

## **PROFESSIONAL ELECTIVES UNDER SCIENCE STREAM**

### **CHEMISTRY**

**19CHY243      COMPUTATIONAL CHEMISTRY AND MOLECULAR MODELLING      L-T-P-C: 3-0-0-3**

#### **Course Outcomes:**

- CO1: Get to understand the structure of molecules using symmetry.  
CO2: Understanding Quantum mechanical approach to calculate the energy of a system.  
CO3: Applying mathematical knowledge and quantum mechanical approach in finding out the characteristics- reactivity, stability, etc., of the molecule.  
CO4: To get a brief idea about molecular mechanics based chemical calculations.  
CO5: To get an idea about general methodology of molecular modeling.

#### **Syllabus**

##### **Unit 1**

Introduction: Stability, symmetry, homogeneity and quantization as the requirements of natural changes - Born - Haber cycle – Energetic – kinetics - Principles of spectra.

Computational techniques: Introduction to molecular descriptors, computational chemistry problems involving iterative methods, matrix algebra, Curve fitting.

Molecular mechanics: Basic theory - Harmonic oscillator – Parameterization - Energy equations - Principle of coupling - Matrix formalism for two masses - Hessian matrix - enthalpy of formation - enthalpy of reactions.

Introduction to Quantum mechanics - Schrodinger equation - Position and momentum  
MO formation - Operators and the Hamiltonian operator - The quantum oscillator  
Oscillator Eigen value problems - Quantum numbers - labeling of atomic electrons.

##### **Unit 2**

Molecular Symmetry: Elements of symmetry - Point groups - Determination of point groups of molecules.

Huckel's MO theory: Approximate and exact solution of Schrodinger equation - Expectation value of energy - Huckel's theory and the LCAO approximation - Homogeneous simultaneous equations - Secular matrix - Jacobi method - Eigen vectors: Matrix as operator - Huckel's coefficient matrix - Wheeland's method - Hoffmann's EHT method - Chemical applications such as bond length, bond energy, charge density, dipole moment, Resonance energy.

##### **Unit 3**

Self consistent fields: Elements of secular matrix - Variational calculations - Semi empirical methods - PPP self consistent field calculation - Slater determinants - Hartree equation - Fock equation – Roothaan - Hall equation - Semi empirical models and approximations.

Ab-initio calculations: Gaussian implementations – Gamess - Thermodynamic functions - Koopman's theorem - Isodesmic reactions, DFT for larger molecules - Computer aided assignments/mini projects with softwares - Introduction to HPC in Chemical calculations.

Molecular modelling software engineering - Modeling of molecules and processes

Signals and signal processing in Chemistry - QSAR studies and generation of molecular descriptors - Applications of chemical data mining - Familiarization with open source softwares useful for molecular modeling - Introduction to molecular simulation - M.D. simulation.

#### **TEXTBOOKS:**

1. *K. I. Ramachandran, G Deepa and K Namboori, "Computational Chemistry and Molecular Modeling - Principles and Applications", Springer-Verlag, Berlin, Heidelberg, 2008, ISBN-13 978-3-540-77302-3.*
2. *Donald W Rogers, "Computational Chemistry Using PC", Wiley, (2003).*
3. *Alan Hinchliffe, "Chemical Modeling from atoms to liquids", Wiley, (2005).*

**REFERENCES:**

1. *James B Foresman and Aeleen Frisch-Gaussian, "Exploring Chemistry with Electronic Structure Method", Inc., Pittsburgh, PA, 2nd edition, (2006).*
2. *A C Philips, "Introduction to Quantum mechanics", Wiley, (2003).*
3. *Wolfram Koch, Max C. Holthausen, "A Chemist's guide to Density Functional Theory", Wiley, VCH, 2nd edition, (2001).*

**Evaluation Pattern**

Assessment	Internal	End Semester
Periodical 1 (P1)	15	
Periodical 2 (P2)	15	
*Continuous Assessment (CA)	20	
End Semester		50

\*CA – Can be Quizzes, Assignment, Projects, and Reports.

**Course Outcomes:**

- CO1: Understand the fundamental concepts of electrochemistry through electrode potential and reaction kinetics  
CO2: Learn the application of the electrochemical principles for the functioning and fabrication of industrial batteries and fuel cells  
CO3: Acquire knowledge in solving numerical problems on applied electrochemistry  
CO4: Analysis and practical problem solving in fabrication of batteries and fuel cells  
CO5: Application of concepts and principle in industrial electrochemical processes  
CO6: Evaluation of comprehensive knowledge through problem solving

**Syllabus****Unit 1**

Background Theory: Origin of potential - electrical double layer - reversible electrode potential - standard hydrogen electrode - emf series - measurement of potential - reference electrodes (calomel and silver/silver chloride) indicator and ion selective electrodes - Nernst equation - irreversible processes - kinetic treatment - Butler-Volmer equation - Overpotential, activation, concentration and IR overpotential - its practical significance - Tafel equation and Tafel plots - exchange current density and transfer coefficients.

**Unit 2**

Batteries: Primary batteries: The chemistry, fabrication and performance aspects, packing classification and rating of the following batteries: (The materials taken their function and significance, reactions with equations, their performance in terms of discharge, capacity, and energy density to be dealt with). Zinc-carbon (Leclanche type), zinc alkaline (Duracell), zinc/air, zinc-silver oxide batteries; lithium primary cells - liquid cathode, solid cathode and polymer electrolyte types and lithium-ferrous sulphide cells (comparative account).

Secondary batteries: ARM (alkaline rechargeable manganese) cells, Lead acid and VRLA (valve regulated (sealed) lead acid), nickel-cadmium, nickel-zinc, nickel-metal hydride batteries, lithium ion batteries, ultra thin lithium polymer cells (comparative account). Advanced Batteries for electric vehicles, requirements of the battery - sodium-beta and redox batteries.

**Unit 3**

Reserve batteries and Fuel cells: Reserve batteries - water activated, electrolyte activated and thermally activated batteries - remote activation - pyrotechnic materials. Fuel Cells: Principle, chemistry and functioning - carbon, hydrogen- oxygen, proton exchange membrane (PEM), direct methanol(DMFC), molten carbonate electrolyte (MCFC) fuel cells and outline of biochemical fuel cells.

Electrochemical Processes: Principle, process description, operating conditions, process sequence and applications of Electroforming – production of waveguide and plated through hole (PTH) printed circuit boards by electrodeposition; Electroless plating of nickel, copper and gold; Electropolishing of metals; Anodizing of aluminium; Electrochemical machining of metals and alloys.

**TEXTBOOKS:**

1. Derek Pletcher and Frank C. Walsh, "Industrial Electrochemistry", Blackie Academic and Professional, (1993).
2. Dell, Ronald M Rand, David A J, "Understanding Batteries", Royal Society of Chemistry, (2001).

**REFERENCES:**

1. Christopher M A, Brett, "Electrochemistry – Principles, Methods and Applications", Oxford University, (2004).
2. Watanabe T, "Nano-plating: microstructure control theory of plated film and data base of plated film microstructure", Elsevier, Oxford, UK (2004).
3. Kanani N, "Electroplating and electroless plating of copper and its alloy", ASM International, Metals Park, OH and Metal Finishing Publications, Stevenage, UK (2003).
4. Lindon David, "Handbook of Batteries", McGraw Hill, (2002).
5. Curtis, "Electroforming", London, (2004).

6. Rumyantsev E and Davydov A, "Electrochemical machining of metals", Mir, Moscow, (1989).

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Assessment	Internal	End Semester
Periodical 1 (P1)	15	
Periodical 2 (P2)	15	
*Continuous Assessment (CA)	20	
End Semester		50

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**Course Objectives:**

To provide the basic knowledge about fuels, rocket propellants and explosives.

**Course Outcomes:**

- CO1: Understand the types of fuels and variation in their properties  
CO2: Able to analyze the fuel content  
CO3: Obtain knowledge in identifying a proper fuel as per the requirement  
CO4: Ability to know the preparation and working of propellants and explosives

**Syllabus****Unit 1**

Fuels - Solid fuels - Classification, preparation, cleaning, analysis, ranking and properties - action of heat, oxidation, hydrogenation, carbonization, liquefaction and gasification.

Liquid fuels – Petroleum - origin, production, composition, classification, petroleum processing, properties, testing - flow test, smoke points, storage and handling.

Secondary liquid fuels - Gasoline, diesel, kerosene and lubricating oils. Liquid fuels - refining, cracking, fractional distillation, polymerization. Modified and synthetic liquid fuels. ASTM methods of testing the fuels.

**Unit 2**

Gaseous fuels - Types, natural gas, methane from coal mine, water gas, carrier gas, producer gas, flue gas, blast furnace gas, biomass gas, refinery gas, LPG - manufacture, cleaning, purification and analysis. Fuels for spark ignition engines, knocking and octane number, anti knock additives, fuels for compression, engines, octane number, fuels for jet engines and rockets.

Flue gas analysis by chromatography and sensor techniques.

**Unit 3**

Combustion: Stoichiometry, thermodynamics. Nature and types of combustion processes - Mechanism - ignition temperature, explosion range, flash and fire points, calorific value, calorific intensity, theoretical flame temperature. Combustion calculations, theoretical air requirements, flue gas analysis, combustion kinetics – hydrogen - oxygen reaction and hydrocarbon - oxygen reactions.

Rocket propellants and Explosives - classification, brief methods of preparation, characteristics; storage and handling.

**TEXTBOOK:**

1. *Fuels and Combustion, Samir Sarkar, Orient Longman Pvt. Ltd, 3rd edition, 2009.*

**REFERENCES:**

1. *Fuels - Solids, liquids and gases - Their analysis and valuation, H. Joshua Philips, Biobliflife Publisher, 2008.*
2. *An introduction to combustion: Concept and applications - Stephen R Turns, Tata Mc. Graw Hill, 3rd edition, 2012.*
3. *Fundamentals of Combustion, D P Mishra, 1st edition, University Press, 2010*
4. *Engineering Chemistry - R. Mukhopadhyay and Sriparna Datta, Newage International Pvt. Ltd, 2007.*

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*Continuous Assessment (CA)	20	
End Semester		50

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**Course Objectives:**

1. Understand the principles of green chemistry and its contribution to the development of sustainable products
2. Possess knowledge of the migration from a hydrocarbon-based economy to carbohydrate-based economy
3. Evaluate the deficiencies of traditional process and acknowledge the invent of new processes
4. Distinctly map the culmination of academic research to industrial chemistry

**Course Outcomes:**

- CO1: Understand the evolving concept of Green Chemistry and its application to the manufacture of sustainable products
- CO2: Appreciate the need for Renewable energy and Feed stock along with carbon sequestration through the fundamentals of Green Chemistry Techniques
- CO3: Develop a coherence to evaluate systematic deficiencies in traditional Chemical science process and products
- CO4: Undertake a purposeful Journey through the microscopic domain of academic research to the macroscopic domain of Industrial chemistry

**Syllabus****Unit 1**

Our environment and its protection, chemical pollution and environmental regulations, environmental chemistry, pollution prevention strategies, challenges to the sustainability of chemical industry, Pollution Prevention Act 1990, USA, Green Chemistry and its 12 principles, toxicity of chemicals, material safety data sheet (MSDS), concept of zero pollution technologies, atom economy, functional toxicity vs non-functional toxicity, alternative solvents, energy minimization, microwave and sonochemical reactions, renewable feed stock, carbon dioxide as a feed stock.

**Unit 2**

Greener strategies of the synthesis of ibuprofen synthesis, teriphthalic acid etc. phase behaviour and solvent attributes of supercritical CO<sub>2</sub>, use of supercritical carbon dioxide as a medium chemical industry, use of ionic liquids as a synthetic medium, gas expanded solvents, superheated water, etc. Synthesis of various chemicals from bio mass, polycarbonate synthesis and CO<sub>2</sub> fixation, green plastics, green oxidations, etc.

**Unit 3**

Processes involving solid catalysts – zeolites, ion exchange resins, Nafion/silica nano composites and enhanced activity. Polymer supported reagents, green oxidations using TAML catalyst, membrane reactors. Green chemistry in material science, synthesis of porous polymers, green nanotechnology.

**REFERENCES:**

1. *Hand Book of Green Chemistry and Technology*; by James Clarke and Duncan Macquarrie; Blakwell Publishing.
2. *Anastas, P. T., Warner, J. C. Green Chemistry: Theory and Practice*, Oxford University Press Inc., New York, 1998.
3. *Matlack, A. S. Introduction to Green Chemistry* Marcel Dekker: New York, NY, 2001.

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**Course Outcomes:**

- CO1: To develop an understanding of principle and working of the range of instrumental methods in analytical chemistry
- CO2: To provide an understanding and skills in contemporary methods of separation and appropriate selection of instruments for the successful analysis of chemical compounds
- CO3: To impart skills in the scientific method of planning, conducting, reviewing, reporting experiments and problem solving in chemical analysis.

**Syllabus****Unit 1**

Error Analysis and Sampling: Accuracy - Precision - Classification of Errors -Minimization of errors - Standard deviation - Coefficient of variance - F-test - t-test - Significant figures. Sampling - Basis of sampling, Sampling and physical state - Safety measures of sampling.

Separation Techniques: Brief out line of column, paper and thin layer chromatography - Ion exchange methods - principle and application – HPLC.

**Unit 2**

Gas chromatography - principle and applications – gel chromatography.

Electroanalytical techniques: Potentiometry - Potentiometric titration - determination of equivalence point - acid base, complexometric, redox and precipitation titrations - merits and demerits. Voltammetry - Cyclic voltammetry - basic principle and application - Polarography - introduction - theoretical principles - migration current - residual current - half wave potential - instrumentation - analytical applications.

**Unit 3**

Spectro-chemical techniques: UV-VIS spectrophotometry - principle - Beer's Law application - photometric titration - single and double beam spectrophotometer - instrumentation of IR - sample handling - IR applications - H - NMR - Instrumentation and applications – principle - instrumentation - applications of atomic absorption spectroscopy.

Thermal and Diffraction techniques: Principles and applications of DTG - DTA DSC - X-ray - Electron Diffraction Studies - SEM, TEM.

**TEXTBOOKS:**

1. Willard H W, Merritt J R, "Instrumental Methods of Analysis", 6th edition, Prentice Hall, (1986).
2. Skoog Douglas A, West Donald, "Fundamentals of Analytical Chemistry", 7th edition, New York Addison, Wesley, (2001).

**REFERENCES:**

1. "Vogel's Textbook of Quantitative Chemical Analysis", 5th edition, ELBS, (1989).
2. Kaur. H, "Instrumental Methods of Chemical Analysis", Goel Publisher, (2001).

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**Course Objective:**

To provide sound knowledge on the application of electrochemistry in energy storage systems.

**Course Outcome**

- CO1: Understand the fundamental concepts of electrochemistry through electrode potential and reaction kinetics  
CO2: Learn the application of the electrochemical principles for the functioning and fabrication industrial batteries and fuel cells  
CO3: Analysis of practical problem solving in fabricating batteries and fuel cells  
CO4: Evaluation of comprehensive knowledge through problem solving

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Batteries: Primary batteries: The chemistry, fabrication and performance aspects, packing classification and rating of the following batteries: (The materials taken their function and significance, reactions with equations, their performance in terms of discharge, capacity, and energy density to be dealt with). Zinc-carbon (Leclanche type), zinc alkaline (Duracell), zinc/air batteries; Lithium primary cells - liquid cathode, solid cathode and lithium-ferrous sulphide cells (comparative account).

Secondary batteries: Lead acid and VRLA (valve regulated (sealed) lead acid), nickel-cadmium, nickel-zinc, nickel-metal hydride batteries, lithium ion batteries, ultrathin lithium polymer cells (comparative account). Advanced Batteries for electric vehicles, requirements of the battery - sodium-beta and redox batteries.

**Unit 3**

Fuel Cells: Description, working principle, anodic, cathodic and cell reactions, fabrication of electrodes and other components, applications, advantages, disadvantages and environmental aspects of the following types of fuel cells: Proton Exchange Membrane Fuel Cells, alkaline fuel cells, phosphoric acid, solid oxide, molten carbonate, direct methanol fuel cells.

Membranes for fuel cells: Nafion – Polymer blends and composite membranes; assessment of performance – recent developments.

Fuels for Fuel Cells: Hydrogen, methane, methanol - Sources and preparation, reformation processes for hydrogen – clean up and storage of the fuels – use in cells, advantages and disadvantages of using hydrogen as fuel.

**TEXTBOOKS:**

1. Dell, Ronald M Rand, David A J, 'Understanding Batteries', Royal Society of Chemistry, (2001).
2. M. Aulice Scibioh and B. Viswanathan 'Fuel Cells – principles and applications', University Press, India (2006).

**REFERENCES:**

1. Kanani N, 'Electroplating and electroless plating of copper and its alloy', ASM International, Metals Park,

- OH and Metal Finishing Publications, Stevenage, UK (2003).*
2. *Curtis, 'Electroforming', London, (2004).*
  3. *F. Barbir, 'PEM fuel cells: theory and practice', Elsevier, Burlington, MA, (2005).*
  4. *G. Hoogers, 'Fuel cell handbook', CRC, Boca Raton, FL, (2003).*

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**Course Outcome:**

- CO1: Development of skill in identifying the nature and type of corrosion  
 CO2: Understanding the mechanism of various types of corrosion  
 CO3: Analysing the problem and find out a solution to combat corrosion in any sort of environment.

**CO-PO Mapping**

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	2	-	-	-	-	-	-	-	-	-	-	3	1	-	-
CO2	-	3	1	2	-	-	-	-	-	-	-	1	1	2	-	-
CO3	-	3	3	3	2	3	3	-	-	-	-	1	3	2	3	-

**Syllabus****Unit 1**

Basic principles: Free energy concept of corrosion - different forms of corrosion - Thermodynamic & Kinetic aspects of corrosion: The free energy criterion of corrosion possibility - Mechanism of Electrochemical corrosion - Galvanic and Electrochemical series and their significance.

Corrosion Control: Materials selection - metals and alloys - metal purification - non metallic - changing medium.

**Unit 2**

Anodic and cathodic protection methods - Coatings - metallic and other inorganic coatings - organic coatings - stray current corrosion - cost of corrosion control methods.

Corrosion protection by surface treatment: CVD and PVD processes - Arc spray - Plasma spray - Flame spray.

Corrosion Inhibitors: Passivators - Vapour phase inhibitor.

**Unit 3**

Stress and fatigue corrosion at the design and in service condition - control of bacterial corrosion.

Corrosion protection: Automobile bodies – engines – building construction.

**TEXTBOOKS:**

1. Fontana and Mars G, "Corrosion Engineering", 3rd edition, McGraw Hill, (1987).
2. Uhlig H H and Reviees R W, "Corrosion and its Control", Wiley, (1985).

**REFERENCES:**

1. ASM Metals Handbook, "Surface Engineering", Vol. 5, ASM Metals Park, Ohio, USA, (1994).
2. ASM Metals Handbook, "Corrosion", Vol. 13, ASM Metals Park, Ohio, USA, (1994).
3. Brain Ralph, "Material Science and Technology", CRC Series, Boston, New York.

**Evaluation Pattern**

Assessment	Internal	End Semester
Periodical 1 (P1)	15	
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*Continuous Assessment (CA)	20	
End Semester		50

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## PHYSICS

19PHY340

ADVANCED CLASSICAL DYNAMICS

L-T-P-C: 3-0-0-3

### Course Outcomes:

- CO1: Able to use the Lagrangian formalism to solve simple dynamical system  
CO2: Able to understand Hamiltonian formalism and apply this in solving dynamical systems  
CO3: Able to apply Lagrangian formalism in bound and scattered states with specific reference to Kepler's laws and Scattering states  
CO4: Able to solve problems in the Centre of Mass frame and connect it to Laboratory Frame of Reference  
CO5: Understand and solve problems in rigid body rotations applying of Euler's equations.

### CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	1	1	0	0	0	0	0	0	0	1	0	0	0
CO2	3	3	1	1	0	0	0	0	0	0	0	1	0	0	0
CO3	3	3	3	1	0	0	0	0	0	0	0	1	0	0	0
CO4	3	3	3	1	0	0	0	0	0	0	0	2	0	0	0
CO5	3	3	3	2	0	0	0	0	0	0	0	2	0	0	0

### Syllabus

#### Unit 1

Introduction to Lagrangian dynamics

Survey of principles, mechanics of particles, mechanics of system of particles, constraints, D'Alembert's principle and Lagrange's equation, simple applications of the Lagrangian formulation, variational principles and Lagrange's equations, Hamilton's principles, derivation of Lagrange's equations from Hamilton's principle, conservation theorems and symmetry properties.

#### Unit 2

Central field problem

Two body central force problem, reduction to the equivalent one body problem, Kepler problem, inverse square law of force, motion in time in Kepler's problem, scattering in central force field, transformation of the scattering to laboratory system, Rutherford scattering, the three body problem.

Rotational kinematics and dynamics

Kinematics of rigid body motion, orthogonal transformation, Euler's theorem on the motion of a rigid body.

#### Unit 3

Angular momentum and kinetic energy of motion about a point, Euler equations of motion, force free motion of rigid body.

Practical rigid body problems

Heavy symmetrical spinning top, satellite dynamics, torque-free motion, stability of torque-free motion - dual-spin spacecraft, satellite maneuvering and attitude control - coning maneuver - Yo-yo despin mechanism - gyroscopic attitude control, gravity- gradient stabilization.

**TEXTBOOKS:**

1. *H. Goldstein, Classical Mechanics, Narosa Publishing House, New Delhi, 1980, (Second Edition)*
2. *H. Goldstein, Charles Poole, John Safko, Classical Mechanics, Pearson education, 2002 (Third Edition)*
3. *Howard D. Curtis, Orbital Mechanics for Engineering Students, Elsevier, pp.475 - 543*
4. *Anderson John D, Modern Compressible flow, McGraw Hill.*

**REFERENCE BOOKS:**

1. *D. A. Walls, Lagrangian Mechanics, Schaum Series, McGraw Hill, 1967.*
2. *J. B. Marion and S. T. Thornton, Classical dynamics of particles and systems, Ft. Worth, TX: Saunders, 1995.*

**Evaluation Pattern**

Assessment	Internal	End Semester
Periodical 1 (P1)	15	
Periodical 2 (P2)	15	
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**Course Outcomes**

- CO1: To understand the nature of interaction between atoms in crystalline solid materials that determines their dielectric, magnetic and electrical properties.
- CO2: Analyze the relation between the macroscopic dielectric constant and the atomic structure of an insulator.
- CO3: Fundamental concepts of magnetic fields required to illustrate the magnetic dipoles. This forms the basis to understand the magnetic properties of dia, para, ferro, antiferro and ferri magnetic materials.
- CO4: Fundamentals concerned with conduction mechanism in metals and superconductors.
- CO5: Understand the basics for classification of materials based on its conductivity, nature of chemical bonds in Si and Ge, carrier density, energy band structure and conduction mechanism in intrinsic and extrinsic semiconductors.

**CO-PO Mapping**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	1											1	-
CO2	2	2	2										1	-
CO3	2	2	2										2	-
CO4	2	2	2										2	-
CO5	2	2	2					2					1	-

**Syllabus****Unit 1**

Conducting materials: The nature of chemical bond, crystal structure Ohm's law and the relaxation time, collision time, electron scattering and resistivity of metals, heat developed in a current carrying conductor, thermal conductivity of metals, superconductivity.

Semiconducting materials: Classifying materials as semiconductors, chemical bonds in Si and Ge and its consequences, density of carriers in intrinsic semiconductors, conductivity of intrinsic semiconductors, carrier densities in n type semiconductors, n type semiconductors, Hall effect and carrier density.

**Unit 2**

Magnetic materials: Classification of magnetic materials, diamagnetism, origin of permanent, magnetic dipoles in matter, paramagnetic spin systems, spontaneous magnetization and Curie Weiss law, ferromagnetic domains and coercive force, anti ferromagnetic materials, ferrites and its applications.

**Unit 3**

Dielectric materials: Static dielectric constant, polarization and dielectric constant, internal field in solids and liquids, spontaneous polarization, piezoelectricity.

PN junction: Drift currents and diffusion currents, continuity equation for minority carriers, quantitative treatment of

the p-n junction rectifier, the n-p-n transistor.

**TEXTBOOK:**

1. *A J Decker, "Electrical Engineering materials", PHI, New Delhi, 1957.*

**REFERENCES:**

1. *A J Decker, "Solid State Physics", Prentice Hall, Englewood Cliffs, N J 1957.*
2. *C Kittel, "Introduction to solid state Physics", Wiley, New York, 1956 (2nd edition).*
3. *Allison, Electronic Engineering materials and Devices, Tata Mc Graw Hill*
4. *F K Richtmyer E H Kennard, John N Copper, "Modern Physics", Tata Mc Graw Hill, 1995 (5th edition).*

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**Unit 1**

Review of some basic concepts and principle of laser.

Introduction to light and its properties: Reflection, refraction, interference, diffraction and polarization. Photometry – calculation of solid angle. Brewster's law. Snell's law and, its analysis.

Introduction to LASERS: Interaction of radiation with matter - induced absorption, spontaneous emission, stimulated emission. Einstein's co-efficient (derivation). Active material. Population inversion – concept and discussion about different techniques. Resonant cavity.

**Unit 2**

Properties of LASERS

Gain mechanism, threshold condition for PI (derivation), emission broadening - line width, derivation of FWHM natural emission line width as deduced by quantum mechanics - additional broadening process: collision broadening, broadening due to dephasing collision, amorphous crystal broadening, Doppler broadening in laser and broadening in gases due to isotope shifts. Saturation intensity of laser, condition to attain saturation intensity.

Properties – coherency, intensity, directionality, monochromaticity and focussibility. LASER transition – role of electrons in LASER transition, levels of LASER action: 2 level, 3 level and 4 level laser system.

**Unit 3**

Types of LASERS

Solid state LASER: (i) Ruby LASER – principle, construction, working and application. (ii) Neodymium (Nd) LASERS. gas LASER: (i) He-Ne LASER - principle, construction, working and application. (i) CO<sub>2</sub> LASER - principle, construction, working and application.

Liquid chemical and dye LASERS. Semiconductor LASER: Principle, characteristics, semiconductor diode LASERS, homo-junction and hetero-junction LASERS, high power semi conductor diode LASERS.

Applications in Communication field:

LASER communications: Principle, construction, types, modes of propagation, degradation of signal, analogue communication system, digital transmission, fiber optic communication.

Applications of LASERS in other fields:

Holography: Principle, types, intensity distribution, applications. laser induced fusion. Harmonic generation. LASER spectroscopy. LASERS in industry: Drilling, cutting and welding. Lasers in medicine: Dermatology, cardiology, dentistry and ophthalmology.

**REFERENCES:**

1. William T Silfvast, "Laser Fundamentals", Cambridge University Press, UK (2003).
2. B B Laud, "Lasers and Non linear Optics", New Age International (P) Ltd., New Delhi.

3. Andrews, "An Introduction to Laser Spectroscopy (2e)", Ane Books India (Distributors).
4. K R Nambiar, "Lasers: Principles, Types and Applications", New Age International (P) Ltd., New Delhi.
5. T Sahara, "Semiconductor Laser Fundamentals", Marcel Dekker (2004).

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**Course Outcomes**

- CO1: Understand, Comprehend and acquaint with concepts of NanoPhysics  
 CO2: To familiarize the material's property changes with respect to the dimensional confinements.  
 CO3: Acquire knowledge on the modern preparation process and analysis involved in the nanomaterial's research  
 CO4: To learn about the technological advancements of the nano-structural materials and devices in the engineering applications

**CO-PO Mapping**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2												
CO2	2	3												
CO3				3										
CO4						3	2					1		

**Syllabus****Unit 1**

## Introduction

Introduction to nanotechnology, comparison of bulk and nanomaterials – change in band gap and large surface to volume ratio, classification of nanostructured materials. Synthesis of nanomaterials - classification of fabrication methods – top down and bottom up methods.

## Concept of quantum confinement and phonon confinement

Basic concepts – excitons, effective mass, free electron theory and its features, band structure of solids. Bulk to nano transition – density of states, potential well - quantum confinement effect – weak and strong confinement regime. Electron confinement in infinitely deep square well, confinement in two and three dimension. Blue shift of band gap - effective mass approximation. Vibrational properties of solids - phonon confinement effect and presence of surface modes.

**Unit 2**

## Tools for characterization:

Structural – X-ray diffraction, transmission electron microscope, scanning tunneling microscope, atomic force microscope. Optical - UV – visible absorption and photoluminescence techniques, Raman spectroscopy.

## Nanoscale materials – properties and applications:

Carbon nanostructures – structure, electrical, vibration and mechanical properties. Applications of carbon nanotubes

**Unit 3**

Field emission and shielding – computers – fuel cells – chemical sensors – catalysis – mechanical reinforcement. Quantum dots and Magnetic nanomaterials – applications.

Nanoelectronics and nanodevices:

Impact of nanotechnology on conventional electronics. Nanoelectromechanical systems (NEMSs) – fabrication (lithography) and applications. Nanodevices - resonant tunneling diode, quantum cascade lasers, single electron transistors – operating principles and applications.

**TEXTBOOKS:**

1. *Robert W. Kelsall, Ian W. Hamley and Mark Geoghegan, Nanoscale Science and Technology, John Wiley and Sons Ltd 2004.*
2. *W. R. Fahrner (Ed.), Nanotechnology and Nanoelectronics, Springer 2006.*

**Evaluation Pattern**

Assessment	Internal	End Semester
Periodical 1 (P1)	15	
Periodical 2 (P2)	15	
*Continuous Assessment (CA)	20	
End Semester		50

\*CA – Can be Quizzes, Assignment, Projects, and Reports.

**Course Outcomes:**

- CO1: Understand, comprehend and acquaint with the basics working principles and governing equations of electronic devices like diodes, Bipolar junction transistors, Mosfet and heterojunction transistors
- CO2: Analyze and Solve physics problems pertaining to various process like charge conduction across semiconductor device.
- CO3: Apply the knowledge for the development and design of new methods to determine semiconductor parameters and devices

**Syllabus****Unit 1**

Introduction: Unit cell, Bravais lattices, crystal systems, crystal planes and Miller indices, symmetry elements. Defects and imperfections – point defects, line defects, surface defects and volume defects

Electrical conductivity: Classical free electron theory – assumptions, drift velocity, mobility and conductivity, drawbacks. quantum free electron theory – Fermi energy, Fermi factor, carrier concentration. Band theory of solids – origin of energy bands, effective mass, distinction between metals, insulators and semiconductors.

**Unit 2**

Theory of semiconductors: Intrinsic and extrinsic semiconductors, band structure of semiconductors, carrier concentration in intrinsic and extrinsic semiconductors, electrical conductivity and conduction mechanism in semiconductors, Fermi level in intrinsic and extrinsic semiconductors and its dependence on temperature and carrier concentration. Carrier generation - recombination, mobility, drift-diffusion current. Hall effect.

Theory of p-n junctions – diode and transistor: p-n junction under thermal equilibrium, forward bias, reverse bias, carrier density, current, electric field, barrier potential. V-I characteristics, junction capacitance and voltage breakdown.

**Unit 3**

Bipolar junction transistor, p-n-p and n-p-n transistors: principle and modes of operation, current relations. V-I characteristics. Fundamentals of MOSFET, JFET. Heterojunctions – quantum wells.

Semiconducting devices: Optical devices: optical absorption in a semiconductor, e--hole generation. Solar cells – p-n junction, conversion efficiency, heterojunction solar cells. Photo detectors – photo conductors, photodiode, p-i-n diode. Light emitting diode (LED) – generation of light, internal and external quantum efficiency.

Modern semiconducting devices: CCD - introduction to nano devices, fundamentals of tunneling devices, design considerations, physics of tunneling devices.

**TEXTBOOKS:**

1. C Kittel, "Introduction to Solid State Physics", Wiley, 7th Edn., 1995.
2. D A Neamen, "Semiconductor Physics and Devices", TMH, 3rd Edn., 2007.

**REFERENCES:**

1. S M Sze, "Physics of Semiconductor Devices", Wiley, 1996.
2. P Bhattacharya, "Semiconductor Opto- Electronic Devices", Prentice Hall, 1996.
3. M K Achuthan & K N Bhat, "Fundamentals of Semiconductor Devices", TMH, 2007.
4. J Allison, "Electronic Engineering Materials and Devices", TMH, 1990.

**Evaluation Pattern**

Assessment	Internal	End Semester
Periodical 1 (P1)	15	
Periodical 2 (P2)	15	
*Continuous Assessment (CA)	20	
End Semester		50

\*CA – Can be Quizzes, Assignment, Projects, and Reports.



**Course Outcomes:**

After completion of the course students should be able to

CO1: Get a broad knowledge of scientific and technical methods in astronomy and astrophysics.

CO2: Apply mathematical methods to solve problems in astrophysics.

CO3: Develop critical/logical thinking, scientific reasoning and skills in the area of modern astrophysics.

**CO-PO Mapping:**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3											1		
CO2	2	2												
CO3	1	2												

**Syllabus****Unit 1**

Historical introduction: Old Indian and western – astronomy - Aryabhata, Tycho Brahe, Copernicus, Galileo - Olbers paradox - solar system – satellites, planets, comets, meteorites, asteroids.

Practical astronomy - telescopes and observations & techniques – constellations, celestial coordinates, ephemeris.

Celestial mechanics - Kepler's laws - and derivations from Newton's laws.

Sun: Structure and various layers, sunspots, flares, faculae, granules, limb darkening, solar wind and climate.

**Unit 2**

Stellar astronomy: H-R diagram, color-magnitude diagram - main sequence - stellar evolution – red giants, white dwarfs, neutron stars, black holes - accretion disc - Schwartzchild radius - stellar masses Saha-Boltzman equation - derivation and interpretation.

Variable stars: Cepheid, RR Lyrae and Mira type variables - Novae and Super novae. Binary and multiple star system - measurement of relative masses and velocities. Interstellar clouds - Nebulae.

**Unit 3**

Galactic astronomy: Distance measurement - red shifts and Hubble's law – age of the universe, galaxies – morphology - Hubble's classification - gravitational lens, active galactic nuclei (AGNs), pulsars, quasars.

Relativity: Special theory of relativity - super-luminal velocity - Minkowski space - introduction to general theory of relativity – space - time metric, geodesics, space-time curvature. Advance of perihelion of Mercury, gravitational lens.

Cosmology: Cosmic principles, big bang and big crunch – cosmic background radiation - Nucleo-synthesis - plank length and time, different cosmic models - inflationary, steady state. Variation of G. anthropic principle.

**REFERENCES:**

1. "Textbook of Astronomy and Astrophysics with elements of Cosmology", V. B. Bhatia, Narosa publishing 2001.
2. William Marshall Smart, Robin Michael Green "On Spherical Astronomy", (Editor) Carroll, Bradley W Cambridge University Press, 1977
3. Bradley W. Carroll and Dale A. Ostlie. "Introduction to modern Astrophysics" Addison-Wesley, 1996.
4. Bradley W. Carroll and Dale A. Ostlie, "An Introduction to Modern Astrophysics" Addison-Wesley

*Publishing Company, 1996*

5. *'Stellar Astronomy' by K. D Abhayankar.*

6. *'Solar Physics' by K. D Abhayankar.*

**Evaluation Pattern**

Assessment	Internal	End Semester
Periodical 1 (P1)	15	
Periodical 2 (P2)	15	
*Continuous Assessment (CA)	20	
End Semester		50

\*CA – Can be Quizzes, Assignment, Projects, and Reports.

## MATHEMATICS

19MAT341

STATISTICAL INFERENCE

L-T-P-C: 3-0-0-3

### Syllabus

#### Unit 1

Introduction to Statistics: Data Collection and Descriptive Statistics, Populations and Samples, describing data sets, summarizing data sets, Normal Data Sets, Paired Data Sets and the Sample Correlation Coefficient. Review of Random Variables and Distributions, Distributions of Sampling Statistics, The Sample Mean, The Central Limit Theorem, The Sample Variance, Sampling Distributions from a Normal Population, Distribution of the Sample Mean, Joint Distribution of  $\bar{X}$  and  $S^2$ , Sampling from a Finite Population.

#### Unit 2

Parameter Estimation: Introduction, Maximum Likelihood Estimators, Interval Estimates, Estimating the Difference in Means of Two normal populations, Approximate Confidence Interval for the Mean of a Bernoulli random variable, Confidence Interval of the Mean of the Exponential Distribution, Evaluating a Point Estimator, The Bayes Estimator. Hypothesis Testing: Introduction, Significance Levels, Tests Concerning the Mean of a Normal Population, Testing the Equality of Means of Two Normal Populations, Hypothesis Tests Concerning the Variance of a Normal Population, Tests Concerning the Mean of a Poisson Distribution.

#### Unit 3

Regression: Introduction, Least Squares Estimators of the Regression Parameters, Distribution of the Estimators, Statistical Inferences about the Regression Parameters, the Coefficient of Determination and the Sample Correlation Coefficient, Analysis of Residuals, transforming to Linearity, Weighted Least Squares, Polynomial Regression, Multiple Linear Regression, Predicting Future Responses, Logistic Regression Models for Binary Output Data.

### TEXTBOOK:

1. Ross S.M., *Introduction to Probability and Statistics for Engineers and Scientists*, 3rd edition, Elsevier Academic Press.

### REFERENCES:

1. Douglas C. Montgomery and George C. Runger, *Applied Statistics and Probability for Engineers*, John Wiley and Sons Inc., 2005
2. Ravichandran, J. *Probability and Statistics for engineers*, First Reprint Edition, Wiley India, 2012.
3. Ronald E. Walpole, Raymond H. Myers, Sharon L. Myers and Keying Ye, *Probability and Statistics for Engineers and Scientists*, 8<sup>th</sup> Edition, Pearson Education Asia, 2007.
4. Hogg, R.V., Tanis, E.A. and Rao J.M., *Probability and Statistical Inference*, Seventh Ed, Pearson Education, New Delhi.

### Evaluation Pattern

Assessment	Internal	End Semester
Periodical 1 (P1)	15	
Periodical 2 (P2)	15	
*Continuous Assessment (CA)	20	
End Semester		50

\*CA – Can be Quizzes, Assignment, Projects, and Reports.

**Syllabus****Unit 1**

Elements of Game theory, examples, Strategic Games, 2 Player Strategy Games, payoffs, Minimax, Weak and Strong Domination, Saddle Points, Nash Equilibrium, Prisoner's Dilemma, Stag Hunt, Matching pennies, BOS, Multi NE, Cooperative and Competitive Games, Strict and Non Strict NE, Best response functions for NE.

**Unit 2**

Combinatorial games, Winning and losing positions, Subtraction Game, 3-Pile and K-Pile Games, Proof of Correctness, Variations of K-Pile Games, Graph Games, Construction, Proof of finiteness, SG theorem for sum of games.

**Unit 3**

Cournot's Oligopoly, Bertrand's Oligopoly, Electoral Competition, Median Voter Theorem, Auctions, role of knowledge, Decision making and Utility Theory, Mixed Strategy Equilibrium, Extensive Games with Perfect Information, Stackelberg's model of Duopoly, Buying Votes, Committee Decision making, Repeated Games, Prisoner's Dilemma, Supermodular Game and Potential games

**TEXTBOOK:**

1. *Martin Osborne, An Introduction to Game Theory, Oxford University Press.*

**REFERENCES:**

1. *Thomas Ferguson, Game Theory, World Scientific, 2018.*
2. *Stef Tijss, Introduction to Game Theory, Hindustan Book Agency.*
3. *Allan MacKenzie, Game Theory for Wireless Engineers, Synthesis Lectures On Communications.*

**Evaluation Pattern**

Assessment	Internal	End Semester
Periodical 1 (P1)	15	
Periodical 2 (P2)	15	
*Continuous Assessment (CA)	20	
End Semester		50

\*CA – Can be Quizzes, Assignment, Projects, and Reports.

**Syllabus****09 (a) Roots finding methods:**

Roots of Transcendental and Polynomial Equations: Bisection method, Iteration methods based on first degree equation, Rate of convergence, system of nonlinear equations.

**09 (b) Interpolations:**

Interpolation and Approximation: Lagrange, Newton's Divided Difference, Newton's Forward and Backward interpolations.

**07 (b) Multivariable optimization (2 Credits)**

Optimality criteria – unidirectional search – direct search methods – gradient based methods. Lagrangian and Kuhn-Tucker conditions.

**TEXTBOOK:**

1. Edwin K.P. Chong, Stanislaw H. Zak, "An introduction to Optimization", 2nd edition, Wiley, 2013.
2. M.K. Jain, S.R.K. Iyengar and R.K. Jain, Numerical methods for scientific and Engineering computation, New Age International Publishers, 2007, 5th edition.

**REFERENCES:**

1. Kalyanmoy Deb, "Optimization for Engineering Design: Algorithms and Examples, Prentice Hall, 2002.
2. S.S. Rao, "Optimization Theory and Applications", Second Edition, New Age International (P) Limited Publishers, 1995.

**Evaluation Pattern**

Assessment	Internal	End Semester
Periodical 1 (P1)	15	
Periodical 2 (P2)	15	
*Continuous Assessment (CA)	20	
End Semester		50

\*CA – Can be Quizzes, Assignment, Projects, and Reports.

**FREE ELECTIVES OFFERED UNDER MANAGEMENT STREAM  
COMMON TO ALL PROGRAMS**

19MNG331

FINANCIAL MANAGEMENT

L-T-P-C: 3-0-0-3

**Course Objectives**

- Understand the overview of financial management
- Inculcate methods and concepts on valuation
- Familiarize with working capital management, financial analysis and planning

**Course Outcomes**

- CO1:** Understand and apply time value concept of money and use this for investment criteria decisions.  
**CO2:** Evaluate the risk and return for various alternatives of investment.  
**CO3:** Apply the capital budgeting techniques and evaluate the investment decisions.  
**CO4:** Understand working capital management, cash and liquidity management and financial statements.

**CO/PO Mapping**

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3					1	1		3	3	1			
CO2	3	3					2	1		3	3	1			
CO3	3	2					1	1		3	3	1			
CO4	3	2			1		2	1	2	3	3	1			

**Syllabus**

**Unit 1**

Introduction: Financial Management an overview – Financial Decisions in a firm – Goal of FM – Function of the financial system.

**Unit 2**

Fundamental Valuation Concepts: Time value of money – Risk and Return. Capital Budgeting: Techniques of capital budgeting investment criteria– NPV – Benefit Cost Ratio – IRR – Payback Period – ARR – Investment appraisal in Practice – Estimation of Project cost flows.

**Unit 3**

Working Capital Management: Current Assets – Financing Ruling – Profit Criterion. Cash and Liquidity Management. Working Capital Financing.

Financial Analysis and Planning: financial instruments, sources of long-term, intermediate term and short term finance. Analyzing Financial Performance – Break – even analysis and Leverages – Financial Planning and Budgeting.

Mergers and Takeovers-International trade.

**TEXT BOOKS**

1. *Chandra, P., 'Financial Management: Theory and Practice', 9e, TMH, 2017.*
2. *Denzil Watson & Antony Head, 'Corporate Finance- Principles and Practice', 2e, Pearson Education Asia, 2016.*
3. *R L Varshney & K L. Maheshwari, 'Managerial Economics', S Chand & Sons, 22e, 2014.*

**REFERENCE BOOKS**

1. Stephen Blyth, *'An Introduction to Corporate Finance'*, McGraw Hill Book Company, 2014.
2. Eugene F. Brigham & Louis C. Gapenski, *'Financial Management – Theory and Practice'*, 14e, 2015.

**Evaluation Pattern**

Assessment	Internal	End Semester
Periodical 1	15	
Periodical 2	15	
*Continuous Assessment (CA)	20	
End Semester		50

\*CA – Can be Quizzes, Assignments, Projects, and Reports

**Course Objectives**

- Understand the complexity and key issues in supply chain management.
- Describe logistics networks, distribution planning, routing design and scheduling models.
- Familiarize dynamics of supply chain and the role of information in supply chain.
- Understand the issues related to strategic alliances, global supply chain management, procurement and outsourcing strategies.

**Course Outcomes**

**CO1:** Analyze the complexity and key issues in supply chain management

**CO2:** Evaluate single and multiple facility location problems, logistics network configuration, vehicle routing and scheduling models

**CO3:** Analyze inventory management models and dynamics of the supply chain

**CO4:** Develop the appropriate supply chain through distribution requirement planning and strategic alliances

**CO5:** Identify the issues in global supply chain management, procurement and outsourcing strategies

**CO/PO Mapping**

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1	1									1	3		
CO2	2	2	3	1						1	1	2	2		
CO3	3	3	3	3	2				3	1	1	3	2		
CO4	2	2	1	1						1	1	2	2		
CO5	3	3	3	1					3	1	1	3	2		

**Syllabus****Unit 1**

Introduction: Introduction to SCM-the complexity and key issues in SCM – Location strategy – facility location decisions – single facility and multiple location models.

Logistics: Logistics Network Configuration – data collection-model and data validation- solution techniques-network configuration DSS – Transport strategy – Service choices: single service and inter modal services – vehicle routing and scheduling models – traveling salesman problems – exact and heuristic methods.

**Unit 2**

Inventory: Inventory Management and risk pooling-managing inventory in the SC. Value of Information-bullwhip effect-lead time reduction.

Supply Chain Integration: Supply chain integration-distributed strategies-push versus pull systems. Distribution Requirements Planning – DRP and demand forecasting, DRP and master production scheduling. DRP techniques – time-phased order point – managing variations in DRP – safety stock determination-Strategic alliances-third party logistics-distribution integration.

**Unit 3**

Issues in SCM: Procurement and outsourcing strategies – framework of e-procurement. International issues in SCM- regional differences in logistics. Coordinated product and supply chain design-customer value and SCM.

**TEXT BOOK**

*Simchi-Levi,D.,Kaminsky,P.,Simchi-Levi,E., Shankar,R., 'Designing and Managing the Supply Chain: Concepts, Strategies, and Cases', Tata McGraw Hill, 2008.*



**REFERENCE BOOKS**

1. Christopher, M., 'Logistics and Supply Chain Management: Strategies for reducing Cost and Improving Service', PH, 1999.
2. Ballou, M., 'Business logistics / Supply chain management', Pearson Education, 2003.
3. Vollmann, T.E., 'Manufacturing Planning and Control for Supply Chain Management', 5e, McGraw Hill, 2005.

**Evaluation Pattern**

Assessment	Internal	End Semester
Periodical 1	15	
Periodical 2	15	
*Continuous Assessment (CA)	20	
End Semester		50

\*CA – Can be Quizzes, Assignments, Projects, and Reports

**Course Objective**

To educate the students to apply concepts and techniques in marketing so that they become acquainted with the duties of a marketing manager with an emphasis to make the students exposed to the development, evaluation, and implementation of marketing management in a variety of business environments.

**Course Outcomes**

On successful completion of the Course students will be able to:

- CO1:** Illustrate key marketing concepts, theories and techniques for analysing a variety of marketing situations  
**CO2:** Identify and demonstrate the dynamic nature of the environment in which marketing decisions are taken and appreciate the implication for marketing strategy determination and implementation  
**CO3:** Develop the ability to carry out a research project that explores marketing planning and strategies for a specific marketing situation  
**CO4:** Understand the need and importance of sales promotions and make use of advertising  
**CO5:** Manage a new product development process from concept to commercialization.  
**CO6:** Illustrate the importance of modern trends in retailing and marketing logistics

**CO/PO Mapping**

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1			3	1								1			
CO2		1	3	3		2	1			2	2	2			
CO3	1	1	1	3	2	2	2		2	2	2	3			
CO4			2	2		2	1	1		3	3	3			
CO5	1	1	3	2		1	1			1	2	3			
CO6	1	1	3	2		1	1			1	2	3			

**Syllabus****Unit 1**

Marketing Process: Definition, Marketing process, dynamics, needs, wants and demands, value and satisfaction, marketing concepts, environment, mix. Philosophies, selling versus marketing, organizations, industrial versus consumer marketing, consumer goods, industrial goods, product hierarchy.

Buying Behaviour and Market Segmentation: Major factors influencing buying behaviour, buying decision process, business buying behaviour. Segmenting consumer and business markets, market targeting.

**UNIT 2**

Product Pricing and Marketing Research: Objectives, pricing, decisions and pricing methods, pricing management. Introduction, uses, process of marketing research.

**UNIT 3**

Developing New Products - Challenges in new-product Development - Effective organizational arrangements - Managing the development Process: ideas - Concept to strategy - Development to commercialization – The consumer-adoption process.

Advertising Sales Promotion and Distribution: Characteristics, impact, goals, types, and sales promotions- point of

purchase- unique selling proposition. Characteristics, wholesaling, retailing, channel design, logistics, and modern trends in retailing.

#### **TEXT BOOKS**

1. *Kotler, P., 'Marketing Management', Pearson Education 2001.*
2. *Ramasamy and Namakumari, 'Marketing Environment: Planning, implementation and control the Indian context', 1990.*

#### **REFERENCE BOOKS**

1. *Paul, G.E. and Tull, D., 'Research for marketing decisions', Prentice Hall of India, 1975.*
2. *Tull, D.S. and Hawkins, 'Marketing Research', Prentice Hall of India-1997.*
3. *Kotler, P. and Armstrong, G., 'Principles of Marketing' Prentice Hall of India, 2000.*
4. *Skinner, S.J., 'Marketing', All India Publishers and Distributes Ltd. 1998.*
5. *Govindarajan, M., 'Industrial marketing management', Vikas Publishing Pvt. Ltd, 2003.*

#### **Evaluation Pattern**

Assessment	Internal	End Semester
Periodical 1	15	
Periodical 2	15	
*Continuous Assessment (CA)	20	
End Semester		50

\*CA – Can be Quizzes, Assignments, Projects, and Reports

**Course Objectives**

- To discuss the project life cycle and build a successful project from pre-implementation to completion.
- To introduce different project management tools and techniques

**Course Outcomes**

- CO1:** Appraise the selection and initiation of individual projects and its portfolios in an enterprise.  
**CO2:** Analyze the project planning activities that will predict project costs, time schedule, and quality.  
**CO3:** Develop processes for successful resource allocation, communication, and risk management.  
**CO4:** Evaluate effective project execution and control techniques that results in successful project completion

**CO/PO Mapping**

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	3	2	2	1				2		3	1	2	3	2
CO2	2	3	3	2	2				3		3	2	2	3	3
CO3	1	2	3	2	2				2		3	2	1	2	3
CO4	1	1	2		1				2		3	1	1	1	2

**Syllabus****Unit 1**

**Overview of Project Management:** Verities of project, Project Features, Project Life Cycle – S-Curve, J-C

**Project Selection:** Project Identification and Screening – New ideas, Vision, Long-term objectives, SWOT Analysis (Strength, Weakness, Opportunities, Threats).

Project Appraisal – Market Appraisal, Technical Appraisal, Economic Appraisal, Ecological Appraisal, and Financial Appraisal – Payback, Net Present Value (NPV), Internal Rate of Returns (IRR).

Project Selection – Decision Matrix, Technique for Order Preference using Similarity to Ideal Solution (TOPSIS), Simple Additive Weighting (SAW).

**Unit 2**

**Project Presentation:** WBS, Project Network – Activity on Arrow (A-O-A), Activity on Node (A-O-N).

**Project Scheduling:** Gant Chart, Critical Path Method (CPM), Project Evaluation & Review Technique (PERT).(6hrs)

Linear time cost trade-offs in project - Direct cost, indirect cost, Project crashing

Resource Consideration - Profiling, Allocation, Levelling.

**Introduction to project management software:** Primavera/ Microsoft project

**Unit 3**

**Project Execution:** Monitoring control cycle, Earned Value Analysis (EVA), Project Control – Physical control, Human control, financial control.

**Organizational and Behavioral Issues:** Organizational Structure, Selection-Project Manager, Leadership Motivation, Communication, Risk Management.

**Project Termination:** Extinction, Addition, Integration, Starvation.

**TEXT BOOKS**

1. Jack R. Meredith and Samuel J. Mantel, Jr. - 'Project Management- A Managerial Approach' Eighth Edition - John Wiley & Sons Inc - 2012.
2. Arun Kanda – 'Project Management-A Life Cycle Approach' PHI Learning Private Limited - 2011

**REFERENCE BOOKS**

1. *'A Guide to Project Management Body of Knowledge' PMBOK GUIDE, Sixth edition, Project management Institute – 2017*
2. *Ted Klastorin - 'Project Management, Tools, and Trade-Offs' - John Wiley – 2011*

**Evaluation Pattern**

Assessment	Internal	End Semester
Periodical 1	15	
Periodical 2	15	
*Continuous Assessment (CA)	20	
End Semester		50

\*CA – Can be Quizzes, Assignments, Projects, and Reports

**Course Objectives**

- To impart knowledge on the fundamentals of costing, pricing methods and strategies.
- To give an overview of production operations planning.
- To summarize various quantitative methods of plant location, layout and lean manufacturing.
- To familiarize the concepts of e-commerce, e-purchasing, MRP and ERP in business

**Course Outcomes**

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

- CO1:** Understand the concepts of cost and pricing of goods and appraise project proposals  
**CO2:** Design and analyze manufacturing and service processes and to measure the work performed.  
**CO3:** Understand and analyze the key issues of supply chain Management  
**CO4:** Understand the application of lean manufacturing tools and six sigma concepts  
**CO5:** Select appropriate plant location and their layout methods  
**CO6:** Create capacity plan, aggregate plan, schedule, ERP & MRP systems

**CO/PO Mapping**

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	1	1							2	2			
CO2	2	1								1		2	1		1
CO3	2	1										2	1		1
CO4	2	1	1	1						1		2	1		1
CO5	2	1		1								2			
CO6	2	2	1	1							1	2	1		1

**Syllabus****Unit 1**

Engineering Economics: cost concepts - types of costs - cost functions. Cost controls: reduction – tools & applications. Pricing policies – methods – problems. Process design and improvement – process capacity – process layout – process reengineering – job design. Work standards – work measurement – work sampling – problems.

**Unit 2**

Supply Chain Management – Basic Concepts, SC dynamics, push-pull boundary, integrated supply chain, logistics, customer relationship, supplier relationship – selection, rating and development, procurement, SC metrics and performance measurement - problems. Lean Manufacturing – concepts, wastes – tools viz., pull system, standardized work, takt time, kanban system, JIT, kaizen, SMED, 5S, value stream mapping, benefits of lean and implementation issues. Introduction to Six Sigma. Plant Location – globalization, factors affecting location decisions, facility location-Break-even method, rectilinear, factor-rating and centre of gravity – problems. Plant Layout – types, process layout, product layout, Systematic layout planning (SLP), Line Balancing problems. Capacity Planning – Aggregate Planning – importance, planning process, methods – problems.

**Unit 3**

Role of IT in business performance improvement – e-commerce – e-purchasing – Master Production Schedule, inventory lot sizing strategies, MRP basics – MRP explosion, Available to Promise(ATP) inventory – MRP calculations – MRP II – Scheduling – Gantt chart – Introduction to ERP – ERP software – ERP modules – ERP implementation.

**TEXT BOOKS**

1. *L J Krajewski, L.P.RitzmanMalhotra.M and Samir K. Srivastava, 'Operations Management: Processes and Value chains, 11e, Pearson, 2015.*
2. *R L Varshney& K L. Maheshwari, 'Managerial Economics', S Chand & Sons, 22e, 2014.*

**REFERENCE BOOKS**

1. *Richard B. Chase, Ravi Shankar, F. Robert Jacobs, 'Operations and Supply Chain Management' McGraw Hill Education (India) Private Limited.14e, 2017.*
2. *E S Buffa and R K Sariss, 'Modern Production/Operations Management', Wiley India Private Limited, 8e, 2007.*
3. *Harrison.B, Smith.C., and Davis.B.,, 'Introductory Economics', 2e Pr Macmillan, 2013.*

**Evaluation Pattern**

Assessment	Internal	End Semester
Periodical 1	15	
Periodical 2	15	
*Continuous Assessment (CA)	20	
End Semester		50

\*CA – Can be Quizzes, Assignments, Projects, and Reports.

**Course Objectives**

Familiarizing the students with quantitative tools and techniques, which are frequently applied in operational decisions

**Course Outcomes**

- CO1:** Formulate operations research models to optimize resources.  
**CO2:** Solve transportation and assignment problems using suitable techniques.  
**CO3:** Apply appropriate technique to analyze a project with an objective to optimize resources.  
**CO4:** Solve operational problems using decision theory approaches.  
**CO5:** Select suitable inventory model for effective utilisation of resources.  
**CO6:** Solve Operations Research problems using software package

**CO/PO Mapping**

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2		2						2	2	2		
CO2	3	2	2		2						2	2	2		
CO3	3	2	2		2						2	2	2		
CO4	3	2	2		2						2	2	2		
CO5	3	2	2		2						2	2	2		
CO6	3	2	2		2						2	2	2		

**Syllabus****Unit1**

Linear Programming: Formulations - graphical solutions - Simplex Method - Duality, Dual simplex method.  
 Transportation model: Assignment model – Travelling Salesman Problem.

**Unit 2**

Decision Theory: Decision Trees. Game theory - 2 person zero sum; mixed strategies; 2 x n and m x 2 games.  
 Network Models- Project Networks- CPM / PERT- Project Scheduling – crashing networks and cost considerations-  
 Resource leveling and smoothing - shortest route problem, minimal spanning tree problem, maximal flow problem.

**Unit 3**

Sequencing model – 2 machines ‘n’ jobs, ‘m’ machines ‘n’ jobs – n jobs 2 machines.  
 Inventory models: deterministic & probabilistic models. Quantity discounts. Selective Inventory Management  
 Queuing models: Poisson arrival and exponential service times. Single server, multi-server. Queues -infinite and finite capacity queues.  
 Simulation –Monte Carlo simulation: simple problems

**Lab session:** Practicing case problems with excel solver/MatLab/LINGO package

**TEXT BOOK**

Hillier, F .S. and Lieberman, G .J, ‘Operations Research’, 9e, McGraw Hill, 2010

**REFERENCE BOOKS**

1. Taha,H.A., ‘Operations Research: an Introduction’, 8e, Prentice Hall, New Delhi, 2008.
2. Ravindran, A., Phillips, D.J., and Solberg, J.J., ‘Operations Research- Principles and Practice’, John Wiley & Sons, 2005.
3. Wagner, H.M., ‘Principles of Operations Research’, Prentice Hall, New Delhi, 1998.



4. *Hardley, G., 'Linear Programming', Narosa Book Distributors Private Ltd 2002.*

**Evaluation Pattern**

Assessment	Internal	End Semester
Periodical 1	10	
Periodical 2	10	
*Continuous Assessment (Theory) (CAT)	15	
*Continuous Assessment(Lab) (CAL)	30	
End Semester		35

\*CA – Can be Quizzes, Assignments, Projects, and Reports

**Course Objectives**

- To inculcate the concepts of work study and its application to industrial practice
- Impart skills to design, develop, implement, and improve manufacturing/service systems

**Course Outcomes**

At the end of the course, the student will be able to

- CO1:** Create value to organizations through the analysis, evaluation, and improvement of work systems using work study and method study
- CO2:** Develop work systems through motion economy principles
- CO3:** Apply work measurement techniques to improve productivity, fix wages and incentives
- CO4:** Apply systematic layout planning techniques and work station design principles based on ergonomics and material handling.

**CO/PO Mapping**

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	1	1	1						1		3	2		
CO2	2	1	2	1	1					1		3	2		
CO3	1	2		1	1						1	3	2		
CO4	2	2		1	2						2	3	2		

**Syllabus****Unit 1**

Work System: Elements of work, maintenance of machines, interaction, effect of working conditions and environment, physical and mental fatigue.

Productivity: Productivity, factors affecting production, Measurement of productivity.

Work Study: Definition and scope of work study; Areas of application of work study in industry; Human aspects of work study.

Method Study: Information collection, recording techniques, and processing aids; critical examination; development, installation and maintenance of improved methods.

**Unit 2**

Motion Economy and Analysis: Principles of motion economy; Motion analysis; Micromotion and Memomotion study; Therbligs and SIMO charts; Normal work area and design of work places; Basic parameters and principles of work design.

Work Measurement: Work measurement techniques; Calculation of standard time, work sampling and predetermined Motion time systems.

Wages and Incentive Schemes: Introduction, wage payment of direct and indirect labour, wage payment plans and incentives, various incentive plans, incentives for indirect labour

**Unit 3**

Plant Layout: Concept of plant layout, types of layout; factors affecting plant layout.

Ergonomics: Ergonomic Design of equipment and work place. work station design, factors considered in designing a work station, ergonomic design standards - Study of development of stress in human body and their consequences. Case Studies. Production planning and scheduling.

Material Handling: Introduction and functions of material handling equipment, selection of material handling equipment for different requirements, safety requirements.

Recent advances in Industrial Engineering.

**TEXT BOOKS**

1. Barnes, R, “*Motion and Time Study*” - *Design and Measurement of Work* . NY: John Wiley and Sons, 8th Edition, 1985.
2. “*Introduction to Work Study*”, 4ed, International Labor Office, Geneva, 2006.

**REFERENCE BOOKS**

1. Martand T. Telsang, ‘*Industrial Engineering and Production Management*’ S Chand; 2nd Rev Edn 2006.
2. Mahajan M., “*Industrial Engineering and Production Management*” Dhanpat rai and Sons Publishers, 2005.

**Evaluation Pattern**

Assessment	Internal	End Semester
Periodical 1	15	
Periodical 2	15	
*Continues Assessment (CA)	20	
End Semester		50

\*CA – Can be Quizzes, Assignments, Projects, and Reports

**Course Objective**

To impart the knowledge of basic statistical tools for analysis and interpretation of qualitative and quantitative data for decision making

**Course Outcomes**

- CO1:** Apply basic probability and statistics concepts for various business problems  
**CO2:** Perform test of hypothesis  
**CO3:** Compute and interpret the result of regression and correlation analysis for forecasting  
**CO4:** Solve real time problems by applying different decision making methods.

**CO/PO Mapping**

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3		2	2						2	2	3		
CO2	3	3		2	2						2	2	3		
CO3	3	3		2	2						2	2	3		
CO4	3	3		2	2						2	2	3		

**Syllabus****Unit 1**

Quantitative methods: Basic terminology in probability, probability rules, conditions of statistical dependence and independence, Bayes Theorem, Discrete Random Variables review of probability distributions, measure of central tendency.

Sampling and sampling distributions: Introduction to sampling, random sampling, design of experiments, introduction to sampling distributions

Estimation: point estimates, interval estimates and confidence intervals, calculating interval estimates of mean from large samples, using t test, sample size estimation.

**Unit 2**

Testing hypothesis: Introduction, basic concepts, testing hypothesis, testing when population standard deviation is known and not known, two sample tests.

Chi-square and analysis of variance: introduction, goodness of fit, analysis of variance, inferences about a population variation

**Unit 3**

Regression and correlation: Estimation using regression line, correlation analysis, finding multiple regression equation, modelling techniques,

Non parametric methods and time series and forecasting: Sign test for paired data, rank sum test, rank correlation, Kolmogrov – smirnov test, variations in time series, trend analysis, cyclic variation, seasonal variation and irregular variation. Decision theory: Decision tree analysis

**TEXT BOOKS**

1. Levin R. I. and Rubin D. S. - 'Statistics for management' - Pearson Education – 2007 - 5<sup>th</sup> Edition
2. Montgomery D. C. and Runger G. C. - 'Applied Statistics and Probability for Engineers' - John Wiley & Sons - 2002 - 3<sup>rd</sup> Edition

**REFERENCE BOOKS**

1. Bain.L. J. and Engelhardt M. - 'Introduction to Probability and Mathematical Statistics' - Duxbury Press -

March 2000 - 2<sup>nd</sup> Edition

2. Hinkelmann K. and Kempthorne O. - 'Design and Analysis of Experiments : Volume I' - John Wiley & Sons, Inc. - December 2007 - 2<sup>nd</sup> Edition
3. Johnson R. A. and Wichern D. W. - 'Applied Multivariate Statistical Analysis' - Prentice-Hall, Inc. - December 2001 - 5<sup>th</sup> Edition
4. Myers R. H. - 'Classical and Modern Regression with Applications' - PWS-Kent Publishing Company - March 2000 - 2<sup>nd</sup> Edition
5. Devore J. L. - 'Probability and Statistics for Engineering and the Sciences' - Brooks/Cole Publishing Company - December 1999 - 5<sup>th</sup> Edition
6. Freund J. E. and Walpole R. E. - 'Mathematical Statistics' - Prentice-Hall Inc. - October 1986 - 4<sup>th</sup> Edition

### **Evaluation Pattern**

Assessment	Internal	End Semester
Periodical 1	15	
Periodical 2	15	
*Continuous Assessment (CA)	20	
End Semester		50

\*CA – Can be Quizzes, Assignments, Projects, and Reports

**Course Objective**

To impart knowledge on quality management principles, tools, techniques and quality standards for real life applications

**Course Outcomes**

- CO1:** Evaluate the principles of quality management and to explain how these principles can be applied within quality management systems.
- CO2:** Evaluate the performance measures using various quality and management tools
- CO3:** Apply the Quality Function Deployment, Taguchi principles, Total Productive Maintenance and Failure Mode and Effect Analysis concepts to solve industrial problems.
- CO4:** Practice the various quality system in industry.

**CO/PO Mapping**

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	2										2	2		
CO2	1	2										2	2		
CO3	2	2	2									2	2		
CO4	2	2	2	2								2	2		

**Syllabus****Unit 1**

Definition of quality - dimensions of quality. Quality planning - quality costs. Total Quality Management: historical review and principles –leadership - quality council - quality statements - strategic planning - Deming philosophy. Barriers to TQM implementation

**Unit 2**

Customer satisfaction – Customer retention - Employee involvement - Performance appraisal - Continuous process improvement - Supplier partnership - Performance measures. Seven tools of quality. Statistical fundamentals - Control Charts for variables and attributes - Process capability - Concept of six sigma - New seven management tools - Benchmarking.

**Unit 3**

Quality function deployment (QFD) - Taguchi quality loss function - Total Productive Maintenance (TPM) - FMEA. Need for quality systems - ISO 9000:2000 – Elements of quality systems (such as ISO 9000:2000). Implementation of quality system – documentation - quality auditing - QS 9000-ISO 14000

**TEXT BOOK**

*Besterfield D. H. - 'Total Quality Management' - Pearson Education Asia – 2015-4<sup>th</sup> Edition*

**REFERENCE BOOKS**

1. *Evans J. R, and Lidsay W. M. - 'The Management and Control of Quality' - Southwestern (Thomson Learning) - 2002 - 5<sup>th</sup> Edition*
2. *Feigenbaum A. V. - 'Total Quality Management - Vol I & II' – McGraw Hill - 1991*

### **Evaluation Pattern**

Assessment	Internal	End Semester
Periodical 1	15	
Periodical 2	15	
*Continuous Assessment (CA)	20	
End Semester		50

\*CA – Can be Quizzes, Assignments, Projects, and Reports

**Course Objectives**

- Understand Lean manufacturing principles and tools
- Inculcate the concepts of value stream mapping
- Familiarize lean implementation practices

**Course Outcomes**

- CO1:** Identify key requirements and concepts in lean manufacturing.  
**CO2:** Initiate a continuous improvement change program in a manufacturing organization  
**CO3:** Analyze and improve a manufacturing system by applying lean manufacturing tools  
**CO4:** Build value stream map for improving the productivity  
**CO5:** Improve productivity through lean practices

**CO/PO Mapping**

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2											2	2		
CO2	2	2	2	1					2	1		1	2		1
CO3	2	2	2	2	1				2	1		1	2	1	2
CO4	2	2	2	1	1	1	1			1		2	2	1	1
CO5	2	2	2	1	1	1	1			1		2	2	1	1

**Syllabus****Unit 1**

Introduction to Lean and Factory Simulation: History of Lean and comparison to other methods - The 7 Wastes, their causes and the effects - An overview of Lean Principles / concepts / tools - Stockless Production.

The Tools of Lean Manufacturing: Continuous Flow – Continuous Flow Manufacturing and Standard Work Flow – 5S and Pull Systems (Kanban and ConWIP systems) – Error Proofing and Set-up Reduction – Total Productive Maintenance (TPM) – Kaizen Event examples. Toyota production systems.

Ford production systems – FPS gear model

**Unit 2**

Value Stream Mapping – Current state: Preparation for building a Current State Value Stream Map – Building a Current State Map (principles, concepts, loops, and methodology) – Application to the factory Simulation scenario.

**Unit 3**

Value Stream Mapping – Future State: Key issues in building the Future State Map – Process tips in building the map and analysis of the customer loop, supplier loop, manufacturing loop and information loop – Example of completed Future State Maps – Application to factory simulation

Implementation of lean practices - Best Practices in Lean Manufacturing.

**TEXT BOOKS**

1. Womack, J.P., Jones, D.T., and Roos, D., 'The Machine that Changed the World', Simon & Schuster, New York, 2007.
2. Liker, J.K., 'Becoming Lean', Industrial Engineering and Management Press, 1997.

**REFERENCES BOOKS**

1. Womack, J.P. and Jones, D.T., 'Lean thinking', Simon & Schuster, USA, 2003.
2. Rother, M. and Shook, J., 'Learning to see', The Lean Enterprise Institute, Brookline, USA, 2003.



### **Evaluation Pattern**

Assessment	Internal	End Semester
Periodical 1	15	
Periodical 2	15	
*Continuous Assessment (CA)	20	
End Semester		50

\*CA – Can be Quizzes, Assignments, Projects, and Reports

### Course Objectives

- This course describes the key aspects of a software project.
- It introduces the basic principles of Engineering Software Projects. Most, if not all, students' complete projects as part of assignments in various courses undertaken. These projects range in size, subject and complexity but there are basic project essentials that need to be understood and practiced for successful team project outcomes.
- The course provides an understanding of the purpose, methods and benefits of process management by exposing the student to the concepts, practices, processes, tools and techniques used in process management for software development.

### Course Outcomes

**CO 1:** To understand the basic concepts, terminologies and issues of software project management.

**CO 2:** To apply appropriate methods and models for the development of solutions.

**CO 3:** To analyze the cost-benefits of calculations so as to optimize the selection strategy

**CO 4:** To evaluate methods, models and technologies towards achieving project success

**CO 5:** To design and evaluate network planning models with criticality

### CO-PO Mapping

PO/PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO														
CO1	3	1	1								1		3	2
CO2	3	2	3						3	3		2	3	2
CO3	3	2	2	3	2	2	2	2	3	3	2	2	3	2
CO4	2	2	2	1	3	2	2	2	3	3		2	3	2
CO5	3	2	3	3	3	2	2	2	3	3		2	3	2

### Syllabus

#### Unit 1

Introduction to Software Project Management- Software Projects - ways of categorizing software projects – problems with software projects - Project Life Cycle– Management -Setting objectives –Stakeholders - Project Team- Step-wise : An overview of project planning -project Evaluation –Selection Of Appropriate Project Objectives- Software Effort Estimation Techniques, Function Point Analysis-Object Point-COCOMO.

#### Unit 2

Activity planning-- project schedules - sequencing and scheduling projects - Network planning model – AON and AOA-identifying critical activities-Crashing And Fast Tracking-,Risk management—Categories , Risk planning, Management and Control - Evaluating risks to the schedule. PERT- Resource Allocation, Monitoring and Tracking - Monitoring and control - allocation - identifying resource requirements - scheduling resources - creating critical paths - publishing schedule - cost schedules- sequence schedule.

#### Unit 3

Monitoring and control – Visualizing Progress, Earned value analysis, managing people and organizing teams-organizational structures- Planning for small projects. Case Study: PMBOK , Agile Development

#### TEXT BOOK(S)

*Mike Cotterell, Bob Hughes. Software Project Management, Fifth Edition, Tata McGraw-Hill; 2012.*

#### REFERENCE(S)

1. Roger S. Pressman. *Software Engineering – A Practitioner’s Approach, Eighth Edition*, Tata McGraw-Hill publishers; 2014.
2. Jalote P. *Software Project Management in practice, Second edition*, Person Education; 2003.

**Evaluation Pattern**

Assessment	Internal	External
Periodical 1 (P1)	15	
Periodical 2 (P2)	15	
*Continuous Assessment (CA)	20	
End Semester		50

\*CA – Can be Quizzes, Assignment, Projects, and Reports.

**Pre-Requisite(s):** 19MAT112 Linear Algebra, 19MAT205 Probability and Random Processes

### Course Objectives

- This course serves as an introduction to financial engineering including cash flows, financial decision making etc
- It gives a thorough yet highly accessible mathematical coverage of standard and recent topics of introductory investments: fixed-income securities, modern portfolio theory, optimal portfolio growth and valuation of multi-period risky investments.

### Course Outcomes

**CO1:** Apply basic concepts to understand and evaluate cash flows

**CO2:** Evaluate and arrive at a financial investment decision employing the underlying knowledge of stocks and derivatives

**CO3:** Analyse and design Portfolio selection methods

**CO4:** Understand capital market theory for stock performance evaluation

### CO-PO Mapping

PO/ PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO														
CO1	2	1			2								3	2
CO2	2	3	1										3	2
CO3	1	3			2								3	2
CO4	2	1											3	2

### Syllabus

#### Unit 1

Cash Flows and Fixed income securities: Investments and markets - Principal and interest - Present and future values of streams - IRR. Fixed income securities - Market value for future cash - Bond value - Bond details – Yields – Convexity – Duration - Immunization. Bond portfolio management - Level of market interest rates, Term structure of interest-rate theories.

#### Unit 2

Stocks and Derivatives: Common stock valuation - Present value of cash dividends - Earnings approach - Value versus price - Efficient markets theory - Technical analysis. Analysis of financial statements. Derivatives - futures and options - Black Scholes formula - Utility functions - Applications in financial decision making.

#### Unit 3

Portfolio analysis and capital market theory: Covariance of returns – Correlation - Portfolio return - Portfolio standard deviation - Two asset case - Efficient frontier - Optimum portfolio. Capital market theory - Capital market line - Sample diversifications to reduce risk - Characteristic line - Capital asset pricing model. Arbitrage price theory - Stock performance evaluation.

### TEXT BOOK(S)

1. David Luenberger, *Investment Science. Second Edition, Oxford University Press; 2013*
2. Jack Clark Francis, Richard W. Taylor. *Investments, Schaum's Outlines, Tata McGraw Hill ;2006.*

**REFERENCE(S)**

1. Lyuu YD. Financial Engineering and Computation. Cambridge University Press; 2004.
2. Perry H. Beaumont. Financial Engineering Principles. John Wiley and Sons Inc, New Jersey; 2004.

**Evaluation Pattern**

Assessment	Internal	External
Periodical 1 (P1)	15	
Periodical 2 (P2)	15	
*Continuous Assessment (CA)	20	
End Semester		50

\*CA – Can be Quizzes, Assignment, Projects, and Reports.

**Course Objectives**

- Prepare engineering students to analyze and understand the business, impact of economic environment on business decisions

**Course Outcomes**

- CO1:** Understand and evaluate the economic theories, cost concepts and pricing policies and draw inferences for the investment decisions for appraisal and profitability
- CO2:** Appraise the dynamics of the market and market structures and portray implication for profit and revenue maximization
- CO3:** Employ operations research and allied techniques in managerial economics for an enhanced analysis and decision making

**CO-PO Mapping**

PO/ PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO														
CO1	2	3	2	2		2		2			3	2	3	2
CO2	1	3	2	1		2		2			3	2	3	2
CO3	2	3	2	2		2		2			3	2	3	2

**Syllabus****Unit 1**

Economics: Nature and scope of managerial economics. Economic theory and managerial economics, Cost Concepts: Types of costs - Cost functions. Cost controls: reduction – Tools & Areas. Pricing policies- methods. Capital budgeting - cost of capital. Appraising project profitability

**Unit 2**

The essentials of demand and supply: The law of demand. Market demand curve. Other determinants of market demand. The law of supply. Determinants of market supply. The market mechanism. Price elasticity of demand, Profit and revenue maximization: Optimal input combination. Total revenue maximization.

**Unit 3**

Market structure: Perfect competition and monopoly. Characteristics of monopolistic competition. Oligopoly Operations Research techniques in managerial economics: Inventory models. Theory of games. Decision theory, Risk and Uncertainty, Measuring risk, Consumer behavior and risk aversion, Decision making under uncertainty with complete ignorance

**TEXT BOOK(S)**

*Webster, T.J. Managerial Economics- Theory and Practice, Elsevier; 2004.*

**REFERENCE(S)**

1. Panneerselvam, R. *Engineering Economics, Second Edition, PHI; 2013.*
2. R L Varshney, K L. Maheshwari. *Managerial Economics, S Chand & Sons; 2014.*
3. Harrison. B, Smith. C., and Davis. B. *Introductory Economics, Second Edition, Pr Macmillan; 2013.*

### **Evaluation Pattern**

Assessment	Internal	External
Periodical 1 (P1)	15	
Periodical 2 (P2)	15	
*Continuous Assessment (CA)	20	
End Semester		50

\*CA – Can be Quizzes, Assignment, Projects, and Reports.

**Course Objectives**

- This course is to expose the students to the managerial issues relating to information systems and also understand the role of Business Process Reengineering technique in an organization.
- The course also focus on the management of information technology to provide efficiency and effectiveness or strategy decision making.

**Course Outcomes**

**CO1:** Understand the fundamental concepts of Information Systems in business.

**CO2:** Understand and analyse the strategic role played by Information Systems in e-commerce.

**CO3:** Analyse management challenges in Global Businesses predominantly dependent on IS functions.

**CO-PO Mapping**

PO/ PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO														
CO1	3												3	2
CO2	2	2			2								3	2
CO3	1	3			2	2					2	1	3	2

**Syllabus****Unit 1**

Introduction to IS -Fundamental concepts-IS in Business- Role of IS –Information system and technologies – Components of IS –resources and activities –Types of IS- E business Applications –Role of BI and Analytics in IS- Functional Business Systems - Marketing Systems, Manufacturing systems, Human Resource Systems, Accounting Systems and Financial Management Systems.-Cross-Functional Enterprise Systems Cross-Functional Enterprise Applications, Enterprise Application Integration, Transaction Processing Systems and Enterprise Collaboration Systems. Enterprice Business Systems CRM, ERP, SCM , Case Studies

**Unit 2**

Electronic Commerce Systems : Scope of e-Commerce, Essential e-Commerce Processes and Electronic Payment Processes - E-commerce Applications & Issues -Decision Support Systems- Business and Decision Support, Decision Support Trends, Management Information Systems, Online Analytical Processing, Decision Support Systems, Executive Information Systems, Enterprise Portals and Decision Support - Knowledge Management Systems. Artificial Intelligence Technologies and its application in Business- Strategic role of IT- Competing with IT, value chain ,reengineering, virtual organization ,knowledge creation-Organizational Planning, The Scenario Approach, Planning for Competitive Advantage, SWOT Business Models and Planning, Business IT Planning, -Business/ IT Strategies and Business Application Planning- Developing and Implementing Business Systems - Implementation Challenges- barriers - change management-: Case Studies

**Unit 3**

Management challenges-Security, Ethical and Societal Challenges- Ethical Responsibility of Business Professionals, Computer Crime, Privacy Issues, Health Issues, and Societal Solutions- Security Management of IT- Tools of security Management, Internetworked Security Defenses, other security measures –system controls and audits- Enterprise and Global Management of IT- Managing the IS Function and Failures in IT Management - Global IT Management, Cultural, Political and Geo-economic Challenges, Global Business/IT Strategies, Global Business/IT Applications, Global IT Platforms, Global Data Access Issues and Global Systems Development –Case studies

**TEXT BOOK(S)**



1. O'Brien JA, Marakas GM. *Management information systems*. McGraw-Hill Irwin; 2006.
2. Brien, Marakas G M and Behi R, *MIS, 9<sup>th</sup> edition, Tata McGraw Hill Special Indian Edition; 2010*.

**REFERENCE(S)**

Laudon K, Laudon JP. *Management Information Systems; 2010*

**Evaluation Pattern**

Assessment	Internal	External
Periodical 1 (P1)	15	
Periodical 2 (P2)	15	
*Continuous Assessment (CA)	20	
End Semester		50

\*CA – Can be Quizzes, Assignment, Projects, and Reports.

**FREE ELECTIVES OFFERED UNDER HUMANITIES / SOCIAL SCIENCE STREAMS  
COMMON TO ALL PROGRAMS**

**19CUL230**

**ACHIEVING EXCELLENCE IN LIFE -AN INDIAN PERSPECTIVE**

**L-T-P-C: 2-0-0-2**

**Course Objectives:**

The course offers to explore the seminal thoughts that influenced the Indian Mind on the study of human possibilities for manifesting excellence in life. This course presents to the students, an opportunity to study the Indian perspective of Personality Enrichment through pragmatic approach of self analysis and application.

**Syllabus**

**Unit 1**

Goals of Life – Purusharthas

What are Purusharthas (Dharma, Artha, Kama, Moksha); Their relevance to Personal life; Family life; Social life & Professional life; Followed by a Goal setting workshop;

Yogic way of Achieving Life Goals – (Stress Free & Focused Life)

Introduction to Yoga and main schools of Yoga; Yogic style of Life & Time Management (Work Shop);

Experiencing life through its Various Stages

Ashrama Dharma; Attitude towards life through its various stages (Teachings of Amma);

**Unit 2**

Personality Development

What is Personality – Five Dimensions – Pancha Kosas (Physical / Energy / Mental / Intellectual / Bliss); Stress Management & Personality; Self Control & personality; Fundamental Indian Values & Personality;

Learning Skills (Teachings of Amma)

Art of Relaxed Learning; Art of Listening; Developing ‘Shraddha’ – a basic qualification for obtaining Knowledge; Communication Skills - An Indian Perspective;

**Unit 3**

Developing Positive Attitude & Friendliness - (Vedic Perspective);

Achieving Work Excellence (Karma Yoga by Swami Vivekananda & teachings based on Amma);

Leadership Qualities – (A few Indian Role models & Indian Philosophy of Leadership);

**REFERENCE BOOKS:**

1. *Awaken Children (Dialogues with Sri Mata Amritanandamayi) Volumes 1 to 9*
2. *Complete works of Swami Vivekananda (Volumes 1 to 9)*
3. *Mahabharata by M. N Dutt published by Parimal publications – New Delhi (Volumes 1 to 9)*
4. *Universal message of Bhagavad-Gita (An exposition of Gita in the light of modern thought and Modern needs) by Swami Ranganathananda. (Vols.1 to 3)*
5. *Message of Upanishads, by Swami Ranganathananda published by Bharatiya Vidya Bhavan, Bombay.*
6. *Personality Development – Swami Vivekananda published by Advaita Ashram, Kolkatta.*
7. *Art of Man Making - Swami Chinmayananda published by Chinmaya Mission, Bombay*
8. *Will Power and its Development- Swami Budhananda published by Advaita Ashram, Kolkatta*
9. *Ultimate Success - Swami Ramakrishnananada Puri published by Mata Amritanandamayi Math, Kollam*
10. *Yoga In Daily Life - Swami Sivananda – published by Divine Life Society*
11. *Hindu Dharma - H. H. Sri Chandrasekharandra Saraswati published by Bharatiya Vidya Bhavan, Bombay*
12. *All about Hinduism – Swami Sivananda - Published by Divine Life Society*
13. *The Mind and its Control by Swami Budhananda published by Advaita Ashram, Kolkatta*
14. *Krida Yoga - Vivekananda Kendra, Publication.*
15. *Valmiki Ramayana – Four volumes- published by Parimal Publications, Delhi*

16. *New perspectives in Stress Management - Dr H R Nagendra & Dr R Nagaratna published by Swami Vivekananda Yoga Prakashana, Bangalore.*
17. *Mind Sound Resonance Technique (MSRT) Published by Swami Vivekananda Yoga Prakashana, Bangalore.*
18. *Yoga & Memory - Dr H R Nagendra & Dr. Shirley Telles, published by Swami Vivekananda Yoga Prakashana, Bangalore.*

**Evaluation Pattern**

Assessment	Internal	End Semester
Periodical 1 (P1)	15	
Periodical 2 (P2)	15	
*Continuous Assessment (CA)	20	
End Semester		50

\*CA – Can be Quizzes, Assignment, Projects, and Reports.

**Syllabus****Unit 1**

1. The anatomy of 'Excellence'. What is 'excellence'? Is it judged by external factors like wealth?
2. The Great Flaw. The subject-object relationship between individual and world. Promote subject enhance excellence.
3. To work towards excellence, one must know where he is. Our present state... An introspective analysis. Our faculties within.

**Unit 2**

4. The play of the mind. Emotions – convert weakness into strength.
5. The indispensable role of the intellect. How to achieve and apply clear thinking?
6. The quagmire of thought. The doctrine of Karma – Law of Deservance.
7. Increase Productivity, reduce stress.. work patterning.

**Unit 3**

8. The art of right contact with the world. assessment, expectations.
9. Myths and Realities on key issues like richness, wisdom, spirituality.
10. Collect yourself, there is no time to waste. The blue-print of perfect action.

**REFERENCES:**

*The Bhaja Govindam and the Bhagavad Gita.*

**Evaluation Pattern**

Assessment	Internal	End Semester
Periodical 1 (P1)	15	
Periodical 2 (P2)	15	
*Continuous Assessment (CA)	20	
End Semester		50

\*CA – Can be Quizzes, Assignment, Projects, and Reports.

**OBJECTIVES:**

This course offers a journey of exploration through the early developments in India of astronomy, mathematics, technologies and perspectives of the physical world. With the help of many case studies, the students will be equipped to understand concepts as well as actual techniques.

**Syllabus****Unit 1**

1. General introduction: principles followed and sources;
2. Astronomy & mathematics from the Neolithic to the Indus civilization;
3. Astronomy & mathematics in Vedic literature;
4. Vedanga Jyotisha and the first Indian calendars;
5. Shulba Sutras and the foundations of Indian geometry;

**Unit 2**

1. Astronomy & mathematics in Jain and Buddhist literature;
2. The transition to the Siddhantic period; Aryabhata and his time;
3. The Aryabhatiya: concepts, content, commentaries;
4. Brahmagupta and his advances;
5. Other great Siddhantic savants;
6. Bhaskara II and his advances;

**Unit 3**

1. The Kerala school of mathematics;
2. The Kerala school of astronomy;
3. Did Indian science die out?;
4. Overview of recent Indian scientists, from S. Ramanujan onward;
5. Conclusion: assessment and discussion;

**TEXTBOOK:**

*Indian Mathematics and Astronomy: Some Landmarks, by S. Balachandra Rao*

**REFERENCE:**

*IFIH's interactive multimedia DVD on Science & Technology in Ancient India.*

**Evaluation Pattern**

Assessment	Internal	End Semester
Periodical 1 (P1)	15	
Periodical 2 (P2)	15	
*Continuous Assessment (CA)	20	
End Semester		50

\*CA – Can be Quizzes, Assignment, Projects, and Reports.

**OBJECTIVES:**

This course offers the foundation necessary to understand Eastern approaches to psychology and spirituality. The course includes experiential components centering on meditation and spiritual practice.

**Syllabus****Unit 1**

Introduction

Introduction to Modern Psychology

A short history of Modern Psychology - Major Schools of Modern Psychology - The three major forces in Western Psychology - Freudian Psychoanalysis; Behaviourism; Humanistic Psychology.

Introduction to Indian Psychology

What is Yoga? - Rise of Yoga Psychology tradition - Various schools of Yoga Psychology - Universal Goal of all Yoga-schools.

Patanjali Yoga Sutra – 1

Introduction to Rishi Patanjali - Bird view of Yoga-Sutra - Definition of Yoga – Vrittis.

Patanjali Yoga Sutra – 2

Five Kinds of Vrittis - Pramanam - sources of right knowledge - Viparyayah – unfolded belief - Vikalpah – Unfolded belief - Smriti – Memory.

**Unit 2**

Patanjali Yoga Sutra – 3

Two formulae - Necessity of Abhyasah and Vairagyah - Foundation of Abhyasah - Foundation of Vairagyah.

Patanjali Yoga Sutra – 4

Introduction to Samadhi - Samprajnata-Samadhi - Reasoning in Samprajnata-Samadhi - Reflection in Samprajnata-Samadhi - Bliss in Samprajnata-Samadhi - Sense of Individuality in Samprajnata-Samadhi.

Patanjali Yoga Sutra – 5

Main obstacles in the path of Yoga - other obstructions - removal of obstacles by one – pointedness; by controlling Prana - by observing sense experience - by inner illumination - by detachment from matter - by knowledge of dream and sleep - by meditation as desired.

Patanjali Yoga Sutra – 6

How to make mind peaceful? - Cultivating opposite virtues: happiness – friendliness - misery – compassion - virtue – gladness - vice – indifference.

Patanjali Yoga Sutra – 7

Five causes of Pain - avidya – ignorance (Root Cause) - asmita – ‘I-Feeling’ – raga – attraction - dwesha – repulsion - abhinivesha – clinging to life.

**Unit 3**

Patanjali Yoga Sutra – 8

Necessity of Yoga practice - eight parts of Yoga practice - five Yamas: ahimsa – satya – asteya – brahmacharyam – aparigraha.

Patanjali Yoga Sutra – 9

Five Niyamas: Soucha – Santhosha – Tapas – Swadyah – Ishwara - Pranidhanam.

Patanjali Yoga Sutra – 10

Asanam – Pranayamah - various kinds of Pranayamah - Pratyaharah - Mastery over the senses.

Report review Conclusion

**REFERENCES:**

1. *The course book will be “The four chapters of Freedom” written by Swami Satyananda Saraswati of Bihar School of Yoga, Munger, India.*
2. *“The message of Upanishads” written by Swami Ranganathananda. Published by Bharathiya Vidya Bhavan.*
3. *Eight Upanishads with the commentary of Sankaracharya, Translated by Swami Gambhirananda, Published by Advaita Ashram, Uttaranjal.*
4. *‘Hatha Yoga Pradipika’ Swami Muktibodhananda, Yoga Publications Trust, Munger, Bihar, India*

**Evaluation Pattern**

Assessment	Internal	End Semester
Periodical 1 (P1)	15	
Periodical 2 (P2)	15	
*Continuous Assessment (CA)	20	
End Semester		50

\*CA – Can be Quizzes, Assignment, Projects, and Reports.

**OBJECTIVES:**

To introduce business vocabulary; to introduce business style in writing and speaking; to expose students to the cross-cultural aspects in a globalised world; to introduce the students to the art of persuasion and negotiation in business contexts.

**Course Outcomes**

- CO1: Familiarize and use appropriate business vocabulary and etiquettes in verbal communication in the professional context  
 CO2: Understand organizational structures, pay structures and performance assessments  
 CO3: Apply language skills in drafting various business documents and other necessary communications in the business context  
 CO4: Understand and address cross cultural differences in the corporate environment  
 CO5: Participate in planned and extempore enactments of various business situations

**CO-PO Mapping**

PO/PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO												
CO1										3		2
CO2									1		1	
CO3										3		
CO4						2						
CO5									2			

**Syllabus****Unit 1**

Business Vocabulary - Writing: Drafting Notices, Agenda, and Minutes - Reading: Business news, Business articles.

**Unit 2**

Writing: Style and vocabulary - Business Memorandum, letters, Press Releases, reports – proposals – Speaking: Conversational practice, telephonic conversations, addressing a gathering, conducting meetings.

**Unit 3**

Active Listening: Pronunciation – information gathering and reporting - Speaking: Cross-Cultural Issues, Group Dynamics, negotiation & persuasion techniques.

**Activities**

Case studies & role-plays.

**BOOKS RECOMMENDED:**

1. Jones, Leo & Richard Alexander. *New International Business English*. CUP. 2003.
2. Horner, David & Peter Strutt. *Words at Work*. CUP. 1996.
3. Levi, Daniel. *Group Dynamics for Teams*. 3 ed. Sage Publications India Pvt. Ltd. New Delhi, 2011.
4. Owen, Roger. *BBC Business English*. BBC. 1996.



5. *Henderson, Greta Lafollette & Price R Voiles. Business English Essentials. 7th Edition. Glencoe / McGraw Hill.*
6. *Sweeney, Simon. Communicating in Business. CUP. 2000.*

**Evaluation Pattern**

Assessment	Internal	End Semester
Periodical 1 (P1)	15	
Periodical 2 (P2)	15	
*Continuous Assessment (CA)	20	
End Semester		50

\*CA – Can be Quizzes, Assignment, Projects, and Reports.

**OBJECTIVES:**

To expose the students to the greatness of Indian Thought in English; to develop a sense of appreciation for the lofty Indian Thought; to develop an understanding of the eclectic Indian psyche; to develop an understanding about the societal changes in the recent past.

**Syllabus****Unit 1****Poems**

Rabindranath Tagore's Gitanjali (1-10); Nizzim Ezekiel's Enterprise; A.K. Ramanujam's Small-Scale Reflections on a Great House.

**Unit 2****Prose**

Khushwant Singh's The Portrait of a Lady; Jhumpa Lahiri's Short Story - Interpreter of Maladies.

**Unit 3****Drama and Speech**

Vijay Tendulkar's Silence, the Court is in Session; Motivational speeches by Jawaharlal Nehru/ S. Radhakrishnan / A. P. J. Abdul Kalam's My Vision for India etc. (any speech).

**REFERENCES:**

1. Lahiri, Jhumpa. *Interpreter of Maladies*, Harper Collins Publications, 2000.
2. Ramanujan A. K. ed. K. M. George, *Modern Indian Literature: An Anthology, Vol. I, Sahitya Akademi, 1992.*
3. Singh, Khushwant. *The Portrait of a Lady: Collected Stories*, Penguin, 2009.
4. Tagore, Rabindranath. *Gitanjali*, Penguin Books India Pvt. Ltd, 2011.
5. Tendulkar, Vijay. *Five Plays*, Oxford University Press, 1996.

**Evaluation Pattern**

Assessment	Internal	End Semester
Periodical 1 (P1)	15	
Periodical 2 (P2)	15	
*Continuous Assessment (CA)	20	
End Semester		50

\*CA – Can be Quizzes, Assignment, Projects, and Reports.

**OBJECTIVES:**

To expose the students to different genres of Literature; to hone reading skills; to provide deeper critical and literary insights; to enhance creative thinking; to promote aesthetic sense.

**Syllabus****Unit 1****Poems**

1. W. H. Auden: Refugee Blues; 2. A. K. Ramanujan: Obituary; 3. William Blake: The Little Black Boy; 4. Gieve Patel: Grandparents at a Family Get-together.

**Unit 2****Short Stories**

1. Chinua Achebe: Marriage is a Private Affair; 2. Ruskin Bond: The Thief; 3. Isai Tobolsky: Not Just Oranges; 4. K A Abbas: The Refugee

**Unit 3****Prose**

1. A G Gardiner: On The Philosophy of Hats; 2. Robert Lynd: Mispronunciation

Practicals:

Role plays: The Proposal, Chekov / Remember Ceaser, Gordon Daviot / Final Solutions, Mahesh Dattani, Book reviews, Movie reviews.

**SUGGESTED READING:**

*The Old Man and the Sea, Hemingway / Any one of the novels of R.K. Narayan, etc.*

**Evaluation Pattern**

Assessment	Internal	End Semester
Periodical 1 (P1)	15	
Periodical 2 (P2)	15	
*Continuous Assessment (CA)	20	
End Semester		50

\*CA – Can be Quizzes, Assignment, Projects, and Reports.

**OBJECTIVES:**

To introduce the students to the elements of technical style; to introduce the basic elements of formal correspondence; to introduce technical paper writing skills and methods of documentation; to improve oral presentation skills in formal contexts.

**Course Outcomes:**

After the completion of the course the student will be able to:

CO1: Understand and use the basic elements of formal correspondence and methods of documentation

CO2: Learn to edit technical content for grammatical accuracy and appropriate tone and style

CO3: Use the library and internet recourses for research purposes

CO4: Demonstrate the ability to communicate effectively through group mock-technical presentations and other activities

**Mapping of course outcomes with program outcomes:**

PO/PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO														
CO1										3				
CO2										3				
CO3				1										
CO4									3	3				

**Syllabus:****Unit 1**

Mechanics of writing: Grammar rules – punctuation - spelling rules - tone and style - graphical Representation.

**Unit 2**

Different kinds of written documents: Definitions – descriptions – instructions – recommendations - manuals - reports – proposals; Formal Correspondence: Letter Writing including job applications with Resume.

**Unit 3**

Technical paper writing: Library research skills - documentation style - document editing – proof reading – formatting.

Practice in oral communication and Technical presentations

**REFERENCES:**

1. Hirsh, Herbert. L “Essential Communication Strategies for Scientists, Engineers and Technology Professionals”. II Edition. New York: IEEE press, 2002
2. Anderson, Paul. V. “Technical Communication: A Reader-Centred Approach”. V Edition. Harcourt Brace College Publication, 2003
3. Strunk, William Jr. and White. E B. “The Elements of Style” New York. Alliyen & Bacon, 1999.
4. Riordan, G. Daniel and Pauley E. Steven. “Technical Report Writing Today” VIII Edition (Indian Adaptation). New Delhi: Biztantra, 2004.

**Evaluation Pattern**

Assessment	Internal	End Semester
Periodical 1 (P1)	15	
Periodical 2 (P2)	15	
*Continuous Assessment (CA)	20	
End Semester		50

\*CA – Can be Quizzes, Assignment, Projects, and Reports.

**OBJECTIVES:**

To help the students learn the fine art of story writing; to help them learn the techniques of story telling; to help them study fiction relating it to the socio- cultural aspects of the age; to familiarize them with different strategies of reading short stories; to make them familiar with the morals and values held in high esteem by the ideals of Indianness.

**Syllabus****Unit 1**

Introduction: Differences between novel and short stories – origin and development of short stories - Rabindranath Tagore: Kabuliwallah; Mulk Raj Anand: The Gold Watch.

**Unit 2**

R. K. Narayan: Sweets for Angels; K. A. Abbas: The Refugee; Khushwant Singh: The Mark of Vishnu.

**Unit 3**

Masti Venkatesha Iyengar: The Curds-Seller; Manohar Malgonkar: Upper Division Love; Romila Thapar: The Spell; Premchand: The Voice of God.

**TEXT:**

*M. G. Narasimha Murthy (ed), Famous Indian Stories. Hyderabad: Orient Black Swan, 2014*

**REFERENCE:**

*Mohan Ramanan (Ed), English and the Indian Short Story: Essays in Criticism, Hyderabad, Orient Black Swan, 2000.*

**Evaluation Pattern**

Assessment	Internal	End Semester
Periodical 1 (P1)	15	
Periodical 2 (P2)	15	
*Continuous Assessment (CA)	20	
End Semester		50

\*CA – Can be Quizzes, Assignment, Projects, and Reports.

**Syllabus****Unit 1****Population - Identity**

How to introduce yourself (name, age, address, profession, nationality); Numbers; How to ask questions; Grammar – Pronouns - subjects; Regular verbs of 1st group (er) in the present; Être (to be) and avoir (to have) in the present; Interrogative sentence; Gender of adjectives.

**Unit 2****The suburbs - At the train station**

Introduce someone; Buy a train ticket or a cinema ticket; Ask for information; Official time; Ask for a price; The city (church, town hall, post office...)

Grammar – Pronouns - subjects (continuation); Gender of adjectives (continuation); Plural of nouns and adjectives; Definite and indefinite articles; Interrogative adjectives; I would like (Je voudrais).

**Unit 3****Paris and the districts - Looking for a room**

Locate a room and indicate the way; Make an appointment; Give a price; Ordinal numbers; Usual time; Ask for the time.

Grammar - Imperative mode; Contracted articles (au, du, des); negation.

**TEXTBOOK:**

*Metro St Michel - Publisher: CLE international*

**Evaluation Pattern**

Assessment	Internal	End Semester
Periodical 1 (P1)	15	
Periodical 2 (P2)	15	
*Continuous Assessment (CA)	20	
End Semester		50

\*CA – Can be Quizzes, Assignment, Projects, and Reports.

**Syllabus****Unit 1****The first room of a student**

A party to celebrate the 1st room; Description of a room; furniture; Locate objects: prepositions (devant, derrière, dans...), Read advertisement; Appreciation (I like, I prefer,).

Grammar - Perfect past tense with avoir; Possessive adjectives (mon, ton, son...); Demonstrative adjectives (ce, cet, cette); Yes (oui, si).

**Unit 2****Small jobs**

Conversation on the phone; Give Time indications; Answer a job offer; Describe a job; Suggest a meeting time. Grammar - Perfect past tense with être and avoir (continuation); Possessive adjectives (notre, votre, leur); Prepositions (à, pour, avec ...); Pronoun as direct object (le, la, l', les).

**Unit 3****University Restaurant**

Inquiry; Express an opinion; Ask questions (continuation); Food, meals, taste, preferences; Nutrition, diet, choose a menu or diet, Expression of quantities (beaucoup, peu).

Grammar - Partitif (expressing quantity) (du, de la, pas de...); Comparison (plus...que, moins...que, autant...que); Interrogation (continuation), inversion, Est-ce que, qu'est-ce que?.

**TEXTBOOK:**

Metro St Michel - Publisher: CLE International

**Evaluation Pattern**

Assessment	Internal	End Semester
Periodical 1 (P1)	15	
Periodical 2 (P2)	15	
*Continuous Assessment (CA)	20	
End Semester		50

\*CA – Can be Quizzes, Assignment, Projects, and Reports.



**Syllabus****Unit 1**

Greetings; Introducing one-self (formal and informal context), saying their name, origin, living place, occupation. Numbers 1-100; Saying the telephone number. Countries and Languages.

Grammar: Structure – W - Questions and Yes/No questions and statements, personal pronouns, verb conjugations. Articles.

Vocabulary: Professions.

**Unit 2**

Giving the personal details. Name, age, marital status, year of birth, place of birth, etc.

Numbers till 1000. Saying a year. Alphabets – spelling a word.

Filling up an application form; In the restaurant – making an order.

Grammar: Definite, indefinite and negative article in nominative. Accusative: indefinite and negative Article

Vocabulary: Food items

**Unit 3**

Numbers above 1000. Orientation in Shopping plazas: asking the price, where do I find what, saying the opinion.

Grammar: Accusative – definite article. Adjectives and plural forms. Vocabulary: Furniture and currencies.

**Evaluation Pattern**

Assessment	Internal	End Semester
Periodical 1 (P1)	15	
Periodical 2 (P2)	15	
*Continuous Assessment (CA)	20	
End Semester		50

\*CA – Can be Quizzes, Assignment, Projects, and Reports.

**Syllabus****Unit 1**

Shopping and orientation in supermarket; Conversation between the customer and salesman; Where one finds what in supermarket; Asking for requests and suggestions.

Grammar: Dative of personal pronouns. Imperative form. Vocabulary: Consumables and measurements;

**Unit 2**

Appointments; Work and leisure time activities; Time, weekdays, months and seasons; saying the date; fixing up an appointment.

Grammar: Model verbs; Prepositions with time and place; Ordinal numbers. Vocabulary: Leisure activities, weekdays, months and seasons.

**Unit 3**

Family and household; Family and relations; household and daily routine. Grammar: Possessive articles; Divisible and indivisible verbs.

Vocabulary: Family circle; Household articles.

**Evaluation Pattern**

Assessment	Internal	End Semester
Periodical 1 (P1)	15	
Periodical 2 (P2)	15	
*Continuous Assessment (CA)	20	
End Semester		50

\*CA – Can be Quizzes, Assignment, Projects, and Reports.

**Syllabus**

To have an elementary exposure to German language; specifically

1. to have some ability to understand simple spoken German, and to be able to speak it so as to be able to carry on life in Germany without much difficulty (to be able to do shopping, etc.);
2. to be able to understand simple texts, and simple forms of written communication;
3. to have a basic knowledge of German grammar;
4. to acquire a basic vocabulary of 500 words;
5. to be able to translate simple letters with the use of a dictionary; and
6. to have some familiarity with the German life and culture.

(This will not be covered as part of the regular classroom teaching; this is to be acquired by self-study.)

Some useful websites will be given.

**Evaluation Pattern**

Assessment	Internal	End Semester
Periodical 1 (P1)	15	
Periodical 2 (P2)	15	
*Continuous Assessment (CA)	20	
End Semester		50

\*CA – Can be Quizzes, Assignment, Projects, and Reports.

**Syllabus**

The basic vocabulary and grammar learned in the earlier course is mostly still passive knowledge. The endeavour of this course is to activate this knowledge and develop the skill of communication.

Topics are: Airport, railway station, travelling; shopping; invitations, meals, meeting people; around the house; the human body; colours; professions.

Past and future tenses will be introduced. Applying genitive, dative and accusative. Some German culture. Films.

**Evaluation Pattern**

Assessment	Internal	End Semester
Periodical 1 (P1)	15	
Periodical 2 (P2)	15	
*Continuous Assessment (CA)	20	
End Semester		50

\*CA – Can be Quizzes, Assignment, Projects, and Reports.

**OBJECTIVES:**

To teach Hindi for effective communication in different spheres of life - Social context, Education, governance, Media, Business, Profession and Mass communication.

**Course Outcomes:**

After the completion of the course the student will be able to:

- CO1: Gain knowledge about the nature and culture of Hindi language  
 CO2: Understand the structural aspects of Hindi language  
 CO3: Apply the knowledge of the grammatical structures to communicate in Hindi  
 CO4: Analyse the social significance of modern literature.  
 CO5: Develop the ability to translate a given text to Hindi

**CO-PO Mapping:**

PO/PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO														
CO1									2	3				
CO2									2	3				
CO3									2	3				
CO4										3				
CO5									2					

**Syllabus****Unit 1**

Introduction to Hindi Language, National Language, Official Language, link Language etc. Introduction to Hindi language, Devanagari script and Hindi alphabet.

Shabda Bhed, Roopanthar ki Drishti se- Bhasha – Paribhasha aur Bhed – Sangya - Paribhasha Aur Bhed - Sangya ke Roopanthar - kriya.

**Unit 2**

Common errors and error corrections in Parts of Speech with emphasis on use of pronouns, Adjective and verb in different tenses – Special usage of adverbs, changing voice and conjunctions in sentences, gender& number - General vocabulary for conversations in given context –understanding proper pronunciation - Conversations, Interviews, Short speeches.

**Unit 3**

Poems – Kabir 1st 8 Dohas, Surdas 1st 1 Pada; Tulsidas 1st 1 Pada; Meera 1st 1 Pada

**Unit 4**

Letter writing – personal and Formal – Translation from English to Hindi.

**Unit 5**

Kahani – Premchand: Kafan, Abhilasha, Vidroh, Poos ki rath, Julooos.

**BOOKS:**

1. *Prem Chand Ki Srvashestha Kahaniyam: Prem Chand; Diamond Pub Ltd. New Delhi*
2. *Vyavaharik Hindi Vyakaran ,Anuvad thaha Rachana : Dr. H. Parameswaran, Radhakrishna publishing House, New Delhi*
3. *Kamtha Prasad Guru : Hindi Vyakaran, Best Book pub House, New Delhi*
4. *Poetry : Kavya Ras - Ed: T.V. Basker - Pachouri Press; Mathura*

**Evaluation Pattern**

Assessment	Internal	End Semester
Periodical 1 (P1)	15	
Periodical 2 (P2)	15	
*Continuous Assessment (CA)	20	
End Semester		50

\*CA – Can be Quizzes, Assignment, Projects, and Reports.

**OBJECTIVES:**

Appreciation and assimilation of Hindi Literature both drisyā & shravyā using the best specimens provided as anthology.

**Course Outcomes:**

After the completion of the course the student will be able to:

- CO1: Understand the grammatical structures of Hindi  
 CO2: Understand the post modern trends of literature  
 CO3: Enhance critical thinking and writing skills  
 CO4: Identify and analyse different literary and audio-visual material  
 CO5: Apply fundamental knowledge of Hindi in formal and informal writing

**CO-PO Mapping:**

PO/PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO														
CO1									1	2				
CO2									1	2				
CO3									1	2				
CO4										3				
CO5									1	2				

**Syllabus:****Unit 1**

Kavya Tarang; Dhumil ke Anthim Kavitha [Poet-Dhumil]; Dhabba [Poet-Kedarnath Singh]; Proxy [Poet-Venugopal]; Vakth [Poet-Arun Kamal]; Maachis [Poet-Suneeta Jain].

**Unit 2**

Communicative Hindi - Moukhik Abhivyakthi

**Unit 3**

Audio-Visual Media in Hindi – Movies like Tare Zameen par, Paa, Black etc., appreciation and evaluation. News reading and presentations in Radio and TV channels in Hindi.

**Unit 4**

Gadya Manjusha – Budhapa, Kheesa, Sadachar ka Thavis

**Unit 5**

Translation: Theory and Practice - Letter writing: Formal and Personal – Introduction to Hindi Software.

**BOOKS:**

1. *Kavay Tarang: Dr. Niranjana, Jawahar Pusthakaalay, Mathura.*

2. *Gadya Manjusha: Editor: Govind, Jawahar Pusthakalay, Mathura*

**Evaluation Pattern**

Assessment	Internal	End Semester
Periodical 1 (P1)	15	
Periodical 2 (P2)	15	
*Continuous Assessment (CA)	20	
End Semester		50

\*CA – Can be Quizzes, Assignment, Projects, and Reports.



**Syllabus****Unit 1**

Emotional Intelligence: Concept of Emotional Intelligence, Understanding the history and origin of Emotional Intelligence, Contributors to Emotional Intelligence, Science of Emotional Intelligence, EQ and IQ, Scope of Emotional Intelligence.

**Unit 2**

Components of Emotional Intelligence: Self-awareness, Self-regulation, Motivation, Empathy, Social skills. Emotional Intelligence Competencies, Elements of Emotional Intelligence, Models of Emotional Intelligence: The Ability-based Model, The Trait Model of Emotional Intelligence, Mixed Models of Emotional Intelligence.

**Unit 3**

Emotional Intelligence at Work place: Importance of Emotional Intelligence at Work place? Cost-savings of Emotional Intelligence, Emotionally Intelligent Leaders, Case Studies Measuring Emotional Intelligence: Emotionally Intelligence Tests, Research on Emotional Intelligence, Developing Emotional Intelligence.

**REFERENCES:**

1. Daniel Goleman (1996). *Emotional Intelligence- Why it can Matter More than IQ*. Bantam Doubleday Dell Publishing Group
2. Daniel Goleman (2000). *Working with Emotional Intelligence*. Bantam Doubleday Dell Publishing Group
3. Liz Wilson, Stephen Neale & Lisa Spencer-Arnell (2012). *Emotional Intelligence Coaching*. Kogan Page India Private Limited

**Evaluation Pattern**

Assessment	Internal	End Semester
Periodical 1 (P1)	15	
Periodical 2 (P2)	15	
*Continuous Assessment (CA)	20	
End Semester		50

\*CA – Can be Quizzes, Assignment, Projects, and Reports.

19HUM231

**GLIMPSES INTO THE INDIAN MIND -  
THE GROWTH OF MODERN INDIA**

L-T-P-C: 2-0-0-2

**Syllabus**

**Unit 1**

Introduction

General Introduction; 'His + Story' or 'History' ?; The concepts of 'nation', 'national identity' and 'nationalism'; Texts and Textualities: Comparative Perspectives.

**Unit 2**

Selected writings / selections from the complete works of the following authors will be taken up for study in a chronological order:

Raja Ram Mohan Roy; Dayananda Saraswati; Bal Gangadhar Tilak; Rabindranath Tagore;

**Unit 3**

Selected writings / selections from the complete works of the following authors will be taken up for study in a chronological order:

Swami Vivekananda; Sri Aurobindo; Ananda K. Coomaraswamy; Sister Nivedita; Mahatma Gandhi; Jawaharlal Nehru; B.R. Ambedkar; Sri Chandrasekharendra Saraswati, the Paramacharya of Kanchi; Dharampal; Raja Rao; V.S. Naipaul.

Conclusion.

**REFERENCES:**

1. Tilak, Bal Gangadhar. *The Orion / Arctic Home in the Vedas*.
2. Tagore, Rabindranath. *The History of Bharatavarsha / On Nationalism / Greater India*.
3. Vivekananda, Swami. "Address at the Parliament of Religions"/"The Future of India"/"In Defence of Hinduism" from *Selections from the Complete Works of Swami Vivekananda*.
4. Aurobindo, Sri. *The Renaissance in India / On Nationalism*.
5. Coomaraswamy, Ananda K. *Essays in Indian Idealism (any one essay) / Dance of Shiva*.
6. Nivedita, Sister. "Noblesse Oblige: A Study of Indian Caste" / "The Eastern Mother" from *The Web of Indian Life*.
7. Gandhi, Mahatma. *Hind Swaraj*.
8. Nehru, Jawaharlal. "The Quest" from *Discovery of India*.
9. Ambedkar, B. R. "Buddha and His Dhamma" from *Collected Works*.
10. Saraswati, Chandrasekharendra. "The Sastras and Modern Life" from *The Hindu Dharma*.
11. Dharampal. *Bharatiya Chitta, Manas and Kala / Understanding Gandhi*.
12. Naipaul, V. S. *India: A Wounded Civilization / India: A Million Mutinies Now*.

**Evaluation Pattern**

Assessment	Internal	End Semester
Periodical 1 (P1)	15	
Periodical 2 (P2)	15	
*Continuous Assessment (CA)	20	
End Semester		50

\*CA – Can be Quizzes, Assignment, Projects, and Reports.

**Syllabus****Unit 1**

## Introduction

A peep into India's glorious past

Ancient India – the vedas, the vedic society and the Sanatana Dharma – rajamandala and the Cakravartins – Ramarajya – Yudhisthira's ramarajya; Sarasvati - Sindhu Civilization and the myth of the Aryan Invasion; Classical India – Dharma as the bedrock of Indian society – Vaidika Brahmanya Dharma and the rise of Jainism and Buddhism – the sixteen Mahajanapadas and the beginning of Magadhan paramountcy - Kautilya and his Arthashastra – Chandragupta Maurya and the rise of the Mauryan empire – Gupta dynasty Indian art and architecture – classical sanskrit literature – Harsavardhana; Trade and commerce in classical and medieval India and the story of Indian supremacy in the Indian ocean region; The coming of Islam – dismantling of the traditional Indian polity – the Mughal empire – Vijayanagara samrajya and days of Maratha supremacy.

**Unit 2**

India's contribution to the world: spirituality, philosophy and sciences

Indian Philosophy – the orthodox (Vaidika) and the heterodox (atheistic) schools; Ramayana and Mahabharata; Bhagavad Gita; Saints and sages of India; Ancient Indian medicine: towards an unbiased perspective; Ancient Indian mathematics; Ancient Indian astronomy; Ancient Indian science and technology.

The arrival of Europeans, British paramountcy and colonization

What attracted the rest of the world to India?; India on the eve of the arrival of European merchants; The story of colonization and the havoc it wrecked on Indian culture and civilization; Macaulay and the start of the distortion of Indian education and history; Indian economy – before and after colonization: a brief survey; The emergence of modern India.

**Unit 3**

Women in Indian society

The role and position of women in Hindu civilization; Gleanings from the Vedas, Brihadarnyaka Upanishad, Saptasati Devi Mahatmyam, Ramayana, Mahabharata, Manusmriti, Kautilya's Arthashastra and Mrichchhakatikam of Sudraka; The role and position of Indian women vis-a-vis Islam and European cultures; The great women of India.

Modern India

The national movement for freedom and social emancipation; Swami Vivekananda, Sri Aurobindo, Rabindranath Tagore; Understanding Mahatma Gandhi; A new nation is born as a republic – the pangs of birth and growth; India since Independence – the saga of socio-political movements; Problems facing the nation today; Globalization and Indian Economy; Bharatavarsha today and the way ahead: Regeneration of Indian National Resources.

Conclusion

The Wonder that was India; The 'politics' and 'purpose' of studying India.

**REFERENCES:**

1. Parameswaran, S. *The Golden Age of Indian Mathematics*. Kochi: Swadeshi Science Movement.
2. Somayaji, D. A. *A Critical Study of Ancient Hindu Astronomy*. Dharwar: 1972.
3. Sen, S. N. & K. V. Sarma eds. *A History of Indian Astronomy*. New Delhi, 1985.
4. Rao, S. Balachandra. *Indian Astronomy: An Introduction*. Hyderabad: Universities Press, 2000.
5. Bose, D. M. et. al. *A Concise History of Science in India*. New Delhi: 1971.
6. Bajaj, Jitendra & M. D. Srinivas. *Indian Economy and Polity*. Chennai: Centre for Policy Studies.
7. Bajaj, Jitendra & M. D. Srinivas. *Timeless India, Resurgent India*. Chennai: Centre for Policy Studies.
8. Joshi, Murli Manohar. *Science, Sustainability and Indian National Resurgence*. Chennai: Centre for Policy Studies, 2008.
9. *The Cultural Heritage of India*. Kolkata: Ramakrishna Mission Institute of Culture.

10. Vivekananda, Swami. *Selections from the Complete Works of Swami Vivekananda*. Kolkata: Advaita Ashrama.
11. Mahadevan, T. M. P. *Invitations to Indian Philosophy*. Madras: University of Madras.
12. Hiriyanna, M. *Outlines of Indian Philosophy*. Motilal Banarsidass.
13. Tagore, Rabindranath. *The History of Bharatavarsha / On Nationalism / Greater India*.
14. Majumdar, R. C. et. al. *An Advanced History of India*. Macmillan.
15. Mahajan, V. D. *India Since 1526*. New Delhi: S. Chand & Company.
16. Durant, Will. *The Case for India*. Bangalore: Strand Book Stall, 2008.
17. Aurobindo, Sri. *The Indian Renaissance / India's Rebirth / On Nationalism*.
18. Nivedita, Sister. *The Web of Indian Life*. Kolkata: Advaita Ashrama.
19. Durant, Will. *The Story of Civilization. Volume 1 – Our Oriental Heritage*. New York: Simon & Schuster.
20. Ranganathananda, Swami. *Eternal Values for A Changing Society*. Bombay: Bharatiya Vidya Bhavan.
21. Ranganathananda, Swami. *Universal Message of the Bhagavad Gita*. Kolkata: Advaita Ashrama.
22. Seturaman, V. S. *Indian Aesthetics*. Macmillan.
23. Coomaraswamy, Ananda K. *The Dance of Shiva*. New Delhi: Sagar Publications.
24. Coomaraswamy, Ananda K. *Essays on Indian Idealism*. New Delhi: Munshiram Manoharlal.
25. Danino, Michel. *The Invasion That Never Was*.
26. Kautilya. *Arthashastra*.
27. Altekar, A. S. *State and Government in Ancient India*. New Delhi: Motilal Banarsidass.
28. Altekar, A. S. *The Position of Women in Hindu Civilization*. New Delhi: Motilal Banarsidass.
29. Sircar, D. C. *Studies in the Religious Life of Ancient and Medieval India*. New Delhi: Motilal Banarsidass.
30. Sircar, D. C. *Studies in the Political and Administrative Systems in Ancient and Medieval Times*. New Delhi: Motilal Banarsidass.
31. Madhavananda, Swami & R. C. Majumdar eds. *The Great Women of India*. Kolkata: Advaita Ashrama.
32. Dutt, R. C. *The Economic History of India*. London, 1902.
33. Dharampal. *Collected Works*.
34. Dharampal. *Archival Compilations (unpublished)*

#### Evaluation Pattern

Assessment	Internal	End Semester
Periodical 1 (P1)	15	
Periodical 2 (P2)	15	
*Continuous Assessment (CA)	20	
End Semester		50

\*CA – Can be Quizzes, Assignment, Projects, and Reports.

**Syllabus****Unit 1**

## Introduction

General Introduction; Primitive man and his modes of exchange – barter system; Prehistoric and proto-historic polity and social organization.

Ancient India – up to 600 B.C.

Early India – the vedic society – the varnashramadharma – socio-political structure of the various institutions based on the four purusharthas; The structure of ancient Indian polity – Rajamandala and Cakravartins – Prajamandala; Socio-economic elements from the two great Epics – Ramayana and Mahabharata – the concept of the ideal King (Sri Rama) and the ideal state (Ramarajya) – Yudhisthira's ramarajya; Sarasvati - Sindhu civilization and India's trade links with other ancient civilizations; Towards chiefdoms and kingdoms – transformation of the polity: kingship – from gopati to bhupati; The mahajanapadas and the emergence of the srenis – states and cities of the Indo-Gangetic plain.

**Unit 2**

Classical India: 600B.C. – 1200 A.D.

The rise of Magadha, emergence of new religions – Buddhism and Jainism – and the resultant socio-economic impact; The emergence of the empire – the Mauryan Economy and Kautilya's Arthashastra; of Politics and trade – the rise of the Mercantile Community; Elements from the age of the Kushanas and the Great Guptas; India's maritime trade; Dharma at the bedrock of Indian polity – the concept of Digvijaya: dharma-vijaya, lobha-vijaya and asura-vijaya; Glimpses into the south Indian economies: political economies of the peninsula – Chalukyas, Rashtrakutas and Cholas

Medieval India: 1200 A.D. – 1720 A.D.

Advent of Islam – changes in the social institutions; Medieval India – agrarian economy, non-agricultural production and urban economy, currency system; Vijayanagara samrajya and maritime trade – the story of Indian supremacy in the Indian Ocean region; Aspects of Mughal administration and economy; The Maratha and other provincial economies.

**Unit 3**

Modern India: 1720 - 1947

the Indian market and economy before the arrival of the European traders; Colonisation and British supremacy (dismantling of everything that was 'traditional' or 'Indian') – British attitude towards Indian trade, commerce and economy and the resultant ruining of Indian economy and business – man-made famines – the signs of renaissance: banking and other business undertakings by the natives (the members of the early Tagore family, the merchants of Surat and Porbander, businessmen of Bombay, etc. may be referred to here) – the evolution of the modern banking system; Glimpses into British administration of India and administrative models; The National movement and nationalist undertakings in business and industry: the Tatas and the Birlas; Modern India: the growth of large-scale industry – irrigation and railways – money and credit – foreign trade; Towards partition – birth of two new nations – division of property; The writing of the Indian Constitution – India becomes a democratic republic – a new polity is in place.

Independent India – from 1947

India since Independence – the saga of socio-political movements; Indian economy since Independence – the fiscal system – the five year plans – liberalisation – the GATT and after; Globalisation and Indian economy; Impact of science and (new/ emerging) technology on Indian economy; Histories of select Indian business houses and business entrepreneurship.

Conclusion

**REFERENCES:**

1. *The Cultural Heritage of India. Kolkata: Ramakrishna Mission Institute of Culture. Kautilya. Arthashastra.*

2. Altekar, A. S. *State and Government in Ancient India*. New Delhi: Motilal Banarsidass.
3. Sircar, D. C. *Studies in the Political and Administrative Systems in Ancient and Medieval Times*. New Delhi: Motilal Banarsidass.
4. Dutt, R. C. *The Economic History of India*. London, 1902.
5. Dharampal. *Collected Works (Volumes IV & V)*.
6. Dharampal. *Archival Compilations (unpublished)*.
7. Bajaj, Jitendra & M. D. Srinivas. *Indian Economy and Polity*. Chennai: Centre for Policy Studies.
8. Bajaj, Jitendra & M. D. Srinivas. *Timeless India, Resurgent India*. Chennai: Centre for Policy Studies.
9. Joshi, Murli Manohar. *Science, Sustainability and Indian National Resurgence*. Chennai: Centre for Policy Studies, 2008.
10. Tripathi, Dwijendra. *The Oxford History of Indian Business*. New Delhi: Oxford University Press, 2004.
11. McGuire, John, et al, eds. *Evolution of World Economy, Precious Metals and India*. New Delhi: Oxford University Press, 2001.
12. Tripathi, Dwijendra and Jyoti Jumani. *The Concise Oxford History of Indian Business*. New Delhi: Oxford University Press, 2007.
13. Kudaisya, Medha M. *The Life and Times of G. D. Birla*. New Delhi: Oxford University Press, 2003.
14. Raychaudhuri, Tapan and Irfan Haib, eds. *The Cambridge Economic History of India. Volume*
15. *New Delhi: Orient Longman, 2004.*
16. Kumar, Dharma, ed. *The Cambridge Economic History of India. Volume 2*. New Delhi: Orient Longman, 2005.
17. Sabavala, S. A. and R. M. Lala, eds. *J. R. D. Tata: Keynote*. New Delhi: Rupa & Co., 2004.
18. Mambro, Arvind ed. *J. R. D. Tata: Letters*. New Delhi: Rupa & Co., 2004.
19. Lala, R. M., *For the Love of India: The Life and Times of Jamsetji Tata*. New Delhi: Penguin, 2006.
20. Thapar, Romila. *The Penguin History of Early India: From the Origins to AD 1300*. New Delhi Penguin, 2002.
21. Majumdar, R. C., et. al. *An Advanced History of India*. Macmillan.

#### Evaluation Pattern

Assessment	Internal	End Semester
Periodical 1 (P1)	15	
Periodical 2 (P2)	15	
*Continuous Assessment (CA)	20	
End Semester		50

\*CA – Can be Quizzes, Assignment, Projects, and Reports.

**Syllabus****Unit 1****Introduction to Health**

Health is wealth; Role of lifestyle habits on health; Importance of adolescence; Stages, Characteristics and changes during adolescence; Nutritional needs during adolescence why healthy lifestyle is important for adolescence. Eating Habits - eating disorders, skipping breakfast, junk food consumption.

*Practicals - Therapeutic Diets*

**Unit 2****Food and Nutritional Requirements during Adolescence**

Fluid intake; nutrition related problems; lifestyle related problems, Role of physical activity; resting pattern and postures, Personal habits – alcoholism, and other tobacco products, electronic addiction etc

*Practicals - Ethnic Foods*

**Unit 3****Need for a Positive Life Style Change**

Peer pressure & procrastination, Stress, depression, suicidal tendency, Mini project review and viva, Whole portions revision.

*Practical - Cooking without Fire or Wire-healthy Snacks*

**TEXTBOOKS:**

1. B. Srilakshmi, "Dietetics", New age international (P) ltd, publishers, 2010.
2. "Nutrient requirement and Recommended Dietary Allowances for Indians", published by Indian Council of Medical Research, ICMR, 2010.

**REFERENCE BOOKS:**

1. K Park "Textbook of preventive and social medicine", 2010.
2. WHO Report on Adolescent Health: 2010

**Evaluation Pattern**

Assessment	Internal	End Semester
Periodical 1 (P1)	15	
Periodical 2 (P2)	15	
*Continuous Assessment (CA)	20	
End Semester		50

\*CA – Can be Quizzes, Assignment, Projects, and Reports.

**Syllabus****Unit 1**

Introductory study of the Bhagavad Gita and the Upanishads.

**Unit 2**

The relevance of these classics in a modern age.

**Unit 3**

Goals of human life - existential problems and their solutions in the light of these classics etc.

**REFERENCE:**

*The Bhagavad Gita, Commentary by Swami Chinmayananda*

**Evaluation Pattern**

Assessment	Internal	End Semester
Periodical 1 (P1)	15	
Periodical 2 (P2)	15	
*Continuous Assessment (CA)	20	
End Semester		50

\*CA – Can be Quizzes, Assignment, Projects, and Reports.



**PREAMBLE:**

This paper will introduce the students to the multiple dimensions of the contribution of India to the fields of philosophy, art, literature, physical and social sciences. The paper intends to give an insight to the students about the far-reaching contributions of India to world culture and thought during the course of its long journey from the hoary antiquity to the present times. Every nation takes pride in its achievements and it is this sense of pride and reverence towards the achievements that lays the foundation for its all-round progress.

**Syllabus****Unit 1**

A brief outline of Indian history from prehistoric times to the present times.

Contributions of India to world culture and civilization: Indian Philosophy and Religion; Art and Literature; Physical and Social Sciences.

**Unit 2**

Modern India: Challenges and Possibilities.

Scientific and technological progress in post-independence era; Socio-cultural and political movements after independence; Challenges before the nation today - unemployment – corruption – degradation of cultural and moral values - creation of a new system of education; Creation of a modern and vibrant society rooted in traditional values.

**Unit 3**

Modern Indian Writing in English: Trends in Contemporary Indian Literature in English.

**TEXTBOOK:**

*Material given by the Faculty*

**BACKGROUND LITERATURE:**

1. *Selections from The Cultural Heritage of India, 6 volumes, Ramakrishna Mission Institute of Culture (Kolkata) publication.*
2. *Selections from the Complete Works of Swami Vivekananda, Advaita Ashrama publication.*
3. *Invitations to Indian Philosophy, T. M. P. Mahadevan, University of Madras, Chennai.*
4. *Outlines of Indian Philosophy, M. Hiriyanna, MLBD.*
5. *An Advanced History of India, R. C. Majumdar et al, Macmillan.*
6. *India Since 1526, V. D. Mahajan, S. Chand & Company*
7. *The Indian Renaissance, Sri Aurobindo.*
8. *India's Rebirth, Sri Aurobindo.*
9. *On Nationalism, Sri Aurobindo.*
10. *The Story of Civilization, Volume I: Our Oriental Heritage, Will Durant, Simon and Schuster, New York.*
11. *Eternal Values for a Changing Society, Swami Ranganathananda, Bharatiya Vidya Bhavan.*
12. *Universal Message of the Bhagavad Gita, Swami Ranganathananda, Advaita Ashrama.*
13. *Awaken Children: Conversations with Mata Amritanandamayi*
14. *Indian Aesthetics, V. S. Seturaman, Macmillan.*
15. *Indian Philosophy of Beauty, T. P. Ramachandran, University of Madras, Chennai.*
16. *Web of Indian Thought, Sister Nivedita*
17. *Essays on Indian Nationalism, Anand Kumaraswamy*
18. *Comparative Aesthetics, Volume 2, Kanti Chandra Pandey, Chowkhamba, Varanasi*
19. *The Invasion That Never Was, Michel Danino*
20. *Samskara, U. R. Ananthamurthy, OUP.*
21. *Hayavadana, Girish Karnard, OUP.*

22. *Naga-Mandala, Girish Karnard, OUP.*

**Evaluation Pattern**

Assessment	Internal	End Semester
Periodical 1 (P1)	15	
Periodical 2 (P2)	15	
*Continuous Assessment (CA)	20	
End Semester		50

\*CA – Can be Quizzes, Assignment, Projects, and Reports.

**OBJECTIVES:**

To familiarize students with Sanskrit language; to introduce students to various knowledge traditions in Sanskrit; to help students appreciate and imbibe India's ancient culture and values.

**Syllabus****Unit 1**

Sanskrit Language – Vakya Vyavahara (प्रथमादीक्षा) - Introduction to Sanskrit language - Devanagari script and Sanskrit alphabet - Vowels and Consonants – Pronunciation - Classification of Consonants – Samyukthakshara Words – Nouns and Verbs - Cases – Introduction to Numbers and Time – Verbs: Singular, Dual and Plural – SarvaNamas: First Person, Second Person, Third Person – Tenses: Past, Present and Future -Words for Communication – Selected Slokas – MoralStories – Subhashithas – Riddles.

**Unit 2**

Language Studies - Role of Sanskrit in Indian & World Languages.

**Unit 3**

Introduction to Sanskrit Classical Literature – KavyaTradition – Drama Tradition - Stotra Tradition – Panchatantra Stories.

**Unit 4**

Introduction to Sanskrit Technical Literature – Astronomy – Physics – Chemistry – Botany – Engineering – Aeronautics – Ayurveda – Mathematics – Medicine – Architecture - Tradition of Indian Art – Administration – Agriculture.

**Unit 5**

Indology Studies – Perspectives and Innovations.

**TEXTBOOKS AND REFERENCE BOOKS:**

1. *Vakya Vyavahara- Prof. Vempaty Kutumba Sastri, Rashtriya Sanskrit Sansthan, New Delhi*
2. *The Wonder that is Sanskrit - Dr.Sampadananda Mishra, New Delhi*
3. *Science in Sanskrit – Samskritha Bharathi, NewDelhi*

**Evaluation Pattern**

Assessment	Internal	End Semester
Periodical 1 (P1)	15	
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*Continuous Assessment (CA)	20	
End Semester		50

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**Syllabus****Unit 1**

Introduction to Basic Concepts of NSS: History, philosophy, aims and objectives of NSS, Emblem, flag, motto, song, badge etc., Organisational structure, roles and responsibilities of various NSS functionaries.

NSS Programmes and Activities: Concept of regular activities, special campaigning, Day Camps, Basis of adoption of village / slums, methodology of conducting survey, financial pattern of the scheme, other youth programme/schemes of GOI, Coordination with different agencies, Maintenance of the Diary.

**Unit 2**

Volunteerism and Shramdan: Indian Tradition of volunteerism, Needs and importance of volunteerism, Motivation and Constraints of volunteerism, Shramdan as part of volunteerism, Amalabharatam Campaign, Swatch Bharath.

**Unit 3**

Understanding youth: Definition, profile and categories of youth, Issues, challenges and opportunities for youth, Youth as an agent of social change.

Youth and Yoga: History, philosophy and concept of Yoga, Myths and misconceptions about Yoga, Different Yoga traditions and their impacts, Yoga as a preventive and curative method, Yoga as a tool for healthy life style

**Unit 4**

Youth Development Programmes in India: National Youth Policy, Youth development programmes at the national level, state level and voluntary sector, youth-focused and youth-led organizations.

Youth and Crime: Sociological and psychological factors influencing youth crime, Peer mentoring in preventing crimes, Awareness about Anti-Ragging, Cyber Crime and its prevention, Juvenile Justice.

**Unit 5**

Environmental Issues: Environment conservation, enrichment and sustainability, climate change, waste management, rain water harvesting, energy conservation, waste land development.

Project Work / Practical

**Evaluation Pattern**

Assessment	Internal	End Semester
Periodical 1 (P1)	15	
Periodical 2 (P2)	15	
*Continuous Assessment (CA)	20	
End Semester		50

\*CA – Can be Quizzes, Assignment, Projects, and Reports.

**Course Objectives**

1. To help students acquire the basic knowledge of behavior and effective living
2. To create an awareness of the hazards of health compromising behaviours
3. To develop and strengthen the tools required to handle the adversities of life

**Course Outcome**

CO 1: Understand the basic concepts of Behavioral Psychology

CO 2: Demonstrate self reflective skills through activities

CO 3: Apply the knowledge of psychology to relieve stress

CO 4: Analyse the adverse effects of health compromising behaviours.

CO 5: Evaluate and use guided techniques to overcome and cope with stress related problems.

**CO-PO Mapping**

PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO												
CO1						1						1
CO2						2	3		3	3		
CO3						3	3	2	1		3	2
CO4						2	2	3				1
CO5						1	2				1	1

**Syllabus****Unit 1****Self-Awareness & Self-Motivation**

Self analysis through SWOT, Johari Window, Maslow's hierarchy of motivation, importance of self esteem and enhancement of self esteem.

**Unit 2****The Nature and Coping of Stress**

Conflict, Relationship issues, PTSD. Stress – stressors – eustress - distress, coping with stress, stress management techniques.

**Unit 3****Application of Health Psychology**

Health compromising behaviours, substance abuse and addiction.

**TEXTBOOKS:**

1. V. D. Swaminathan & K. V. Kaliappan "Psychology for effective living - An introduction to Health
2. Psychology. 2nd edition Robert J. Gatchel, Andrew Baum & David S. Krantz, McGraw Hill.

**REFERENCE BOOKS:**

1. S. Sunder, 'Textbook of Rehabilitation', 2nd edition, Jaypee Brothers, New Delhi. 2002.
2. Weiben & Lloyd, 'Psychology applied to Modern Life', Thompson Learning, Asia Ltd.2004.

**Evaluation Pattern**

Assessment	Internal	End Semester
Periodical 1 (P1)	15	
Periodical 2 (P2)	15	
*Continuous Assessment (CA)	20	
End Semester		50

\*CA – Can be Quizzes, Assignment, Projects, and Reports.

**Course Objectives:**

1. To strengthen the fundamental knowledge of human behavior
2. To strengthen the ability to understand the basic nature and behavior of humans in organizations as a whole
3. To connect the concepts of psychology to personal and professional life

**Course Outcome**

- CO 1: Understand the fundamental processes underlying human behavior such as learning, motivation, individual differences, intelligence and personality.
- CO 2: Apply the principles of psychology in day- to- day life for a better understanding of oneself and others.
- CO 3: Apply the knowledge of Psychology to improve study skills and learning methods
- CO 4: Apply the concepts of defense mechanisms to safeguard against abusive relationships and to nurture healthy relationships.

**CO-PO Mapping**

PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO												
CO1						3	3		3	2		1
CO2						3	3	2	3	3	1	2
CO3										2	1	
CO4							3		2	2		2

**Syllabus****Unit 1**

Psychology of Adolescents: Adolescence and its characteristics.

**Unit 2**

Learning, Memory & Study Skills: Definitions, types, principles of reinforcement, techniques for improving study skills, Mnemonics.

**Unit 3**

Attention & Perception: Definition, types of attention, perception.

**TEXTBOOKS:**

1. S. K. Mangal, "General Psychology", Sterling Publishers Pvt. Ltd.2007
2. Baron A. Robert, "Psychology", Prentice Hall of India. New Delhi 2001

**REFERENCE BOOKS:**

1. Elizabeth B. Hurlock, *Developmental Psychology - A life span approach*, 6th edition.
2. Feldman, *Understanding Psychology*, McGraw Hill, 2000.
3. Clifford Morgan, Richard King, John Scholper, "Introduction to Psychology", Tata Mcgraw Hill, Pvt Ltd 2004.

**Evaluation Pattern**

Assessment	Internal	End Semester
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Periodical 2 (P2)	15	
*Continuous Assessment (CA)	20	
End Semester		50

\*CA – Can be Quizzes, Assignment, Projects, and Reports.



**Syllabus****Unit 1**

## Introduction

Western and Indian views of science and technology

Introduction; Francis Bacon: the first philosopher of modern science; The Indian tradition in science and technology: an overview.

**Unit 2**

## Indian sciences

Introduction; Ancient Indian medicine: towards an unbiased perspective; Indian approach to logic; The methodology of Indian mathematics; Revision of the traditional Indian planetary model by Nilakantha Somasutvan in circa 1500 AD

## Science and technology under the British rule

Introduction; Indian agriculture before modernization; The story of modern forestry in India; The building of New Delhi

**Unit 3**

## Science and technology in Independent India

Introduction; An assessment of traditional and modern energy resources; Green revolution: a historical perspective; Impact of modernisation on milk and oilseeds economy; Planning without the spirit and the determination.

## Building upon the Indian tradition

Introduction; Regeneration of Indian national resources; Annamahatmyam and Annam Bahu Kurvita: recollecting the classical Indian discipline of growing and sharing food in plenty and regeneration of Indian agriculture to ensure food for all in plenty.

## Conclusion

**REFERENCES:**

1. Joseph, George Gheverghese. *The Crest of the Peacock: Non-European Roots of Mathematics*. London: Penguin (UK), 2003.
2. Iyengar, C. N. Srinivasa. *History of Hindu Mathematics*. Lahore: 1935, 1938 (2 Parts).
3. Amma, T. A. Saraswati. *Geometry in Ancient and Medieval India*. Varanasi: Motilal Banarsidass, 1979.
4. Bag, A. K. *Mathematics in Ancient and Medieval India*. Varanasi: Motilal Banarsidass, 1979.
5. Sarma K. V. & B. V. Subbarayappa. *Indian Astronomy: A Source-Book*. Bombay: Nehru Centre, 1985.
6. Sriram, M. S. et. al. eds. *500 Years of Tantrasangraha: A Landmark in the History of Astronomy*. Shimla: Indian Institute of Advanced Study, 2002.
7. Bajaj, Jitendra & M. D. Srinivas. *Restoring the Abundance: Regeneration of Indian Agriculture to Ensure Food for All in Plenty*. Shimla: Indian Institute of Advanced Study, 2001.
8. Bajaj, Jitendra ed. *Report of the Seminar on Food for All: The Classical Indian Discipline of Growing and Sharing Food in Plenty*. Chennai: Centre for Policy Studies, 2001.
9. Bajaj, Jitendra & M. D. Srinivas. *Annam Bahu Kurvita: Recollecting the Indian Discipline of Growing and Sharing Food in Plenty*. Madras: Centre for Policy Studies, 1996.
10. Parameswaran, S. *The Golden Age of Indian Mathematics*. Kochi: Swadeshi Science Movement.
11. Somayaji, D. A. *A Critical Study of Ancient Hindu Astronomy*. Dharwar: 1972.
12. Sen, S. N. & K. V. Sarma eds. *A History of Indian Astronomy*. New Delhi, 1985.
13. Rao, S. Balachandra. *Indian Astronomy: An Introduction*. Hyderabad: Universities Press, 2000.
14. Bose, D. M. et. al. *A Concise History of Science in India*. New Delhi: 1971.
15. Bajaj, Jitendra & M. D. Srinivas. *Indian Economy and Polity*. Chennai: Centre for Policy Studies.

16. Bajaj, Jitendra & M. D. Srinivas. *Timeless India, Resurgent India*. Chennai: Centre for Policy Studies.
17. Joshi, Murlī Manohar. *Science, Sustainability and Indian National Resurgence*. Chennai: Centre for Policy Studies, 2008.
18. *The Cultural Heritage of India*. Kolkata: Ramakrishna Mission Institute of Culture.

*\* The syllabus and the study material in use herein has been developed out of a 'summer programme' offered by the Centre for Policy Studies (CPS), Chennai at the Indian Institute of Advanced Study (IIAS), Rashtrapati Nivas, Shimla, sometime ago. The same has been very kindly made available to us by Professors Dr M.D. Srinivas (Chairman) and Dr J.K. Bajaj (Director) of the CPS.*

#### **Evaluation Pattern**

Assessment	Internal	End Semester
Periodical 1 (P1)	15	
Periodical 2 (P2)	15	
*Continuous Assessment (CA)	20	
End Semester		50

\*CA – Can be Quizzes, Assignment, Projects, and Reports.

**Syllabus****Unit 1**

Introduction: Relevance of Bhagavad Gita today – Background of Mahabharatha.

ArjunaVishada Yoga: Arjuna's Anguish and Confusion – Symbolism of Arjuna's Chariot.

Sankhya Yoga: Importance of Self-knowledge – Deathlessness: Indestructibility of Consciousness – Being Established in Wisdom – Qualities of a Sthita-prajna.

**Unit 2**

Karma Yoga: Yoga of Action – Living in the Present – Dedicated Action without Anxiety over Results - Concept of Swadharma.

Dhyana Yoga: Tuning the Mind – Quantity, Quality and Direction of Thoughts – Reaching Inner Silence.

**Unit 3**

Bhakti Yoga: Yoga of Devotion – Form and Formless Aspects of the Divine – Inner Qualities of a True Devotee.

GunatrayaVibhaga Yoga: Dynamics of the Three Gunas: Tamas, Rajas, Sattva – Going Beyond the Three Gunas – Description of a Gunatheetha.

**TEXTBOOKS / REFERENCES:**

1. Swami Chinmayananda, *"The Holy Geeta"*, Central Chinmaya Mission Trust, 2002.
2. Swami Chinmayananda, *"A Manual of Self Unfoldment"*, Central Chinmaya Mission Trust, 2001.

**Evaluation Pattern**

Assessment	Internal	End Semester
Periodical 1 (P1)	15	
Periodical 2 (P2)	15	
*Continuous Assessment (CA)	20	
End Semester		50

\*CA – Can be Quizzes, Assignment, Projects, and Reports.

**OBJECTIVES:**

To give students an introduction to the basic ideas contained in the Upanishads; and explores how their message can be applied in daily life for achieving excellence.

**Syllabus****Unit 1**

An Introduction to the Principal Upanishads and the Bhagavad Gita - Inquiry into the mystery of nature - Sruti versus Smrti - Sanatana Dharma: its uniqueness - The Upanishads and Indian Culture - Upanishads and Modern Science.

**Unit 2**

The challenge of human experience & problems discussed in the Upanishads – the True nature of Man – the Moving power of the Spirit – The Message of Fearlessness – Universal Man - The central problems of the Upanishads – Ultimate reality – the nature of Atman - the different manifestations of consciousness.

**Unit 3**

Upanishad Personalities - episodes from their lives and essential teachings: Yajnavalkya, Aruni, Uddalaka, Pippalada, Satyakama Jabala, Svetaketu, Nachiketas, Upakosala, Chakrayana Ushasti, Raikva, Kapila and Janaka. Important verses from Upanishads - Discussion of Sage Pippalada's answers to the six questions in Prasnopanishad.

**REFERENCES:**

1. *The Message of the Upanishads* by Swami Ranganathananda, Bharatiya Vidya Bhavan
2. *Eight Upanishads with the commentary of Sankaracharya*, Advaita Ashrama
3. *Indian Philosophy* by Dr. S. Radhakrishnan, Oxford University Press
4. *Essentials of Upanishads* by R L Kashyap, SAKSI, Bangalore
5. *Upanishads in Daily Life*, Sri Ramakrishna Math, Mylapore.
6. *Eternal stories of the Upanishads* by Thomas Egenes and Kumuda Reddy
7. *Upanishad Ganga series – Chinmaya Creations*

**Evaluation Pattern**

Assessment	Internal	End Semester
Periodical 1 (P1)	15	
Periodical 2 (P2)	15	
*Continuous Assessment (CA)	20	
End Semester		50

\*CA – Can be Quizzes, Assignment, Projects, and Reports.

**Course Objectives:**

- To introduce the significance of food, nutrients, locally available food resources, synergic food combinations, good cooking methods and importance of diversity in foods
- To understand nutritional imbalances and chronic diseases associated with the quality of food.
- To gain awareness about the quality of food - Organic food, genetically modified food, adulterated food, allergic food, , food poisoning and food safety.
- To understand food preservation processing, packaging and the use of additives.

**Course Outcome:**

CO1: Acquire knowledge about the various food and food groups

CO2: Understand nutritional imbalances and chronic diseases prevailing among different age groups.

CO3: Understand the significance of safe food and apply the food safety standards

CO4: Demonstrate skills of food processing, preservation and packaging methods with or without additives

CO5: Evaluate the quality of food based on the theoretical knowledge of Food and Nutrition

**CO-PO Mapping:**

PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO												
CO 1		1	1			1	2	1	1	1	1	3
CO 2		1	1			1	1	1	1	1	1	3
CO 3		1	1			1	1	1	1	1	1	3
CO 4		1	1			1	1	1	1	1	1	3
CO 5		1	1			1	2	1	2	1	1	3

**Syllabus****Unit 1****Food and Food Groups**

Introduction to foods, food groups, locally available foods, Nutrients, Cooking methods, Synergy between foods, Science behind foods, Food allergies, food poisoning, food safety standards.

*Cookery Practicals - Balanced Diet*

**Unit 2****Nutrients and Nutrition**

Nutrition through life cycle, RDA, Nutrition in disease, Adulteration of foods & Food additives, Packaging and labeling of foods.

*Practicals - Traditional Foods*

**Unit 3****Introduction to Food Biotechnology**

Future foods - Organic foods and genetically modified foods, Fortification of food value addition of foods, functional foods, Nutraceuticals, supplementary foods, Processing and preservation of foods, applications of food

technology in daily life, and your prospects associated with food industry – Nanoparticles, biosensors, advanced research.

*Practicals - Value added foods*

**TEXTBOOKS:**

1. *N. Shakuntalamanay, M. Shadaksharaswamy, "Food Facts and principles", New age international (P) ltd, publishers, 2005.*
2. *B. Srilakshmi, "Dietetics", New age international (P) ltd, publishers, 2010.*

**REFERENCE BOOKS:**

1. *B. Srilakshmi, "Food Science", New age international (P) ltd, publishers, 2008.*
2. *"Nutrient requirement and Recommended Dietary Allowances for Indians", published by Indian Council of Medical Research, ICMR, 2010.*

**Evaluation Pattern**

Assessment	Internal	End Semester
Periodical 1 (P1)	15	
Periodical 2 (P2)	15	
*Continuous Assessment (CA)	20	
End Semester		50

\*CA – Can be Quizzes, Assignment, Projects, and Reports.

**Syllabus**

This paper will introduce the basics of Japanese language. Students will be taught the language through various activities like writing, reading, singing songs, showing Japanese movies etc. Moreover this paper intends to give a thorough knowledge on Japanese scripts that is Hiragana and Katakana. Classes will be conducted throughout in Japanese class only. Students will be able to make conversations with each other in Japanese. Students can make self-introduction and will be able to write letters in Japanese. All the students will be given a text on Japanese verbs and tenses.

Students can know about the Japanese culture and the lifestyle. Calligraphy is also a part of this paper. Informal sessions will be conducted occasionally, in which students can sing Japanese songs, watch Japanese movies, do Origami – pattern making using paper.

**Evaluation Pattern**

Assessment	Internal	End Semester
Periodical 1 (P1)	15	
Periodical 2 (P2)	15	
*Continuous Assessment (CA)	20	
End Semester		50

\*CA – Can be Quizzes, Assignment, Projects, and Reports.

**Syllabus**

Students will be taught the third and the most commonly used Japanese script, Kanji. Students will be taught to write as well as speak.

Students will be given detailed lectures on Calligraphy.

This version of the course includes a new project where the students should make a short movie in Japanese language selecting their own topics.

By the end of the semester they the students will master the subject in all means. They will be able to speak Japanese as fluently as they speak English. Students will be encouraged to write stories and songs in Japanese language themselves.

**Evaluation Pattern**

Assessment	Internal	End Semester
Periodical 1 (P1)	15	
Periodical 2 (P2)	15	
*Continuous Assessment (CA)	20	
End Semester		50

\*CA – Can be Quizzes, Assignment, Projects, and Reports.



**OBJECTIVES:**

To enable the students to acquire basic skills in functional language; to develop independent reading skills and reading for appreciating literary works; to analyse language in context to gain an understanding of vocabulary, spelling, punctuation and speech.

**Syllabus****Unit 1**

Adalitha Kannada: bhashe, swaroompa, belavanigeya kiru parichaya Paaribhaashika padagalu  
Vocabulary Building

**Unit 2**

Prabhandha – Vyaaghra Geethe - A. N. Murthy Rao

Prabhandha – Baredidi...baredidi, Baduku mugiyuvudilla allige...- Nemi Chandra Paragraph writing –  
Development: comparison, definition, cause & effect Essay – Descriptive & Narrative

**Unit 3**

Mochi – Bharateepriya

Mosarina Mangamma – Maasti Venkatesh Iyengar Kamalaapurada Hotelnalli – Panje Mangesh Rao Kaanike – B. M. Shree

Geleyanobbanige bareda Kaagada – Dr. G. S. Shivarudrappa Moodala Mane – Da. Ra. Bendre  
Swathantryada Hanate – K. S. Nissaar Ahmed

**Unit 4**

Letter Writing - Personal: Congratulation, thanks giving, invitation, condolence

**Unit 5**

Reading Comprehension; nudigattu, gaadegalu Speaking Skills: Prepared speech, pick and speak

**REFERENCES:**

1. H. S. Krishna Swami Iyengar – Adalitha Kannada – Chetana Publication, Mysuru
2. N. Murthy Rao – Aleyuva Mana – Kuvempu Kannada Adyayana Samste
3. Nemi Chandra – Badhuku Badalisabahudu – Navakarnataka Publication
4. Sanna Kathegalu - Prasaraanga, Mysuru University, Mysuru
5. B. M. Shree – Kannadada Bavuta – Kannada Sahitya Parishattu
6. K. S. Nissar Ahmed – 75 Bhaavageetegalu – Sapna Book House (P) Ltd.
7. Dr. G. S. Shivarudrappa – Samagra Kavya – Kamadhenu Pustaka Bhavana

**Evaluation Pattern**

Assessment	Internal	End Semester
Periodical 1 (P1)	15	
Periodical 2 (P2)	15	
*Continuous Assessment (CA)	20	
End Semester		50

\*CA – Can be Quizzes, Assignment, Projects, and Reports.

**OBJECTIVES:**

To enable the students to acquire basic skills in functional language; to develop independent reading skills and reading for appreciating literary works; to develop functional and creative skills in language; to enable the students to plan, draft, edit & present a piece of writing.

**Syllabus****Unit 1**

Official Correspondence: Adhikrutha patra, prakatane, manavi patra, vanijya patra

**Unit 2**

Nanna Hanate - Dr. G. S. Shivarudrappa

Mankuthimmana Kaggada Ayda bhagagalu – D. V. Gundappa (Padya Sankhye 5, 20, 22, 23, 25, 44, 344, 345, 346, 601)

Ella Marethiruvaga - K. S. Nissar Ahmed Saviraru Nadigalu – S Siddalingayya

**Unit 3**

Sayo Aata – Da. Ra. Bendre

**Unit 4**

Sarva Sollegala turtu Maha Samelana - Beechi Swarthakkaagi Tyaga - Beechi

**Unit 5**

Essay writing: Argumentative & Analytical Précis writing

**REFERENCES:**

1. H. S. Krishnaswami Iyengar – Adalitha Kannada – Chetan Publication, Mysuru
2. Dr. G. S. Shivarudrappa – Samagra Kavya. - Kamadhenu Pustaka Bhavana
3. Shrikanth - Mankuthimmana Kaggada – Taatparya – Sri Ranga Printers & Binders
4. K. S. Nissar Ahmed – 75 Bhaavageetegalu – Sapna book house
5. Dr. Da. Ra. Bendre – Saayo Aata – Shri Maata Publication
6. Beechi – Sahukara Subbamma – Sahitya Prakashana

**Evaluation Pattern**

Assessment	Internal	End Semester
Periodical 1 (P1)	15	
Periodical 2 (P2)	15	
*Continuous Assessment (CA)	20	
End Semester		50

\*CA – Can be Quizzes, Assignment, Projects, and Reports.

**Course Objectives:**

To appreciate the aesthetics & cultural implications; to enhance creative thinking in mother-tongue; to learn our culture & values; to equip students read & write correct Malayalam; to correct the mistakes in pronunciation; to create awareness that good language is the sign of complete personality

**Course Outcome:**

After the completion of the course the student will be able to:

- CO1: Understand and inculcate philosophical thoughts and practices  
 CO2: Understand and appreciate the post modern trends of literature.  
 CO3: Analyse the literary texts and comprehend the cultural diversity of Kerala  
 CO4: Distinguish the different genres in Malayalam literature  
 CO5: Demonstrate the ability to effectively communicate in Malayalam

**CO-PO Mapping:**

PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO												
CO1	-	-	-	-	-	-	-	-	2	3	-	-
CO2	-	-	-	-	-	-	-	-	2	3	-	-
CO3	-	-	-	-	-	-	-	-	2	3	-	-
CO4	-	-	-	-	-	-	-	-	-	3	-	-
CO5	-	-	-	-	-	-	-	-	1	1	-	-

**Syllabus****Unit 1**

Ancient poet trio: Adhyatmaramayanam,  
 Lakshmana Swanthanam (valsa soumitre... mungikidakayal), Ezhuthachan - Medieval period classics –  
 Jnanappana (kalaminnu... vilasangalingane), Poonthanam

**Unit 2**

Modern Poet trio: Ente Gurunathan, Vallathol Narayana Menon - Critical analysis of the poem.

**Unit 3**

Short stories from period 1/2/3, Poovanpazham - Vaikaom Muhammed Basheer - Literary & Cultural figures of Kerala and about their literary contributions.

**Unit 4**

Literary Criticism: Ithihasa studies - Bharatha Paryadanam - Vyasante Chiri - Kuttikrishna Mararu - Outline of literary Criticism in Malayalam Literature - Introduction to Kutti Krishna Mararu & his outlook towards literature & life.

**Unit 5**

Error-free Malayalam: 1. Language; 2. Clarity of expression; 3. Punctuation – Thettillatha Malayalam

Writing - a. Expansion of ideas; b .Precis Writing; c. Essay Writing; d. Letter writing; e. Radio Speech; f. Script / Feature / Script Writing; g. News Editing; h. Advertising; i. Editing; j. Editorial Writing; k. Critical appreciation of literary works (Any one or two as an assignment).

**REFERENCES:**

1. P. K. Balakrishnanan, *Thunjan padhanangal*, D. C. Books, 2007.
2. G. Balakrishnan Nair, *Jnanappanayum Harinama Keerthanavum*, N. B. S, 2005.
3. M. N. Karasseri, *Basheerinte Poonkavanam*, D. C. Books, 2008.
4. M. N. Vijayan, *Marubhoomikal Pookkumbol*, D. C. Books, 2010.
5. M. Thomas Mathew, *Lavanyanubhavathinte Yukthisasthram*, National Book Stall, 2009.
6. M. Leelavathy, *Kavitha Sahityacharitram*, National Book Stall, 1998.
7. Thayattu Sankaran, *Vallathol Kavithapadhanam*, D. C. Books, 2004.

**Evaluation Pattern**

Assessment	Internal	End Semester
Periodical 1 (P1)	15	
Periodical 2 (P2)	15	
*Continuous Assessment (CA)	20	
End Semester		50

\*CA – Can be Quizzes, Assignment, Projects, and Reports.

**OBJECTIVES:**

To appreciate the aesthetics & cultural implications; to enhance creative thinking in mother-tongue; to learn our culture & values; to equip students read & write correct Malayalam; to correct the mistakes in pronunciation; to create awareness that good language is the sign of complete personality.

**Course Outcome:**

After the completion of the course the student will be able to:

- CO1: Understand the different cultural influences in linguistic translation  
 CO2: Identify and appreciate the Romantic elements of modern literature  
 CO3: Analyze the genre of autobiographical writing  
 CO4: Critically evaluate the significance of historical, political and socio cultural aspects in literature  
 CO5: Demonstrate good writing skills in Malayalam

**CO-PO Mapping:**

PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO												
CO1	-	-	-	-	-	-	-	-	2	3	-	-
CO2	-	-	-	-	-	-	-	-	2	3	-	-
CO3	-	-	-	-	-	-	-	-	2	3	-	-
CO4	-	-	-	-	-	-	-	-	-	3	-	-
CO5	-	-	-	-	-	-	-	-	1	1	-	-

**Syllabus****Unit 1**

Ancient poet trio: Kalayanasougandhikam, (kallum marangalun... namukkennarika vrikodara) Kunjan Nambiar - Critical analysis of his poetry - Ancient Drama: Kerala Sakunthalam (Act 1), Kalidasan (Translated by Attor Krishna Pisharody).

**Unit 2**

Modern / romantic / contemporary poetry: Manaswini, Changampuzha Krishna Pillai – Romanticism – modernism.

**Unit 3**

Anthology of short stories from period 3/4/5: Ninte Ormmayku, M. T. Vasudevan Nair - literary contributions of his time

**Unit 4**

Part of an autobiography / travelogue: Kannerum Kinavum, V. T. Bhattathirippadu - Socio-cultural literature - historical importance.

**Unit 5**

Error-free Malayalam - 1. Language; 2. Clarity of expression; 3. Punctuation - Thettillatha Malayalam

Writing - a. Expansion of ideas; b. Précis Writing ; c. Essay Writing; d. Letter writing; e. Radio Speech; f. Script / Feature / Script Writing; g. News Editing; h. Advertising; i. Editing; j. Editorial Writing; k. Critical appreciation of literary works (Any one or two as an assignment).

**REFERENCES:**

1. *Narayana Pillai. P. K, Sahitya Panchanan. Vimarsanathrayam, Kerala Sahitya Academy, 2000*
2. *Sankunni Nair. M. P, Chathravum Chamaravum, D. C. Books, 2010.*
3. *Gupthan Nair. S, Asthiyude Pookkal, D. C Books. 2005*
4. *Panmana Ramachandran Nair, Thettillatha Malayalam, Sariyum thettum etc., D. C. Book, 2006.*
5. *M. Achuthan, Cherukatha-Innale, innu, National Book Stall, 1998.*
6. *N. Krishna Pillai, Kairaliyude Katha, National Book Stall, 2001.*

**Evaluation Pattern**

Assessment	Internal	End Semester
Periodical 1 (P1)	15	
Periodical 2 (P2)	15	
*Continuous Assessment (CA)	20	
End Semester		50

\*CA – Can be Quizzes, Assignment, Projects, and Reports.

**OBJECTIVES:**

To familiarize students with Sanskrit language and literature; to enable them to read and understand Sanskrit verses and sentences; to help them acquire expertise for self- study of Sanskrit texts and communication in Sanskrit; to help the students imbibe values of life and Indian culture as propounded in scriptures.

**Syllabus****Unit 1**

Introduction to Sanskrit language, Devanagari script - Vowels and consonants, pronunciation, classification of consonants, conjunct consonants, words – nouns and verbs, cases – introduction, numbers, Pronouns, communicating time in Sanskrit. Practical classes in spoken Sanskrit

**Unit 2**

Verbs- Singular, Dual and plural – First person, Second person, Third person. Tenses – Past, Present and Future – Atmanepadi and Parasmaipadi-karthariprayoga

**Unit 3**

Words for communication, slokas, moral stories, subhashithas, riddles (from the books prescribed)

**Unit 4**

Selected slokas from Valmiki Ramayana, Kalidasa's works and Bhagavad Gita. Ramayana – chapter VIII - verse 5, Mahabharata - chapter 174, verse -16, Bhagavad Gita – chapter - IV verse 8, Kalidasa's Sakuntalam Act IV – verse 4

**Unit 5**

Translation of simple sentences from Sanskrit to English and vice versa.

**ESSENTIAL READING:**

1. *Praveshaha; Publisher: Samskrita bharati, Aksharam, 8th cross, 2nd phase, girinagar, Bangalore - 560 085*
2. *Sanskrit Reader I, II and III, R. S. Vadyar and Sons, Kalpathi, Palakkad*
3. *Prakriya Bhashyam written and published by Fr. John Kunnappally*
4. *Sanskrit Primer by Edward Delavan Perry, published by Ginn and Company Boston*
5. *Sabdamanjari, R. S. Vadyar and Sons, Kalpathi, Palakkad*
6. *Namalinganusasanam by Amarasimha published by Travancore Sanskrit series*
7. *Subhashita Ratna Bhandakara by Kashinath Sharma, published by Nirnayasagar press*

**Evaluation Pattern**

Assessment	Internal	End Semester
Periodical 1 (P1)	15	
Periodical 2 (P2)	15	
*Continuous Assessment (CA)	20	
End Semester		50

\*CA – Can be Quizzes, Assignment, Projects, and Reports.

**OBJECTIVES:**

To familiarize students with Sanskrit language and literature; to enable them to read and understand Sanskrit verses and sentences; to help them acquire expertise for self- study of Sanskrit texts and communication in Sanskrit; to help the students imbibe values of life and Indian culture as propounded in scriptures.

**Syllabus****Unit 1**

Seven cases, indeclinables, sentence making with indeclinables, Saptha karakas.

**Unit 2**

Ktavatu Pratyaya, Upasargas, Ktvanta, Tumunnanta, Lyabanta. Three Lakaras – brief introduction, Lot lakara.

**Unit 3**

Words and sentences for advanced communication. Slokas, moral stories (Pancatantra) Subhashitas, riddles.

**Unit 4**

Introduction to classical literature, classification of Kavyas, classification of Dramas - The five Mahakavyas, selected slokas from devotional kavyas- Bhagavad Gita – chapter - II verse 47, chapter - IV verse 7, chapter - VI verse 5, chapter - VIII verse 6, chapter - XVI verse 21, Kalidasa's Sakuntala act IV – verse 4, Isavasyopanishat 1st Mantra, Mahabharata chapter 149 verses 14 - 120, Neetisara chapter - III

**Unit 5**

Translation of paragraphs from Sanskrit to English and vice versa.

**ESSENTIAL READING:**

1. *Praveshaha; Publisher: Samskrita bharti, Aksharam, 8th cross, 2nd phase, girinagar, Bangalore -560 085*
2. *Sanskrit Reader I, II and III, R.S. Vadhyar and Sons, Kalpathi, Palakkad*
3. *Prakriya Bhashyam written and published by Fr. John Kunnappally*
4. *Sanskrit Primer by Edward Delavan Perry, published by Ginn and Company Boston*
5. *Sabdamanjari, R. S. Vadyar and Sons, Kalpathi, Palakkad*
6. *Namalinganusasanam by Amarasimha published by Travancore Sanskrit series*
7. *Subhashita Ratna Bhandakara by Kashinath Sharma, published by Nirnayasagar Press.*

**Evaluation Pattern**

Assessment	Internal	End Semester
Periodical 1 (P1)	15	
Periodical 2 (P2)	15	
*Continuous Assessment (CA)	20	
End Semester		50

\*CA – Can be Quizzes, Assignment, Projects, and Reports.



**Syllabus****Unit 1**

Understanding CSR - Evolution, importance, relevance and justification. CSR in the Indian context, corporate strategy. CSR and Indian corporate. Structure of CSR - In the Companies Act 2013 (Section 135); Rules under Section 13; CSR activities, CSR committees, CSR policy, CSR expenditure CSR reporting.

**Unit 2**

CSR Practices & Policies - CSR practices in domestic and international area; Role and contributions of voluntary organizations to CSR initiatives. Policies; Preparation of CSR policy and process of policy formulation; Government expectations, roles and responsibilities. Role of implementation agency in Section 135 of the Companies Act, 2013. Effective CSR implementation.

**Unit 3**

Project Management in CSR initiatives - Project and programme; Monitoring and evaluation of CSR Interventions. Reporting - CSR Documentation and report writing. Reporting framework, format and procedure.

**REFERENCES:**

1. *Corporate Governance, Ethics and Social Responsibility*, V Bala Chandran and V Chandrasekaran, PHI learning Private Limited, New Delhi 2011.
2. *White H. (2005) Challenges in evaluating development effectiveness: Working paper 242, Institute of Development Studies, Brighton.*
3. *UNDP (nd) Governance indicators: A users guide. Oslo: UNDP*
4. *Rao, Subbha (1996) Essentials of Human Resource Management and Industrial Relations, Mumbai, Himalaya*
5. *Rao, V. S. L. (2009) Human Resource Management, New Delhi, Excel Books,*

**Evaluation Pattern**

Assessment	Internal	End Semester
Periodical 1 (P1)	15	
Periodical 2 (P2)	15	
*Continuous Assessment (CA)	20	
End Semester		50

\*CA – Can be Quizzes, Assignment, Projects, and Reports.

## Syllabus

### Unit 1

Mental Health – concepts, definition, Bio-psycho-social model of mental health. Mental health and mental illness, characteristics of a mentally healthy individual, Signs and symptoms of mental health issues, presentation of a mentally ill person. Work place – definition, concept, prevalence of mental health issues in the work place, why invest in workplace mental health, relationship between mental health and productivity, organizational culture and mental health. Case Study, Activity.

### Unit 2

Mental Health Issues in the Workplace: Emotions, Common emotions at the workplace, Mental Health issues - Anger, Anxiety, Stress & Burnout, Depression, Addictions – Substance and Behavioural, Psychotic Disorders - Schizophrenia, Bipolar Disorder, Personality disorders. Crisis Situations - Suicidal behavior, panic attacks, reactions to traumatic events. Stigma and exclusion of affected employees. Other issues –work-life balance, Presenteeism, Harassment, Bullying, Mobbing. Mental Health First Aid - Meaning. Case Study, Activity.

### Unit 3

Strategies of Help and Care: Positive impact of work on health, Characteristics of mentally healthy workplace, Employee and employer obligations, Promoting mental health and well being- corporate social responsibility (CSR), an inclusive work environment, Training and awareness raising, managing performance, inclusive recruitment, Supporting individuals-talking about mental health, making reasonable adjustments, Resources and support for employees - Employee Assistance Programme / Provider (EAP), in house counsellor, medical practitioners, online resources and telephone support, 24 hour crisis support, assistance for colleagues and care givers, Legislations. Case Study, Activity.

## REFERENCES:

1. American Psychiatric Association. "Diagnostic and statistical manual of mental disorders: DSM-IV 4th ed." [www.terapiacognitiva.eu/dwl/dsm5/DSM-IV.pdf](http://www.terapiacognitiva.eu/dwl/dsm5/DSM-IV.pdf)
2. American Psychiatric Association. (2000) [www.ccsa.ca/Eng/KnowledgeCentre/OurDatabases/Glossary/Pages/index.aspx](http://www.ccsa.ca/Eng/KnowledgeCentre/OurDatabases/Glossary/Pages/index.aspx).
3. Canadian Mental Health Association, Ontario "Workplace mental health promotion, A how to guide" [wmhp.cmhaontario.ca/](http://wmhp.cmhaontario.ca/)
4. Alberta Health Services Mental Health Promotion. (2012). *Minding the Workplace: Tips for employees and managers together*. Calgary: Alberta Health Services. <http://www.mentalhealthpromotion.net/resources/minding-the-workplace-tips-for-employees-and-managers-together.pdf>
5. Government of Western Australia, Mental Health Commission. (2014) "Supporting good mental health in the work place." [http://www.mentalhealth.wa.gov.au/Libraries/pdf\\_docs/supporting\\_good\\_mental\\_health\\_in\\_the\\_workplace\\_1.sflb.ashx](http://www.mentalhealth.wa.gov.au/Libraries/pdf_docs/supporting_good_mental_health_in_the_workplace_1.sflb.ashx)
6. Mental Health Act 1987 (India) [www.tnhealth.org/mha.htm](http://www.tnhealth.org/mha.htm)
7. Persons with disabilities Act 1995 (India) [socialjustice.nic.in](http://socialjustice.nic.in)
8. The Factories Act 1948 (India) [www.caaa.in/Image/19ulabourlawshb.pdf](http://www.caaa.in/Image/19ulabourlawshb.pdf)

## Evaluation Pattern

Assessment	Internal	End Semester
Periodical 1 (P1)	15	
Periodical 2 (P2)	15	
*Continuous Assessment (CA)	20	
End Semester		50

\*CA – Can be Quizzes, Assignment, Projects, and Reports.

**Course Objectives:**

- To introduce the students to different literature- Sangam literature, Epics, Bhakthi literature and modern literature.
- To improve their ability to communicate with creative concepts, and also to introduce them to the usefulness of basic grammatical components in Tamil.

**Course Outcomes**

CO 1: To understand the Sangam literature

CO 2: To understand the creative literature

CO 3: To understand the literary work on religious scriptures

CO 4: To improve the communication and memory skills

CO 5: To understand the basic grammar components of Tamil language and their usage and applications.

CO 6: Understand creative writing aspects and apply them.

**CO-PO Mapping**

PO/PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO												
CO1			-	-	-	-	-	-	2	2	-	-
CO2			-	-	-	-	-	-	2	2	-	-
CO3			-	-	-	-	-	-	2	2	-	-
CO4			-	-	-	-	-	-	2	2	-	-
CO5			-	-	-	-	-	-	2	2	-	-
CO6			-	-	-	-	-	-	2	2	-	-

**Syllabus****Unit 1**

The history of Tamil literature: Nāṭṭupuraṅṅam pāṭaḷkaḷ, kataikkaḷ, paḷamoḷikaḷ - ciṅṅkataikaḷ tōṅṅamum vaḷarcciyum, ciṅṅilakkiyaṅkaḷ: Kalinṅkattup paraṅi (pōṅṅpāṅiyatu) - mukkūṅṅar paḷḷu 35.

Kāṅṅpiyaṅkaḷ: Cilappatikāṅṅam – maṅṅimēkaḷai naṅṅaiyiyal āyvu maṅṅum aimperum – aiṅṅciṅṅuṅ kāṅṅpiyaṅkaḷ toṅṅarpāṅa ceytikaḷ.

**Unit 2**

tiṅṅai ilakkiyamum nīṅṅiyilakkiyamum - paṅṅiṅṅkīḷḷkaṅṅakku nūḷkaḷ toṅṅarpāṅa piṅṅa ceytikaḷ - tirukkuraḷ (aṅṅpu, paṅṅpu, kalvi, oḷḷukkam, naṅṅpu, vāymai, kēḷvi, ceynaṅṅri, periyāṅṅaittuṅṅakkōṅṅal, viḷḷippuṅṅarvu pēṅṅra atikāṅṅarattil uḷḷa ceytikaḷ.

Aṅṅaṅṅkaḷ: Ulakanīṅṅi (1-5) – ēḷāṅṅi (1,3,6). - Cittarkaḷ: Kaṅṅuveḷi cittaṅṅ pāṅṅaḷkaḷ (āṅṅantak kaḷippu –1, 4, 6, 7, 8), maṅṅum akappēy cittaṅṅ pāṅṅaḷkaḷ (1-5).

**Unit 3**

tamiḷ ilakkaṅṅam: Vāḷḷkiya vakaikaḷ – taṅṅviṅṅai piṅṅaviṅṅai – nēṅṅkūṅṅru ayaṅṅkūṅṅru

**Unit 4**

tamiḷaka aṛiṅkalkiṅ tamiḷ toṅṭum camutāya toṅṭum: Pāratiyār, pāratitācaṅ, paṭṭukkōṭṭai kalyāṅacuntaram, curatā, cujātā, ciṛpi, mēttā, aptul rakumāṅ, na.Piccaimūrṭti, akilaṅ, kalki, ji.Yū.Pōp, vīramāmuṅivar, aṅṅā, paritimāṅ kalaiṅar, maṅaimalaiyaṭikal.

### Unit 5

tamiḷ molī āyvil kaṅiṅi payaṅpāṭu. - Karuttu parimāṅṅam - viḷampara moliyamaippu – pēccu - nāṭakam paṭaippu - ciṅkukatai, katai, puṅiṅam paṭaippu.

### Textbooks:

1. <http://Www.tamilvu.trg/libirary/libindex.htm>.
2. [http://Www.tunathamizh.tom/2013/07/blog0post\\_24.html](http://Www.tunathamizh.tom/2013/07/blog0post_24.html)
3. Mu.Varatarācaṅ “tamiḷ ilakkiya varalāṅṅu” cāhitya akāṭemi paḷḷikēṅṅaṅs, 2012
4. nā.Vāṅamāmalai “paḷaṅkataikaḷum, paḷamoḷikaḷum” niyū ceṅcuri puttaka veḷiyiṅṅakam,
5. 1980,2008
6. nā.Vāṅamāmalai, “tamiḷar nāṅṅupāṅṅalkal” niyū ceṅcuri puttaka veḷiyiṅṅakam 1964,2006
7. poṅ maṅimāṅṅaṅ “aṅṅōṅ tamiḷ ilakkaṅṅam “aṅṅōṅ paḷiṅṅiṅ kurūp, vaṅciyūr,
8. tiruvaṅṅantapuram, 2007.

### Evaluation Pattern

Assessment	Internal	End Semester
Periodical 1 (P1)	15	
Periodical 2 (P2)	15	
*Continuous Assessment (CA)	20	
End Semester		50

\*CA – Can be Quizzes, Assignment, Projects, and Reports.

**Course Objectives**

- To learn the history of Tamilliterature.
- To analyze different styles of Tamil Language.
- To strengthen the creativity in communication, Tamil basic grammar and use of computer on Tamil Language.

**Course Outcomes**

CO 1: Understand the history of Tamil literature.

CO 2: Apply practical and comparative analyses on literature.

CO 3: Understand thinai literature, literature on justice, Pathinenkeelkanaku literature.

CO 4: Understand the tamil scholars' service to Tamil language and society.

CO 5: Understand components of Tamil grammar and its usage

CO 6: Understand creative writing aspects and apply them

**CO-PO Mapping**

PO/PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO												
CO1			-	-	-	-	-	-	2	2	-	-
CO2			-	-	-	-	-	-	2	2	-	-
CO3			-	-	-	-	-	-	2	2	-	-
CO4			-	-	-	-	-	-	2	2	-	-
CO5			-	-	-	-	-	-	2	2	-	-
CO6			-	-	-	-	-	-	2	2	-	-

**Syllabus****Unit 1**

The history of Tamilliterature: Nāṭṭupuraṭ pāṭalkaḷ, kataikkaḷ, paḷamoliḷkaḷ - ciṟukataikaḷ tōṟṟamum vaḷarcciyum, ciṟṟilakkiyaṅkaḷ: Kaliṅkattup paraṅi (pōṟpāṭiyatu) - mukkūṭar paḷḷu 35.

Kāppiyaṅkaḷ: Cilappatikāram – maṅimēkalai naṭaiyiyal āyvu marṟum aimperum – aiṅciṟuṅ kāppiyaṅkaḷ toṭarpāṇa ceytikaḷ.

**Unit 2**

tiṅai ilakkiyamum nīyilakkiyamum - paṭiṅēṅkīḷkkaṅakku nūḷkaḷ toṭarpāṇa piṟa ceytikaḷ - tirukkuraḷ (aṅṅu, paṅṅu, kalvi, oḷukkam, naṭṭu, vāymai, kēḷvi, ceynaṅṅi, periyāraitṭuṅakkōṭal, viḷippuṅarvu pēṅṅa atikāratil uḷḷa ceytikaḷ.

Aṟaṅūḷkaḷ: Ulakanīti (1-5) – ēḷāti (1,3,6). - Cittarkaḷ: Kaṭuveḷi cittar pāṭalkaḷ (āṅṅantak kaḷippu –1, 4, 6, 7, 8), marṟum akappēy cittar pāṭalkaḷ (1-5).

**Unit 3**

tamiḷ ilakkaṅam: Vākkiya vakaikaḷ – taṅviṅai piṟaviṅai – nēṟkkūṟṟu ayarkūṟṟu

**Unit 4**

tamiḷaka aṟiṅarkaḷiṅ tamiḷ toṅṭum camutāya toṅṭum: Pāṟatīyār, pāṟatitācaṅ, paṭṭukkōṭṭai kalyāṅacuntaram, curatā, cujātā, ciṟpi, mēṭṭā, aptul rakumāṅ, na.Piccaimūrṭti, akilaṅ, kalki, jī.Yū.Pōp, vīramāmuṅivar, aṅṅā, paritimāṟ kalaiṅar, maṟaimalaiyaṭikaḷ.

**Unit 5**

tamiḷ moḷi āyvil kaṇiṇi payaṇṇpāṭu. - Karuttu parimāram - viḷampara moḷiyamaippu – pēccu - nāṭakam paṭaiṇṇu - cirukatai, katai, putiṇam paṭaiṇṇu.

**Text Books / References**

<http://Www.tamilvu.trg/libirary/libindex.htm>. [http://Www.tunathamizh.com/2013/07/blog0post\\_24.html](http://Www.tunathamizh.com/2013/07/blog0post_24.html)

Mu.Varatarācaṇ “tamiḷ ilakkiya varalāru” cāhitya akāṭemi paḷikēṣaṇs, 2012

nā.Vāṇamāmalai “paḷaṅkataikaḷum, paḷamoḷikaḷum” niyū ceṅcuri puttaka veḷiyiṭṭakam, 1980,2008

nā.Vāṇamāmalai, “tamiḷar nāṭṭupṭāṭkaḷ” niyū ceṅcuri puttaka veḷiyiṭṭakam 1964,2006 poṇ maṇimāraṇ “aṭṭṇ tamiḷ ilakkaṇam “aṭṭṇ paḷiṣiṇ kurūp, vaṅciyū

**Evaluation Pattern**

Assessment	Internal	End Semester
Periodical 1 (P1)	15	
Periodical 2 (P2)	15	
*Continuous Assessment (CA)	20	
End Semester		50

\*CA – Can be Quizzes, Assignment, Projects, and Reports.