Amrita University's Amrita Values Programme (AVP) is a new initiative to give exposure to students about richness and beauty of Indian way of life. India is a country where history, culture, art, aesthetics, cuisine and nature exhibit more diversity than nearly anywhere else in the world.

Amrita Values Programmes emphasize on making students familiar with the rich tapestry of Indian life, culture, arts, science and heritage which has historically drawn people from all over the world.

Students shall have to register for any two of the following courses, one each in the third and the fourth semesters, which may be offered by the respective school during the concerned semester.

**Courses offered under the framework of Amrita Values Programmes I and II**

**Message from Amma's Life for the Modern World**
Amma's messages can be put to action in our life through pragmatism and attuning of our thought process in a positive and creative manner. Every single word Amma speaks and the guidance received in on matters which we consider as trivial are rich in content and touches the very inner being of our personality. Life gets enriched by Amma's guidance and She teaches us the art of exemplary life skills where we become witness to all the happenings around us still keeping the balance of the mind.

**Lessons from the Ramayana**
Introduction to Ramayana, the first Epic in the world – Influence of Ramayana on Indian values and culture – Storyline of Ramayana – Study of leading characters in Ramayana – Influence of Ramayana outside India – Relevance of Ramayana for modern times.

**Lessons from the Mahabharata**
Introduction to Mahabharata, the largest Epic in the world – Influence of Mahabharata on Indian values and culture – Storyline of Mahabharata – Study of leading characters in Mahabharata – Kurukshetra War and its significance - Relevance of Mahabharata for modern times.

**Lessons from the Upanishads**
Introduction to the Upanishads: Sruti versus Smriti - Overview of the four Vedas and the ten Principal Upanishads - The central problems of the Upanishads – The Upanishads and Indian Culture – Relevance of Upanishads for modern times – A few Upanishad Personalities: Nachiketas, SatyakamaJabala, Aruni, Shvetaketu.

**Message of the Bhagavad Gita**

**Life and Message of Swami Vivekananda**
Brief Sketch of Swami Vivekananda’s Life – Meeting with Guru – Disciplining of Narendra - Travel across India - Inspiring Life incidents – Address at the Parliament of Religions – Travel in United States and Europe – Return and reception India – Message from Swamiji’s life.

**Life and Teachings of Spiritual Masters India**
Sri Rama, Sri Krishna, Sri Buddha, Adi Shankaracharya, Sri Ramakrishna Paramahamsa, Swami Vivekananda, Sri Ramana Maharshi, Mata Amritanandamayi Devi.

**Insights into Indian Arts and Literature**
The aim of this course is to present the rich literature and culture of Ancient India and help students appreciate their deep influence on Indian Life - Vedic culture, primary source of Indian Culture – Brief introduction and appreciation of a few of the art forms of India - Arts, Music, Dance, Theatre.

**Yoga and Meditation**
The objective of the course is to provide practical training in YOGA ASANAS with a sound theoretical base and theory classes on selected verses of Patanjali’s Yoga Sutra and Ashtanga Yoga. The coverage also includes the effect of yoga on integrated personality development.

**Kerala Mural Art and Painting**
Mural painting is an offshoot of the devotional tradition of Kerala. A mural is any piece of artwork painted or applied directly on a wall, ceiling or other large permanent surface. In the contemporary scenario Mural painting is not restricted to the permanent structures and are being done even on canvas. Kerala mural paintings are the frescos depicting mythology and legends, which are drawn on the walls of temples and churches in South India, principally in Kerala. Ancient temples, churches and places in Kerala, South India, display an abounding tradition of mural paintings mostly dating back between the 9th to 12th centuries when this
form of art enjoyed Royal patronage. Learning Mural painting through the theory and practice workshop is the objective of this course.

Course on Organic Farming and Sustainability
Organic farming is emerging as an important segment of human sustainability and healthy life. Haritamritam is an attempt to empower the youth with basic skills in tradition of organic farming and to revive the culture of growing vegetables that one consumes, without using chemicals and pesticides. Growth of Agriculture through such positive initiatives will go a long way in nation development. In Amma’s words “it is a big step in restoring the lost harmony of nature”.

Benefits of Indian Medicinal Systems
Indian medicinal systems are one of the most ancient in the world. Even today society continues to derive enormous benefits from the wealth of knowledge in Ayurveda of which is recognised as a viable and sustainable medicinal tradition. This course will expose students to the fundamental principles and philosophy of Ayurveda and other Indian medicinal traditions.

Traditional Fine Arts of India
India is home to one of the most diverse Art forms world over. The underlying philosophy of Indian life is “Unity in Diversity” and it has led to the most diverse expressions of culture in India. Most art forms of India are an expression of devotion by the devotee towards the Lord and its influence in Indian life is very pervasive. This course will introduce students to the deeper philosophical basis of Indian Art forms and attempt to provide a practical demonstration of the continuing relevance of the Art.

Science of Worship in India
Indian mode of worship is unique among the world civilisations. Nowhere in the world has the philosophical idea of reverence and worshipfulness for everything in this universe found universal acceptance as it in India. Indian religious life even today is a practical demonstration of the potential for realisation of this profound truth. To see the all-pervading consciousness in everything, including animate and inanimate, and constituting society to realise this truth can be seen as the epitome of civilizational excellence. This course will discuss the principles and rationale behind different modes of worship prevalent in India.

CHEMISTRY

Unit 1
Chemical Bonding
Review of orbital concept and electronic configuration, electrovalency and ionic

Unit 2
Thermodynamic Parameters
Stoichiometry - mole concept, significance of balanced chemical equation - simple calculations - Conditions for occurrence of chemical reactions - enthalpy, entropy and free changes - spontaneity – Thermochemistry - heats of reactions - (formation, combustion, neutralization) - specific heats - variation of enthalpy change with temperature - Kirchhoff’ relation (integrated form) - bond enthalpy and bond order - Problems based on the above.

Kinetics
Review of molecularity and order of a reaction, rate law expression and rate constant - first, second, third and zero order reactions, pseudo-first order reactions (pseudo-unimolecular reactions) - complex reactions - equilibrium and steady state approximations - mechanism of these reactions - effect of temperature on reaction rates - Arrhenius equation and its significance, Michaelis Menden kinetics-enzyme catalysis.

Unit 3
Electrochemistry
Electrolytes - strong and weak, dilution law, Debye-Huckel theory, faraday’s laws, origin of potential, single electrode potential, electrochemical series, electrochemical cells, Nernst equation and its application, reference electrodes- SHE, Ag/AgCl, Calomel.

Photochemistry
Photochemistry, laws of photochemistry - Stark-Einstein law, Beer-Lamberts law, quantum efficiency-determination, photochemical processes - Jablonsky diagram, internal conversion, inter-system crossing, fluorescence, phosphorescence, chemiluminescence and photo sensitization, photo polymerization.
REFERENCE BOOKS
Physical chemistry, Puri and Sharma
Inorganic chemistry, Puri and Sharma

15CHY181  CHEMISTRY LAB.  0 0 2 1
1. Acid base titration (double titration)
2. Complexometric titration (double titration)
3. Redox (permanganometry) titration (double titration)
4. Conductometric titration
5. Potentiometric titration
6. Ester hydrolysis

15CHY231  ADVANCED POLYMER CHEMISTRY  3 0 0 3

Unit 1

Unit 2
Solid-state irradiation polymerization - Atom transfer radical polymerization - Plasma Polymerization - Zwitterionic Polymerization - Isomerization polymerization - Polymer supported solid phase reactions - Merrifield method.

Polymer degradation and stabilization: Mechanism of different types of degradation - Commonly used antidegradants and the mechanism of their stabilization.

Unit 3

TEXTBOOKS:

REFERENCES:
3. Jayadev Sreedhar and Govariker, "Polymer Chemistry".

15CHY232  BIOMATERIALS SCIENCE  3 0 0 3

Unit 1
Introduction: Bulk properties, Surface properties and characterization - polymers, silicone biomaterials, medical fibres and biotextiles - Smart polymers - bioresorbable and bioerodible materials - natural materials, metals and ceramics - physicochemical surface modification.

Biocompatibility concepts: Introduction to biocompatibility - cell material interaction - types of materials - toxic, inert, bioactive - long term effects of materials within the body - cell response.

Unit 2
Chemical and biochemical degradation of polymers - degradation of metals and ceramics - calcification of biomaterials.

Host reactions and their evaluation: Inflammation and foreign body response - adaptive immunity - systemic toxicity and hypersensitivity - blood coagulation and blood materials interactions - device related infections.

Unit 3
Biological testing of biomaterials: In vitro and in vivo assessment of tissue compatibility - evaluation of blood materials interaction - microscopy in biomaterials.

Practical aspects of biomaterials: Bioelectrodes, biomedical sensors and biosensors - sterilization of implants - implant failure - implant retrieval and evaluation - legal aspects, ethical issues and regulation aspects.

TEXTBOOK:

REFERENCES:
15CHY233 CATALYTIC CHEMISTRY 3 0 0 3

Unit 1
Catalysis: Introduction, Industrial applications. Rates of reactions - equilibrium, energy of activation and the catalyst's role. Elementary reactions in catalytic transformations homogeneous and heterogeneous catalysis.

Catalysis in solutions: Acid-base catalysis - catalysis in the gas phase, catalysis in dilute aqueous solution, catalysis in concentrated strong acid solutions, catalysis by bases, catalysis by metal ions, catalysis by electron transfer, organometallic catalysis, catalysis in Ziegler Natta/Metallocene/Metathesis polymerization.

Unit 2
Catalysis by macromolecules, Phase transfer catalysis.

Catalysis by Enzymes: Introduction - kinetics of enzyme catalyzed reaction, catalysis through enzyme, organic catalysis, metalloenzyme catalysis, supported enzymes. Industrial applications of enzyme catalyst.

Catalysis by Polymers: Attachment of catalytic groups to polymer supports. Adsorption and the Kinetics of polymer-catalyzed reactions.

Unit 3
Catalysis in polymer gels, bifunctional and multifunctional catalysis, porous polymers, Applications of polymer catalysis.


TEXTBOOKS:

REFERENCES:

15CHY234 CHEMISTRY OF ADVANCED MATERIALS 3 0 0 3

Unit 1
Chemistry of Engineering Plastics: Preparation, properties and applications of ABS, polycarbonates, epoxy resins - polyamides - Nylon and Kevlar.

TEXTBOOKS:

REFERENCES:


Unit 2

Chemistry of Engineering Plastics: Preparation, properties and applications of ABS, Polycarbonates, Epoxy resins - Polyamides - Nylon and Kevlar.

Photochemistry in Electronics: Photochemical reactions - laws of absorption (Grothers-Draper law - Stark-Einstein’s law) - Quantum efficiency - photochemical decomposition of HI and HBr - and Quantum yield.

Unit 3
Florescence and Phosphorescence - chemiluminescence - photo sensitization.

Chemistry of Toxic Materials and Toxicology: Principles of Toxicology - Volatile poisons - Gases CO, hydrocyanic acid - H2S - PH3 - CO2 - SOx - NOx - Heavy metals - lead, arsenic, mercury, antimony, bismuth, selenium, zinc, thallium - Pesticides - Food poisoning - Drug poisoning - barbiturates - narcotics - ergot - LSD - alkaloids - Radioactive Toxicology - Radiation hazards.

TEXTBOOK:

REFERENCE:

15CHY236 CHEMISTRY OF NANOMATERIALS 3 0 0 3

Unit 1
Introduction: Introduction to Nanomaterials: Size dependence of properties - Surface to volume ratio and Quantum confinement. Microscopic techniques to study nanostructures - SEM, AFM - TEM and STM - Raman spectroscopy.

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Synthesis of Nanomaterials: Synthetic approaches: Colloidal Self-Assembly (Self-assembled monolayers - SAMs) and electrostatic self-assembly, electrochemical methods, sol-gel deposition.

Unit 2
Langmuir-Blodgett (LB) technique, chemical vapour deposition, plasma arcing and ball milling.

Carbon nanostructures: Carbon Clusters: Fullerenes, structure, synthesis, alkali doped C60 - superconductivity in C60, applications of fullerenes. Carbon nanotubes: Classification, properties, synthesis, characterization, and potential applications, growth mechanism of carbon nanotubes.

Other Nanostructures: Quantum Dots: Preparation, properties and applications of Au, CdS and CdSe quantum dots.

Unit 3
Fabrication and applications of conducting polymer nanotubes, TiO2 and metallic nanotubes.

Molecular Electronics and Machines: Molecular electronics: Working of Molecular and supramolecular switches, transistors and wires. Molecular machines: Working of Molecular motors, rotors, cars, elevators and valves.

TEXTBOOKS:

REFERENCES:
SYLLABI
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2015 admissions onwards

15CHY237 CHEMISTRY OF TOXICOLOGY 3 0 0 3

Unit 1
Introduction to Toxicology: Definition - scope - history - relationship to other sciences - dose-response relationship - sources of toxic compounds - Classes of Toxicants - broad overview of toxicant classes such as metals, agricultural chemicals, food additives - contaminants, toxins, solvents, drugs, and cosmetics - history, exposure route, and toxicity of the non-essential metals - cadmium, lead, and mercury - medical treatment of metal poisoning - classes of agricultural chemicals - Toxins - source, including microbial, fungal, algal, plant and animal - examples - Brief discussions - food additives and contaminants – solvents - therapeutic drugs - drugs of abuse - combustion products - cosmetics.

Unit 2
Exposure Classes, Toxicants in Air, Water, Soil, Domestic and Settings: Occupational Air, water and soil as primary media for human exposure to various classes of chemical toxicants in environmental, domestic, and occupational settings - historic and present status of air pollution and air quality - introduction to the major classes of soil and water pollutants - sources, exposure routes and potential adverse health effects - Classes of occupational toxicants - route of exposure and permissible levels - specific examples of concern.

Unit 3
Toxicant Analysis and Quality Assurance Principles: Introduction to procedures, principles and operation of analytical laboratories in toxicology. Summary of the general policies - analytical laboratory operation, analytical measurement systems, quality assurance (QA) - quality control (QC) procedures.


TEXTBOOK:

REFERENCES:

15CHY238 COLLOIDAL AND INTERFACIAL CHEMISTRY 3 0 0 3

Unit 1
Introduction to surfaces, interfaces and colloids: Molecular origin, Surface phenomena and structure of interfaces, Surfactants structure, colloids in action - shapes and size distribution, Types of interaction forces - Physical and Chemical Interaction, Classification of physical forces - Vander Waals force, electrostatic forces.


Unit 2
Interfaces between Condensed Phases - Wetting, The interfaces between condensed phases in two-component systems, Adsorption at interfaces between condensed phases.

Thermodynamics - Adsorption, energy consideration of physical adsorption vs chemisorptions, Gibbs adsorption equation, Langmuir isotherm, BET isotherm, adsorption at solid-liquid interfaces. Emulsions - formation and stability, HLB number, PIT (Phase Inversion Temperature) foams, aerosols, Microemulsions, vesicles, micelles and membranes - applications of various colloidal systems.

Unit 3
Characterization of Colloids, Rheological properties - Classification, Interfacial rheology, Interfacial tension, Electrochemistry of interfaces - Electric double layer.

Stability of charge stabilized colloids, DLVO theory, Hamaker constant, Boltzmann distribution, Debye length, specific ion adsorption, stern layer, electrostatic, steric and electrosteric stabilization, zeta potential, surface tension, wetting and spreading, contact angle - Young’s modulus, practical application - solid surfaces - surface mobility, characteristics and formation.

TEXTBOOKS:

REFERENCES:
SYLLABI
B. Tech - Civil Engg. 2015 admissions onwards

2. J. W. Goodwin, “Colloids and Interfaces with Surfactants and Polymers”, John-Wiley and Sons Ltd, 2004

15CHY239 COMPUTATIONAL CHEMISTRY AND MOLECULAR MODELLING

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.
Introduction to Quantum mechanics - Schrodinge 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.

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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:

REFERENCES:

15CHY241 ELECTROCHEMICAL ENERGY SYSTEMS AND PROCESSES

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

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:

REFERENCES:

15CHY242 ENVIRONMENTAL CHEMISTRY 3 0 0 3

Unit 1
Air and air pollution (earth’s atmosphere): Regions - ozone - CFC and other chemicals - catalytic decomposition of ozone - ‘ozone hole’ formation - Air pollution due to gas emission from industries - Atmospheric aerosols – dust, combustion products, aerosol concentration and lifetimes - Automobile exhausts, smog and effects - Acid rain - chemistry of acid rain, roll of meteorology, greenhouse gases and global warming - air pollution due to jet engines.

TEXTBOOKS:

SYLLABI
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Unit 2
Aerobic processes - wastewater treatment systems (brief description only) - anaerobic and aerobic - sewage treatment - primary, secondary and tertiary processes - water reuse and recycle. Eutrophication of lakes, nitrogen and phosphorus in effluents - Drinking water standards - sources - fluoride and arsenic in water, purification, sterilization - chemistry of chlorination - water purification for domestic use - reverse osmosis - nano filters and membranes.

Industrial Pollution and its control: Industrial pollution and waste waters from various types of industries - environmental pollution due to paper mills, textile mills etc., and its control. Solid waste disposal - methods - solid waste from mining and metal production and its disposal - Electrochemical treatment of pollution control, electro-coagulation and flocculation - Green chemical processes and green solvents - reaction conditions to control industrial pollution.

Unit 3
Other types of pollution: Soil pollution - agricultural pollution - use of chemical fertilizers - Organic chemicals and environment, dioxins and furans - chemistry of some of the pesticides, insecticides and herbicides, ill effects due to uncontrolled use - Bulk storage of hazardous chemicals and disasters, Radioactive pollution, radiation units, sources - exposure and damage - safety standards - radioactive wastes and their disposal - Toxicological substances, testing of toxic substance, enzyme inhibition and biochemical effects of toxic chemicals on humans.

Sampling and Measurements of Pollutants: Sampling and analysis techniques of air pollutants (brief outline only) - analysis of particulate matter and lead - Sampling and measurements of water pollutants - organic loadings, phosphates and nitrogen compounds - monitoring of water quality - water test kits, various analytical methods (brief outline only).
REFERENCES:

15CHY243 FUELS AND COMBUSTION 3 0 0 3

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.


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

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

15CHY245 INSTRUMENTAL METHODS OF ANALYSIS 3 0 0 3

Unit 1

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.


Unit 3

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

TEXTBOOKS:

REFERENCES:

15CHY246 MEDICINAL ORGANIC CHEMISTRY 3 0 0 3

Unit 1

TEXTBOOKS:

REFERENCES:

15CHY247 MODERN POLYMER COMPOSITES 3 0 0 3

Unit 1
Unit 2

Unit 3
Composite precursors: SMCs, DMCs, BMCs prepreg materials and their choice in specific applications. Fabrication processes for FRP Composites: hand layup, spray up, vacuum bag moulding, compression moulding, filament winding, braiding, pultrusion, RTM, RIM, RRIM, RFI, autoclave moulding, injection moulding etc. Room temperature and hot curing of composites, Nanocomposites: Introduction; Nanoscale Fillers – Clay, POSS, CNT, nanoparticle fillers; Processing into nanocomposites; Modification of interfaces; Properties. Applications. Joining composite elements and repairs, Recycling of polymer composites.

TEXTBOOKS:

REFERENCES
Stereochmistry: Tacticity, R/S system of nomenclature of central and axial molecules.

Unit 2
Atropisomerism - isomerism of biphenyls - allenes and spiranes - ansa compounds - Geometrical isomerism, E, Z Isomerism. Asymmetric synthesis.

Conformational Analysis: Optical activity and chirality - Conformational Analysis of cyclic and acyclic system - Conformational effects on reactivity of acyclic systems only.

Unit 3

TEXTBOOKS:

REFERENCES:

15CHY250 POLYMER MATERIALS AND PROPERTIES

Unit 1

Unit 2
Manufacturing, mechanical, thermal, electrical and chemical properties and applications of commodity plastics - PE, PP, PVC, PS, Engineering plastics - ABS, PC, PMMA, polyamide, polycetal, PET, PBT, PTFE, High performance polymer - PES, PEI, PEEK, conducting polymer.

Unit 3
Thermoset materials - PF, UF, MF, epoxy and unsaturated polyester resin, Rubber - natural rubber, synthetic rubber - SBR, PB, nitrile, chloroprene, butyl, silicone - compounding and additives.
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15CHY252 SOLID STATE CHEMISTRY 3 0 0 3

Unit 1

Unit 2
Electrical and Magnetic Properties: Development of free electron theory to band theory of solids - metals and their properties; semiconductors - extrinsic and intrinsic, Hall effect; Insulators - dielectric, ferroelectric, pyroelectric and piezolectric properties and the relationship between them. Dia, para, ferro, ferri, antiferro and antiferri magnetic types - selected magnetic materials such as spinels, garnets and perovskites, superconductors.


Unit 3

Fourier synthesis - definition, applications of fourier synthesis in crystal structure analysis of S-Tetrazine. Structure of Rutile, Fluorite, Antifluorite, Zinc blende, Wurtzite, diamond and graphite.

REFERENCES:


15CHY331 BATTERIES AND FUEL CELLS 3 0 0 3

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 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.

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TEXTBOOKS:

REFERENCES:

15CHY332 CORROSION SCIENCE 3 0 0 3

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.


TEXTBOOKS:

SYLLABI
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REFERENCES:

15CSE100 COMPUTATIONAL THINKING AND PROBLEM SOLVING 3 0 2 4

Unit 1

Unit 2

Unit 3
Problem Solving Techniques: Factoring and Recursion Techniques, Search and Sort techniques, Text processing and Pattern matching.

TEXTBOOKS:
2. R. G. Dromey, “How to solve it by Computer”, PHI, 2008

15CSE102 COMPUTER PROGRAMMING 3 0 0 3

Unit 1
Introduction to C language: Structure of a C program, comments, Data types, Variables, constants, Data input and output statements, input assertions; expressions and evaluation. Functions: inter function communication, standard functions, scope. Selection: two way selection, multi-way selection, repetition: concept of loop, loop invariant, pretest and post-test loops, initialization and updating, event and counter controlled loops. Recursion: recursive definition, recursive solution, designing recursive functions, limitations of recursion.

Unit 2
Unit 3
Strings: fixed length and variable length strings, strings and characters, string input output, array of strings, string manipulation functions, sorting of strings. Enumerated types, Structures: Structure vs array comparison, complex structures, Structures and functions, Union, binary input output, Command line arguments.

TEXTBOOK:

REFERENCES:

15CSE180 COMPUTER PROGRAMMING LAB. 0 0 2 1
Solving simple problems with operators, programs on conditional control constructs, programs on loops (while, do-while, for), programs using user defined functions and library functions, programs on Files, arrays, matrices (single and multi-dimensional arrays), programs using DMA, programs on strings, structures.

REFERENCE:

15CUL101 CULTURAL EDUCATION I 2 0 0 2
Unit 1
Introduction to Indian Culture; Introduction to Amma’s Life and Teachings; Symbols of Indian Culture.

Unit 2
Science and Technology in ancient India; Education in Ancient India; Goals of Life - Purusharthas; Introduction to Vendanta and Bhagavat Gita.

Unit 3
Introduction to Yoga; Nature and Indian Culture; Values from Indian History; Life and work of Great Seers of India.

15CUL111 CULTURAL EDUCATION II 2 0 0 2
Unit 1
1. Relevance of Sri Rama and Sri Krishna in this Scientific Age
2. Lessons from the Epics of India
3. Ramayana and Mahabharata

Unit 2
4. Who is a Wise Man?
5. A Ruler’s Dharma
6. The Story of King Shibi

Unit 3
7. Introduction to the Bhagavad Gita
8. Bhagavad Gita – Action without Desire

Unit 4
9. Role and Position of Women in India
10. The Awakening of Universal Motherhood

Unit 5
11. Patanjali’s Astanga-Yoga System for Personality Refinement
12. Examples of Heroism and Patriotism in Modern India

TEXTBOOKS:
Common Resource Material II (in-house publication)
Sanatana Dharma - The Eternal Truth (A compilation of Amma’s teachings on Indian Culture)

15CUL230 ACHIEVING EXCELLENCE IN LIFE - 2 0 0 2
AN INDIAN PERSPECTIVE
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.
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 (Workshop);

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 Dutta 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)
7. Art of Man Making - Swami Chhinmayananda published by Chinnmaya Mission, Bombay
10. Yoga in Daily Life - Swami Sivananda – published by Divine Life Society
12. All about Hinduism – Swami Sivananda - Published by Divine Life Society
15. Valmiki Ramayana – Four volumes - published by Parimal Publications, Delhi
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.

15CUL231
EXCELLENCE IN DAILY LIFE

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.
15CUL232  EXPLORING SCIENCE AND TECHNOLOGY  2 0 0 2  
IN ANCIENT INDIA

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 well as actual techniques.

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
6. Astronomy & mathematics in Jain and Buddhist literature;
7. The transition to the Siddhantic period; Aryabhata and his time;
8. The Aryabhatiya: concepts, content, commentaries;
9. Brahmagupta and his advances;
10. Other great Siddhantic savants;
11. Bhaskara II and his advances;

Unit 3
12. The Kerala school of mathematics;
13. The Kerala school of astronomy;
14. Did Indian science die out?;
15. Overview of recent Indian scientists, from S. Ramanujan onward;
16. 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.

15CUL233  YOGA PSYCHOLOGY  2 0 0 2

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.

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

Patanjali Yoga Sutra – 2

Unit 2
Patanjali Yoga Sutra – 3
Two formulae - Necessity of Abhyasah and Vairagyah - Foundation of Abhyasah - Foundation of Vairagyah.

Patanjali Yoga Sutra – 4

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

Patanjali Yoga Sutra – 7
**SYLLABI**

**B. Tech - Civil Engg.**

2015 admissions onwards

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**Unit 3**

Patanjali Yoga Sutra – 8


Patanjali Yoga Sutra – 9


Patanjali Yoga Sutra – 10

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

Report review

Conclusion

**REFERENCES:**

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

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**15CVL102 MECHANICS: STATICS AND DYNAMICS 2 1 0 3**

**Unit 1**


Statics of rigid bodies in two dimensions and three dimensions: Moment of a force about a point – moment of a force about an axis – moment of a couple – equivalent force couple system – rigid body equilibrium – support reactions.

**Unit 2**


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**SYLLABI**

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**Unit 3**

Dynamics: Rectangular and cylindrical coordinate system - Combined motion of rotation and translation - Newton’s second law in rectilinear translation - D’Alembert's principle - Mechanical vibration - Simple harmonic motion - Spring-mass model.

**TEXTBOOKS:**


**REFERENCES:**


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**15CVL111 INTRODUCTION TO CIVIL ENGINEERING 1 0 0 1**

Introduction to the various areas of Civil engineering - Simple concepts in each of the areas - Respective tasks performed by each specialty which contributes to a constructed facility.

Introduction to the Civil engineering undergraduate curriculum map - the relationship between the courses in the curriculum.

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**15CVL112 ENGINEERING GRAPHICS – CAD 1 0 2 2**

Section of Solids: Introduction, Section planes, Sectional views, apparent shapes and true shapes of sections of right regular prisms, cylinders, pyramids and cones.

Development of lateral surfaces: Introduction, Development of lateral surfaces of prisms, cylinders, pyramids and cones.

Isometric Projection: Introduction, Isometric scale, Isometric projection of prisms, pyramids, cylinders, cones

Orthographic Views of 3 dimensional solids.

Building Drawing: Construction details – Masonry, Footings.

Development of Plan, Section and Elevation of Simple Residential building.
**SYLLABI**

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**15CVL201 CONSTRUCTION MATERIALS**

**Unit 1**
Commonly used building materials - relationship between material structure and properties.

Masonry materials - stones, bricks, blocks; Refractory products; Timber and wood based products - Classification, properties, testing and selection criteria.

**Unit 2**
Binding materials (Lime, gypsum, cement) and Mortars - types, properties, tests.


**Unit 3**


**TEXTBOOKS:**

**REFERENCE BOOKS:**

**15CVL202 PRINCIPLES OF FLUID MECHANICS**

**Unit 1**
Elementary concepts – properties - concept of gauge and absolute pressure, measurement of pressure using manometers of different types.

Hydrostatic force on plane and curved surface – center of pressure – lock gates - buoyancy and stability of submerged and floating bodies - metacentric height - period of oscillation.

Types of flow, definitions and explanations of unsteady, steady, non-uniform, laminar and turbulent flows. Ideal flow - rotational and irrotational, stream function, potential function. Path line, streak line and stream line – continuity equation – derivation, application of one dimensional steady flow – circulation and vorticity - Basic flow fields such as uniform flow, source, sink, doublet, vortex flow, spiral flow – superposed flows.

**Unit 2**
Derivation of Bernoulli’s energy equation and Euler’s equation, examples illustrating the use of energy equation. Flow meters - venturimeter, Orifice meter, nozzle, derivation of equations of discharge, pitot tubes – applications to flow measurements - notches and weirs.

Laminar flow through circular pipe – shear stress, pressure gradient, velocity profile, Hagen-poiseuille’s equation, power calculations, laminar flow between parallel plates - Couette flow and Poiseuille flow.


**Unit 3**
Boundary layer theory, boundary layer equation – Prandtl equation, Blasius solution, drag on flat plate, boundary layer separation and its control.

Dimensional Analysis, Similitude and Model Analysis: Methods of Dimensional Analysis – Rayleigh’s method – Buckingham Pi-theorem – Hydraulic Similitude –
model analysis – dimensionless numbers – Model testing of partially submerged bodies – Distorted models and scale effects.

**TEXTBOOKS:**

**REFERENCE BOOKS:**

**15CVL203 SOLID MECHANICS 3 1 0 4**

**Unit 1**
Stress and strain at a point – tension, compression and shear stresses – Hooke’s law - Poisson’s ratio - relationship between elastic constants - compound bars - thermal stresses – strain energy in tension, compression and shear - resilience – stresses due to impact and suddenly applied load.

Different types of beam – statically determinate and indeterminate beams - shear force and bending moment diagrams - relationship between intensity of loading, shear force and bending moment.

**Unit 2**
Theory of simple bending - Stress distribution at a cross-section due to bending moment forstastically determinate beams - flitched beams.

Shear stress distribution.

Unsymmetrical bending and Shear centre.

Torsion of circular solid and hollow shafts – combined bending moment and torsion on shafts – close coiled and open coiled helical springs

Complex stresses – principal stresses and principal planes - principal strains – graphical method.

**15CVL204 SURVEYING 3 1 0 4**

**Unit 1**
Introduction - classification of surveys – reconnaissance - principle of working from whole to part – provision of control – conventional signs


**Unit 2**

Unit 3

Curves – simple, transition and vertical curves - curve setting by various methods.

Tacheometric surveying – various methods – instrument constants – analytic lens – tangential system – direct reading tacheometer - subtense bar – trigonometric leveling. Total station - introduction to photogrammetry, remote sensing, global positioning systems, and Geographic information systems. EDM.

Introduction to Hydrographic surveying.

TEXTBOOKS:

REFERENCE BOOKS:
SYLLABI
B. Tech - Civil Engg.  2015 admissions onwards


**Unit 2**


Seepage through soils: Total, neutral and effective stresses – quick sand condition – Seepage through soils – Flownets: characteristics and uses.

**Unit 3**
Stress distribution in soils: Boussinesq’s and Westergaard’s theories for point loads and areas of different shapes – Newmark’s influence chart.

Compaction: Mechanism of compaction – factors affecting – effects of compaction on soil properties – Field compaction equipment - compaction control.


**TEXTBOOKS:**

**REFERENCES BOOKS:**

15CVL213  HYDRAULIC ENGINEERING  2 1 0 3

**Unit 1**
Impulse momentum principle – application – impact of jet-force exerted by a jet on normal, inclined and curved surfaces for stationary and moving cases – torque in rotating machines – jet propulsion.

**SYLLABI**
B. Tech - Civil Engg.  2015 admissions onwards


Classification of pumps – Centrifugal pumps – types and working – characteristics. Reciprocating pumps - types and working – selection of pumps.

**Unit 2**
Open channel flow - Comparison with pipe flow, Types of channels - Classification of flow, uniform flow – Uniform flow using chezy’s and Manning’s formulae - Most efficient channel section – Circular, Rectangular and Trapezoidal channel sections, open channel section for constant velocity at all depths of flow. Specific energy and critical depth, Specific force curve, critical flow computation.

Non-uniform flow, Gradually Varied Flow, Dynamic equation for gradually varied flow, Different forms of the dynamic equation, Flow profiles in prismatic channels, integration of the varied flow equation - Computation of the length of the backwater curve and afflux. Rapidly Varied Flow - Hydraulic Jump, Hydraulic jump equations for a rectangular channel, Practical applications.

**Unit 3**

**TEXTBOOKS:**

**REFERENCES BOOKS:**

15CVL214 STRUCTURAL ANALYSIS 2 1 0 3

Unit 1
Statically indeterminate structures - degree of static and kinematic indeterminacies. Introduction to force and displacement methods of analysis.

Energy principles – Castigliano’s theorems - Engessor’s theorem - Maxwell Betti’s theorem - Principle of least work – Method of virtual work (unit load method) - applications in statically determinate and indeterminate structures.

Analysis of Propped cantilever and fixed beams.

Unit 2
Cables – maximum tension – types of supports – forces in towers – suspension bridges with three and two hinged stiffening girders.

Theory of arches – Eddy’s theorem – analysis of three hinged and two hinged arches – settlement and temperature effects.

Beams curved in plan – analysis of cantilever beam curved in plan – analysis of circular beams over simple supports.

Unit 3
Moving loads and influence lines – influence lines (IL) for statically determinate beams for reaction, SF and BM – effect of moving loads – concentrated and uniformly distributed loads – load position for maximum BM and SF - equivalent UDL.

IL for determinate structures – truss, arch and suspension bridge.

TEXTBOOKS:

REFERENCEBOOKS:
2. Tests on fine aggregate - Grain size distribution – Uniformity coefficient and fineness modulus, Specific gravity, Density, Void ratio, Bulking & Absorption
3. Tests on coarse aggregate - Grain size distribution – Uniformity coefficient and fineness modulus, Specific gravity, Density, Void ratio, Absorption, Crushing & Impact values, Flakiness & Elongation, Los Angle's Abrasion test
4. Test on fresh and hardened concrete
   (a) Workability test - Slump test, Compaction factor test, Flow table test, Vee-Bee Consistometer,
   (b) Use of water reducing admixtures
   (c) Compressive strength, Split tensile strength, Flexure test on beams, Modulus of elasticity
5. Tests on bricks – Crushing strength, water absorption and efflorescence
6. Basic tests on Bitumen

15CVL286 HYDRAULIC ENGINEERING LAB. 0 0 2 1
2. Verification of Bernoulli’s equation.
3. Determination of Coefficient of discharge for a small orifice by a constant head method.
4. Determination of Coefficient of discharge for an external mouth piece by variable head method.
5. Calibration of Triangular Notch
6. Determination of friction factor of pipes
7. Impact of jet on vanes
8. Calibration of Venturimeter, Orificemeter, rotameter and watermeter
9. Determination of metacentric height
11. Efficiency test on centrifugal pump and reciprocating pump.
12. Open channel flow: Manning’s coefficient, specific energy curve, Tracing back water profiles/draw down profiles, Hydraulic jump parameters

15CVL301 ADVANCED STRUCTURAL ANALYSIS 2 1 0 3
Unit 1
Slope deflection method – application to the analysis of statically indeterminate beams with and without settlement of supports - rigid jointed plane frames with and without side sway - gable frames.
Analysis of continuous beams - theorem of three moments.
Sway and non-sway analysis by Moment distribution method and Kani’s method.

15CVL302 DESIGN OF CONCRETE STRUCTURES 3 1 0 4
Unit 2
Unit 3
Introduction to FEM.

TEXTBOOKS:
REFERENCE BOOKS:
Design of Compression Members: effective length, short columns subject to axial compression with and without uniaxial / biaxial eccentricities.

Unit 3
Introduction to slender columns. Design of isolated footing for axially loaded & eccentrically loaded columns, combined footing. Design of staircases.

Introduction to Prestressed concrete with simple examples.

TEXTBOOKS:

REFERENCE BOOKS:
1. Park and Paulay, "Reinforced Concrete Structures", Wiley India (P) Ltd, 2010
6. BIS Codes (SP 23, SP 24, IS 456, IS 875, IS 10262, IS 800, SP 16, IS 883, IS 2750)


Unit 3

Earth Pressure Theories: Rankine’s theory of earth pressure – Earth pressure in layered soils – Coulomb’s earth pressure theory – Culmann’s graphical method.

Retaining Walls: Types of retaining walls – stability of retaining walls.

TEXTBOOKS:

REFERENCE BOOKS:
Compression members: Axially and eccentrically loaded compression members - built up columns - lacing and battens - design of column bases.

Analysis and design of laterally restrained & unrestrained simple & compound beams - Design for flexure, shear, deflection, and bearing.

Unit 3

Introduction to cold-formed steel structures (Light gauge steel sections).

TEXTBOOKS:

REFERENCE BOOKS:

15CVL312 ENVIRONMENTAL ENGINEERING I  2 1 0 3

Unit 1

Intake Works and Transportation: Intakes - types, location, requirements and features. Transportation of water - Types of conduits - relative merits, selection, joints, hydraulic design, and cross-connected parallel pipe to increase capacity - pipe laying and testing.


TEXTBOOK:

REFERENCE BOOKS:
Classification of Roads; Highway Planning; Geometrical Design – Road Cross Sections, Sight Distance and Applications, Super elevation, Horizontal and Vertical Alignment.

Unit 2

Unit 3
Traffic engineering and control: Introduction - Road user, vehicle and traffic characteristics - Speed and volume studies - Principles of design of at-grade intersections - Simple layouts - Objectives, classification and uses of traffic signs and road markings. Classification of transport technologies-intermodal co-ordination - ITS and automated highways.

TEXTBOOKS:

REFERENCE BOOKS:

15CVL314 WATER RESOURCES AND IRRIGATION ENGINEERING 3 1 0 4

Unit 1

Unit 2
Reservoir planning - site investigation - zones of storage - Reservoir yield - Estimation of Reservoir Capacity - Reservoir Sedimentation - Reservoir losses and control - Life of Reservoir.

TEXTBOOKS

REFERENCES:

15CVL381 BUILDING DRAWING 1 0 2 2

Part A
Detailed drawing of components
• Footings
• Roof trusses
• Reinforced Concrete staircase

From given line sketch and specification, develop working drawings of:
• Single storyed residential building with flat and tiled roof
• Public buildings like office, dispensary, post office, bank etc.
• Factory building with trusses
Part B (Computer aided drafting)
Preparation of drawings as per building development rules.
- Residential building: flat and pitched roof, economic domestic units, cottages, bungalows
- Public building: small public utility shelters, dispensaries, banks, schools, offices, libraries, hostels, restaurants, commercial complexes, factories etc.
- Preparation of site plans and service plans as per Building Rules.

TEXTBOOKS:

REFERENCE BOOKS:

15CVL382 GEOTECHNICAL ENGINEERING LAB. 0 0 2 1
1. Specific gravity of coarse and fine-grained soils
2. Grain size analysis
3. Atterberg’s limits and indices
4. Determination of field density (a) sand replacement method (b) core cutter method
5. Determination of coefficient of permeability (a) Constant head method; (b) Variable head method
6. Consolidation test
7. Compaction test (a) IS light compaction test (b) IS heavy compaction test
8. California Bearing Ratio test
9. Direct shear test
10. Triaxial shear test
11. Unconfined compressive strength test & Laboratory vane shear test
12. Demonstration of Plate Load & Standard Penetration Tests

15CVL385 ENVIRONMENTAL ENGINEERING LAB. 0 0 2 1
1. Determination of solids (total, dissolved, organic, inorganic and settleable) in water
2. Determination of turbidity and the optimum coagulant dose
3. Determination of alkalinity and pH of water
4. Determination of hardness and chlorides in water
5. Determination of iron and manganese in water
6. Determination of sulphates and sulphides in water
7. Determination of D.O
8. Determination of available chlorine in bleaching powder and the chlorine dose required to treat the given water sample
9. Determination of coliforms in water
10. Determination of B.O.D and C.O.D

REFERENCES:
Standard method for the examination of water and waste water, 2005, APHA, AWWA, WPCF Publication.

15CVL386 ESTIMATION AND VALUATION PRACTICE 1 0 2 2
1. Introduction - Types of estimate - plinth area method - cubic rate method - unit rate method - bay method - approximate quantity from bill method - comparison method - cost from materials and labour - preparation of detailed estimate
2. Preparation of detailed estimate using Centre line method
3. Preparation of detailed estimate using Long wall - short wall method
5. Preparation of detailed estimate for Steel Structures.
6. Preparation of detailed estimate for roads
7. Preparation of detailed estimate for sanitary and water supply works
8. Specifications - Detailed specifications for common building materials and items of work as per I.S specifications - Preparation of conveyance statement - Calculation of quantities of materials for items of work - Analysis of rate for items of works required for civil engineering works - Preparation of abstract of estimate of civil engineering works.

TEXTBOOKS:

REFERENCE BOOKS:
This initiative is to provide opportunities for students to get involved in coming up with technology solutions for societal problems. The students shall visit villages or rural sites during the vacations (after 4th semester or sixth semester) and if they identify a worthwhile project, they shall register for a 3-credit Live-in-Lab project, in the fifth or seventh semester. The objectives and projected outcome of the project should be reviewed and approved by the Dept. chairperson and a faculty assigned as the project guide. On completion of the project, the student shall submit a detailed project report. The report shall be evaluated and the students shall appear for a viva-voce test on the project.

**15CVL401 CONSTRUCTION MANAGEMENT 3 1 0 4**

**Unit 1**
Construction management environment - Construction activities and sequence.

Construction planning - Network scheduling - Bar chart, linked bar chart, work-breakdown structures, activity-on-arrow diagrams - event based networks. Critical path method. PERT network analysis.

**Unit 2**


Construction safety and Engineering ethics.

**Unit 3**
Materials management - inventory control.

Transportation model and application for distribution of materials.

Construction equipment - selection factors - planning of equipment – equipment for excavation, transport, hoisting, piling, and concrete construction.

Introduction to project management softwares.

**TEXTBOOKS:**
Oxidation / stabilization ponds – aerobic and facultative ponds, Trickling Filters (conventional and high rate).


Unit 3

Solid Waste Management: Solid waste management – causes, effects and control measures of urban and industrial wastes.

Sustainable Development: Sustainable development – Environmental Protection Acts – Introduction to EIA and ISO 14000.

TEXTBOOK:

REFERENCE BOOKS:

15CVL430 ADVANCED CONCRETE DESIGN 2 1 0 3

Unit 1
Yield line theory for slabs - Basic principles - methods of yield line analysis.

Deep beams - analysis - design as per BIS - design using strut and tie method.

Chimneys: Analysis of stresses in concrete chimneys - uncracked and cracked sections - codal provisions - design of chimney.

Unit 2


SYLLABI B. Tech - Civil Engg. 2015 admissions onwards
Unit 3

Design of slab culvert – R.C box culverts – T-beam bridges – Concept on design of continuous bridges, balanced cantilever bridges, arch bridges and rigid frame bridges.

TEXTBOOKS:

REFERENCE BOOKS:
8. BIS codes (IS 456, IS 2210, IS 4998, IS 3370, SP 16, SP 24, SP 34).
9. IRC Codes (iIRC 5, iIRC 6, iIRC 21)

15CVL431 ADVANCED MECHANICS OF MATERIALS 2 1 0 3

Unit 1


Unit 2

Curved Beams: Circumferential stresses - radial stress and shear stress in curved beams - sections having thin flanges - closed sections with thin walls - deflections of sharply curved beams.

Unit 3
Displacements - strains and compatibility - equilibrium equations and boundary conditions – stressfield solutions for plane stress problems - polynomial solutions in Cartesian coordinates – displacements calculated from stresses - plane stress problems in polar coordinates.

TEXTBOOK:

REFERENCE BOOKS:
**REFERENCE BOOKS:**

9. BIS codes (IS 800, SP 6, IS 804, IS 805, IS 6533, IS 9178, IS 801, IS 811)

**15CVL433 BRIDGE ENGINEERING  2 1 0 3**

**Unit 1**

**Unit 2**
Piers and abutments - function, aesthetics, materials; wing walls - construction aspects. super structure - types - choice of materials - design principles, considerations and criteria of pipe culverts, slab culvert, box culvert, causeways.

Design of T beam and slab bridge - design principles of RC balanced cantilever bridge and articulation. Design concepts of rigid frame bridges - thumb rule design of masonry arch bridges - design of bowstring girder bridge and components.

**Unit 3**
Suspension bridges, cable stayed bridges and their components; bearings - types - design of rocker and roller bearings.

Bridge superstructure construction - supports and centering for RC bridges - erection of precast RC girders and steel girder bridges - maintenance of bridges, strengthening of masonry arch bridges.

**TEXTBOOKS:**


**REFERENCE BOOKS:**

4. Relevant Codes of Practice

**15CVL434 COMPUTER METHODS OF STRUCTURAL ANALYSIS  2 1 0 3**

**Unit 1**
Force and Displacement measurement - generalized or independent measurements - constrained or dependent measurements - n dimensional space - principle of superposition - methods of structural analysis. Structure with single and two coordinates - flexibility and stiffness matrices in n coordinates – examples - symmetric nature - constrained measurements - stiffness and flexibility matrices of the element as well as the system - computing the influence coefficient.

Strain energy in terms of stiffness and flexibility matrices - interpretation of coefficient - Betti’s law - other energy theorems using matrix notation.

**Unit 2**
Flexibility and Stiffness Methods (Element Approach): Choice of redundant - ill and well condition equation - Transformation Matrices - transformation of one set redundant to other set - thermal expansion - lack of fit – application to pin-jointed plane truss - continuous beams, frames and grids.

Development of stiffness method - analogy between flexibility and stiffness - analysis due to thermal expansion, lack of fit - Stiffness matrix with rigid body motion - application to pin jointed plane and space trusses - continuous beams - frames and grids - static condensation techniques. Problem solving by computer - choice of the method.

**Unit 3**

Analysis and Design of Pin-jointed and Rigid-jointed Framed Structures using STADD pro (2D and 3D), Introduction to SAP, ETABS, ABAQUS.

**TEXTBOOKS:**

S 65


REFERENCE BOOKS:

15CVL435  FINITE ELEMENT METHODS  2 1 0 3

Unit 1
Boundary value problems and the need for numerical discretization: Introduction, examples of continuum problems, history of finite element method.

Weighted residual methods: Approximation by trial functions, weighted residual forms, piecewise trial functions, weak formulation, Galerkin method, examples of one-, two- and three-dimensional problems.

Variational methods: Variational principles, establishment of natural variational principles, approximate solution of differential equations by Rayleigh-Ritz method, the use of Lagrange multipliers, general variational principles, penalty functions, least-square method.

Unit 2
Isoparametric formulation: The concept of mapping, isoparametric formulation, numerical integration, mapping and its use in mesh generation.

Higher order finite element approximation: Degree of polynomial in trial functions and rate of convergence, the patch test, shape functions for C0 and C1 continuity, one-, two- and three-dimensional shape functions.

Unit 3
Coordinate Transformation: Transformation of vectors and tensors, transformation of stiffness matrices, degree of freedom within elements, condensation, condensation and recovery algorithm, substructuring, structural symmetry.

Formulation of stiffness matrix, member approach for truss and beam element, node numbering, assembly of element equations, formation of overall banded matrix equation, boundary conditions and solution for primary unknowns, Equilibrium and compatibility in solution- applications to truss and beam.

TEXTBOOKS:

15CVL436  INDUSTRIAL STRUCTURES  2 1 0 3

Unit 1
Functional design of industrial buildings: Classification of industrial structures - layout planning requirements – Guidelines from factories act – Lighting - Illumination levels – Natural / Mechanical ventilation – Fire safety requirements – Corrosion protection – Protection against noise – Cladding systems - vibration isolation techniques - Industrial floors.

General overview of Thermal power plant / Nuclear power plant structures / Process plant steelwork – conveyor structures – Boiler supporting structures - Substation structures.

Unit 2

Machine foundations – Types - Design Requirements - Analysis and design of block type machine foundations (IS 2974 method).

Unit 3
Design of Reinforced concrete bunkers and silos as per IS:4995

Tall Chimneys (RCC) – Types - Chimney sizing parameters - Overview of wind and temperature effects - Design principles of Reinforced concrete chimneys as per IS:4998.

Cooling Towers – Types and functions - Design principles of RC natural draught cooling towers as per IS:11504.

REFERENCE BOOKS:
### SMART MATERIALS AND STRUCTURES (15CVL437) 2 1 0 3

#### Unit 1
Introduction to Smart Materials and Structures – Instrumented structures functions and response – Sensing systems – Self-diagnosis – Signal processing consideration – Actuation systems and effectors.


#### Unit 2

Chemical and Bio-Chemical sensing in structural Assessment – Absorptive chemical sensors – Spectroscopes – Fibre Optic Chemical Sensing Systems and Distributed measurement.

#### Unit 3


**REFERENCE BOOKS:**

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### STRUCTURAL DYNAMICS AND SEISMIC DESIGN (15CVL438) 2 1 0 3

#### Unit 1
Introduction to structural dynamics – importance of structural dynamics - types and sources of dynamic loads - distinguishing features of a dynamic problem – methodology for dynamic analysis – types of structural vibration - basic terminology.


#### Unit 2


Earthquake Response: Linear systems: Earthquake ground motion – response spectrum - response history analysis

#### Unit 3
IS codal provisions for the determination of lateral loads – modal analysis. Soil liquefaction – soil-structure interaction effects.


**TEXTBOOKS:**
SYLLABUS  B. Tech - Civil Engg.  2015 admissions onwards

REFERENCE BOOKS:
3. IS:1893 - (Part I), Criteria for Earthquake Resistant structures - General Provisions and Buildings
4. IS:13935 – Repair and Seismic strengthening of buildings
5. IS:4326 - Earthquake Resistant Design and Constructions of buildings
6. IS:13920 – Ductile detailing of RC Structures subject to Seismic forces

15CVL440  ADVANCED SURVEYING  2 1 0 3

Unit 1


Unit 3

TEXTBOOKS:

REFERENCE BOOKS:

15CVL441  ARCHITECTURAL SCIENCE  2 1 0 3

Unit 1


Architectural space and mass, visual and emotional effects of geometric forms; activity space and tolerance space. Forms related to materials and structural systems. Architecture as part of the environment.

Unit 2


Design criteria for control of climate – passive and active building design – passive approach. Active systems – low energy cooling.

Unit 3


TEXTBOOKS:

REFERENCE BOOKS:
15CVL442  CONCRETE TECHNOLOGY  2 1 0 3

Unit 1
Materials: cement - different types - chemical composition and physical properties - tests on cement - I.S. specifications - aggregates - classification - mechanical properties and tests as per I.S. - alkali aggregate reaction - grading requirements - heavy weight - light weight - normal weight - aggregate - sampling of aggregate - water - quality of water - admixtures - accelerators - retarders - water reducing agents - super plasticizers - use of silica fumes.

Properties of fresh concrete - workability - factors affecting workability - tests for workability - segregation and bleeding.

Unit 2


Unit 3


Introduction to Non-destructive test methods.

TEXTBOOKS:

REFERENCE BOOKS:
15CVL444 DISTRESS MONITORING AND REPAIR OF STRUCTURES

Unit 1
Durability: Life expectancy of different types of buildings – influence of environmental elements such as heat, moisture, precipitation and frost on buildings. Effect of biological agents like fungus, moss, plants, trees, algae - termite control and prevention - chemical attack and impact of pollution on building materials and components - Aspects of fire damage and assessment.

Unit 2

Common defects in buildings and control measures - maintenance philosophy - phases of maintenance.

Materials for repair - special mortar and concretes, concrete chemicals, admixtures, special cements and high grade concrete.

Unit 3

Strengthening measures - flexural strengthening, beam shear capacity strengthening, column strengthening, shoring, under pinning and jacketing.

Conservation of historic buildings - materials and methods - examples.

TEXTBOOKS:

REFERENCE BOOKS:

15CVL445 SUSTAINABLE CONSTRUCTION

Unit 1

Unit 2

Unit 3

TEXTBOOK:

REFERENCE BOOKS:
SYLLABI
B. Tech - Civil Engg.
2015 admissions onwards


15CVL450 ADVANCED FOUNDATION ENGINEERING 2103

Unit 1
Foundation on expansive soils: Introduction to expansive soil - Clay mineralogy and mechanism of swelling - Identification of expansive soils - Swelling potential, swelling pressure, free swell - Free swell index - Classification of expansive soil - Tests for swell pressure (IS code method) - Prediction of swell pressure from index properties - Damages in buildings on expansive soils - Elimination of swelling - Environmental solutions such as soil replacement techniques and lime columns - Principles of design of foundations in expansive soil deposits - Structural solutions such as provision of rigid foundation, under reamed piles, T Beams as strip footing for walls etc. (basic aspects).

Unit 2
Soil dynamics and Machine foundations: Introduction to soil dynamics - Soil behavior under dynamic loads - Difference between static and dynamic load behavior of soil - Dynamic soil properties - Free vibrations and forced vibrations - Types of machines - Types of machine foundations - Vibration analysis of a machine foundation - General design criteria for machine foundations - Design criteria for foundation for reciprocating machines (IS specifications) - Design procedure for block foundation for a reciprocating machine (IS code method) - Vibration isolation and control.

Unit 3
Special foundations: Introduction to shell foundations - Structural form and efficiency - Different types of shell foundations - General principles of geotechnical design of shell foundations and soil-structure interaction.

Special features of the foundations for water tanks, silos, chimneys and transmission line towers.

Foundations for marine structures - Design principles.

TEXTBOOKS:

REFERENCE BOOKS:
Diaphragm walls and coffer dams – type of diaphragm walls and their construction techniques in various soil types – Earth pressure on braced cuts and coffer dams – Design of coffer dams.

**TEXTBOOKS:**

**REFERENCE BOOKS:**

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**15CVL452 ENVIRONMENTAL GEOTECHNOLOGY 2 1 0 3**

**Unit 1**
Environmental cycles - Soil and water - Environmental interaction relating to geotechnical problems - Effect of pollution on soil - water behaviour.

Origin, nature and distribution of soil - Description of individual particle - Soil fabric and structure - Gravitational and surface forces - Interlayer sheet and interlayer bonding in the clay minerals - Basic structural units of clay minerals - Isomorphous substitution - Kaolinite mineral - Montmorillonite mineral - Illite mineral - Electric charges on clay minerals - Ion exchange capacity - Diffused double layer - Adsorbed water - Soil structure - Methods for the identification of minerals (introduction only).

Effect of drying on Atterberg limits - Shrinkage, swelling and cracking characteristics of soil - Electrochemical characteristics of soil-water system - Sensitivity of soil to environment - Soil-water-air interaction - Activity, sensitivity, causes of sensitivity - Influence of exchangeable cations, pH and organic matter on properties of soils - Permeability of soils - Hydraulic conductivity of different types of soils - Darcy’s law and its validity - Factors affecting permeability

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**15CVL453 GROUND IMPROVEMENT TECHNIQUES 2 1 0 3**

**Unit 1**
Objective of ground improvement - In-situ ground improvement methods - Introduction to soil improvements without the addition of many material - surface compaction – compaction piles in sand - impact compaction / dynamic compaction of sands – vibratory compaction in sand - vibroflotation in sand – explosions in sand - Terra probe method - replacement process - vibroflotation in clays - preloading techniques - sand drains - stone columns - introduction to soil improvement by thermal treatment - introduction to biotechnical stabilization.

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**Unit 2**
Introduction to soil improvement by adding materials - lime stabilization – Mechanism - optimum lime content - lime fixation point - effect of lime on physical and engineering properties of soil - lime column method - stabilization of soft clay or silt

Unit 3

Geosynthetics – Types - general applications - types of geotextiles and geo-grids - physical and strength properties of geotextiles and geogrids - behaviour of soils on reinforcing with geotextiles and geogrids - design aspects with geotextiles and geogrid.

TEXTBOOKS:

REFERENCE BOOKS:

15CVL456 REMOTE SENSING AND GIS 2 1 0 3

Unit 1
Introduction, Basic concepts and principles of remote sensing; Definition components of remote sensing - energy sensor, interacting body – active and passive remote sensing – platforms - EMR interaction with earth surface material, radiance, irradiance, incident, reflected, absorbed and transmitted energy – reflectance – specular and diffused reflection surfaces – spectral signature – spectral signature curves – EMR interaction with water, soil and earth surface. Application; Meteorology, land use, networking, hydrological studies, soil studies and coastal zone analysis.

Unit 2
Photogrammetry; Aerial and Terrestrial; photo interpretation. Sensors; Radar imaging; colour scanners; thematic mapper.

Unit 3
Analysis using raster and vector data – retrieval, reclassification, overlaying, buffering - data output – printers and plotters. Open source softwares.

GIS and remote sensing applications – urban applications – water resources – urban analysis – watershed management – resources information system – hazard mitigation.

TEXTBOOKS:

REFERENCES:

15CVL457 SURFACE HYDROLOGY AND WATER POWER 2103

Unit 1


Unit 2


Unit 3
Planning for water power development – estimation of available water power-powe duration curve - storage and pondage - load studies - load duration curve - variations in load factor - power system load - system integrated operational studies - load prediction - market requirements of power - installed capacity - Benefits evaluation of installed capacity.

Classification of hydropower development - storage power development - runoff river power development - pumped storage power development - small hydro power development.

Hydro power plants - power plant structure - layout of hydropower plants - types of power houses - sizing of power house.

Water conductor system – intakes - location and types of intakes - penstock and pressure shafts - water hammer - water hammer equation - types of surge tanks.

TEXTBOOKS:

REFERENCES:
SYLLABI
B. Tech - Civil Engg.
2015 admissions onwards

15CVL458   WATER RESOURCES SYSTEM PLANNING AND DESIGN

Unit 1
Water systems engineering - scope and approach. Issues and the systems planning approach - water system dynamics - water resource development alternatives - Water systems planning objectives - Constraints and Criteria - Economic and Econometric principles.

Hydrologic input analysis, Demand analysis, System elements & Subsystem planning - Stochastic planning and management - Design and management issues.

Unit 2
Optimization methods and their application in water resource systems. Linear programming and Dynamic programming models. Problem formulation for W. R systems – Multi-objective planning – Large scale system analysis - Case studies.

Unit 3
Ground water system planning – Conjunctive surface and G. W development - Hierarchical approach - Water quality management planning - Regional planning - Policy issues.

REFERENCE BOOKS:

15CVL460   ADVANCED ENVIRONMENTAL ENGINEERING

Unit 1
Instrumental methods for analysis of contaminants in air, water and soil - colorimetry, Chromatography, spectroscopy, electrochemical probes

Indoor and outdoor air pollution – meteorology - influence of solar radiation and wind fields - lapse rate and stability conditions - characteristics of stack plumes - effective stack height.

REFERENCE BOOKS:

15CVL461   ENVIRONMENTAL IMPACT ASSESSMENT

Unit 1
Concept of environment, Concept of environmental impact, Environmental impact assessment (EIA) – definitions, terminology and overview, Evolution of EIA in the USA, Key features of the National Environmental Policy Act and its implementation and the Council on Environmental Quality (CEQ) guidelines, Role of the USEPA, Evolution of EIA in India, Sustainable development, Generalised EIA process flow chart, Screening, Initial environmental examination (IEE), Scoping, Public participation.
Unit 2
Environmental baseline, Impact assessment methods – checklists – matrices - quantitative methods – networks - overlay mapping. Introduction to impact prediction and evaluation, Factors to be considered while assessing the impacts of water related projects, power projects, waste water treatment facilities etc. Major features of the EIA notification in India, Present status and procedures of EIA in India.

Unit 3
Prediction and assessment of impacts of developmental activities on surface water, land and soil, groundwater, air, biological environment etc.

Prediction and assessment of visual impacts, Socioeconomic impact analysis, Evaluation of alternatives, Preparing the EIA document, Environmental impact statement (EIS), Environmental monitoring, Environmental audit (EA). Case studies.

REFERENCE BOOKS:
7. Website of the Ministry of Environment and Forests, Govt. of India and the USEPA.

15CVL462 INDUSTRIAL WASTE TREATMENT 2 1 0 3

Unit 1

Unit 2

Treatment of industrial waste - suitability of different techniques - disposal of industrial waste.

REFERENCE BOOKS:

15CVL470 PAVEMENT DESIGN 2 1 0 3

Unit 1
Introduction: Types and component parts of pavements – factors affecting design and performance of pavements - comparison between highway and airport pavements - functions and significance of sub grade properties – various methods of assessment of sub grade soil strength for pavement design - cause and effects of variations in moisture content and temperature - depth of frost penetration - design of bituminous mixes by Marshall method.

Unit 2
Stress analyses and methods of flexible pavement design: stresses and deflections in homogeneous masses - burmister 2 layer and 3 layer theories - wheel load stresses - ESWL of multiple wheels - repeated loads and EWL factors - empirical, semi-empirical and theoretical approaches for flexible pavement design - group index, CBR, triaxial, mcleod and burmister layered system methods.

Unit 3
Stresses analysis and methods of rigid pavement design: types of stresses and causes - factors influencing stresses, general conditions in rigid pavement analysis – ESWL - wheel load stresses - warping stresses – friction stresses - combined stresses - functions of various types of joints in cement concrete pavements -
design and detailing of slab thickness; longitudinal, contraction and expansion joints by IRC recommendations.

Pavement evaluation and rehabilitation.

**TEXTBOOK:**

**REFERENCE BOOKS:**

**15CVL471 TRAFFIC ENGINEERING AND MANAGEMENT 2 1 0 3**

**Unit 1**
Introduction - Objectives and scope of traffic engineering - Components of road traffic: vehicle, driver and road - Road user and vehicle characteristics and their effect on road traffic - Traffic maneouvre - Traffic Stream Characteristics - Relationship between Speed, Flow and Density.

Objectives, methods, equipment, data collection, analysis and interpretation (including case studies) of (a) Speed and delay, (b) Origin and destination, (c) Parking, (d) Accident and other studies.

**Unit 2**
Design, Regulation and Management of Traffic Engineering Facilities: Control of traffic movements through time sharing and space sharing concepts - Design of channelising islands, T, Y, skewed, staggered, roundabout, mini-roundabout and other forms of at-grade crossings including provision for safe crossing of pedestrians and cyclists - Grade separated intersections - Warrants and design features - Bus stop location and bus bay design - Road lighting - Regulations on vehicles, drivers and traffic - Planning and design of traffic management measures: one-way streets, reversible lanes and roadways, turn regulation, transit and carpool lanes - Planning and design of pedestrian facilities – Traffic calming.

**TEXTBOOKS:**

**15CVL472 TRANSPORTATION SYSTEM MANAGEMENT AND CONTROL 2 1 0 3**

**Unit 1**
Traffic Engineering Facilities and Control: Control of Traffic Movements through Time Sharing and Space Sharing Concepts – Design of Channelising Islands - T, Y, Skewed, Staggered, Roundabout, Mini-Round about and other At-Grade Crossings and Provision for Safe Crossing of Pedestrians and Cyclists; Grade Separated Intersections, their warrants and Design Features, Bus Stop Location and Bus Bay Design.

Traffic Control Devices: Traffic Signs and Signals, Principle of Signal Design, Webster’s Method, Redesign of Existing Signals including Case Studies; Signal System Coordination.

**Unit 2**
TSM Actions:
Combination and Interactions, Input Assessment and Evaluation, Monitoring and
Surveillance, Study of following TSM Actions with respect to:
1) Problems Addressed 2) Conditions for Applications 3) Implementation Problems
4) Evaluation and Impact Analysis.

Public Transportation and HOV Treatment, Toll discounts for Car Pools during Peak periods, Park and Ride, Car pooling, Exclusive Bus & Two-wheeler Lanes, Priority at Ramp Terminals, Bus Transfer Stations, Limited Skip & Stop Bus Services & Shared Rides.

Unit 3
Demand Management: Staggered Working hours, Flexible Work hours, High Peak Period Tolls, Shuttle Services, Circulation Services and Extended Routes.

Traffic Operations Improvements: On-Street, Parking ban, Freeway Ramp Control and Closure, Travel on Shoulders, One-way Streets, Reversible Lanes, Traffic Calming, Right Turn Phase, Right Turn Lanes, Reroute Turning Traffic.

TEXTBOOK:

REFERENCE BOOKS:

15CVL473 URBAN TRANSPORTATION PLANNING

Unit 1

Unit 2
Transportation Survey and Analysis: Definition of study area - Zoning - Types and sources of data - Road side interviews - Home interview surveys - Expansion factors - Accuracy checks.

Trip Generation Analysis: Trip generation models - Zonal models - Category analysis - Household models - Trip attractions of work centers.


Unit 3
Mode Split Analysis: Mode choice behaviour, Completing modes, Mode split curves, Probabilistic models.

Route Split Analysis - Elements of transportation networks, coding - minimum path trees, all-or-nothing assignment.

TEXTBOOK:

REFERENCE BOOKS:

15CVL481 STRUCTURAL DESIGN AND DETAILING

Design drawing and detailing of RC elements / structures – preparation of detailed design documents, schedules of structural elements and reinforcement details (structural drawing).
- Framed structure
- Retaining walls
- Water tanks
- Design and detailing of steel elements / structures
- Built-up columns and Column bases
- Roof trusses and joints including purlins
- Gantry girder
- Computer aided analysis and design
- Multi-storey frame analysis for dead, live and wind loads - Applications.
- Design of Reinforced concrete Beams, Columns – Footings – Steel beams – columns - Trusses

TEXTBOOKS:

REFERENCE BOOKS:
3. SP:34-1987, “Handbook on Concrete Reinforcement and Detailing”, BIS.

**15CVL491**  PROFESSIONAL PROJECT  0 1 2 2

The objective of this course is to impart and improve the design capability of the student. This course conceives purely a design problem in any one of the disciplines of Civil Engineering: e.g., Design of a RC structure, Design of a waste water treatment plant, Design of a foundation system, Design of traffic intersection etc. The design problem can be allotted to a group of students comprising of not more than four. At the end of the course the group should submit a complete report on the design problem consisting of the data given, the design calculations, specifications if any and complete set of drawings which follow the design.

**15CVL495**  PROJECT PHASE I  2 cr

The student is expected to start the initial planning and preparation for the final year project. They have to identify their team, project advisor and, plan the objectives, scope, methodology and the work schedule. A detailed literature review is also expected in this phase.

**15CVL499**  PROJECT PHASE II  10 cr

The student is expected to work on a topic in the field of Civil Engineering which could involve theoretical and/or fabrication and/or experimental and/or computational work. Evaluation will be done at the mid-course, as well as at the end of the semester.

**15EEE180**  WORKSHOP B  0 0 2 1

Part A - Electronics
Identification of electronic components (Passive and Active)
Study of measuring instruments (Voltmeter, Ammeter and Multimeter)
Measurement and theoretical Verification of series and parallel combination of resistors and capacitors
Calibration of CRO and measurements of signal parameters (RMS, maximum value, peak value, time and frequency)
Calibration of function generator using CRO
Soldering practice

**SYLLABI B. Tech - Civil Engg.**

**15ENG111**  COMMUNICATIVE ENGLISH  2 0 2 3

OBJECTIVES: To make the students communicate their thoughts, opinions, and ideas freely and naturally; to make them understand the different styles in communication; to make the students understand the aesthetics of reading and writing; to bring in a spirit of enquiry; to motivate critical thinking and analysis; to help them ruminate on human values.

Unit 1
Reading: Different styles of communication – Reading Comprehension - critical thinking and analysis – Note-making – Any two pieces from the text.

Unit 2
Writing: Prewriting techniques - Kinds of paragraphs - basics of continuous writing.
Grammar & Usage: Parts of Speech, Tenses, Concord, Phrasal Verbs, Modal Auxiliaries, Modifiers (Workbook) - Any two pieces from the text.

Unit 3
Practical sessions (Listening & Speaking): Introduction to English pronunciation including minimal pairs and word stress – differences between British and American English – Listening comprehension and Note-taking - Any two pieces from the text.
SYLLABI  
B. Tech - Civil Engg.  
2015 admissions onwards

Activities: Short speeches, seminars, quizzes, language games, debates, and discussions, Book Reviews, etc.

Text: Language through Reading: Compilation by Amrita University for internal circulation

Poems:
i. The Poplar Field by William Cowper
ii. Telephone Conversation by Wole Soyinka

Prose:
i. Higher Mathematics by R. K. Narayan
ii. Wings of Fire by Abdul Kalam (Part III.11)

Short Stories:
i. Best Investment I Ever Made by A. J. Cronin
ii. Death of an Indian by Krishna Charan Das

1. Language through Practice: Compilation by Amrita University for internal circulation

15ENG230  BUSINESS COMMUNICATION  1 0 2 2

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.

Unit 1

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:


15ENG231  INDIAN THOUGHT THROUGH ENGLISH  1 0 2 2

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.

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 Jawaharal Nehru / S. Radhakrishnan / A. P. J. Abdul Kalam’s My Vision for India etc. (any speech).

REFERENCES:

15ENG232  INSIGHTS INTO LIFE THROUGH ENGLISH LITERATURE  1 0 2 2

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.

Unit 1 Poems

References
Schools of Engineering Amrita Vishwa Vidyapeetham

S 93

S 94
Unit 2 Short Stories

Unit 3 Prose

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.

15ENG233  TECHNICAL COMMUNICATION  1 0 2  2

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.

Unit 1

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

Practice in oral communication and Technical presentations

REFERENCES:

15ENV300  ENVIRONMENTAL SCIENCE AND SUSTAINABILITY  3 0 0  3

Unit 1
State of Environment and Unsustainability, Need for Sustainable Development, Traditional conservation systems in India, People in Environment, Need for an attitudinal change and ethics, Need for Environmental Education, Overview of International Treaties and Conventions, Overview of Legal and Regulatory Frameworks.

Environment: Abiotic and biotic factors, Segments of the Environment, Biogeochemical Cycles, Ecosystems (associations, community adaptations, ecological succession, Food webs, Food chain, ecological pyramids), Types of Ecosystems – Terrestrial ecosystems, Ecosystem Services, Economic value of ecosystem services, Threats to ecosystems and conservation strategies.

Biodiversity: Species, Genetic & Ecosystem Diversity, Origin of life and significance of biodiversity, Value of Biodiversity, Biodiversity at Global, National and Local Levels,
India as a Mega-Diversity Nation (Hotspots) & Protected Area Network, Community Biodiversity Registers. Threats to Biodiversity, Red Data book, Rare, Endangered and Endemic Species of India. Conservation of Biodiversity. People’s action.

Impacts, causes, effects, control measures, international, legal and regulatory frameworks of: Climate Change, Ozone depletion, Air pollution, Water pollution, Noise pollution, Soil / land degradation / pollution

Unit 2
Linear vs. cyclical resource management systems, need for systems thinking and design of cyclical systems, circular economy, industrial ecology, green technology. Specifically apply these concepts to: Water Resources, Energy Resources, Food Resources, Land & Forests, Waste management.

Discuss the interrelation of environmental issues with social issues such as: Population, Illiteracy, Poverty, Gender equality, Class discrimination, Social impacts of development on the poor and tribal communities, Conservation movements: people’s movements and activism, Indigenous knowledge systems and traditions of conservation.

Unit 3

Global and national state of housing and shelter, Urbanization, Effects of unplanned development case studies, Impacts of the building and road construction industry on the environment, Eco-homes / Green buildings, Sustainable communities, Sustainable Cities.

Ethical issues related to resource consumption, Intergenerational ethics, Need for investigation and resolution of the root cause of unsustainability, Traditional value systems of India, Significance of holistic value-based education for true sustainability.

TEXTBOOKS / REFERENCES:

15FRE230 PROFICIENCY IN FRENCH LANGUAGE (LOWER) 1 0 2 2

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

15FRE231 PROFICIENCY IN FRENCH LANGUAGE (HIGHER) 1 0 2 2

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

15GER230   GERMAN FOR BEGINNERS I   1 0 2 2

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 – Wh - 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

15GER231   GERMAN FOR BEGINNERS II   1 0 2 2

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.

15GER232   PROFICIENCY IN GERMAN LANGUAGE (LOWER)   1 0 2 2

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.

15GER233 PROFICIENCY IN GERMAN LANGUAGE (HIGHER) 1 0 2 2

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.

15HIN101 HINDI I 1 0 2 2

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

Unit 1
Introduction to Hindi Language, National Language, Official Language, link Language etc. Introduction to Hindi language, Devanagari script and Hindi alphabet.

Shabda Bhed, Shabdantar ki Drishti se - Bhasha Paribhasha aur Bhed - Sangya - Paribhasha Aur Bhed - Sangya ke Roopantar 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

15HIN111 HINDI II 1 0 2 2

OBJECTIVES: Appreciation and assimilation of Hindi Literature both drisya & shravya using the best specimens provided as anthology.

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

BOOKS:
2. Gadya Manjusha: Editor: Govind, Jawahar Pusthalay, Mathura
15HUM230  EMOTIONAL INTELLIGENCE  2002

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

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:

15HUM231  GLIMPSES INTO THE INDIAN MIND: THE GROWTH OF MODERN INDIA  2002

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;

REFERENCES:
1. Tilak, Bal Gangadhar. The Orion / Arctic Home in the Vedas.
2. Tagore, Rabindranath. The History of Bharatvarsha / On Nationalism / Greater India.

15HUM232  GLIMPSES OF ETERNAL INDIA  2002

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 – Kautiya and his Arthasastra – Chandragupta Maurya and the rise of the Mauryan empire – Gupta dynasty Indian art and architecture – classical sanskrit literature – Harisvarvadhana; 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 wreaked 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, Brihadaranyak Upanishad, Saptasati Devi Mahatmyam, Ramayana, Mahabharata, Manusmriti, Kautilya’s Arthasastra 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:
of the various institutions based on the four purusarthas; 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 bhopati; The mahajanapadas and the emergence of the srenis – states and cities of the Indo-Gangetic plain.

Unit 2
Classical India: 600 B.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 Arthasastra; of Politics and trade – the rise of the Mercantile Community; Elements from the age of the Kushan 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 nationalistic 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.

Conclusion

REFERENCES:
1. The Cultural Heritage of India. Kolkata: Ramakrishna Mission Institute of Culture.
SYLLABI 
B. Tech - Civil Engg.  
2015 admissions onwards

15HUM234 
HEALTH AND LIFE STYLE 
1 0 2 2

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.

Practicals - Cooking without Fire or Wire-healthy Snacks

TEXTBOOKS:

REFERENCE BOOKS:
WHO Report on Adolescent Health: 2010

15HUM235 
INDIAN CLASSICS FOR 
THE TWENTY-FIRST CENTURY 
2 0 0 2

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.

SYLLABI 
B. Tech - Civil Engg.  
2015 admissions onwards

REFERENCE:
The Bhagavad Gita, Commentary by Swami Chinnayanananda

15HUM236 
INTRODUCTION TO INDIA STUDIES 
2 0 0 2

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.

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. Hriyanna, 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.
SYLLABI

B. Tech - Civil Engg. 2015 admissions onwards

9  On Nationalism, Sri Aurobindo.
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 Kumarasvamy
18  Comparative Aesthetics, Volume 2, Kanti Chandra Pandey, Chowkhamba, Varanasi
19  The Invasion That Never Was, Michel Danino
20  Sanskara, U. R. Ananthamurthy, OUP.
21  Hayavadana, Girish Karnard, OUP.
22  Naga-Mandala, Girish Karnard, OUP.

15HUM237 INTRODUCTION TO SANSKRIT LANGUAGE 2002

AND LITERATURE

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.

Unit 1

Unit 2
Language Studies - Role of Sanskrit in Indian & World Languages.

Unit 3

Unit 4

SYLLABI

B. Tech - Civil Engg. 2015 admissions onwards

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

15HUM238 NATIONAL SERVICE SCHEME 2002

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.

Unit 5
Environmental Issues: Environment conservation, enrichment and sustainability, climate change, waste management, rain water harvesting, energy conservation, waste land development.

Project Work / Practical

15HUM239  PSYCHOLOGY FOR EFFECTIVE LIVING  2 0 0 2

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

Unit 3 Application of Health Psychology
Health compromising behaviours, substance abuse and addiction.

TEXTBOOKS:

REFERENCE BOOKS:

15HUM240  PSYCHOLOGY FOR ENGINEERS  2 0 0 2

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:

REFERENCE BOOKS:

15HUM241  SCIENCE AND SOCIETY – AN INDIAN PERSPECTIVE  2 0 0 2

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:
**SYLLABI**

### B. Tech - Civil Engg. 2015 admissions onwards

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 (IAS), 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.

15HUM242 THE MESSAGE OF BHAGAVAD GITA 2 0 0 2

Unit 1
Introduction: Relevance of Bhagavad Gita today – Background of Mahabharatha.

Arjuna Vishada Yoga: Arjuna’s Anguish and Confusion – Symbolism of Arjuna’s Chariot.


15HUM243 THE MESSAGE OF THE UPANISHADS 2 0 0 2

**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.

Unit 1
An Introduction to the Principal Upanishads and the Bhagavad Gita - Inquiry into the mystery of nature - Sruti versus Smriti - Sanatana Dharma: its uniqueness - The Upanishads and Indian Culture - Upanishads and Modern Science.

Unit 2

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.
SYLLABI  B. Tech - Civil Engg.  2015 admissions onwards

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.
7. Upanishad Ganga series – Chinmaya Creations

15HUM244 UNDERSTANDING SCIENCE OF FOOD AND NUTRITION

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:

REFERENCE BOOKS:

SYLLABI  B. Tech - Civil Engg.  2015 admissions onwards

15JAP230 PROFICIENCY IN JAPANESE LANGUAGE (LOWER) 1 0 2 2
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.

15JAP231 PROFICIENCY IN JAPANESE LANGUAGE (HIGHER) 1 0 2 2
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.

15KAN101 KANNADA I 1 0 2 2

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.

Unit 1
Adalitha Kannada: bhashe, swaroopa, belavanige yiri parichaya
Paaribhaashika padagalu
Vocabulary Building
SYLLABI
B. Tech - Civil Engg. 2015 admissions onwards

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 Iyangar – Adalitha Kannada – Chetana Publication, Mysuru
2. A. N. Murthy Rao – Aleyuva Mana – Kuvempu Kannada Adyayana Samste
3. Nemi Chandra – Badhuku Badalisabahudu – Navakarnataka Publication
4. Sanna Kathegalu - Prasaranga, Mysuru University, Mysuru
5. B. M. Shree – Kannadada Bavuta – Kannada Sahitya Parishattu
7. Dr. G. S. Shivarudrappa – Samagra Kavya – Kamadhenu Pustaka Bhavana

15KAN111 KANNADA II 1 0 2 2

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.

Unit 1
Anchuthkutha patra, prakatane, manavi patra, vanijya patra

Unit 2
Nanna Hanate - Dr. G. S. Shivarudrappa

SYLLABI
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Unit 3
Mankuthimmana Kaggada Ayda bhagagalu – D. V. Gundappa (Padya Sanikhye 5, 20, 22, 23, 25, 44, 344, 345, 346, 601)
Ella Marethiruvaga - K. S. Nissaar Ahmed
Saviraru Nadigalu – S Siddalingayya

Unit 4
Swayy Aata – Da. Ra. Bendre

Unit 5
Swaytakkaagi Tyaga - Beechi

REFERENCES:
1. H. S. Krishnaswami Iyangar – Adalitha Kannada – Chetana Publication, Mysuru
2. Dr. G. S. Shivarudrappa – Samagra Kavya. - Kamadhenu Pustaka Bhavana
4. K. S. Nissaar Ahmed – 75 Bhaavageetegalu – Sapna book house
5. Dr. Da. Ra. Bendre – Saayo Aata – Shri Maata Publication

15MAL101 MALAYALAM I 1 0 2 2

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.

Unit 1
Ancient poet trio: Adhyatmaramayanam, Lakshmana Swanthanam (valsa soumitre... mungikidakayal), Ezuthachan - Medieval period classics – Jnanappana (kalaminnu... vilasangalingane), Poonthanam

Unit 2

Unit 3
Short stories from period 1/2/3, Poovanpazham - Vaikaom Muhammed Basheer - Literary & Cultural figures of Kerala and about their literary contributions.
SYLLABI
B. Tech - Civil Engg. 2015 admissions onwards

Unit 4
Literary Criticism: Ithihasa studies - Bharatha Paryadanam - Vyasaante Chiri - Kuttikrishna Mararu - Outline of literary Criticism in Malayalam Literature - Introduction to Kuttu 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 .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:

15MAL111 MALAYALAM II 1 0 2 2

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.

Unit 1

Unit 2

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

SYLLABI
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Unit 4
Part of an autobiography / travelogue: Kannerum Kinavum, V. T. Bhattachiripadu - 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:

15MAT111 CALCULUS AND MATRIX ALGEBRA 2 1 0 3

Unit 1 Calculus
Limit and Continuity: Limit (One-Sided and Two-Sided) of Functions. Continuous Functions, Discontinuities, Monotonic Functions, Infinite Limits and Limit at Infinity.


Unit 3 Matrix Algebra
Review: System of linear Equations, linear independence
Eigen values and Eigen vectors: Definitions and Properties, Positive definite, Negative Definite and Indefinite Matrices, Diagonalization and Orthogonal Diagonalization, Quadratic form, Transformation of Quadratic Form to Principal axes, Symmetric and Skew Symmetric Matrices, Hermitian and Skew Hermitian

**TEXTBOOKS:**

**REFERENCE BOOKS:**

15MAT121 VECTOR CALCULUS AND ORDINARY DIFFERENTIAL EQUATIONS

**Unit 1**

Vector Integration: Line Integral, Line Integrals Independent of Path, Green's Theorem in the Plane (Sections: 10.1, 10.2, 10.3, 10.4).

**Unit 2**
Surface Integral: Surfaces for Surface Integrals, Surface Integrals, Triple Integrals – Gauss Divergence Theorem, Stoke's Theorem. (Sections: 10.5, 10.6, 10.7, 10.9)

First Order Differential Equations: First Order ODE, Exact Differential Equations and Integrating Factors (Sections 1.1 and 1.4).

**Unit 3**
Second Order Differential Equations: Homogeneous and non-homogeneous linear differential equations of second order (Review), Modelling: Free Oscillations,
Euler-Cauchy Equations, Solution by Undetermined Coefficients, Solution by the Method of Variation of Parameters (Sections 2.1, 2.2, 2.4, 2.5, 2.6, 2.7, 2.10).


**TEXTBOOK:**

15MAT204 TRANSFORMS AND PARTIAL DIFFERENTIAL EQUATIONS

**Unit 1**

**Unit 2**
Convolution, Integral Equations, Partial Fractions, Differential Equations, Systems of Differential Equations. (Sections: 6.1 to 6.7)


**Unit 3**

Partial Differential Equations: Basic Concepts, Modeling: Vibrating String, Wave Equation, Separation of Variables, Use of Fourier Series, Heat Equation; Solution by Fourier Series. (Sections: 12.1 - 12.5)

**TEXTBOOK:**

15MAT212 COMPLEX ANALYSIS AND NUMERICAL METHODS

**Unit 1**
Complex Numbers, Complex Plane, Polar Form of Complex Numbers. Powers and
SYLLABI  B. Tech - Civil Engg.  2015 admissions onwards


Unit 2

Unit 3

TEXTBOOK:

REFERENCE BOOK:

15MAT214  PROBABILITY AND STATISTICS  2103

Unit 1

Random Variable and Distributions: Introduction to random variable – discrete and continuous distribution functions - mathematical expectations – moment generating functions and characteristic functions. Binomial, Poisson, Geometric, Uniform, Exponential, Normal distribution functions (MGF, mean, variance and simple problems) – Chebyshev’s theorem

Unit 2
Sampling Distributions: Distributions of Sampling Statistics, Chi-square, t and F distributions (only definitions and use). Central Limit Theorem.


Unit 3
Testing of Hypothesis: Large and small sample tests for mean and variance – Tests based on Chi-square distribution.

TEXTBOOK:

REFERENCE BOOKS:

15MEC100  ENGINEERIN GDrawing - CAD  2023


TEXTBOOK:

REFERENCES:

15MEC180  WORKSHOP A  0021

1. Product Detailing Workshop
Disassemble the product of sub assembly - Measure various dimensions using measuring instruments - Free hand rough sketch of the assembly and components - Name of the components and indicate the various materials used - Study the functioning of the assembly and parts - Study the assembly and components design for compactness, processing, ease of assembly and disassembly - Assemble the product or subassembly.

2. Pneumatics and PLC Workshop
Study of pneumatic elements - Design and assembly of simple circuits using basic
pneumatic elements - Design and Assembly of simple circuits using Electro-pneumatics.
Study of PLC and its applications - Simple programming using ladder diagrams.

3. Sheet Metal Workshop
Study of tools and equipments - Draw development drawing of simple objects on sheet metal (cone, cylinder, pyramid, prism, tray etc.) Fabrication of components using small shearing and bending machines - Riveting and painting practice.

4. (a) Welding Workshop
Study of tools and equipments - Study of various welding methods - Arc welding practice and demonstration of gas welding and cutting.

(b) Demo and practice Workshop
Fitting: Study of tools, practice in chipping, filing and making joints.
Carpentry: Study of tools, planning practice and making joints

REFERENCE:
Concerned Workshop Manual

15PHY100 PHYSICS 3 0 0 3

Unit 1 Review of Classical Physics and dual nature of Waves / particle


Unit 2 Atomic Structure and Quantum Mechanics
Quantum Mechanics: Introduction - wave equation - Schrodinger's equation (time dependent and independent) - expectation values, operators, Eigen value (momentum and energy) – 1D potential box (finite and infinite) - tunnel effect - harmonic oscillator.

Unit 3 Statistical Mechanics and Solid State Physics


TEXTBOOK:
REFERENCE BOOK:
"Principles of Physics" by Halliday, Resnick and Walker, 9th edition

15PHY230 ADVANCED CLASSICAL DYNAMICS 3 0 0 3

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:

REFERENCE BOOKS:

15PHY233 BIOPHYSICS AND BIOMATERIALS 3 0 0 3

OBJECTIVE: To equip the students with the knowledge on different kinds of biomaterials and other medical need, basic research, and to provide an overview of theory and practice of biomaterials.

Unit 1

Definition and classification of bio-materials, mechanical properties, visco-elasticity, wound-healing process, Application of biomaterial for the human body, body response to implants, blood compatibility. Implementation problems - inflammation, rejection, corrosion, structural failure. Surface modifications for improved compatibility.

Unit 2
Bioceramics, Biopolymers, Metals, ceramics and composites in medicine: Properties, applications, suitability & modifications required for certain applications.


Unit 3

TEXTBOOKS AND REFERENCES:

15PHY234 INTRODUCTION TO COMPUTATIONAL PHYSICS 3 0 0 3

Unit 1
Differentiation: Numerical methods, forward difference and central difference methods, Lagrange’s interpolation method.

Integration: Newton - cotes expression for integral, trapezoidal rule, Simpson’s rule, Gauss quadrature method.

Unit 2

Unit 3

Eigen values and Eigen vectors of matrix: Determinant of a matrix, characteristic equation of a matrix, eigen values and eigen vectors of a matrix, power method.

TEXTBOOK:
Rubin H Landau & Manuel Jose Paez Mejia, “Computational Physics”, John Wiley & Sons
Suresh Chandra, “Computer Applications in Physics”, Narosa Publishing House, New Delhi
M Hijroth Jensen, Department of Physics, University of Oslo, 2003 (Available in the Web)

15PHY239 ELECTROMAGNETIC FIELDS AND WAVES

Unit 1
Electrostatics: Coulomb's law and electric field intensity, field due to a continuous volume charge distribution, field of a line charge, field of sheet of charge, electric flux density, Gauss’s law, application of Gauss’s law, Maxwell’s first equation.

Poisson’s and Laplace’s equations: The potential field of a point charge, potential field of a system of charges: conservative property, potential gradient, the dipole.

Unit 2
Poisson’s and Laplace’s equations, uniqueness theorem, examples of the solution of Laplace’s equation, solution of Poisson’s equation.

Electromagnetics: Biot Savart law, magnetic flux and magnetic flux density, scalar and vector magnetic potentials, derivation of steady magnetic field laws, Faraday’s laws, displacement current, Maxwell’s equations in point and integral form, retarded potentials

Unit 3
Electromagnetic waves: EM wave motion in free space, wave motion in perfect dielectrics, plane wave in lossy dielectrics, Poynting vector and power consideration, skin effect, reflection of uniform plane waves, standing wave ratio.

Transmission line equations, line parameters - examples, dipole radiation, retarded potentials, electric dipole radiation.

TEXTBOOK:

REFERENCES:

15PHY239 ELECTROMAGNETIC FIELDS AND WAVES

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 it’s 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 it’s 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:
15PHY240  ELECTRONIC MATERIALS SCIENCE  3 0 0 3

Unit 1
Types of bonding in solids, Crystallography and crystalline defects: Crystallography, Directions and planes, Crystalline defects, line defects, Planar defects, Volume defects; Binary and Ternary Phase Diagrams; Lever rule and phase rule, Eutectic, peritectic and Eutecloid systems, Applications of Phase diagrams; Basic Quantum Physics - atomic structure, Use of band theory and occupation statistics to explain existence and basic properties of metals and nonmetals. Working of Semiconductor Devices using band diagrams and their electrical characteristics: pn junctions, BJT, MOSFET.

Unit 2
Use of band theory to explain optoelectronic properties of materials and optoelectronic devices: LEDs, Solar Cells, Lasers, pin diodes, photodiodes; Magnetic properties and Superconductivity: Magnetic moments and Magnetic Permeability, types of magnetism, saturation magnetization, magnetic domains, soft and hard magnetic materials, superconductivity and its origin, Giant Magneto Resistance, Josephson effect, Energy band diagrams and Magnetism, Applications of magnetic materials - Magnetic recording materials, etc.

TEXTBOOK:

REFERENCE:

15PHY241  LASERS IN MATERIAL PROCESSING  3 0 0 3

Unit 1
Basic optical theory: Nature of electromagnetic radiation, interaction of radiation with matter, reflection, refraction, polarization, laser fundamentals, laser beam characteristics, beam quality (laser cavity modes), Q-switching, mode locking, continuous wave, types of lasers, energy and power.

Laser interaction with materials: Optical properties of materials, laser interaction with metals, insulators, semiconductors, polymers and biological materials.

REFERENCES:

15PHY243  MICROELECTRONIC FABRICATION  3 0 0 3

Unit 1
Introduction to semiconductor fabrication – scaling trends of semiconductor devices; crystal structure of semiconductor materials, crystal defects, phase diagrams and laser surface treatment: Introduction to laser surface hardening, laser surface melting, laser surface alloying, laser surface cladding, laser cleaning. Laser ablation: mechanisms (photothermal, photophysical and photochemical), mask projection techniques, laser micro and nano structuring.

Unit 2
Laser cutting and drilling: Mechanism for inert gas and oxygen-assisted cutting, factors controlling cut quality and kerf width. Laser assisted drilling.

Laser welding: Introduction to laser keyhole welding and contrast with conduction limited welding, applications.

Direct laser fabrication (DLF): Laser sintering & laser rapid manufacturing, comparison with rapid prototyping. Main potential and limitations of DLF for direct fabrication and for the production of novel engineering materials and structures.

Unit 3
Laser forming: Mechanisms involved, including thermal temperature gradient, buckling, upsetting. Applications in alignment and straightening and in rapid production processes.

Scope of application of laser materials processing; focused on industrial application of laser in materials processing including laser welded tailored blanks.

Laser safety: Introduction to safety procedures in the use of lasers, including wavelength effects and laser safety standards.
solid solubility; physics of Czochralski growth of single crystal silicon, Bridgeman method for GaAs, float zone process; diffusion science: Ficks laws of diffusion, atomistic models of diffusion, dopant diffusion mechanisms; kinetics of thermal oxidation, Deal-Grove Model, nitridation of silicon, structure and characteristics of oxides, effect of dopants on oxidation kinetics, dopant redistribution;

Unit 2
Physics of ion implantation: Coulombic scattering and projected range, nuclear and electronic stopping, channeling, implantation damage removal, dopant activation by rapid thermal annealing; principles of optical lithography – optics and diffraction, light sources and spatial coherence, physics of pattern transfer, nodulation transfer function; chemistry of lithographic processes: organic and polymeric photoresists, developing and exposure, contrast; principles of non-optical lithography: electron beam, X-ray lithography, resists, sources; etching: Chemistry of wet etching, plasma physics, chemistry of plasma etching and reactive ion etching; chemical mechanical polishing.

Unit 3
Vacuum science: Kinetic theory of gases, gas flow and conductance, vacuum pumps and seals; deposition of thin films: physics of sputtering and evaporation, step coverage and morphology of deposited films, chemical vapor deposition: chemical equilibrium and law of mass action, gas flow and boundary layers, types of CVD, plasma assisted CVD; thermodynamics of epitaxial growth, types molecular beam epitaxy, isolation and contact formation – LOCOS and trench, silicides, metallization with Al and Cu; process Integration: CMOS, bipolar process flow.

TEXTBOOK:
Stephen Campbell, Science and Engineering of Microelectronic Fabrication, Oxford University Press, 2001

REFERENCES:

15PHY245 NUCLEAR ENERGY: PRINCIPLES AND APPLICATIONS 3 0 0 3

Unit 1

Fission and fusion: The fission process, energetic of fission, byproducts of fission, energy from nuclear fuels. Fusion reactions, electrostatic and nuclear forces, thermo nuclear reactions in plasma. Energetics of fusion. Comparison of fusion and fission reactions.

Unit 2
Neutron chain reactions and nuclear power: Criticality and multiplication, factors governing the multiplication, neutron flux and reactor power, reactor types and reactor operations. Methods of heat transmission and removal, steam generation and electric power generation, waste heat disposal.

Unit 3
Breeder reactors and fusion reactors: The concept of breeding nuclear fuel, isotope production and consumption, fast breeder reactor, breeding and uranium sources. Technical problems in the functioning of fusion reactor, requirements for practical fusion reactors, magnetic confinement, inertial confinement and other fusion concepts. Prospects of fusion power.

Radiation protection and waste disposal: Biological effects of radiation, radiation dose units, protective measures, internal exposure, and radon problem. Nuclear fuel cycle and waste classification, spent fuel storage and transportation, high level waste disposal, low level waste disposal.

TEXTBOOK:

REFERENCES:
1. David Bodansky, Nuclear Energy: principles, practices and prospects, Springer Verlag

15PHY247 PHOTOVOLTAICS 3 0 0 3

Unit 1
Introduction to semiconductors: Semiconductors: concept of electron and holes, conduction in semiconductors and concentration of charge carriers in semiconductors. Direct and indirect band gap semiconductors (quantum mechanical treatment). Extrinsic semiconductors: n-type, p-type & compensation doping, carrier concentration; PN junction - concept of bands at PN junction, junction under forward and reverse biases (conceptual).

Unit 2

Unit 3

Advanced Solar cell technologies (III Generation): Alternatives to conventional Si based solar cells - Thin film solar cells, Hetero junction solar cells, Tandem solar cells: material properties, fabrication and stability (includes nano scale devices). Organic solar cells.

TEXTBOOK:

REFERENCES:

15PHY248 PHYSICS OF LASERS AND APPLICATIONS 3 0 0 3

Unit 1
Review of some basic concepts and principle of laser.


Unit 2
Properties of LASERS
Gain mechanism, threshold condition for PI (derivation), emission broadening - line width, derivation of $\Delta \omega_{FWHM}$ 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

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:

REFERENCES:

15PHY250 QUANTUM PHYSICS AND APPLICATIONS 3 0 0 3

Unit 1
Unit 2
Bosons and Fermions - symmetric and antisymmetric wavefunctions - elements of statistical physics: density of states, fermi energy, Bose condensation - solid state physics: Free electron model of metals, elementary discussion of band theory and applications to semiconductor devices.

Einstein coefficients and light amplification - stimulated emission - optical pumping and laser action.

Unit 3

Nuclear physics: nuclear properties - binding energy and mass formula - nuclear decay with applications - theory of alpha decay - nuclear forces – fission - principle of nuclear reactor - elementary particles - leptons, hadrons, quarks, field bosons - the standard model of elementary particles.

TEXTBOOK:
A Beiser, Perspectives in Modern Physics, McGraw Hill

REFERENCES:

15PHY251
THIN FILM PHYSICS  3 0 0 3

Unit 1

Defects in thin film: General concepts, nature of defect, microscopic defect and dislocation. Boundary defects. Defect and energy states - donar acceptor levels, trap and recombination centers, excitons, phonons.

Unit 2

15PHY331
ASTRONOMY  3 0 0 3

Unit 1

Unit 2
Observational Astronomy
Observing the Universe - The classic Newtonian telescope - The Cassegrain telescope - Cataluptic telescopes - The Schmidt camera - The Schmidt–Cassegrain telescope - The Maksutov–Cassegrain telescope - Active and adaptive optics -
SYLLABI  
B. Tech - Civil Engg.  
2015 admissions onwards

Some significant optical telescopes - Gemini North and South telescopes - The Keck telescopes - The South Africa Large Telescope (SALT) - The Very Large Telescope (VLT) - The Hubble Space Telescope (HST) - The future of optical astronomy - Radio telescopes - The feed and low noise amplifier system - Radio receivers - Telescope designs - Large fixed dishes - Telescope arrays - Very Long Baseline Interferometry (VLBI) - The future of radio astronomy - Observing in other wavebands – Infrared – Sub-millimetre wavelengths - The Spitzer space telescope - Ultraviolet, X-ray and gamma-ray observatories - Observing the universe without using electromagnetic radiation - Cosmic rays - Gravitational waves.

Unit 3

TEXTBOOK:
Introduction to Astronomy and Cosmology, Ian Morison, Wiley (UK), 2008

REFERENCE BOOK:

15PHY333  
CONCEPTS OF NANOPHYSICS AND NANOTECHNOLOGY  
3 0 0 3

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.

SYLLABI  
B. Tech - Civil Engg.  
2015 admissions onwards

Concept of quantum confinement and phonon confinement

Unit 2
Tools for characterization:

Nanoscale materials – properties and applications:
Carbon nanostructures – structure, electrical, vibration and mechanical properties. Applications of carbon nanotubes

Unit 3

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

TEXTBOOKS:

15PHY335  
MEDICAL PHYSICS  
3 0 0 3

Unit 1
Ultrasonics - production methods and properties - acoustic impedance - Doppler velocimetry - echocardiography – resolution – speckle - ultrasound imaging - therapeutic use of ultrasound - use in diagnostics of cardiac problems.

X-rays – production – intensity - hard and soft X-rays - characteristic and continuous X-ray spectrum - attenuation of x-rays by hard and soft tissues –
resolution – contrast X-ray imaging - fluoroscopy modes of operation - image quality - fluoroscopy suites - radiation dose – computed-aided tomography (CAT).

Unit 2
Nuclear medicine - principles of nuclear physics – natural radioactivity, decay series, type of radiation and their applications, artificially produced isotopes and its application, accelerator principles; Nuclear Isomerism, internal conversion - ideal energy for radiotherapy based on interactions. Radionuclide used in medicine - radionuclide production – dosimetry - safety - radiation hazards – PET.

Nuclear magnetic resonance physics - magnetic moment – magnetization – relaxation - nuclear magnetic resonance spectroscopy.

Unit 3
Nuclear magnetic resonance imaging (MRI) – principle - chemical shift - magnetic resonance signal induction and relaxation - pulse sequencing and spatial encoding.
Unit 2

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.


Cosmology: Comic 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:
5. ‘Stellar Astronomy’ by K. D Abhayankar.

15PHY535  EARTH’S ATMOSPHERE  3 0 0 3

Unit 1
Earth’s atmosphere: overview and vertical structure. Warming the earth and the atmosphere: temperature and heat transfer; absorption, emission, and equilibrium; incoming solar energy. Air temperature: daily variations, controls, data, human comfort, measurement. Humidity, condensation, and clouds: circulation of water in the atmosphere; evaporation, condensation, and saturation; dew and frost; fog.
important nonsilicate minerals, resources. Igneous rocks: magma, igneous processes, compositions & textures; naming igneous rocks; origin and evolution of magma, intrusive igneous activity, mineral resources and igneous processes.

Unit 2
Volcanoes and volcanic hazards: materials extruded, structures and eruptive styles, composite cones and other volcanic landforms, plate tectonics and volcanic activity. Weathering and soils: earth’s external processes: mechanical & chemical weathering, rates; soils, controls of formation, profile, classification, human impact, erosion, weathering and ore deposits. Sedimentary rocks: the importance and origins of sedimentary rocks; detrital & chemical sedimentary rocks, coal, converting sediment into sedimentary rock; classification & structures, nonmetallic mineral & energy resources. Metamorphism and metamorphic rocks: metamorphic textures, common metamorphic rocks, metamorphic environments & zones.

Unit 3

Unit 4
Shorelines: coastal zone, waves & erosion, sand movement, shoreline features & stabilization; erosion problems along U.S. coasts, hurricanes, coastal classification, tides. Earthquakes and earth’s interior: faults, seismology, locating the source of an earthquake, measuring intensity, belts and plate boundaries, destruction, damage east of the Rocky Mountains, earthquake prediction, earth’s interior. Plate tectonics: continental drift, divergent boundaries, convergent boundaries, transform fault boundaries, testing the plate tectonics model, the breakup of Pangaea, measuring plate motion, what drives plate motions, plate tectonics in the future.

Unit 5
Origin and evolution of the ocean floor: continental margins, features of deep-ocean basins, anatomy of oceanic ridge, oceanic ridges and seafloor spreading, nature of oceanic crust, continental rifting, destruction of oceanic lithosphere. Crustal deformation and mountain building: structures formed by ductile & brittle deformation, mountain building at subduction zones, collisional mountain belts, fault-block mountains, vertical movements of the crust. Geologic time: time scales, relative dating, correlation of rock layers; dating with radioactivity, the geologic time scale, difficulties in dating. Earth’s evolution: birth of a planet, origin of the atmosphere and oceans, Precambrian (formation of continents); Phanerozoic (formation of modern continents & earth’s first life); Paleozoic (life explodes); the Mesozoic (dinosaurs); Cenozoic era (mammals). Global climate change: climate & geology, climate system, detecting change; atmospheric basics & heating the atmosphere; natural & human causes; carbon dioxide, trace gases, and climate change; climate-feedback mechanisms, aerosols, some possible consequences.

TEXTBOOK:

REFERENCE:
Bifurcations: in one-dimensional maps and flows, Hopf bifurcations, homoclinic and heteroclinic bifurcations, crises.

Hamiltonian chaos: Hamilton’s equations and properties of Hamiltonian systems, examples, three-dimensional conservative flows, symplectic maps.

**Unit 3**

Time-series properties: examples, conventional linear methods, a case study, time-delay embeddings.

Nonlinear prediction and noise-reduction: linear predictors, state-space prediction, noise reduction, Lyapunov exponents from experimental data, false nearest neighbours.

Fractals: Cantor sets, curves, trees, gaskets, sponges, landscapes.

Calculations of fractal dimension: similarity, capacity and correlation dimensions, entropy, BDS statistic, minimum mutual information, practical considerations.

Fractal measure and multifractals: convergence of the correlation dimension, multifractals, examples and numerical calculation of generalized dimensions.

Non-chaotic fractal sets: affine transformations, iterated functions systems, Mandelbrot and Julia sets.

Spatiotemporal chaos and complexity: examples, cellular automata, coupled map lattices, self-organized criticality.

**TEXTBOOK:**

**REFERENCES:**

15PHY542 OPTOELECTRONIC DEVICES 3 0 0 3

**Unit 1**


**REFERENCES:**

15SAN101 SANSKRIT I 1 0 2 2

**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.

**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. Vadhyar and Sons, Kalpathi, Palakkad
3. Prakriya Bhashyam written and published by Fr. John Kunnapally
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 Nirmayasagar press

15SAN111 SANSKRIT II

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.

Unit 1
Seven cases, indeclinables, sentence making with indeclinables, Saptha karakas.

15SSK221 SOFT SKILLS I

Soft skills and its importance: Pleasure and pains of transition from an academic environment to work - environment. Need for change. Fears, stress and competition in the professional world. Importance of positive attitude, self motivation and continuous knowledge upgradation.

Self-confidence: Characteristics of the person perceived, characteristics of the situation, characteristics of the perceiver. Attitude, values, motivation, emotion management, steps to like yourself, positive mental attitude, assertiveness.

Presentations: Preparations, outlining, hints for efficient practice, last minute tasks, means of effective presentation, language, gestures, posture, facial expressions, professional attire.
Vocabulary building: A brief introduction into the methods and practices of learning vocabulary. Learning how to face questions on antonyms, synonyms, spelling error, analogy, etc. Faulty comparison, wrong form of words and confused words like understanding the nuances of spelling changes and wrong use of words. Listening skills: The importance of listening in communication and how to listen actively.

Prepositions, articles and punctuation: A experiential method of learning the uses of articles and prepositions in sentences is provided.

Problem solving level I: Number system; LCM & HCF; Divisibility test; Surds and indices; Logarithms; Ratio, proportions and variations; Partnership;

Problem solving level II: Time speed and distance; work time problems;

Data interpretation: Numerical data tables; Line graphs; Bar charts and Pie charts; Caselet forms; Mix diagrams; Geometrical diagrams and other forms of data representation.

Logical reasoning: Family tree; Deductions; Logical connectives; Binary logic; Linear arrangements; Circular and complex arrangement; Conditionalities and grouping; Sequencing and scheduling; Selections; Networks; Codes; Cubes; Venn diagram in logical reasoning; Quant based reasoning; Flaw detection; Puzzles; Cryptography.

TEXTBOOKS:
4. The Hard Truth about Soft Skills, by Amazon Publication.
5. Quantitative Aptitude by R. S. Aggarwal, S. Chand
6. Quantitative Aptitude – Abijith Guha, TMH.
7. Quantitative Aptitude for Cat - Arun Sharma. TMH.

REFERENCES:
3. The BBC and British Council online resources
4. Owl Purdue University online teaching resources
www.englishpage.com - online teaching resources and other useful websites.

15SSK321 

SOFT SKILLS II 

Professional grooming and practices: Basics of corporate culture, key pillars of business etiquette. Basics of etiquette: Etiquette – socially acceptable ways of
doing, appropriate dressing, personal hygiene, professional attire, cultural adaptability.

Group discussions: Advantages of group discussions, structured GD – roles, negative roles to be avoided, personality traits to do well in a GD, initiation techniques, how to perform in a group discussion, summarization techniques.

Listening comprehension advanced: Exercise on improving listening skills, grammar basics: Topics like clauses, punctuation, capitalization, number agreement, pronouns, tenses etc.

Reading comprehension advanced: A course on how to approach middle level reading comprehension passages.

Problem solving level III: Money related problems; Mixtures; Symbol based problems; Clocks and calendars; Simple, linear, quadratic and polynomial equations; special equations; Inequalities; Functions and graphs; Sequence and series; Set theory; Permutations and combinations; Probability; Statistics.

Data sufficiency: Concepts and problem solving.

Non-verbal reasoning and simple engineering aptitude: Mirror image; Water image; Paper folding; Paper cutting; Grouping of figures; Figure formation and analysis; Completion of incomplete pattern; Figure matrix; Miscellaneous.

Spacial aptitude: Cloth, leather, 2D and 3D objects, coin, match sticks, stubs, chalk, chess board, land and geodesic problems etc., related problems.

TEXTBOOKS:
4. The Hard Truth about Soft Skills, by Amazon Publication.
5. Quick Maths – Tyra.
6. Quicker Arithmetic – Ashish Aggarwal
7. Test of reasoning for competitive examinations by Thorpe.E. TMH
8. Non-verbal reasoning by R. S. Aggarwal, S. Chand
REFERENCE:
3. The BBC and British Council online resources
4. Owl Purdue University online teaching resources
   www.grammarbook.com - online teaching resources
   www.englishpage.com - online teaching resources and other useful websites.

15SSK331 SOFT SKILLS III

Team work: Value of team work in organisations, definition of a team, why team, elements of leadership, disadvantages of a team, stages of team formation. Group development activities: Orientation, internal problem solving, growth and productivity, evaluation and control. Effective team building: Basics of team building, teamwork parameters, roles, empowerment, communication, effective team working, team effectiveness criteria, common characteristics of effective teams, factors affecting team effectiveness, personal characteristics of members, team structure, team process, team outcomes.

Facing an interview: Foundation in core subject, industry orientation / knowledge about the company, professional personality, communication skills, activities before interview, upon entering interview room, during the interview and at the end. Mock interviews.

Advanced grammar: Topics like parallel construction, dangling modifiers, active and passive voices, etc.

Syllogisms, critical reasoning: A course on verbal reasoning. Listening comprehension advanced: An exercise on improving listening skills.

Reading comprehension advanced: A course on how to approach advanced level of reading, comprehension passages. Exercises on competitive exam questions.

Problem solving level IV: Geometry; Trigonometry; Heights and distances; Coordinate geometry; Mensuration.

Specific training: Solving campus recruitment papers, national level and state level competitive examination papers; Speed mathematics; Tackling aptitude problems asked in interview; Techniques to remember (In mathematics). Lateral thinking problems. Quick checking of answers techniques; Techniques on elimination of options, estimating and predicting correct answer; Time management in aptitude tests; Test taking strategies.

REFERENCES:
3. The BBC and British Council online resources
4. Owl Purdue University online teaching resources
   www.grammarbook.com - online teaching resources
   www.englishpage.com - online teaching resources and other useful websites.

15SWK230 CORPORATE SOCIAL RESPONSIBILITY

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:

15SWK231 WORKPLACE MENTAL HEALTH 2002

Unit 1

Unit 2

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:
3. Canadian Mental Health Association, Ontario “Workplace mental health promotion, A how to guide”wmhpa.cmhaontario.ca/
SYLLABI  B. Tech - Civil Engg.  2015 admissions onwards

Unit 5
Tamil Grammar: āl vakaikal - vēṟṟumai urupukal - vallippong ikkumāṭam
mikayiṭam - canti(puṭtarce) - ilakkaṭakkuppu.
Practical skills: Listening, speaking, writing and reading

Textbooks:
- Poṭṭu “ē lāṟta tamkamā” nakkirai pālīkkataikai
- Cakältokpē "nalla hōtonsukai múlamuramaiyum"
mollai patippakam 7098
- Poṭṭu moṭiṭamā “āṭō tamli ilakkaṭum” “āṭō poḷḷiṭam kurip, vaṭṭiyiṭe
- Poḷliyār kēkāṭa “putamātāṭu” srēcēṭukai patippakam, 2010

ISTAM111  TAMIL I I  1 0 2 2

Objectives: To learn the history of Tamil literature. To analyze different styles, language
training, to strengthen the creativity in communication, Tamil basic grammar, Computer and its
use in Tamil language.

Unit 1
The history of Tamil literature: Nāṭṭuṭum pāṭṭalkal, kathaikal, paḷamoljikal -
citukataikal tōṟrumum vāḷacciyum, cīṟṟilakkiṭaiṭal. Kaliṅktuṭ paraṭi (pōṟṭiyiṭatu) - nakkirai pāḷu 35.
Kāppiyaiṭal: Cīḷappatikāram – maṇṭiṭukal naïṭiyiṭal āyyu maṟṟum amperum – aṁṭiṭukā kāppiyaiṭal toṭṟṟapāṭa ceṭṭal.

Unit 2
tīṉai ilakkiṭamum nīṭivilakkiṭamum - paṭṭuṇi kōḷkanākkukku nīkal toṭṟṟapāṭa nīṟa
ceṭṭal tirukkuṭal (aṭṭu, pāṭṭu, kalvi, olakkam, naṭṭu, vāymai, kēḷvi, ceṭṭam, periyaraṭṭukaiṭkal, vilippuṭarvuvu peṇṭa atikaratit illa ceṭṭal.

SYLLABI  B. Tech - Civil Engg.  2015 admissions onwards

Aranṭukal: Ulakanti (1-5) – elāti (1,3,6). - Cittakal: Katuvell ciṭṭar pāṭṭalkal
(āṭāntak kalippu –1,4,6,7,8), maṟṟum akappē ciṭṭar pāṭṭalkal (1-5).

Unit 3
tamīḷ ilakkataikai: Viḷḷiṭiya vakaikal – taṇṭuṇi paṭṭaṅgai – nēṟṟkkāṭī paṭṭaṅgai

Unit 4
tamīḷakka atukarai tamīḷ toṭṭum camuṭṭaya toṭṭum: Pāratiyār, pāratiṭaiṭal, paṭṭakkottai kalviṭaiṭcuntaram, curaiṭu, cuṭṭāṭi, cifī, mēṭṭā, aṭṭul rakumān,

Unit 5
tamīḷ moṭi ayvīl kaṇṭṭi paṇṭaṅgai. - Karuttu puramaṭṭam - vēḷaṃpara
moḍiyamaṭṭumu – pēṟcu – naṭṭakal paṭṭaiṭtu – ciṭṭukaiṭi, kaiṭi, putṭaiṭa paṭṭaiṭtu

Textbooks:
- Na. Vēṟṟumamaṭṭai: “poḷḷiṭakataṭum, paḷamoljaiṭum” nyu cenciru
puttaka veliyṭṭakam, 1980,2008
- Nā. Vēṟṟumamaṭṭai. “tamīḷar nāṭṭappaṭṭalkal” nyu cenciru puttaka veliyṭṭakam
   1964,2006
- Poṭṭ māṭiṭamā “āṭō tamli ilakkaiṭum” “āṭō poḷḷiṭam kurip, vaṭṭiyiṭe