of tax planning under managerial decisions.
- To provide theoretical knowledge in the field of tax planning and tax management.
- Students will be able to evaluate fully tax planning avenues.
- Learners understand the meaning of tax evasion and tax avoidance.
- Providing Knowledge about difference between tax planning and tax avoidance.
- Students acquire skill to prepare Tax planning for salaries employees.
- Students will be able to identify Tax planning for computation income from house property.
- Students understand about assessment procedure and application in various situations.
- To acquaint students with the concepts and procedure of Income Tax Act.
- Students will be able to define the procedure of tax assessment.
- They will understand the concept of PAN and concept of TAN.
- They can also define assessment and relate different types of assessments method and its use in practical situation.
- Student will be able to aware about best judgment and explain the provision of income tax Act about such assessment.

LEARNING OUTCOME

- To comprehend the re-assessment.
- Students gain knowledge of self assessment tax.
- Students can understand the complete knowledge of basic concept of Return of income.
- Students will be able to file income tax return an individual basis.
- To understand various tax rebate &relief and procedure to file income tax return.
- Learners will learn the filling of return and assessment procedure.
- Broadly discuss about the provision of income tax act regarding signing a return.
- To gain knowledge on belated return and defective return.
- To understand the student about the difference a defective return and revised return.
- To get the knowledge about the time limit for submitting a belated return.
- Students acquire conceptual knowledge of advance payment of tax.
- Describing the objectives of TDS and tax collection at source.
- Learners will be able to explain different types of income and their tax ability and expenses and their deductibility.
- Students will be able to gain knowledge about the concept of interest under Indian income tax Act.
- Learners are able to understand the meaning of penalties and prosecutions.
- Learned about the concept of Interest for default in payment of installment (s) of advance tax (sec 234c)

SEMESTER	COURSE CODE	NATURE	COURSE TITLE	MENTORS
VI	6.4.1 CH	DSE-4	International Business	Utpal Das, Sk Shakeel

COURSE OBJECTIVES: The objectives of this course are basic and broad knowledge in international business environment, strategies and management. Ability to apply concepts, principles and theories to simple business situations. Global awareness of the different thinking and viewpoints of diverse cultures and awareness of the global business environment and its impacts on businesses. Use of excel tools in real world scenarios.

COURSE OUTCOMES:

- Explain the concepts in international business with respect to foreign trade/international business
- Apply the current business phenomenon and to evaluate the global business environment in terms of economic, social and legal aspects

LEARNING OUTCOME

- Analyze the principle of international business and strategies adopted by firms to expand globally
- Integrate concept in international business concepts with functioning of global trade
- Demonstrate international trade terms and concepts when communicating.
- Explain the international trade concepts used in making global decision.
- Use effective communication skills to promote respect and relationship for international trade.
- Utilize information by applying a variety of business and industry software and hardware to major international trade function.
- Demonstrate a basic understanding of international trade.
- Compare at the level of formal analysis, the major models of international trade and be able to distinguish between them in terms of their assumptions and economic implications.
- Employ the principle of comparative advantage and its formal expression and interpretation within different theoretical models.

Program Outcomes

Upon completion of above Semesters students will be able to demonstrate the following:

- PO 1 : Enables learners to get theoretical and practical exposure in the commerce sector which includes Accounts, Commerce, Marketing, Management, Economics, Environment etc.
- PO2 : Build a strong foundation in accounting, management and business subjects
- PO 3 : Seek variety of career options in accounting, management and business related fields
- PO 4: Equip with skills and knowledge to excel in their future careers
- PO 5 : This program could provide Industries, Banking Sectors, Insurance Companies, Financing companies,

Transport Agencies, Warehousing etc., well trained professionals to meet the requirements.

- PO 6 : After completing graduation, students can get skills regarding various aspects like Marketing Manager,
  Selling Manager, over all Administration abilities of the Company.
- PO 7 : Capability of the students to make decisions at personal & professional level will increase after completion
  of this course.
- PO 8: Students can independently start up their own Business.
- PO 9: Students can get thorough knowledge of finance and commerce.
- PO10: Makes students industry ready and develop various managerial and accounting skills for better professional
  opportunities.
- PO11: Develops communication skills and build confidence to face the challenges of the corporate world.
- PO12: The knowledge of different specializations in Accounting, costing, banking and finance with the practical
  exposure helps the students to stand in organization.

Program Specific Outcome

- PSO 1: The students can get the knowledge, skills and attitudes during the end of the B.com degree course.
- PSO 2: By goodness of the preparation they can turn into a Manager, Accountant ,Management Accountant, cost Accountant,
  Bank Manager, Auditor, Company Secretary, Teacher, Professor, Stock Agents, Government employments and so on.,
- PSO 3: Students will prove themselves in different professional exams like C.A. ,C S, CMA,

MPSC, UPSC. As well as other courses.

- PSO 4 : The students will acquire the knowledge, skill in different areas of communication, decision making, innovations and problem solving in day to day business activities.
- PSO 5: Students will gain thorough systematic and subject skills within various disciplines of finance, auditing and taxation, accounting, management, communication, computer.
- PSO 6: Students can also get the practical skills to work as accountant, audit assistant, tax consultant, and computer operator. As well as other financial supporting services.
- PSO 7 : Students will learn relevant Advanced accounting career skills, applying both quantitative and qualitative knowledge to their future careers in business.
- PSO 8 : Students will be able to do their higher education and can make research in the field of finance and commerce.
- PSO 9: Understand the application of business Knowledge in both theoretical and practical aspects.
- PSO 10: Determine the procedures and schedules to be followed on preparing financial statements of Companies.
- PSO 11: Understand the basic concepts and functions of accounting, trade and computer software
- PSO 12: Develop proficiency in the management of an organization
- PSO 13: Attain skills in conducting business transactions online
- PSO 14 : Analyze the scope of the business by adopting modern technology in the business practice
- PSO 15 : Follow the ethics pertaining to business transactions

DEPARTMENT OF COMMERCE
B.COM GENERAL (SEM- I, II, III, IV, V &VI)
COURSE OUTCOMES

The course outcomes of different papers of Semester I, II, III, IV,V & VI are presented below.

After completion of these Semester the students will able to:

SEMESTER	COURSE CODE	NATURE	COURSE TITLE	MENTORS
I	1.1	AECC - 1	Environmental Studies	Kinkini Bhattacharjee, Utpal Das, Sadananda Halder, Sk. Shakeel,

COURSE OBJECTIVES: The objective of Environmental Studies is to develop a world population that is aware of and concerned about the environment and its associated problems among students. This study has the knowledge, skills, attitudes, motivations and commitment towards solutions of current problems and prevention of new ones.

In view of this aim, Environmental Studies should form an integral part of the educational process, be centered in practical problems and be of an interdisciplinary or multidisciplinary character.

COURSE OUTCOMES

- To acquire depth of knowledge in definition, nature, scope and importance of environmental studies.
- Articulate the interconnected and interdisciplinary nature of environmental studies.
- Understand how the environment influences plant growth and crop yields and ways to modify environment to improve plant growth.
- Define natural resources, distinguish between different types of natural resources and create a personal inventory of consumption of natural resources.
- Understand the concepts of sustainable development and use of resources for sustainable development.
- Able to define and describe different types of ecology and ecosystem.
- To have a conceptual idea about energy flow model.

LEARNING OUTCOME

- Demonstrate ability to critically and systematically integrate knowledge and perspectives to analyze, assess and deal with complex biological problems, issues and situations within the field of biodiversity.
- Have a broad idea about different Ecosystem services.
- To understand the nature, causes, effects and control measures of different types of pollution.
- Have a broad idea about solid waste management and how to manage disaster.
- To understand theConstitutional provisions for protecting environment .
- Identifying the causes of Climate Change, Global warming, ENSO, Acid rain, Ozone layer depletion.
- To learn aboutEnvironmental Laws and The Wild life protection Act, 1972.
- To understand the rapid population growth and its impact on environment.
- Broad idea about different environmental movements in India.
- Environmental education field studies help teachers and students build and strengthen relationships.
- Field work experiences enhance students' thinking about environment and relate them.

SEMESTER	COURSE CODE	NATURE	COURSE TITLE	MENTORS
I	1.2 CG	CC - 1	Financial Accounting-I	Dr. Arun Kumar Patra, Sadananda Halder, Sk. Shakeel

COURSE OBJECTIVES: The objective of this paper is to help students acquire conceptual knowledge of the financial accounting and to impart skills for recording various kinds of business transactions.

COURSE OUTCOMES

- To acquire the conceptual knowledge how to keep and why to keep the records of financial transactions on the basis accounting principles, Indian Accounting Standards and International Financial Reporting Standards.
- To acquire the conceptual knowledge of conventions, entity and going concern concept,

and other ideas like- money measurement, periodicity, accruals, consistency conservatism, materiality full disclosure etc.

- To help the students to acquire the knowledge about the concept and history of single entry system.
- To make them aware the drawbacks of single entry system and how it does differs from double entry system.
- To help them how to prepare accounts from single to double entry system.
- To help them to acquire the conceptual knowledge about the sectional and self balancing ledger.
- To facilitate them to develop the knowledge of processing and recording of Adjustment accounts.
- To help the students to acquire the knowledge about the concept consignment sale, consignor and consignee.
- To facilitate them how to keep records and determine consignment profits in the books of consignor using the concept of goods send at cost or at invoice price.
- To make them aware the impact of ordinary commission and Del credere commission on sales calculating consignment profit.
- To help them how to keep records in the books of consignee.
- Understanding the significance of claim for loss of stock and loss of profit
- Comprehend with the terms Loss of Profit, standing charges and increased cost of working
- Compute the amount of claim for loss of stock and loss of profit
- Students will understand the process of preparation of final account of admission, retirement and death of partners.
- Be able to analyse the profit/loss of firm at¬ time of pre and post admission, retirement and death of partners.
- Able to understand accounting treatment¬ of Goodwill during admission, retirement and death of partner.

- Final Account of Partnership firms with¬ various adjustments.

SEMESTER	COURSE CODE	NATURE	COURSE TITLE	MENTORS
I	1.3 CG	CC - 2	Business Management	Utpal Das, Sadananda Halder, Sk. Shakeel

COURSE OBJECTIVES: The objective of the course is students acquired the knowledge and skills that prepare them to plan, build and run a successful business enterprise. Students also learn how to lead and work effectively with people within a organization successfully. The main objective of management is to secure maximum outputs with minimum efforts & resources. Management is basically concerned with thinking & utilizing human, material & financial resources in such a manner that would result in best combination. This combination results in reduction of various costs. Through proper utilization of various factors of production, their efficiency can be increased to a great extent which can be obtained by reducing spoilage, wastages and breakage of all kinds, this in turn leads to saving of time, effort and money which is essential for the growth & prosperity of the enterprise. Management ensures smooth and coordinated functioning of the enterprise. This in turn helps in providing maximum benefits to the employee in the shape of good working condition, suitable wage system, incentive plans on the one hand and higher profits to the employer on the other hand. Management serves as a tool for the upliftment as well as betterment of the society. Through increased productivity & employment, management ensures better standards of living for the society. It provides justice through its uniform policies.

COURSE OUTCOMES

- Demonstrate knowledge of the theories, concepts and findings of the Faculty specializations
- Discuss and communicate the management evolution and how it will affect future managers.
- Strategic and critical thinking in relation to business and commerce related issues.
- Observe and evaluate the influence of historical forces on the current practice of management.
- Identify and evaluate social responsibility and ethical issues involved in business situations

and logically articulate own position on such issues.

- Explain how organizations adopt to an uncertain environment and identify techniques managers use to influence and control the internal environment.
- Practice the process of management's four functions: planning, organizing, leading, and controlling.
- Identify and properly use vocabularies within the field of management to articulate one's own position on a specific management issue and communicate effectively with varied audiences.
- Evaluate leadership styles to anticipate the consequences of each leadership style.
- Gather and analyze both qualitative and quantitative information to isolate issues and formulate best control methods.
- Analyze effective application of PPM knowledge to diagnose and solve organizational problems and develop optimal managerial decisions.
- Understand the complexities associated with management of human resources in the organizations and integrate the learning in handling these complexities.
- Select and use appropriate resources to collect business data that will ultimately translate into information for decision-making.
- Use the marketing information management concepts, systems, and tools needed to obtain, evaluate, and disseminate information for use in making marketing decisions.
- Conduct research to identify and analyze client needs and desires and make marketing recommendations regarding business decisions and use appropriate leadership skills and styles to maximize employee productivity.
- Practice critical and creative thinking to improve the decision making process.
- Conduct research to identify new business trends and customer needs.
- Use quantitative measurements to solve business problems related to payroll, taxes, percentages, future value of money and to be able to make better business decisions.

SEMESTER	COURSE CODE	NATURE	COURSE TITLE	MENTORS
I	1.4	L1-1 English	Language, Variety and Stylistics	
COURSE OBJECTIVES:				
COURSE OUTCOMES				

LEARNING OUTCOME

SEMESTER	COURSE CODE	NATURE	COURSE TITLE	MENTORS
II	2.1 CG	AECC-2	Communicative English/MIL	
COURSE OBJECTIVES:				
COURSE OUTCOMES				

SEMESTER	COURSE CODE	NATURE	COURSE TITLE	MENTORS
II	2.2 CG	GE - 1	Principles of Economics	Kinkini Bhattacharjee

COURSE OBJECTIVES: The objective of this course is to acquaint the students with the basic principles of Economics. Students will understand theories and principles in microeconomics including price theory, market structure, factor markets, consumer theory, selected macroeconomic principles etc. Apply these principles to analyze economic issues.

By studying both microeconomics (the behavior of consumer and companies) and macroeconomic (large-scale economic factors, such as national production, employment, inflation and interest rates), they will learn to think like an economist and understand how a modern market economy functions.

COURSE OUTCOMES:

- Explain how supply and demand are relationships between the price of a product and the quantity of the same.
- Demonstrate how changes in the determinants of supply and demand affect the equilibrium price and quantity of a good or service.
- Explain the concept of elasticity and explain various kinds of elasticity using common economic variables.
- Describe how consumers maximize total utility within a given income using the Utility Maximizing Rule.
- Able to define the term production, production function, AR, MR etc.

LEARNING OUTCOME

- To explain diminishing marginal product and diminishing marginal returns.
- Differentiate between short run and long run costs, explicit and implicit costs.
- Define and explain economies and diseconomies of scale, returns to scale.
- Define various types of markets and the characteristics of Perfect Competition.
- Understand the difference between the firm and industry. Explain and illustrate the difference between the demand curve for a perfectly competitive firm and that for a competitive industry.
- Define the characteristics of monopoly and explain sources and barriers to entry.
- Differentiate between a single price monopolist and a price discriminating monopolist.
- Describe the incomes earned by the factors of production (land, labour, capital, entrepreneurship) wages, interest, rents and profit.
- Use the Lorenze Curve to analyze the distribution of income and wealth.
- Explain the concepts of Macroeconomics and its interrelations with microeconomics.
- Apply the principle of macroeconomics in explaining the behavior of Macroeconomic variables at national as well as global level.
- Define inflation and explain how the rate of inflation is calculated.
- Identify the consequences of inflation.

SEMESTER	COURSE CODE	NATURE	COURSE TITLE	MENTORS
II	**2.3 CG**	**CC-3**	**Business Law**	**Utpal Das, Sadananda Halder, Sk. Shakeel**

COURSE OBJECTIVES : In this program discuss the fundamentals concepts, principles and rules of law that apply to business transactions and includes the function and operation of the courts, business crimes, contract law, the sale of goods act, limited liability partnership act to business activities and recent developments in business law.

COURSE OUTCOMES:

- Familiarize with the relevance of business law to individuals and business and the role of law in an economic, political and social context.
- Make the students understand about business and corporate law

LEARNING OUTCOME

- Identify the fundamental legal principles behind contractual agreements.
- To acquire problem solving techniques and to be able to present coherent, concise legal argument.
- Understand the legal and fiscal structure of different forms of business organizations and their responsibilities as an employer.
- Broadly describing about the sale of goods act and its nature.
- Broadly describing about partnership act and limited liability partnership act and their relationship.
- Develop knowledge on contract and various types of contracts
- To help the students to understand the concept of sale of goods
- Make the students understand about companies and its types
- To equip the students with proper knowledge about Foreign exchange

SEMESTER	COURSE CODE	NATURE	COURSE TITLE	MENTORS
II	2.4 CG	CC - 4	Cost Accounting-I	Dr. Arun Kumar Patra, Sk Shakeel

COURSE OBJECTIVES : The students understand clearly to reduce and control the cost during the course of production because cost is a vital aspect in the modern business. To provide knowledge about the ascertainment the profitability of each of the products and advise the management to maximize its profits.

COURSE OUTCOMES:

- Familiarize with cost concepts and teach the fundamentals of cost accounting as a separate system of accounting.
- To understand Basic Cost concepts, Elements of cost and cost sheet.
- Providing knowledge about difference between financial accounting and cost accounting.
- Demonstrate knowledge of the theories, concepts and findings of the Faculty specializations
- To acquire conceptual knowledge of the cost accounting and to impart skills for recording various kinds of business
- Apply cost accounting concepts and methods to interpret actual financial statements for

LEARNING OUTCOME

evaluating the financial position and performance of organizations.

- Aimed to familiarize the concept of cost accounting
- Helps to gather knowledge on preparation of cost sheet in its practical point of view
- To facilitate the idea and meaning of material control with pricing methods
- Develop the knowledge about remuneration and incentives
- To introduce the concept of overhead cost
- Determinations of Measurement of actual business income by production cost, per unit cost of accounts.
- Broadly describing about advantages cost accounting and its importance in the present business scenario.
- Broadly describing about role of cost accountant and its importance for determine the actual
- Ascertainment of Material and Labor Cost.
- Student's Capability to apply theoretical knowledge in practical situation will be increased.

LEARNING OUTCOME

SEMESTER	COURSE CODE	NATURE	COURSE TITLE	MENTORS
III	3.1 CG	CC-5	Cost Accounting-II	Sk Shakeel, Dr. Arun Kumar Patra, Utpal Das

COURSE OBJECTIVES: To understand the various methods and techniques involved in cost ascertainment and to be able to analyze and evaluation information for cost planning, control and decision making.

COURSE OUTCOMES

- To acquire conceptual knowledge of Job costing and Batch costing.
- Broadly describing about principles, process and equitability, advantages and limitation of Job Costing
- To understand the meaning and features of Batch Costing.
- To learn Preparation of Statement of Cost under Batch Costing, Economic Batch Quantity.
- To acquire conceptual knowledge of Contract Costing.
- Broadly describing about Recording of Contract Cost, Progress payments, Retention money, Escalation clause to understand the meaning and features of Batch Costing.
- To learn the Preparation of Contract Account, Contractee Account and Extracts of Balance Sheet, Profit or Loss on incomplete contract.
- To acquire conceptual knowledge of Process Costing.
- To understand the concept of normal process loss, abnormal process loss and abnormal gain in cost accounting.
- To understand the concept Joint product and By-product, apportionment of joint cost.
- Broadly describing about method of apportioning–physical unit method, average unit cost methods, contribution margin method.
- To learn the Preparation of Process Costing and treatment of by-products cost in cost accounting.
- To acquire conceptual knowledge of Standard Costing.
- To understand the concept of standard costs.
- To understand the concept of material and labour standards.
- Broadly describing about advantage and criticism of standard costing.
- To acquire conceptual knowledge of Marginal Costing.
- To understand the concept of marginal costing, comparison between direct costing
- To understand the concept of absorption costing.
- Broadly describing about cost-volume-profit analysis, profit volume chart, break-even analysis, and graphical presentation of break-even chart.
- Broadly describing about limitation of break-even analysis, methods of breakeven analysis, margin of safety, angle of incidence
- To learn the Preparation of cost-volume-profit analysis, profit volume chart, break-even

analysis.

SEMESTER	COURSE CODE	NATURE	COURSE TITLE	MENTORS
III	3.2 CG	CC-6	Financial Accounting-II	Dr. Arun Kumar Patra, Dr. Nirmalendu Sarkar, Sadananda Halder

COURSE OBJECTIVES: Objective of this course is to acquire conceptual knowledge of financial accounting and to provide knowledge about the technique for preparing accounts in different business organization. The student will be in position to understand treatment of specific transaction like royalty, hire-purchase and branches etc. This will also help in gaining Apply accounting techniques and methods for the formation, dissolution, partner changes, earnings distribution, and liquidation of partnerships

COURSE OUTCOMES

- Understand the salient features and nature of Hire purchase transactions
- Journalize the Hire purchase entries both in the books of hire purchaser and the hire vendor
- Learn methods of accounting of Hire purchase transactions
- Ascertain various missing values, required while accounting the hire purchase transactions, on the basis of given information
- Calculate the record the value of repossessed goods and also to calculate the profit on resale of such goods
- Understand the installment payment system and also how it is different from hire purchase transactions.
- To understand the methods for maintaining branch accounts and its respective accounting treatment, ascertain profit/loss made by Branch and take corrective measures against unprofitable branches.
- Gain knowledge about allocation of expenses and incomes among the departments, to analyse individual profit made by the departments, to find out unprofitable departments and take corrective measures for the same.

LEARNING OUTCOME

- Allocate common expenditures of the organization among various departments on appropriate basis.
- Deal with the inter-departmental transfers and their accounting treatment
- Calculate the amount of unrealized profit on unsold inter-departmental stock-in-hand at the end of the accounting year.
- Work on problems based on inter-departmental transfers at profit and calculation of unrealized profit on the remaining stock at the end of the accounting year
- Prepare financial accounts for partnership firms in different situations of admission, retirement, death and insolvency of the partners.
- Prepare financial statements for partnership firm on dissolution of the firm.
- Employ critical thinking skills to understand the difference between the dissolution of the firm and dissolution of partnership.
- Understand the various types of capital structure of the company and their representation in the balance sheet.
- Evaluate the different situations of capital issue to public like issue at premium, issue at discount, forfeiture of shares etc
- Demonstrate an understanding about the profits of the company and their division.
- Preparation of financial accounts with profits before incorporation.
- Understand the valuation of shares and goodwill and prepare financial statements accordingly
- Enabling the students to understand the features of Shares and Debentures
- Develop an understanding about redemption of Shares and Debenture and its types
- To give an exposure to the company final accounts
- To provide knowledge on Goodwill
- Students can get an idea about internal reconstruction

SEMESTER	COURSE CODE	NATURE	COURSE TITLE	MENTORS
III	3.3	L1-2	Language,	

		English	**Imagination and Creativity**	
COURSE OBJECTIVES:				
COURSE OUTCOMES				

SEMESTER	COURSE CODE	NATURE	COURSE TITLE	MENTORS
III	**3.4 CG**	**SEC - 1**	**E-Commerce**	**Utpal Das, Sk Shakeel, Sadananda Halder**

COURSE OBJECTIVES: This course introduces the concepts, vocabulary, and procedures associated with E-Commerce and the Internet. The student gains an overview of all aspects of E-Commerce. Topics include development of the Internet and E-Commerce, options available for doing business on the Internet, features of Web sites and the tools used to build an E-Commerce web site, payment options, security issues, and customer service.

COURSE OUTCOMES

- Demonstrate an understanding of the foundations and importance of E-Commerce
- Analyze the impact of E-Commerce on business models and strategy
- Describe the infrastructure for E-Commerce
- Describe the key features of Internet, Intranets and Extranets and explain how they relate to each other
- Identify the forces behind e-commerce
- Explain about Information Technology Act 2000
- Clarify the Digital Signature and digital signature certificates
- Analyze the electronic governance
- Describe the Appellate Tribunal Offences
- Explain about cyber crimes
- Discuss about models and methods of e-payments
- Demonstrate an understanding of the payments gateway and online banking
- Analyze about functions of online banking systems
- An outline about risks of online business and e-payments.

LEARNING OUTCOME

SEMESTER	COURSE CODE	NATURE	COURSE TITLE	MENTORS
IV	4.1 CG	CC - 7	Financial Accounting-III	Dr. Arun Kumar Patra, Dr. Nirmalendu Sarkar, Sadananda Halder

COURSE OBJECTIVES: The objective of this paper is to help students to acquire conceptual knowledge of the corporate accounting and to impart skills for recording various kinds of corporate transactions.

COURSE OUTCOMES:

- To acquire the conceptual knowledge how to keep the records of redemption of the various types of Pref. Share depending upon the agreement at the time of issue, e.g. at par, at discount or at a premium.
- To acquire the conceptual and practical knowledge recording of issue and redemption of various types of Debentures.
- To help the students to impart the knowledge of recoding of corporate transactions.
- To help them to think about the optimal capital structure, and the degree of using debt capital depending upon the cost of debt capital and cost of preference capital.
- To acquire the conceptual knowledge how to keep the records how to keep corporate financial statements under companies Act 2013.
- To help them to understand the importance of introduction of Schedule –III
- To make them aware regarding the provision of Dividend, transfer to reserve out of current profit or past reserve and impact on tax.
- To acquire the conceptual knowledge of Goodwill
- To help them how to calculate value of the goodwill under different methods.
- To make them aware that there is no uniqueness of the value of goodwill, it depends upon the various factors to be considered under different method.
- To help them to calculate value of each shares under different methods e.g. Assets - Backing method, Yield-Basis Method, Fair Value Method, ROCE Method and Price Earning Method.
- To develop their leadership shill while Trading of Shares in different Stock Exchange.
- To acquire the conceptual knowledge how to keep the records of corporate transaction for Internal and External reconstruction of companies.
- To make them understand the differences between Internal and external reconstruction of companies.
- To help them how to treat the accumulated losses, arrear preference dividend and surrender of shares while preparing Reconstruction Account.
- To acquire the conceptual knowledge how to keep the records of Holding Company and its

subsidiaries companies as per Companies Act 1956.

- To help them how to deal the requirements of Sec-212 i,e. legal requirements for presenting information to the members of the Holding Company. To make them understand the advantages and disadvantages of holding company.

SEMESTER	COURSE CODE	NATURE	COURSE TITLE	MENTORS
IV	4.2 CG	CC-8	Corporate Laws	Sk. Shakeel, Utpal Das, Sadananda Halder

COURSE OBJECTIVES : The objectives of the course is to impart basic knowledge of the provisions of Companies Act and Depositories Act, case studies and its consequences, and the regulations of corporate laws are required to be discussed.

To gain basic knowledge in Corporate Laws and to understand the concepts of regulatory compliance, and to give an exposure to some of the important laws essential and relevant for a business entity. To demonstrate an overview of laws related to Companies. To provide knowledge, comprehension and principles of Corporate. To gain an in-depth knowledge of corporate functions in the context of Companies Act & related Corporate Laws.

COURSE OUTCOMES:

- Apply principles of corporate law in a rigorous and principled manner.
- Analyze the impact of corporate law from a policy perspective, in the context of social and cultural diversity.
- Understand the principles of Corporate Laws relevant for compliance and decision-making
- To acquire conceptual knowledge of the various types of company like one person, small and dormant company.
- To acquire conceptual knowledge of the Memorandum of Association and Articles of Associations.
- Broadly describing about prospectus, red hearing prospectus and misstatement of prospectus.
- Identify and evaluate types of directors, director identity number and their legal positions.

LEARNING OUTCOME

- To learn the Qualification, Disqualification, Appointment, Position, Rights, Duties, Power, Resignation, Liabilities, Removal and Resignation of director.
- To understand the meaning of share, types of shares, rules regarding issue of debentures.
- Understand the concept of Buyback, Sweat Equity, Bonus, Right, Capital Reduction, and Share Certificate

SEMESTER	COURSE CODE	NATURE	COURSE TITLE	MENTORS
IV	4.3 CG	SEC - 2	Computer Applications in Business	Sadananda Halder, Utpal Das, Sk Shakeel

COURSE OBJECTIVES: The objective of the course is to provide Computer skills and knowledge for commerce students and to enhance the student understand of usefulness of information technology tools for business operations.

To understand the structure function and characteristics of Computer systems. To understand the design of the various functional units and components of Computers. To explain the function of each element of a memory hierarchy. To identify and compare different methods for computer input output systems. To identify, understand and apply different number system and codes. Describe how the CPU process data and instructions and controls the operation of all other devices. Provide student knowledge of memory management and deadlock handling algorithms. Provide basic knowledge of relational database management system. To provide knowledge of data models and scheme in DBMS. The objective of data management system to know how to design, manipulate and manage data base. The objective of word processing is to teach students to identify word processing terminology and concepts create technical documents, format and edit documents, use simple tools and utilities and print documents. Students to identify spreadsheet terminology; create formulas and functions; use formatting features; and generate charts, graphs and report. To make the students to learn about the application of Computers Accounting Systems using Tally.

COURSE OUTCOMES BOTH THEORY AND PRACTICAL:

- Students are able to understand the basic concept of computer and its characteristics.

LEARNING OUTCOME

- They can identify the basic computing functions.
- Students are able to understand window and menu commands and how they are used.
- They are able to demonstrate how to organize files and documents on a USB / hard drive.
- Describe the use of computer and why computers are essential components in business.
- Learners understand the principles and implementation of computer arithmetic.
- Students will be able to identify and explain components of a computer system.
- Understand the theory and architecture of central processing unit.
- Design a simple CPU with applying the theory concept.
- The learners are able to different between RAM and ROM memory.
- Students understand the primary and secondary storage system.
- Understand the concept of input and output device of Computer how it works.
- Students are able to understand the concept of operating system.
- Implement various algorithms required for management, scheduling, allocation, and communication used in operating system.
- Distinguished between operating systems software and application systems software.
- Students will be able to work effectively with a range of current, standard office productivity software applications.
- Students will be able to understand the knowledge of number system.
- Students will learn the meaning of Binary number, Decimal Number and Hexadecimal Number.
- Students gain detailed knowledge of internet, URL, IP address.
- Enable students to analyze the main functions of Protocols.
- Students understand the advantages of TCP, FTP, TELENT, HTML, DTHML and XML
- Students will be able to distinguish between hypertext markup language and Dynamic Hypertext markup language.
- Students learn how routers are used throughout the Internet.
- They learn how to determine own TCP/IP configuration.
- Students understand basic concept of database and Database management system
- Students are able to identify and explain the levels of abstraction in database management system.

Practical

- Students will be able to identify the names and functions of the word interface components and word processing software.
- Learners are able to identify the purpose of the commands on the menu bar.
- Students can create, edit, save, format, header and footer and show preview and print a Word document.

LEARNING OUTCOME

- Create basic tables, compare and merge documents and checking the document for spelling and grammar errors.
- Acquire the knowledge of work with buttons on the toolbar.
- Students will be able to identify the document format by reference to the file extension.
- Students learn how to use templates and wizards
- Understand the features of the document inserting graphics, tables, pictures, charts etc and using different formatting styles.
- Explain the importance of choice topic; own's topic;
- Design scenario for presentation with suitable visual materials
- Uses the strategies for attracting attention and motivation of audience;
- Build credibility and add a sense of reality;
- Students will be able to understand the utility and different features of spreadsheet.
- Students are able to identify the different components of the excel worksheet.
- Create and navigate through multiple spreadsheets in a file.
- They will also have knowledge insert and format text information in spreadsheet cells.
- Building basic worksheet by entering Text, numbers and formulas.
- They can use spreadsheet software to prepare organizational documents.
- Students get idea to use spreadsheet software for financial and other business application requiring mathematical calculations.
- They familiar to use spreadsheet software to prepare various charts -pie, bar, line, column and area.
- They can create various types of charts based on data sets define in a spreadsheet.
- Learners are able to use the print function to create a printable copy of data stored on an Excel spreadsheet.
- Students know about modify chart types to appropriately represent base data.
- They will also have knowledge on sum the numeric values of multiple cells.
- Students will be able to perform financial analysis through spreadsheet.
- Students would gather the knowledge of Computer Accounting system and its importance
- Students will also have knowledge of accounting software.
- Students are able to identify various components of Tally.

LEARNING OUTCOME

SEMESTER	COURSE CODE	NATURE	COURSE TITLE	MENTORS
IV	4.4 CG	SEC-3	Entrepreneurship	Utpal Das, Sadananda Halder

COURSE OBJECTIVES: The purpose of the course is that the students acquire necessary knowledge and skills required for organizing and carrying out entrepreneurial activities, to develop the ability of analyzing and understanding business situations in which entrepreneurs act and to master the knowledge necessary to plan entrepreneurial activities. The objective of the course is, further on, that the students develop the ability of analyzing various aspects of entrepreneurship – especially of taking over the risk, and the specificities as well as the pattern of entrepreneurship development and, finally, to contribute to their entrepreneurial and managerial potentials.

COURSE OUTCOMES:

- Evaluate the nature of entrepreneurship and the entrepreneur in the successful, commercial application of innovations
- Confirm an entrepreneurial business idea
- Identify personal attributes that enable best use of entrepreneurial opportunities
- Explore entrepreneurial leadership and management style.
- Analyze about the role of an entrepreneur in economic growth
- Categorize various types of entrepreneur ship
- Appraise the Concept of business groups
- Classify the role of business houses
- Analyze family business in India
- Differentiate between family business and general business
- Explain MSMEs and MSMEs, Medium and Large business
- Discuss about Women Entrepreneurship and Women Entrepreneurship problems and prospects in the role of business
- Analyze about Public and private system of stimulation
- Explain and understand stimulation
- Generalize sustainability of entrepreneurship

LEARNING OUTCOME

- Detect various support system to the entrepreneur
- Explain Central Government in promoting entrepreneurship
- Classify State Government in promoting entrepreneurship
- Differentiate between Central Government and State Government in promoting entrepreneurship
- Interpret Central and State Government incentives, subsidies, grants
- Describe various types of banks and Distinguish between them
- Explain the significance of writing the business plan and contents of business plan
- Discuss the project planning and compose project report
- Discuss the various aspects of project report
- Classify feasibility studies and Appraise mobilizing resources for start up business
- Understanding the resources accommodation and utilities
- Describe preliminary contracts with vendors and others
- Compare principal customers and Conclude contract management
- Justify basic start up problems

LEARNING OUTCOME

SEMESTER	COURSE CODE	NATURE	COURSE TITLE	MENTORS
V	5.1 CG	CC - 9	Taxation - I	Sk. Shakeel, Dr. Arun Kumar Patra, Sadananda Halder

COURSE OBJECTIVES: To provide basic knowledge and equip students with application of principles and provisions of Income-tax Act, 1961

COURSE OUTCOMES

- To understand the concept of Assessee, Previous year, Assessment year, Person, Income, Sources of income, Heads of income, Gross total income, Total income, Maximum marginal rate of tax, Capital Gains
- To understand the concept of Residential Status and Incidence of Tax.
- Broadly describing Incomes which do not form part of Total Income Except section 10AA.
- To understand the concept of agricultural and non-agricultural Income
- To understand how to determine the Residential Status and Incidence of Tax.
- Broadly describing assessment of tax liability when there are both agricultural and non-agricultural incomes
- To understand the meaning of salary
- To understand how to compute income from salary.
- Broadly describing assessment of salary income
- To understand the meaning of perquisites
- To understand the meaning of head House Property
- To understand how to compute income from the head House Property.
- Broadly describing assessment of House Property income
- To understand the meaning of Profits and Gains of Business or Profession
- To understand how to Compute income from the head Profits and Gains of Business or Profession.
- Broadly describing assessment of Profits and Gains of Business or Profession

LEARNING OUTCOME

SEMESTER	COURSE CODE	NATURE	COURSE TITLE	MENTORS
V	5.2 CG	CC - 10	Auditing	Sadananda Halder, Sk. Shakeel, Utpal Das

COURSE OBJECTIVES: The objective of this course is to provide knowledge of auditing principles, procedure and techniques in accordance with current legal requirements and professional standards.This course is intended to acquaint the student with auditing standards and the general procedures required in conducting an audit .The purpose of an audit is to render an opinion as to the fair presentation of the financial statements.

Apply auditing concepts and techniques to develop an appropriate plan for a financial statement audit . Explain how the auditor's understanding of business information systems and internal control concepts and techniques is used in audit risk assessment and planning.To identify the stages of an audit from planning to conclusion. Determine the appropriate audit report for a given audit situation. This course is a study of techniques available for gathering,summarizing,analizing and interpreting the data presented in financial statements and procedures used in verifying the fairness of the information.

COURSE OUTCOMES

- Students are provided with knowledge of basic concept of Auditing.
- Students are able to explain and discuss auditing principles and its relationship with different disciplines .
- Student can explain the advantages of Auditing .
- Have knowledge about audit planning and execution
- Students can describe the major types of audits and auditor's.
- Students are able to apply all the standard audit procedure.
- Student is able to identify all the stages of an audit.
- Student will explain the internal audit process including the professional standards applicable to the internal audit profession.
- Know how to prepare and use working papers, such as checklists.
- Acquired knowledge of audit documentation and audit evidence .
- Students acquired knowledge about vouching of cash credit transactions, verification of

Assets and liabilities

- Students will be understood qualification and disqualification of an auditor.
- Students will be able to comprehend the knowledge about appointment, rights, duties and responsibility of auditor.
- Students will be able to understand the provisions relating to rotational retirement.
- Students can distinguish between the respective roles and responsibilities of directors and internal and external auditors.
- Student will interpret and analyze the relevant provisions of companies Act 2013.
- Student can demonstrate the accounting knowledge and skills in Auditing.
- Students will be able to Draft in good form an audit report.
- Students are able to explain the form and importance of the Reports provide at the end of the audit.
- Students will be able to show understanding and be able to interpret different types of audit reports.
- Students can distinguish between Audit Report and Audit certificate.
- Learners can describe the situations in which special reports are prepared.
- Learners will be able to broadly describing the provisions of companies Act, 2013, regarding contents of Audit Report.
- Students are able to mention guiding factors to establish True and Faiir view of the financial statement.
- LearnersareabletoidentifythestepsforAuditofEducationalinstitutions.
- StudentscanexplaintheroleofanAuditorinAuditofEducationalinstitutions.
- Design the audit process for a particular audit programme, how control risks are assessed and controlled.
- Students will be able to explain the procedure for preparation of audit report.
- Learners can apply auditing practices to different nature of concerns.
- LearnersareabletoidentifythestepsforAuditofEducationalinstitutions.
- StudentscanexplaintheroleofanAuditorinAuditofEducationalinstitutions.

LEARNING OUTCOME

- Design the audit process for a particular audit programme, how control risks are assessed and controlled.
- Students will be able to explain the procedure for preparation ofaudit report.
- Learners can apply auditing practices to different nature of concerns.

SEMESTER	COURSE CODE	NATURE	COURSE TITLE	MENTORS
V	5.3.1 CG	DSE - 1	Management Accounting	Sk. Shakeel, Sadananda Halder, Dr. Arun Kumar Patra

COURSE OBJECTIVES: To impart knowledge to the students about the use of financial, cost and other data for the purpose of managerial planning, control and decision making.

COURSE OUTCOMES

- To understand the meaning, objective, Scope, Functions, Advantages, Limitations of Management Accounting,
- To understand the techniques and need of Management Accounting
- To get a brief knowledge of role of management accountant
- To learn the difference between Financial Accounting and Cost Accounting
- To understand the meaning, objective, advantages, and disadvantages of Comparative financial statement
- To understand the meaning objective, advantages, and disadvantages of common size financial statement
- To understand the computation of comparative financial statement and common size financial statement
- To understand the concept of ratio analysis, its objectives, advantages and limitations
- To understand the Computation and interpretation of important accounting ratios
- To Prepare financial statements and statements of proprietors' fund from the given ratios

LEARNING OUTCOME

- To get familiar with solvency ratios, liquidity ratios, proprietary ratios and other ratios for key decision making.
- To understand the concept of funds
- To understand the process of preparation of cash flow statement as per Indian Accounting Standard (IndAS): 7.
- To get familiar with Indian Accounting Standard (IndAS): 7.
- To understand the concept of budget
- To understand the concept of budgeting and budgetary control
- To understand the concept of Budget administration, Functional budgets, Fixed and flexible budgets, Zero base budgeting
- To get the knowledge of preparation of budget and understand its importance.

SEMESTER	COURSE CODE	NATURE	COURSE TITLE	MENTORS
V	5.4.1 CG	DSE - 2	Indian Financial System	Sadananda Halder, Utpal Das, Sk. Shakeel

COURSE OBJECTIVES: The objective of the course is to provide the student a basic knowledge of financial markets and institutions and to familiarise them with major financial services in India.

This course allows students to provide basic knowledge about the finance concept, markets and various services provided in these markets. The syllabus is structured in a way which provide adequate information about role of intermediaries and its regulating bodies. To provide information about the prevailing financial system in India. This course aims at providing the students the intricacies of Indian financial system for better financial decision making.

COURSE OUTCOMES

- Students will be able to understand various concept of Financial market and Financial institutions.
- Students will be able to understand the functions and working of the components and intermediaries of the financial system .

LEARNING OUTCOME

- They are able to drafting of organisation structure of Indian financial system.
- Students can gain skills for using the various tools in the financial market.
- Students can explain the role of financial intermediaries in an economy.
- Students will be able to distinguish between the organised and unorganised financial institutions in a financial system.
- Students are able to build relationship with various financial institutions and intermediaries.
- Students will be able to identify and explain Indian Financial Sector reforms under liberalisation.
- Students can be define the money markets and instruments.
- Students should know a detailed knowledge of the functioning of the money market.
- Students are able to identify the role of RBI in adjustment of liquidity in money market.
- Understand the functioning of RBI in controlling Financial system in Indian.
- Students can explain the basic concepts about capital market .
- Students get overall idea about an overview of the functioning and instruments of the various capital market segments.
- Students will be able to understand the evolution, working, and role of Debt market in India.
- To increase the level of understanding and analyzing of the Indian enquity market.
- Students can explain the relationship between the new issue market and secondary market.
- Students will be able to identify and explain utility and the Role of stock Exchange or share market.
- They will get in-depth knowledge on important stock exchange in India.
- Students also acquire skills to present a Report on functioning of stock Exchange.
- Student are able to identify the functions of commercial banks.
- To enrich students understanding of the fundamental concepts and working of financial service institutions.
- It enable students to analyze the Roles of commercial Banks in project finance and

working capital finance.

- Students would have an overview of development financial institutions in India.
- Learners will be able to describe the Role of DFIs in Indian Economy.
- Students are introduced to the mutual Fund.
- Students will know the important role of mutual funds and effectively participate in the development process.
- Students will learn about the financial services Industry.
- Learners will be able to understand the different financial services available in India.
- Students are able to demonstrate an awareness of the current structure and regulation of the Indian financial services sector.
- To introduce the concept of merchant Banking and the role of merchant bankers in issue of various financial instruments.
- Students familiar with pre and post issue management in merchant banking.
- Learners will be able to distinguish between merchant Bank and Commercial Bank.
- Students are able to identify and explain regulations on merchant Banking.
- Students will be able to follow List the detail structure of Non-banking Financial Institution.
- Students will be able to distinguish between leasing and Hire-purchase.
- It will help students in understanding securitization for Housing finance.
- Students are able to familiarise with the different features and methods of ventrue capital finance.
- Learners will be able to identify and describe the stages of venture capital financing.
- Students will be able to detail explain the basic concepts of Factoring and Forfeiting service.

LEARNING OUTCOME

SEMESTER	COURSE CODE	NATURE	COURSE TITLE	MENTORS
VI	6.1 CG	SEC - 4	Personal Selling and Salesmanship	Sadananda Halder, Sk Shakeel

COURSE OBJECTIVES: The purpose of this course is to familiarize the student with the fundamentals of personal selling and the selling Process. This course provides an insight to the students regarding various issues associated with sales like creation and growth of demand, guiding buyers and building up goodwill and reputation of sellers with the help of essential concept of salesmanship.

The learners should be able to apply effective technique in developing and qualifying sales leads and demonstrate effective sales presentation techniques. To develop transferrable skills among the students for managing sales operation efficiently so that they could be ready to join the sales function in any organization.

COURSE OUTCOMES:

- To provide an introduction to personal selling as a systematic process.
- To understand the concepts and terms relevant to personal selling.
- Describe the nature of personal selling and changes brought about the business shift to customer orientation.
- To learn about the tools used by good salesman in various types of selling situations.
- Identify and profile the various selling styles.
- Development of the interpersonal and leadership skills to work effectively in teams.
- To provide insights into how people are motivated both sales people and prospective buyers.
- Identify successful techniques for working with customers in business situation.
- Develop a plan to follow up and service the sale.
- Utilize the sales process as a life skill.
- Lerner's will demonstrate conceptual knowledge of motivation & its functional areas.
- Learners will be able to work affectively in teams and demonstrate team- building capabilities.
- Identify and explain factors which influence Maslow's Theory of need hierarchy.
- Relate internal dynamic such as personality perception, learning motivation and attitude to the choices consumers make.
- Understand the consumer behaviour and their buying process.
- Learners can explain Dynamic nature of motivation.
- Students will be able to classify buying motives.

LEARNING OUTCOME

- Define and discuss each component of the selling process.
- Practice each step of the selling process through role -play and in-class exercises.
- Identifying and profile the various selling styles.
- Demonstrate the ability to deal with objections to advance the sale.
- Demonstrate the ability to close the sale.
- Describe different types of sales persons.
- Design and deliver effective presentation.
- Prepare an agency brief on sales promotion and set up a sales promotion plan.
- Analyze the importance of sales promotion in corporate and marketing plans to identify appropriate opportunities for implementation.
- Analyze direct marketing opportunities and evaluate their role in the sales promotional mix.
- Identify and understand the various advertising media.
- Identify the dealer oriented promotion techniques customer oriented promotion technique and the salesman oriented promotion techniques.
- Explain professional communication techniques used in a sales career.
- Develop effective communication skills.
- Understand the definition and examples of daily sales report.
- Broadly describing about weekly sales report and finishing with monthly sales report and templates.
- Construct written sales plan and professional interactive presentations
- Evaluate ethical circumstances commonly been in personal selling.
- To imparts skills among the students to write a report of their choice on a given area.
- To learn the process of preparation of a sales report.

LEARNING OUTCOME

SEMESTER	COURSE CODE	NATURE	COURSE TITLE	MENTORS
VI	6.2 CG	GE -2	Business Mathematics and Statistics	Kinikini Bhattacharjee, Dr. Arun Kumar Patra

COURSE OBJECTIVES: The objective of this course is to familiarize students with the applications of mathematics and statistical techniques in business decision-making. The overarching objective of Statistics in Business is for students to describe data and make evidence based decisions using inferential statistics that are based on well-reasoned statistical arguments. It is very essential to develop the students' ability to deal with numerical and quantitative issues in business.

COURSE OUTCOMES:

- Explain matrix representation of a linear transformation.
- To calculate inverse of matrices and adjoint of matrices.
- Define mathematical functions and their different types and mathematical forms.
- Evaluate limits of functions from their graphs or formulas.
- Analyze and apply the notions of continuity and differentiability to algebraic functions. Calculate maxima and minima of a function.
- To acquire depth of knowledge in algebra, analysis or statistics.
- Students will formulate complete, concise and correct mathematical proofs.
- Understand about data collection procedure.
- To have a conceptual idea about diagrammatic presentation of frequency distribution.
- To acquire conceptual knowledge of the Measures of Central Tendency.
- Broadly describing about Mean, Median and Mode and calculate their numerical problems.
- Understand the concepts of Partition values and composite mean.
- Able to compute Range of a set of data, the standard deviation for both grouped and ungrouped data and able to interpret the significance of standard deviation.
- Apply the correct measures of dispersion to any given variable based on that variable's level of measurement.

SEMESTER	COURSE CODE	NATURE	COURSE TITLE	MENTORS
VI	6.3.2 CG	DSE - 3	Taxation - II	Sk Shakeel, Dr. Arun Kr. Patra

LEARNING OUTCOME

COURSE OBJECTIVES: The objectives of the course are to impart knowledge about business require considerations of the taxation implications. This course is designed to provide ability to interpret and apply taxation legislation, judicial interpretations and general taxation practices. This is a key course to pursue a career in professional accounting. To provide basic knowledge and equip students with application of principles and provisions of Income-tax Act, 1961and GST.

COURSE OUTCOMES:

- Impart knowledge on the provisions of income tax law and practice and make students compute the assessment practices.
- Demonstrate knowledge of the overall taxation process.
- To acquire conceptual knowledge of the set off and carry forward of losses.
- Determinations of Measurement of total income after setting off income or losses from other heads of income.
- Understand the concept of tax liability of an individual.
- Broadly describing about tax rebates and reliefs.
- Broadly describing about deductions under different heads under sections 80C to 80U from gross total income.
- Understand the concepts of GST, GST Council, GSTN, Types of GST.
- Procedure for issuing invoice, payment of GST, registration under GST and different types of GST return.

SEMESTER	COURSE CODE	NATURE	COURSE TITLE	MENTORS
VI	6.4.1 CH	DSE-4	International Business	Utpal Das, Sk Shakeel

COURSE OBJECTIVES: The objectives of this course are basic and broad knowledge in international business environment, strategies and management. Ability to apply concepts, principles and theories to simple business situations. Global awareness of the different thinking and viewpoints of diverse cultures and awareness of the global business environment and its impacts on businesses. Use of excel tools in real world scenarios.

COURSE OUTCOMES:

LEARNING OUTCOME

- Demonstrate international trade terms and concepts when communicating.
- Explain the international trade concepts used in making global decision.
- Use effective communication skills to promote respect and relationship for international trade.
- Utilize information by applying a variety of business and industry software and hardware to major international trade function.
- Demonstrate a basic understanding of international trade.
- Compare at the level of formal analysis, the major models of international trade and be able to distinguish between them in terms of their assumptions and economic implications.
- Employ the principle of comparative advantage and its formal expression and interpretation within different theoretical models.

Program Outcomes

Upon completion of above Semesters students will be able to demonstrate the following:

- PO 1 : Enables learners to get theoretical and practical exposure in the commerce sector which includes Accounts, Commerce, Marketing, Management, Economics, Environment etc.
- PO2 : Build a strong foundation in accounting, management and business subjects
- PO 3 : Seek variety of career options in accounting, management and business related fields
- PO 4: Equip with skills and knowledge to excel in their future careers
- PO 5 : This program could provide Industries, Banking Sectors, Insurance Companies, Financing companies, Transport Agencies, Warehousing etc., well trained professionals to meet the requirements.
- PO 6 : After completing graduation, students can get skills regarding various aspects like Marketing Manager, Selling Manager, over all Administration abilities of the Company.
- PO 7 : Capability of the students to make decisions at personal & professional level wil

increase after completion of this course.

- PO 8: Students can independently start up their own Business.
- PO 9: Students can get thorough knowledge of finance and commerce.
- PO10: Makes students industry ready and develop various managerial and accounting skills for better professional opportunities.

Program Specific Outcome

- PSO 1: The students can get the knowledge, skills and attitudes during the end of the B.com degree course.
- PSO 2: By goodness of the preparation they can turn into a Manager, Accountant ,Management Accountant, cost Accountant,
  Bank Manager, Auditor, Company Secretary, Teacher, Professor, Stock Agents, Government employments and so on.,
- PSO 3: Students will prove themselves in different professional exams like C.A. ,C S, CMA, MPSC, UPSC. As well as other
  courses.
- PSO 4 : The students will acquire the knowledge, skill in different areas of communication, decision making, innovations and
  problem solving in day to day business activities.
- PSO 5: Students will gain thorough systematic and subject skills within various disciplines of finance, auditing and taxation,
  accounting, management, communication, computer.
- PSO 6: Students can also get the practical skills to work as accountant, audit assistant, tax consultant, and computer operator.
  As well as other financial supporting services.
- PSO 7 : Students will learn relevant Advanced accounting career skills, applying both quantitative and qualitative knowledge to

their future careers in business.

- PSO 8 : Students will be able to do their higher education and can make research in the field of finance and commerce.
- PSO 9: Understand the application of business Knowledge in both theoretical and practical aspects.
- PSO 10: Determine the procedures and schedules to be followed on preparing financial statements of Companies.

LEARNING OUTCOME

DEPARTMENT OF PHILOSOPHY:

COURSE OUTCOME / PROGRAMME OUTCOME

COURSE OUTCOME:

SEMESTER-1

1. **Outlines of Indian Philosophy-1: CC-1**
   - i) Is Indian philosophyPessimistic?
   - ii) Can we overcome our sufferings by following CarvakaPhilosophy?
   - iii) Do you believe inrebirth?
   - iv) Is it at all possible to get liberation? If yes, how is itpossible?

2. ***Outlines of WesternPhilosophy-1: CC-2***
   - i) Is experience only source of all ideas?Discuss.
   - ii) Is knowledge merely true belief?Discuss.
   - iii) How does Descartes explain the relation between mind andbody?

SEMESTER-2

3. **Outlines of Indian Philosophy-2: CC-3**
   - i) Do you support Samkhya School for not admitting God as the creator of this world?
   - ii) How does Ramanuja refute Sankara's doctrine ofMaya?

4. ***Outlines of WesternPhilosophy-2: CC-4***
   - i) How Berkeley does rejects Locke's notion of abstractideas?
   - ii) What are three levels of Hegel's dialecticmethod?

SEMESTER-3

5. ***Indian Ethics: CC-5***
   - i) Is it always wrong to do somethingbad?
   - ii) What is mean by Niskama Karma? Is it possible atall?
   - iii) What is Moksha-the Supremeend?
   - iv) What is the role of the principle of non-violence for makingdeveloped society?
   - v) What is the bondage in Jaina philosophy? How to get liberation fromit?

6. *Western Ethics : CC-6*

i) Why is ethicsrelevant?
ii) Why do we need rules in ourlife?
iii) 'Goodwill is good in itself' what is the implication of thisstatement?
iv) Why should we care about theenvironment?
v) If I do not have free will, can I be responsible for what Ido?
vi) On what grounds criminal should we party should bepunished?

7. *Indian Logic: CC-7*

i) What is the necessity to admit the nirvikalpakapratyaksa?
ii) How can vyıpti beestablished?
iii) What is the necessity to admit svarthanumana ?
iv) What is savyabhicarahetvabhasa?
v) Explain, after Annarnbhatta, the laksana ofkarya.

8. *Philosophy in Practice : SEC-1*

i) What is the difference characteristics Between Philosophy of the West and Darshana of theEast?

ii) Can we fulfilled all conditions for a propositionalknowledge?
iii) Do you think Chala is a valid instrument in debate forparticipants?
iv) Is prakriti the primary cause of theworld?
v) Do you believe that human experience is partly constituted by human mind?

SEMESTER-4

9. *WesternLogic-1: CC-8*

i) Why should we studylogic?
ii) Do we need to study logic properly to make goodarguments?
iii) Distinguish between deductive and inductivearguments.
iv) Distinguish between rules of implication and rules ofreplacement.

10. *Psychology: CC-9*

i) 'Psychology is the science of behaviour'- Do you believe it? Make point'in
favour of your response.
ii) Explain Introspection as psychologicalmethod.
iii) What is meant by the Organization of the SenseField?
iv) What are the marks of goodmemory?
v) Do you think that the Trial and Error Theory of Learning is

effective method?

11. Philosophy ofReligion: CC-10

i) If God is good and created everything, how come there isevil?
ii) What does it mean by 'God isimmanent'?
iii) What is the difference between Theology and Philosophy ofReligion?
iv) Do you think that, we can follow properly the Jaina concept ofnon-violence?
v) Is there any relation between religion andmagic?

12. Philosophy of Human Rights: SEC-2

i) What is meant by "natural rightstradition"?
ii) Do you think that equality and liberty are necessary conditions of human rights?
iii) How important is the right of protection of people in thesociety?
iv) Is freedom of expression very important for humanbeing?
v) What is meant by the right tolife?

SEMESTER-5

13. Socio-PoliticalPhilosophy: CC-11

i) What's the best kind of society? State your ownview.
ii) What is the best sort of Government? State your own view.
iii) What is the best kind ofsociety?
iv) Distinguish between an association and aninstitution.
v) Discuss the role of mores' as forces of socialcontrol.
vi) Explain the main features of LiberalDemocracy.

14. Western Logic-2: CC-12

i) What is the distinguishing mark ofinduction?
ii) Is a word merely a noise when it is spoken, or a set of marks when itis written?

15. Kaḥopaniṣad: DSE-1

i) Why do we need a teacher like Sri Krishna and Yama in ourlife?
ii) Is life precious afterdeath?
iii) State the difference between Sreya andpreya.
iv) How does Yama compare this body and soul with Ratha andRathi?
v) Is Nachiketa an Adhikari purusa to get the knowledge ofBrahman?

16. *B. Russell: The Problems ofPhilosophy: DSE-2*

i) What is the difference between appearance andreality?
ii) According to Russell, what is the main function ofphilosophy?
iii) What is sense data according toRussell?
iv) Do you think that Russell's Sense Data Theory is the basis ofRepresentativeRealism?

SEMESTER-6

17. *Philosophy in the Twentieth Century: Indian: CC-13*

i) Why does Rabindranath hold that his religion is 'the Religion ofMan'?
ii) What does Rabindranath mean by the finiteman?
iii) How can we apprehend God's existence according toIqbal?
iv) Explain the doctrine of Maya according toVivekananda.
v) What is Purna Yoga according to SriAurobindo?

18. *Philosophy in the Twentieth Century: Western: CC-14*

i) What are the arguments in favour of a defence of common sense byG.E. Moore?
ii) Is there any relation between knowledge by Acquaintance and knowledge by description?
iii) Is appearance deceptive according to A. J.Ayer?
iv) What is the difference between Authenticity and Inauthenticity accordingtoM. Heidegger?
v) Is there complementary or contradictory relationship between beingand nothingness?

19. *Rabindranath Tagore: Sadhana: DSE-3*

i) How man is related with thisuniverse?
ii) Why suffering becomes important to us? How is it related with ourjoy?
iii) When we get the state of heaven according to the God Jesus? State after Rabindranath Tagore'sSadhana.
iv) What is the value ofLove?
v) What is the aim of our ultimatebeing?
vi) How do the men realize his ultimate being or the ultimatereality?

20. *Hume: An Enquiry Concerning HumanUnderstanding: DSE-4*

i) What is Hume's view regarding the purpose and nature ofMetaphysics?
ii) Distinguish between Impression and Ideas according toHume.
iii) What does you mean by Association ofideas?

iv) Discuss how Hume tries to show that custom is the great guide of humanlife.

v) Is there any necessary connection between cause andeffect?

PROGRAMME OUTCOME:

PO1: **Philosophy and the world:** Philosophy seeks to thoroughly analyse the relationship between every object and person in the world and to consider and understand what the content as a whole.

PO2: VALUE AND RESPONSIBILITY:

We should understand the value of each member of the world. It is believed that every member is valuable in this world and they are each playing their own role. Every member is very important so it is necessary to respect everyone in the world.

PO3: **The guiding philosopher:** In many difficult situations in our life we have faced moral dilemmas between right and wrong. We even confuse what should we do? At that time, we need a friend, philosopher and guide like Sri Krishna to overcome our moral conflicts and get the actual knowledge of ourselves.

PO4**. Ethics, logic and society:** we need to maintain peace for improving lifestyle of people in the society. We have y to understand that in society we are all interdependent and everyone is responsible to our future generations. We should make every decision with respect to others, we should make decisions on overall development of the society. It is possible if we apply correct reasoning with morality.

PO5. **We have to control our behavior to build a civilized society**. The basic condition for building a civilized society is that every person in the society should control his own behavior and fulfill his responsibilities properly to the society. Every person should do his own duty without thinking of profit and loss, then a real civilized society will be formed.

LEARNING OUTCOME

DEPARTMENT OF POLITICAL SCIENCE (HONS.)

COURSE OUTCOME

SEMESTER:I

➢ PAPER: CC-1:- WESTERN POLITICAL THOUGHT.

➢ **By completing this course students will be able to:**

- **1.**Understand(a): the features of the ancient Greek political thought and
- (b):Importance of Plato's theory of justice and
- (c): Aristotle's concept of state.
- 2. Judge the main features of medieval political thought.
- 3. Understand the nature of renaissance in Italy and Machiavelli's concept of politics,specially the concept of politics,specially the concept of power and secularization.
- 4.Appreciate(a): Hobbe's concept of sovereignty and
- (b): Locke's Contribution to liberalism and
- (c): Rousseau's views on general will which is the foundation of democracy.
- 5.Appreciate Hegel's Theory of state.
- 6.Understand (a): Marx and Engel's views on socio-political development and
- (b)Lenin's theory of imperialism in the context of twentieth century.
- 7. Perceive ideas of liberty as developed by Mill and Berlin.

SEMESTER:I

- **Paper:CC2- Political Theory.**

➢ By completing this course students will be able to:

- 1. Understand the meaning of politics and political theory including decline and revival of political theory.
- 2. Have an overview of different approaches to politics.
- 3. Understand and explain the concept of sovereignty and its different varieties.
- 4. Perceive the meanings of the concept of liberty and equality and their interrelationships.
- 5. Explain the concept of justice with special emphasis on John Rawls's contribution.
- 6. Explain (a) the meaning of ideology and have an overview of different kind of ideologies, (b) comprehend the recent debates on the end of ideology theory with special emphasis on Bell and Fukuyama and
- 7. Have an overview of different theory of state.

SEMESTER:II

- Paper:CC3- Indian Political Thought.

➢ By completing this course students will be able to:

- 1.Understand a) the features of ancient Indian Political Thought, b)The importance of Kautilya's concept of Saptanga and Dandaniti.
- 2.Comprehent the main features of mediaval Indian Muslim Political Thought.
- 3.Have a comprehensive view of Rammuhan Roy's views on British rule.
- 4.Have an overview of Bankim Chandra and Vivekananda's views on nationalism.
- 5.Judge Gandhi's views on Satyagraha and Trusteeship.
- 6. Appreciate Tagore's views on State , Society and Nation.
- 7.Have an over view of Ambedkar's concept of Social Justice.

SEMESTER:II

- Paper:CC4- Indian Govt. and Politics.

➢ By completing this course students will be able to:

- 1.Have an idea of composition and role of the Constitutent Assembly of India.
- 2. Have an overview of the nature of Fundamental Rights and Directive Principles of State Policy .
- 3. Understand the nature of Indian Federalism and its tension areas.
- 4. Understand the organization, fuctions of law making procedures in Indian Parliament with special focus on the role of the speaker and the Constitutional Amendment Process.
- 5. Appreciate the powers and functions of the Union as well as of State Executives
- 6. Understand the composition and functions of the Supreme Court and the High Courts.
- 7. Have an overview of the party system in India with special focus on recent trends namely ,Coalition Governments.
- 8.Understand the Electoral Process in India.

SEMESTER-III

- Paper:CC5- Comparative Government and Politics.

  - By completing this course students will be able to:

- 1.Differentiate between comparative government and comparative politics.
- 2.Understand the importance of the Rule of Law in UK and Fundamental Rights in USA.
- 3.Have a comparative view of different systems of government in UK, USA and France.
- 4.Distinguish between Parliamentary and Presidential systems in UK, USA and China.
- 5. Have a clear view of Party systems in UK, USA, France, Nigeria and Mexico.
- 6.Compare between the organization and function of judiciaries in UK, USA and France.
- 7.Understand the nature of Legislature in UK and USA.

SEMESTER: III

- Paper:CC6- Public Administration: Basic Theories.

➢ By completing this course students will be able to:

- 1.Have an overview of the discipline.
- 2.Acquire knowledge about Scientific Management , Administrative Management and Bureaucracy.
- 3.Distinguish between Neo-Classical Theories of Public Administration.
- 4.Have an idea of contemporary theories of administration.
- 5.Understand the core concepts of administration viz. Line and Staff, decentralization , delegation of power etc.
- 6.Have a comparative view of different approaches to Public Administration.

SEMESTER: III

- Paper:CC7- Local Government in India.

➢ By completing this course students will be able to:

- 1.&2. Know about the73rd & 74th Amendment Acts and there implications for rural and urban local self governments in India
- 3.Have an overview of the Panchayati Raj Institutions.
- 4.Have an overview of the Urban Administration in West Bengal
- 5.Understand the role of the District Administrators viz. DM, SP & SDO.
- 6.Understand the role of Heads of State Administration in West Bengal.
- 7.Know about the necessity of Administrative reform in India with special emphasis on : Globalization, RTI, Lokpal & Lokayukta.

SEMESTER:IV

- PAPER CC-8 : INTERNATIONAL RELATIONS.

➢ By completing this course students will be able to:

- 1.Understand the Nature and Scope of international Relations.
- Know about different kinds of approaches like(a)Idealist(b)Realist and(C) Neo-Realist approaches in International Relations.
- 2.Have an idea about the National power and its elements.
- 3.Have a clear concept about the Balance of Power and Collective Security in International Relations.
- 4.Have an overview about the Origin and end of the cold war.
- 5.Know about the Post Cold War global issues like-(a)Globalization(b)Human Rights and (c) Terrorism.
- 6.Understand about the Disarmament process in International Relations.
- Know about different international organizations, groups and treaties like NPT,CTBT and NSG.
- 7.Have a clear concept about the foreign policy and Diplomacy and its concepts, determinations and objectives.
- 8.Know about the basic theories of Indian foreign policy.

SEMESTER:IV

- PAPER CC-9: SOCIOLOGY AND POLITICS.

- By completing this course students will be able to:

- 1.Have a clear concept about (a) the nature and scope of Political Sociology and the Sociology of Politics.
- (b)Distinguish between the Political Sociology and the Sociology of Politics.
- 2.Understand about (a) the Political cultures and its different types.
- (b)Know about the Political Socialization process and its different roles and agencies.
- 3.Have an idea about the Political participation and its different components.
- 4. Have an overview about the concept of power and authority and its different types.
- 5.Know about the Feminism; its significance and different schools.
- 6. Have an overview of (a) the Environment and Politics (b) different Environmental movements and(c) Eco-Feminism.
- 7. Understand about (a) the Religion and politics and (b) the concept of secularism.
- 8. Have an clear concept about (a) the Civil society (b) role of media (c) the relations between society and politics.

SEMESTER:IV

- PAPER CC-10: INTERNATIONAL ORGANIZATIONS.

- By completing this course students will be able to:

1. Know about the revolution of different kinds of International Organizations.
2. Have an overview about the United nations and its composition, functions and different organs(a) the General Assembly (b) the Security Council(c)Secretariat; Secretary General(d) the International Court of Justice.
3. Understand about the role of the United Nations in International Peacekeeping and peacebuilding.
4. Have a clear concept of different Regional Economic organizations like (a) APEC and (b) OPEC.
5. Know about the various Regional Security Organizations like (a) NATO and(b) ARF.
6. Understand about the goals and functions of different regional Organizations like (a) SAARC (b) ASEAN and (c) BRICS.