With effect from the Academic Year 2016 – 2017

BS 901 MT

MATHEMATICS - III

Instruction: 3+1 periods per week *Duration of Semester End Examination: 3 hours*
CIE: 30 marks *SEE: 70 marks*
Credits : 3

Objectives:

- To introduce the concept of functions of complex variables and their properties
- To formulate partial differential equations and to introduce a few methods to solve first order linear and non-linear partial differential equations
- To study Fourier series and its applications to partial differential equations

Outcomes:

- determine the analyticity of complex functions and expand functions as Taylor and Laurent series
- evaluate complex and real integrals using residue theorem
- expand functions as a Fourier series
- find solutions of first order and second order partial differential equations

UNIT-I

Functions of Complex Variables:

Limits and continuity of function, differentiability and analyticity, necessary & sufficient conditions for a function to be analytic, Cauchy-Reimann equations in polar form, harmonic functions, complex integration, Cauchy's integral theorem, extension of Cauchy's integral theorem for multiply connected regions, Cauchy's integral formula, Cauchy's formula for derivatives and their applications.

UNIT-II

Residue Calculus:

Power series, Taylor's series, Laurent's series, zeros and singularities, residues, residue theorem, evaluation of real integrals using residue theorem, bilinear transformation, conformal mapping.

UNIT-III

Fourier series:

Fourier series, Fourier series expansions of even and odd functions, convergence of Fourier series, Fourier half range series.

UNIT-IV

Partial differential equations:

Formation of first and second order partial differential equations, solution of first order equations, Lagrange's equation, Nonlinear first order equations, Charpit's method, higher order linear equations with constant coefficients.

UNIT-V

Fourier series applications to partial differential equations:

Classification of linear second order partial differential equations, separation of variables method (Fourier method), Fourier series solution of one dimensional heat and wave equations, Laplace's equation.

Suggested Reading :

1. R.K.Jain & S.R.K Iyengar, *Advanced Engineering Mathematics*, Narosa Publications, 4th Edition, 2014.
2. B.S.Grewal, *Higher Engineering Mathematics*, Khanna Publications, 43rd Edition,2014.
3. Erwin Kreyszig, *Advanced Engineering Mathematics*, John Wiley & Sons, 9th Edition, 2012.
4. James Brown and Ruel Churchill, *Complex variables and Applications*, McGraw-Hill Education,9th Edition,2013.

ES 321 EE/ME

ELECTRICAL AND MECHANICAL TECHNOLOGY

SECTION - A

ELECTRICAL TECHNOLOGY

Instruction: 3 periods per week *Duration of Semester End Examination: 3 hours*
CIE: 30 marks *SEE: 70 marks*
Credits : 3

Objectives:

- Acquire knowledge in electrical circuits.
- Be able to understand the basic principle operation of electrical machines.

UNIT - I

DC Circuits: Ohm's law, Kirchhoffs laws, Resistance networks, Series, Parallel. and Series-parallel circuits, Power loss in resistive elements.

AC Circuits: Principles of production of ac waveform, frequency, effective value and form factor, Phasor representation, Behaviour of pure resistance, inductance, and capacitance with ac sinusoidal source, Impedance and simple ac networks with R, Land C elements.

UNIT - II

Three Phase Circuits: Star and Delta connections under balanced conditions, Line & phase Voltages and currents and three phase power. Working principle of single phase energy meter. Basic principles of DC generator and motor

UNIT - III

Transformers: Principle and working under no-load and load conditions, O.C & S.C tests, Losses & efficiency.

Three phase Induction Motors: Rotating magnetic field, Torque-slip characteristics, Starting methods - DOL starter, StarlDelta starter.

Basic idea and applications of single phase induction motors - Capacitor start l-phase induction motor.

Suggested Reading :

1. Mehta YK., Principles of Electrical Engineering and Electronics, S.Chand & Co., 1999
2. Naidu M.S. & Kamakshiah S., Introduction to Electrical Engineering, Tata McGraw Hill, 1995
3. A.Chakrabarti, Sudipta Nath, Chandan Kumar Chanda, "Basic Electrical Engineering" Tata McGraw Hill Education PVT LTD, 2009.

SECTION - B
MECHANICAL TECHNOLOGY

Objectives

- Know the working principle of earth moving equipment
- Study types and working principle of conveying and hoisting equipment
- Understand the working principle of concrete producing, concrete screening and concrete mixing equipment
- Know the principle of pneumatic equipment and tools

UNIT - I

General Description, Operation and Selection of the following: Earth moving and Excavation Equipment -Shovels, Dragline, Clam shell, Cable Excavator, Bucket Wheel Excavator, Tractor, Bull -dozer, Scraper, Earth compactors.

UNIT - II

Conveying Equipment: Belt Conveyor, Screw Conveyor, Bucket Conveyor, Aerial ropeway, Hoisting Equipment: Hoist Winch, Differential and Worm geared chain hoists. Fork lift truck, Guyed derricks, Swing and non-swing mobile crane, Whirler crane, Tower crane.

UNIT - III

Aggregate and Concrete Producing Equipment: Crushers, Jaw, Gyratory, Hammer and Roll crushers; Screens: Stationary, Revolving, Shaking and Vibrating screens. Concrete mixers, Concrete pump. Pneumatic Equipment: Reciprocating air-compressor,
Construction of pneumatic tools: Jack hammer, Paving breaker, Concrete vibrator.

Suggested Reading:

1. Peurifoy R.L, "Construction Planning, Equipment and Methods", McGraw Hill 6th Edn.,2008.

With effect from the Academic Year 2016 – 2017

ES 301 CE

ENGINEERING GEOLOGY

Instruction: 3 periods per week *Duration of Semester End Examination: 3 hours*
CIE: 30 marks *SEE: 70 marks*
Credits : 3

Objectives:

- Understanding the engineering characteristics of different types of rocks for their suitability to Civil Engineering applications
- Assessing the geological features like faults, folds, joints etc.
- Concepts of weathering and its Engineering classification, process of formation of soil and their Engineering properties.
- Conceptualization of the site investigation methods to know the ground condition for dam sites, tunnels and other structures.

Outcomes:

- Differentiates between a rock and a mineral
- Knowledge of the earth's interior and exterior processes
- Application of principles of geology to Civil Engineering problems

UNIT - I

Rocks: Distinguishing features of igneous, sedimentary and metamorphic rocks Geological description and Indian occurrence of Granite, Basalt, Dolerite, Gabbro, Laterite, Sandstone Shale, Limestone Slate, Gneiss, Quartzite, Marble, Khondalite and chamockite.

Geological Structures: Folds, Fractures joints and faults - Fundamental types, mechanism origin and classifications of structures; Field identification and Engineering analysis of structures

UNIT - II

Rock Weathering: Processes and end - products of weathering; susceptibility of rocks tc weathering, Assessment of the degree of weathering and its classification.

Geology of Soils: Formation, geological classification, description and Engineering use of soils Types of Indian soils.

Hydrogeology: Hydrologic cycle, water table, aquifers, occurrence of ground water in various lithological formations, ground water movement, springs, ground water exploration and ground water provinces of India.

UNIT - III

Geomorphology: Evolution, characteristics features and Engineering, considerations of fluviatile, Aeolian, glacial and marine land forms.

Rock Mechanics: Engineering properties- of rocks Stress - Strain behaviour of rocks under uniaxial compression.

Site Investigation: Aerial Photographs, Electrical: Resistivity and Seismic refraction methods.

UNIT - IV

Rock as a Construction Material: Geological considerations III the selection of Concrete aggregate, Highway and Runway aggregates, building stones, Decorative stones, Roofing and facing stones. Building stones of India.

Geology of Dams and Reservoirs: Types of Dams, Problems associated with Dam foundations and reservoirs, Engineering Geological investigations for a masonry dam site, Analysis of dam failure; Engineering Geology of major Dam sites of India.

UNIT - V

Tunnels: Stand - up time of different rocks, Engineering Geological investigations of tunnels in rock, problems in tunneling, pay line and over break, logging of tunnels and geology of some well known Indian tunnels.

Geological Hazards: Geological aspects of Earthquakes, Tsunamis and Landslides; Disaster prevention, mitigation and management.

Suggested Reading:

1. F.G. Bell, Engineering Geology, Elsivier - 2007.

2.Dimitri P. Krynine and William R. Judd, Principles of Engineering Geology & Geotechnics,
CBS Publishers & Distributors, First Edition, 1998.

3.BP. Attewel and I.W. Fanner, Principles of Engineering Geology, Chapman and Hall 1976.

4.Officers of the Geological Survey of India, "Engineering Geology Case Histories" Miscellaneous Pub. No. 29, 1975.

With effect from the Academic Year 2016 – 2017

ES 302 CE

STRENGTH OF MATERIALS - I

Instruction: 3+1 periods per week *Duration of Semester End Examination: 3 hours*
CIE: 30 marks *SEE: 70 marks*
Credits : 3

Objectives:

- Understand the basic concept of the stress and strain for different materials.
- Know the mechanism of development of shear force and bending moments in beams.
- Understand and analyze the stresses for the combined action of direct load and Bending Moment
- Students will be able to define Principal Stresses and strains and different theories of failure.
- Know the concept of unsymmetrical bending and shear centre for different members.

Outcomes:

- Apply the fundamental concepts of stress and strain in the design of various structural components.
- Analyze determinate beams to determine shear forces, bending moments and design forces in trusses.
- Determine the bending stresses and shear stresses produced in a beam subjected to system of loads
- Student will be able to define principal stresses and strains and understand why material fractures on planes other than the plane over which the tensile force is applied.
- Solve problems involving unsymmetrical bending in structural members.

UNIT - I

Simple Stresses and Strains: Definitions of stresses and strains-Hooke's Law - Modulus of Elasticity- Stress - Strain curve for ductile materials- working stress and factor of safety- Deformation of bars under axial loads- uniform sections and abruptly varying sections- deformation due to self weight- Bars of uniform strength- Poission's ratio- volumetric strain and restricted strains- relationships between elastic constants. Compound bars and temperature stresses: Statically indeterminate problems in tension and compression. Temperature stresses.

UNIT - II

Shear Force and Bending Moment: Definitions- Different types of beams and loads- shear force and bending moment diagrams for cantilever, and simply supported beams with and without over hangs subjected 'to different kinds of loads viz., point loads,

uniformly distributed loads, uniformly varying loads and couples- Relation between loading, shear force and bending moments. Shear force and bending moment diagrams by graphical methods,
Bending Stresses in Beams: Assumptions in theory of simple bending- Derivation of bending equation, Moment of resistance- calculation of stresses in statically determinate beams for different loads and different types of structural sections- flitched beams.

UNIT - III

Shear stress in Beams: Equation of shear stresses, distribution across rectangular, circular, triangular.T, T and diamond section.
Direct and Bending Stresses: Basic concept, Eccentric loading, limit of eccentricity- Core of sections- rectangular and circular, solid and hollow sections- Wind pressure on chimneys and water pressure on dams.

UNIT - IV

Compound Stresses: Stresses on oblique planes, principal stresses and planes. Ellipse of stress and Mohr's circle of stress.
Thin Cylinders: Thin cylinders subjected to internal fluid pressure, volumetric change. Thick Cylinders: Lame's equations, stresses under internal and external fluid pressures- Compound cylinders- Shrink fit pressure.

UNIT - V

Unsymmetrical bending of beams: Location of neural axis, maximum stresses for rectangular section.Symmetric channel section.
Shear Centre: Shear stress, shear flow, locating shear center for angle section channel section and T- section, with one axis of symmetry.

Suggested Reading:

1. D.S. Prakash Rao, *Strength of Materials- A practical Approach*, Universities Press, 1999.
2. R.K. Rajput, *A Textbook of Strength of Materials*, S. Chand Publications, 2007.
3. R. Subramanian, *Strength of Materials*, Oxford University Press, New Delhi 2005.
4. B.C. Punmia, *Strength of Materials and Theory of Structures*, Laxmi Publishers, Delhi, 2000.
5. R.K. Bansal, *Strength of materials*, Laxmi Publications, New Delhi, 2010.
6. Ferdinand P Beer et.al., *Mechanics of Materials*, Tata McGraw-Hill, 2004.
7. G. H. Ryder, *Strength of materials*, Third Edition in SI units, Macmillan India Limited, Delhi, 2002.
8. A. Pytel and FL. Singer, *Strength of Materials*, Harper 7 Row, fourth Edition, New York, 1987.
9. William A.Nash, *Theory and Problems of Strength of materials*, Schaum′s Outline series, Tata McGraw-Hill publishing co., New Delhi, 2007.
10. E.P. Popov, *Engineering Mechanics of Solids*, Prentice-Hall of India, New Delhi, 1998.

With effect from the Academic Year 2016 – 2017

ES 303 CE

FLUID MECHANICS - I

Instruction: 3+1 periods per week *Duration of Semester End Examination: 3 hours*
CIE: 30 marks *SEE: 70 marks*
Credits : 3

Objectives:

- Concepts of various fluid properties
- Understand the basic concepts of fluid motion
- Knowledge of forces due to fluids and energy principles
- Study of flow measurement devices
- Study of compressible fluid flows for different conditions of expansion

Outcomes:

- Application of basic principles in Fluid Mechanics
- Application of the concepts of Bernoulli's equation to Fluid mechanics problems
- Knowledge of incompressible flows and its applications

UNIT - I

Fluid Properties: Basic concepts: Specific weight, specific volume, specific mass, gravity, viscosity, bulk modulus, vapour pressure, capillarity and surface tension.
Measurement of pressure, Manometers, Bourden Gauge, Micro manometer, pressure on plane and curved surfaces.

UNIT - II

Fluid Kinematics: stream lines, path lines, streak lines, stream tubes, classification of fluids, steady and unsteady flows, laminar and turbulent flows, uniform and non-unsteady flows, rotational and irrational flows, laminar and turbulent flows, uniform and non- uniform flow, one, two and three dimensional flows, stream function, and velocity potentional, significance and use of flownets.

UNIT – III

Fluid Dynamics: Convective and local acceleration, concept of continuity, Three-dimensional continuity equation, Body forces and surface forces, Body force potential, Euler's equation of motion for 3-D flow, Bernoulli's equation by integration of Euler's equation, Significance of Bernoulli's equation and its limitations

UNIT – IV

Flow Measurement: Vortex flow and its types, Momentum principle, application to bends, Measurement of discharge – Venturimeter, Orifice-meter, Nozzle meter, Elbow meter, Rotameter, Orifices and mouth pieces, Notches and weirs, Measurement of velocity – Piezometers

UNIT - V

Compressible Flow: Compressibility of liquids and gases, Differential form of continuity equation, Bernoulli's energy equation for isothermal and adiabatic conditions, Velocity of pressure wave, wave velocity for adiabatic and isothermal conditions, Mach Number and Mach cone, stagnation pressure and temperature.

Suggested Reading:

1. K. Subramanya, 'Theory and Applications of Fluid Mechanics', Tata McGraw-Hill Publishing Company Ltd., New Delhi, 1993
2. Vijay Gupta and Santosh K. Gupta, 'Fluid Mechanics and its applications', Wiley Eastern Ltd., New Delhi,1984
3. K.L. Kumar, 'Engineering Fluid Mechanics', Eurasia PublishingHouse Pvt Ltd., New Delhi, 2009
4. Vallentine, H.R., 'Applied Hydrodynamics', Butterworths & Co Ltd., London,1959

PC 301 CE

BUILDING MATERIALS AND CONSTRUCTION

Instruction: 3 periods per week *Duration of Semester End Examination: 3 hours*
CIE: 30 marks *SEE: 70 marks*
Credits : 3

Objectives:

- Study about the basic building materials, properties and their applications
- Know the smart building materials, external paints and their uses
- Understand different types of masonries and their applications
- Study about standard dimensions of doors, windows ,ventilators and other components of buildings

Outcomes:

- Differentiate between various building materials i.e, both conventional and smart building materials
- Know the importance of energy conservation, damp proof course and fire protection in buildings.
- Understand different materials used and construction of various form works and scaffoldings.

UNIT - I

Stones: Uses of stones as building materials, classification, characteristics, dressing and polishing of stones, methods of quarrying and construction.
Bricks: Methods of manufacturing bricks. Classification and methods of construction.
Timber: Timber as a building material and its uses. Methods of seasoning and preservation laminates and their uses. Defects in Timber.

UNIT - II

Cement: Introduction to cement, different grades, IS specifications and OPC ::nd PPC Cements (blended cements).
Mortar and Sand: Characteristics of good mortar making sand, availability of sand ant its classification, bulking of sand, manufacturing methods -of mortar. Different types of mortars- preparation, setting and curing.
Coarse and fine Aggregate: Characteristics of good coarse and fine aggregates for manufacture of concrete. Significance and application of coarse and fine aggregate for the production of good quality concrete.

UNIT - III

Concrete: Introduction to Nominal mix and Design mix.
Smart building Materials: Energy conservation in buildings- use of recycled materials, regional materials and industrial waste products as means of sustainable development. Green Building Materials.

Plastering and Pointing: Different types of plasters and plastering process, defects in plastering.

Paints, Varnish and Distemper: Constituents, characteristics of good paints, bases, vehicles, thinners and coloring pigments. Painting of different types of surfaces varnish and its types, application. Distemper, dry and oil bound, and application of distemper.

UNIT - IV

Form work- Types of Form work, types of materials used in form work

Scaffoldings- Types of Scaffoldings, Scaffolding Erection & dismantling, Scaffolding Inspection

Fire protection in structures- Classification of fire, general causes of fire, detection of fire, methods for fire control , Analysis for structural components for fire resistance (wood, steel, concrete and masonry).

Damp Proof Course-Causes of dampness, effects of dampness, methods of damp proofing

UNIT - IV

Type of joints in concrete-Construction, expansion, contraction, and isolation joints.

Cracks in Buildings- Type of cracks in buildings, principal causes-moisture movement, thermal variations, elastic deformation, creep, chemical reaction.

Suggested Reading:

1. VN. Vazirani, and S.P. Chandola, *Engineering Materials*, Khanna Publishers 1993.
2. Sushil Kumar, Building Construction, Standard Publilshers 1992.
3. S.P. Arora and S.P. Bindra, *Text book on Building Construction*, Dhanpath Raj Publications, 1999.
4. M.S.Shetty, *Concrete Technology*, S.Chand Publishers,2012.
5. Gurucharan singh, *Building materials and construction*, Standard book house,2010

With effect from the Academic Year 2016 – 2017

PC 302 CE

SURVEYING - I

Instruction: 3 periods per week *Duration of Semester End Examination: 3 hours*
CIE: 30 marks *SEE: 70 marks*
Credits : 3

Objectives;

- Study the basic concepts and principles of chain survey
- Know the importance of the compass survey and its practical applications
- Understand the basic methods and applications of plane Table survey
- Know the field applications and concepts of leveling survey
- Study the different methods of calculation of area, contouring and measurement of volumes.

Outcomes:

- Understand the basic principles chain surveying
- Computation of lengths, areas, bearings and volumes of the given field work
- Develop and draw plans

UNIT - I

Chain Survey: Principles of chain survey- various instruments employed in chain survey- measuring tapes- types of chains- direct and indirect ranging- obstructions in chaining- well conditioned triangle, correction to chain or tape- cross staff survey, errors in linear measurement with incorrect chain length, line ranger and cross staff, use of optical square and clinometers.

UNIT - II

Compass Survey: Use and adjustment of prismatic and surveyor's compass. Methods of surveying with compass, whole circle bearing system quadrantal bearing System. Fore bearing and back bearing, true meridian, magnetic meridian, dip, magnetic declination. Calculation of included from bearings. Calculation of bearings from included angles. Detection of local attraction and its elimination. Errors in prismatic survey, plotting of compass survey, Correction of errors in prismatic survey. Distribution of closing error graphically by Bowditch's method.

UNIT - III

Plane Table Survey: Instruments employed in plane table survey. Use and adjustment of these instruments including simple alidade. Setting up of the table, Various methods of plane table survey: Radiation method of plane tabling, Intersection or triangulation method of plane tabling, Traversing method of plane tabling, Resection method of plane tabling. Three point and two point problems. Plane table contouring using tangent clinometers, errors in plane table survey. Advantages and disadvantages of plane tabling.

UNIT - IV

Levelling: Definitions and principles of construction of a levellling instrument and its various parts with special reference to the spirit bubble and telescope. Use of Dumpy, Tilting and Auto levels, types of leveling staves, methods of booking and reduction of levels.

Type of Benchmarks, Establishment of benchmarks by longitudinal leveling and' cross- sectional leveling, fly leveling and reciprocal leveling. Sensitivity of bubble tube, errors in leveling, curvature and refraction correction.

UNIT - V

Calculation of Areas: Simpson's rule and trapezoidal rule, computation of area of cross section of level section and two level sections.

Contouring: Definition of contour, contour interval and characteristics of contours. Direct and indirect methods of contouring- uses of contours, Grade contours. ,

Measurement of Volumes: Computation of volumes of earth work and water storage by means of contour lines and sections, Computation of volume from spot levels.

Suggested Reading:

1. B.C. Punmia, *Surveying Vol. 1& 2*, Lakshrni Publishers, New Delhi, 1994.
2. Arora K. R., *SurveyingVol. 1 & 2*, Standard Book House, New Delhi, 2005.
3. C. Venkatramaiah, *A Text Book of Surveying*, University Press, Hyderabad, 1997.
4. S.K. Roy, *Fundamentals of Surveying*, PHI Learning Pvt. Ltd., 2002.
5. S.K. Duggal, *Surveying, Vol. 1& 2*, Tata McGraw Hill Education, 2000.

PC 303 CE

CONSTRUCTION MANAGEMENT AND TECHNOLOGY

Instruction: 3 periods per week *Duration of Semester End Examination: 3 hours*
CIE: 30 marks *SEE: 70 marks*
Credits : 3

Objectives:

- Describe different techniques of construction management projects
- Illustrate economics of construction management projects
- Study the Safety Engineering practices of construction management projects

UNIT - I

Introduction, Objectives of planning, construction stages, Sequence of events in general Civil Engineering construction projects, Construction Schedule. Development of management techniques, Bar charts, Gantt charts, CPM and PERT techniques, Network analysis examples.

UNIT - II

Introduction to cost analysis, Cost reduction in construction management. Cost time analysis, Crashing the Network, Optimization, Resource Leveling and smoothing.

UNIT - III

Development of Operations Research (OR), Quantitative Analysis and Decision Making, need for linear programming, standard form of Linear programming, Graphical Method, Case studies.

UNIT - IV

An algebraic overview of Simplex Method, solving minimization and maximization problems, case studies.

UNIT - V

Safety Engineering: Safety program, Direct and Indirect loss due to accident, Classification of Construction accidents and causes, Location hazards and their elimination, Safety in demolition of buildings, Safety in storage and handling of materials and equipments.

Suggested Reading:

1. Robert L. Peurifoy and William B. Ledbetter, Construction Planning, equipment, and methods, McGraw-Hili International Editions, New Delhi, 1985
2. FrankHarris and Ronald Mc.Caffer,modern construction Management.Blookwell science L1d,2001.
3. Mahesh Varma, Construction Equipment and its Planning and Application, Metropolitan Book Company Pvt Ltd., New Delhi, 1994.
4. H.N.Ahuja, Construction performance control by networks, John willey & sons, New York, 1976.

With effect from the Academic Year 2016 – 2017

ES 351 CE

ENGINEERING GEOLOGY LAB

Instruction: 2 periods per week *Duration of Semester End Examination: 3 hours*
CIE: 25 marks *SEE: 50 marks*
Credits : 1

Objectives:

- Identify and describe the physical and engineering characteristics of different types of rocks.
- Establish the ground conditions with different site investigation methods i.e. aerial photographic study and VES.
- Study the geological, geotechnical, geomorphological and hydrogeological maps of India.
- Study the foundation geological maps of the case histories (major dams and tunnels) of the India.

1. Identification and description of physical properties of Minerals
2. Identification and description of geological and geotechnical characteristics of rocks; IS Code: 1123 (1975) .
3. Determination of apparent specific gravity, porosity and water absorption of different rocks; IS Code: 1124 (1974) ,
4. a) Study of structural models (folds, faults and unconformities) and
   b) Measurement of strike and dip of planar features by clinometers compass.
5. Vertical electrical sounding (VES) - a field experiment to determine depth to water table and bedrock.
6. Seismic refraction survey to determine depth to bedrock (demonstration only).
7. a) Determination of unconfined compressive strength of intact rocks.
   b) Study of topographic maps.
8. Stereoscopic examination of aerial photographs pertaining to landforms, vegetation and water bodies.
9. Study of geological maps of Andhra Pradesh and India with reference to occurrence of building stones.
10. Study of (a) Geotechnical Map of India and (b) Geomorphological Map of India.
11. Study of Hydro geological Maps of Andhra Pradesh and India.
12. Study of Foundation Geological Maps and sections pertaining to the major dam sites of India.

Note: At least 10 experiments are to be conducted

With effect from the Academic Year 2016 – 2017

PC 351 CE

SURVEYING - I LABORATORY

Instruction: 2 periods per week *Duration of Semester End Examination: 3 hours*
CIE: 25 marks *SEE: 50 marks*
Credits : 1

Objectives:

- Understand the basic practical applications of survey instruments such as chain, compass, plane table and level.
- Know the field measurements and field observations
- Understand the surveying measurement methods related to chain, compass, plane table and level
- Study and understand the different methods involved in survey field work

Outcomes:

- Learn to use of different tools and equipment related to chain, compass, plane table and leveling surveying
- Computation of lengths, areas, bearings and volumes of the given field work
- Develop and draw plans

1. Applications of traversing to locate a building and field objects by taking Perpendicular and oblique offsets; and recording in the field book.
2. To determine the area of the given site by cross staff survey
3. Study of prismatic compass and setting out a regular polygon
4. Closed traverse by chain and compass, plotting and adjustment by graphical method
5. Plane tabling: Radiation and intersection methods
6. Plane tabling :Three point problem
7. Plane tabling: methods of plane table surveying Two point Problem
8. Introduction to leveling: Fly leveling using dumpy level
9. Introduction to Tilting level: Reciprocal leveling
10. Introduction to digital Auto level: Longitudinal and cross sectional leveling using digital Auto level with bar-coded staff
11. Indirect contouring using digital Auto level with bar-coded staff and plot contours in computer using a software package
12. To determine the area of a figure using a Digital Planimeter
13. Demonstration of Minor instruments: Abney level and Clinometer

With effect from the Academic Year 2015 – 2016

ES 321 CE

MECHANICS OF MATERIALS
(For Mechanical Engineering)

Instruction: 3 periods per week *Duration of Semester End Examination: 3 hours*
CIE: 30 marks *SEE: 70 marks*
Credits: 3

Objectives:

- Understand the concept of stress, strain and elastic behaviour of materials
- Know the concepts of strain energy, principal stress and principal planes
- Learn the bending moment, shear force and the corresponding stress distribution
- Study the deflections and its applications
- Understand the theory of torsion and stresses in springs

Outcomes:

- Apply the fundamental concepts of stress and strain
- Determine principal stresses and principal planes of a state of stress
- Analyze the structural members subjected to tension, compression, bending, torsion and combined stresses
- Solve the stresses in springs

UNIT - I

Simple Stresses and Strains: Types of stresses and strains, Hook's law, stress-strain curve for ductile materials, moduli of elasticity, Poisson's ratio, linear strain, volumetric strain, relation between elastic constants, bars of varying sections, bar of uniform strength, compound bars and temperature stresses.

UNIT - II

Shear Force and Bending Moment: Relation between intensity of loading, shear force and bending moment, shear force and bending moment diagrams for cantilever and simply supported beams with and without overhanging for point loads, uniformly distributed loads, uniformly varying loads and couples.

Compound Stresses: Stresses on oblique planes, principle stresses and principle planes, Mohr circle of stress and ellipse of stress.

UNIT - III

Theory of Simple Bending: Assumptions, derivation of basic equation, section modulus, moment of resistance, determination of flexural stresses.

Direct and Bending Stresses: Basic concepts, core for rectangular solid and hollow circular and I sections.

Distribution of Shear Stress: Equation of shear stress, distribution across rectangular, circular, diamond, T and I sections.

UNIT - IV

Deflections: Deflections of cantilever and simply supported beams including overhanging beams for point loads and uniformly distributed loads by double integration and Macaulay's method.

Strain Energy: Strain energy in bars due to gradually applied loads, sudden loads, impact loads and shock loads.

UNIT - V

Torsion: Theory of pure torsion, derivation of basic equation, hollow circular shafts, strain energy, transmission of power, combined bending and torsion.

Springs: Close and open coiled helical springs subjected to axial loads and axial couples, strain energy in springs, carriage springs.

References:

1. D.S. Prakash Rao, *Strength of Materials - A Practical Approach*, Universities Press, 1999.
2. R.K. Rajput, *Strength of Materials*, S. Chand & Co., 2003.
3. B.C. Punmia, *Strength of Materials*, Laxmi Publishers, 2000.
4. Ferdinand P Beer et.al., *Mechanics of Materials*, Tata McGraw-Hill, 2004.
5. G.H. Ryder, *Strength of Materials*, Third Edition in SI units, Macmillan Indian Limited, Delhi, 2002.
6. S. Ramamrutham, *Strength of Materials*, Dhanpat Rai & Sons, 1993.
7. S.S. Bhavakatti, *Strength of Materials*, Vikas Publications, 2003.

e-Resources:

1. http://nptel.ac.in/
2. http://mhrd.gov.in/e-contents
3. http://spoken-tutorial.org/

With effect from the Academic Year 2015 – 2016

ES 341 CE

MECHANICS OF MATERIALS LABORATORY

(For Mechanical Engineering)

Instruction: 2 periods per week *Duration of Semester End Examination: 3 hours*
CIE: 25 marks *SEE: 50 marks*
Credits: 1

Objectives:

- Understand the experiments on various materials to assess their behavior and limitations
- Learn the brittle and ductile material failure patterns
- Understand the shear force, bending moment and deflection for different types of beams
- Know the rigidity modulus by conducting spring and torsion test

Outcomes:

- Evaluate Young's modulus, rigidity modulus, hardness number, flexural rigidity and impact strength of given specimens
- Find the cracking stress and compressive strength of bricks
- Determine the stiffness of close coiled helical springs
- Find the deflection of a beam

Cycle - I

1. Uni-axial tension test on a specimen of ductile material
2. Stress-Strain characteristics of a ductile material
3. Brinell's hardness test
4. Compression test on brick
5. Bending test on simply supported beam of timber

Cycle - II

6. Torsion test on a specimen of ductile material
7. Compression test on close coiled helical spring
8. Bending test on simply supported beam of steel
9. Bending test on fixed beam of steel
10. Izod impact test

e-Resources:

1. http://nptel.ac.in/
2. http://mhrd.gov.in/e-contents
3. http://vlab.co.in/

With effect from the Academic Year 2016 – 2017

BS 401 MT

NUMERICAL METHODS

Instruction: 3+1 periods per week *Duration of Semester End Examination: 3 hours*
CIE: 30 marks *SEE: 70 marks*
Credits : 3

Objectives:

- Introduction to few numerical methods to solve non linear equations and system of linear equations
- Basic concepts of numerical differentiation, numerical integration and differential equations
- Concepts of finite differences and their applications

Outcomes:

- Solution to non linear equations, system of linear equations, differential equations and eigen value problems numerically .
- Concepts of numerical differentiation and integration
- Application of finite differences to solve initial and boundary value problems

UNIT-I

Solution of linear and non linear equations: Solution of Algebraic and Transcendental equations-Bisection method, Newton-Raphson method, Solution of linear system of equations-Gauss elimination method, LU decomposition method, Gauss-Jacobi and Gauss-Seidel iteration methods**.**

UNIT-II

Eigenvalue problems and Interpolation: Eigenvalues and Eigenvectors-Jacobi method for symmetric matrices- Given's method for symmetric matrices, Interpolation, Lagrange's interpolation, Newton's divided difference interpolation, Newton's Forward and Backward difference interpolations.

UNIT-III

Numerical differentiation and Integration : Numerical differentiation, Interpolation approach, Numerical integration-Trapezoidal rule,Simpson's 1/3 rule, Romberg method, Two point and three point Gaussian quadrature formulae, Double integration- Trapezoidal rule, Simpson's 1/3 rule.

UNIT-IV

Numerical solutions of ordinary differential equations : Single step methods, Taylor's series method, Euler's method, Picard's method of successive approximations, Runge-Kutta method of 4^{th} order, Multi step methods, Milne's and Adams-Bash forth Predictor-Corrector methods.

UNIT-V

Finite Differences and their applications: construction of finite difference approximations- Taylor series, forward, backward and central difference approximation, finite difference approximation of boundary value and initial value problems, 1D and 2D problems- Explicit and implicit and Crank Nicolson schemes, convergence and stability.

Suggested Reading:

1. M.K.Jain,S.R.K.Iyengar and R.K.Jain, *Numerical methods for scientific and engineering computation* ,6th edition , New Age International Limited., 2012.
2. Richard L Burden, J. Douglas Faires , *Numerical Analysis* , 9th edition, Cengage Learning, 2013.
3. S.S.Sastry, *Introductory Methods of Numerical Analysis*, 5th edition , PHI Private Limited, 2012.
4. Dr.B.S.Grewal, *Numerical methods in Engineering and Science*, Khanna Publishers, 2014.
5. Stevan C.Chopra, Raymond P.Canal, *Numerical Methods for Engineers* ,6th edition, McGraw-Hill company,2010.

With effect from the Academic Year 2016 – 2017

ES 401 CE

STRENGTH OF MATERIALS - II

Instruction: 3+1 periods per week *Duration of Semester End Examination: 3 hours*
CIE: 30 marks *SEE: 70 marks*
Credits : 3

Objectives:

- Study the basic concept of deflections by using various methods and to predict the deformations of a member subjected to various loads and its combinations
- Differentiate statically determinate and indeterminate structures and to analyse members by applying the principles of equilibrium and compatibility in deformation.
- Understand the concepts of pure torsion, different types of spring and their practical applications
- Know about the concept of strain energy principle and its applications to beams for finding their deflection
- Students will be able to understand Euler's formula, secant and straight line formula and their application to long and short columns.

Outcomes:

- To calculate the deflections of a member due to various loads and its combinations.
- Analyze statically indeterminate structural members
- Define pure torsion and derive torsional equation and know the advantage of hollow shafts in communicating power.
- Distinguish the failures of columns by crushing and crippling and analyze with different end conditions by using different theories.

UNIT - I

Deflection: Slope and deflection by double integration method for cantilever, simply supported beams and overhanging beams carrying one, two point loads, u.d.l. and uniformly varying load over entire span. Moment area and conjugate beam method.

UNIT - II

Propped cantilevers: Cantilever beams on elastic and rigid props for point loads and u.d.l. only. Calculation of reactions, B.M. and S.F. diagrams, and deflections.

Fixed Beams: Determination of shear force, ·)ending moment slope and deflection in fixed beams with and without sinking of supports for (i) point loads (ii) u.d.l. (iii)uniformly varying load over entire span.

Continuous Beams: Determination of moments in continuous beams with and without sinking of supports by theorem of three moments, S.F. and B.M. diagrams.

UNIT - III

Torsion: Theory of pure torsion in solid and hollow circular shafts, shear stress, angle of twist, strength and stiffness of shafts- Transmission of Power- Combined torsion and bending with and without end thrust- Determination of principal stresses and maximum shear stress- Equivalent bending moment, and equivalent twisting moment.

Springs: Close and open coiled helical springs under axial load and axial twist- Carriage springs.

UNIT - IV

Strain energy: Strain energy and resilience in statically determinate bars subjected to gradually applied, suddenly applied, impact and shock loads. Resilience of beams. Deflections from resilience. Castigliano Theorem - I and its application to beams- Reciprocal theorem.

Static indeterminacy and kinematic indeterminacy of structures.

UNIT - V

Column analogy method: Application to fixed beams- analogous column- stiffness and carryover factors.

Columns and Struts: Euler's theory for long columns- different end conditions- equivalent length- Rankine's theory. Eccentrically loaded columns- Secant and Perry's formulae.

Suggested Reading:

1. D.S. Prakash Rao, *Strength of Materials* - A practical Approach, Universities Press, 1999.
2. S.B. Junarkar, *Mechanics of Structures* (Vol. 1 &2), Charotar Publishing House Anand, 1992.
3. R.K. Rajput, *Strength of Materials*, S. Chand & Co., 2003.
4. B.C. Punmia, *Strength of Materials and Theory of Structures*, Laxmi Publishers, Delhi, 2000.
5. G.H. Ryder, *Strength of Materials*, Third Edition in SI units, Macmillan Indian Limited, Delhi, 2002.
6. A. Pytel and F. L. Singer, *Strength of Materials*, Harper & Row, Fourth Edition, New York, 1987.
7. R.K. Bansal, A Text book of Strength of materials, Lakshmi Publications, New Delhi, 2010.
8. Dr. Sadhu singh, *Strength of Materials*, Khanna Publishers, Delhi, 2006.
9. S.M.A Kazimi, *Solid mechanics*, Tata Mc- raw-Hill Publications Ltd. New Delhi, 2009
10. B.C. Punmia, Ashok kumar Jain, Arunkumar Jain, *Theory of structures*, Lakshmi publications (P) Ltd, New Delhi, 2007.

With effect from the Academic Year 2016 – 2017

ES 402 CE

FLUID MECHANICS - II

Instruction: 3+1 periods per week *Duration of Semester End Examination: 3 hours*
CIE: 30 marks *SEE: 70 marks*
Credits : 3

Objectives:

- Analysis of various flow characteristics in closed conduits
- Concepts of boundary layer theory, drag and lift
- Basics of open channel flows under different flow conditions

Outcomes:

- Knowledge of various flow characteristics in closed conduits
- Application of boundary layer theory concepts
- Design of open channels for different flow conditions

UNIT - I

Laminar and turbulent flow through pipes: Reynolds experiment, significance of Reynolds number, Hydraulic gradient, Laminar flow through circular pipes-(Hagen-Poiseuille equation), Turbulent flow through pipes – Darcy's equation, Moody's diagram, pipes in parallel and in series.

UNIT – II

Analysis of Pipe flows: Classification of pipes based on different pipe materials, factors influencing different pipe materials for networks. Types of Boosting arrangements, concepts of pipe leakages.

Unsteady flow in pipes: Water hammer phenomenon, pressure rise due to gradual and sudden valve closure, critical period of the pipe line.

UNIT – III

Boundary layer: Definition, laminar and turbulent boundary layers, boundary layer thickness, displacement thickness, momentum thickness, and energy thickness, hydrodynamically smooth and rough boundaries, and boundary layer separation

Drag and Lift: fundamental concepts of drag and lift forces, drag on a sphere, cylinder, flat plate, and aerofoil.

UNIT - IV

Steady uniform flow through open channels: Descriptions and definitions, difference between pipe flow and channel flow, velocity and pressure distributions in a channel cross-section, energy and momentum correction coefficients, friction to flow in open channels, uniform flow, Manning and Chezy formulae, most efficient channel sections, specific energy, concept and applications of critical depth.

UNIT - V

Gradually varied flow: Significance of Froude number, dynamic equation of gradually varied flow, classification of gradually varied flow profiles, computation of flow profiles, direct step method.

Hydraulic Jump: Momentum equation for a jump in horizontal rectangular channel, Surges in open channels, Elementary surge analysis.

Suggested Reading:

1. C.S.P. Ojha, R.Berndtsson, P.N. Chandramouli, 'Fluid Mechanics and Machinery', Oxford University Press, New Delhi, 2010
2. Twort, A.C., F.M. Law, and F.W. Crowley, 'Water Supply', Edward Arnold, London, 1990.
3. Ven Te Chow, 'Open channel hydraulics', McGraw-Hill Book Company, New York, 1959
4. Hanif Chaudhry, M, 'Open-channel flow', Prentice-Hall of India Pvt. Ltd., New Delhi, 1993
5. Subramanya, K, 'Flow through open channels', Tata McGraw-Hill Publishing Company, New Delhi, 1986

With effect from the Academic Year 2016 – 2017

PC 401 CE

SURVEYING – II

Instruction: 3 periods per week *Duration of Semester End Examination: 3 hours*
CIE: 30 marks *SEE: 70 marks*
Credits : 3

Objectives:

- Know the importance of theodotite, total station and their practical applications
- Study the basic concept of trigonometrical leveling, and field applications
- Analyze the horizontal and vertical curves for survey work related to Roads and Railways
- Know the principles of aerial photogrametry and its applications
- Study the various applications of GPS, GIS and remote sensing for field work.

Outcomes:

- Understand the basic working principles of theodolite and total station
- Calculation of applicable corrections to the measured values
- Computation of omitted measurements areas
- Computation of setting out data for setting out of horizontal and vertical curves by various methods
- Understand and learn the basic concepts related to Photogrammetry, GIS and GPS
- Learn various applications of the Photogrammetry, GIS and GPS for land surveying

UNIT - I

Theodolite: Construction details of Vernier theodolite, definitions, temporary and permanent adjustments. Measurement of horizontal angle by repetition and reiteration methods-Measurement of (a) vertical angle, (b) direct angle, (c) deflection angle and (d) magnetic beraing- errors in theodolite survey.

Introduction to Electromagnetic Distance Measurement (EDM) and Total station:

Tacheometry, Basic definitions, Basic Principle of electronic distance measurement, Phase of the wave, types of waves, distance from measurement of transit time, measurement of distance from phase distance, carrier waves, Infrared EDM instruments and Microwave EDM instruments, Features of electronic Theodolites, Types and applications of Total Stations.

UNIT - II

Theodolite Traversing and Computations: Traversing by (i) included angles (ii) bearings- conditions of closed traverse- Gale's Traverse table, closing error and its adjustment by various methods, Coordinates, traverse and their computations.

Trigonometrical Levelling: Effect of curvature and refraction, axis signal correction, difference in elevation by single and reciprocal observations heights and distance problem for inaccessible points using a base line for same plane and different plane problems.

UNIT - III

Horizontal curves: Theory of simple curves, setting out simple curves by linear and instrumental methods. Obstructions in ranging of simple circular curve. Compound curve: simple compound curve, compound curve separated by a tangent, three centered compound curve. Elements of reverse curve. Transition curve: Computation of length of transition curve, elements of transition curve.

UNIT - IV

Vertical Curves: Types of vertical curves, length of vertical curves, sight distance on sag curve passing under an overhead structure, Elements of a summit and sag curves, analysis of sight distance on summit and sag curves, Computations of setting out data of summit and sag curves, setting out methods of vertical curves.

UNIT - V

Aerial Photogrametry: Principles, definitions, types of photographs, stereoscopy, scale, relief displacement, format and lens angle, stereoscopy, flight planning by remote sensing, types of sensors.

Remote Sensing: Principle, components and classification, remote sensing satellite imagery with special relevance to Indian Remote Sensing Satellite (IRS) and applications.

GPS Surveying: Introduction & components of GPS, space segment, control segment and user segment, elements of satellite based survey.

Geographic Information System (GIS): Definition, components, applications and advantages.

Suggested Reading:

1. B.C. Punmia, *Surveying, Vol. I and Vol. II*, Laxmi Publications, 1994.
2. Arora, K.R., *Surveying, Vol. I, II and III*, Standard Book House., 1995.
3. T.M. Lillesand and R.W. Kiefer, *Remote Sensing and Image Interpretation*, John Wiley & Sons, 1994.
4. R. Srinivasa Kumar, *A Text Book of Highway Engineering*, Universities Press, Hyderabad, 2011.
5. M. Chandra, *Advanced Surveying*, New Age International Publishers New Delhi, 2000.

With effect from the Academic Year 2016 – 2017

PC 402 CE

HYDROLOGY AND WATER MANAGEMENT

Instruction: 3 periods per week *Duration of Semester End Examination: 3 hours*
CIE: 30 marks *SEE: 70 marks*
Credits : 3

Objectives:

- Understanding the importance of Hydrology and its applications
- Introduction to Hydrological processes and estimation of Design flood
- Basic concepts and assessment of groundwater flows
- Applications of statistical models in Hydrology
- Introduction and assessment of soil-water-plant relationship

Outcomes:

- Estimation of Design flood for Water Resources structures
- Computation of drawdown and yield in aquifers
- Development of Rainfall – Runoff relationship
- Determination of crop – water requirements

UNIT-I

General: Definition, relation to engineering design, hydrological cycle, importance of hydrology and its application in engineering.

Rainfall: Definition, types of rainfall, measurement of rain fall, types of raingauges, network design, presentation of precipitation data, mean aerial rainfall; thiessen polygon, isohyetal methods., depth- area- duration curve, dependable rainfall.

Infiltration: Evaporation, transpiration-definitions and processes.

UNIT – II

Runoff: Definition, runoff process, factors affecting runoff, determination of runoff, importance of stream gauging, runoff formulae and runoff tables, dependable yield of a basin.

Floods: Definition, causes, importance of flood studies, flood peak and flood hydrograph, methods of computing flood peak, empirical methods, rational formula, unit hydrograph method, flood frequency studies, Weibul's and Gumble's extreme value methods.

UNIT – III

Ground water: Types of aquifers, aquifer parameters, specific yield, storage coefficient, coefficients of permeability and transmissivity, Darcy's law, types of well, steady radial flow to wells in confined and unconfined aquifers, yield of open wells, safe yield, constant level pumping test and recuperation test.

UNIT-IV

Statistics in Hydrology: Introduction, Statistical parameters; central tendency parameters, dispersion characteristics, skewness., probability distribution; discrete and continuous distribution., frequency analysis; log pearson type III distribution., regression and correlation; standard forms of bivariate equations., multivariate linear regression and correlation., analysis of time series., selection of a design return period, determination of permissible risk.

UNIT-V

Irrigation: Definition, necessity of irrigation, types of irrigation, advantages and ill-effects of irrigation.

Soil-water-plant relationship: Vertical distribution of soil moisture, soil moisture tension, soil moisture stress, soil moisture constants, plant water relationship, moisture stress and plant response, consumptive use, crop factor, duty, factors affecting duty, types of crops and their water requirements, crop rotation.

Suggested Reading:

1. K. Subramanya, *Engineering Hydrology*, Tata McGraw Hill Publishing Co.Ltd. 1996.
2. H.M. Raghunath, *Hydrology – Principles, Analysis and Design*, New Age International Publishers, 1996.
3. Michael, A.M, *Irrigation Theory & Practice*, Vikas Publishing House, New Delhi, 1978
4. Ray K.Linsley, Jr, Max A. Kohler, Joseph L.H.Paulhus, *Hydrology for Engineers*, McGraw-Hill Book Company, 1980
5. Ven Te Chow, Hand book of Applied Hydrology, McGraw-Hill Book Company, New York, 1964

With effect from the Academic Year 2016 – 2017

PC 403 CE

REINFORCED CEMENT CONCRETE

Instruction: 3+1 periods per week *Duration of Semester End Examination: 3 hours*
CIE: 30 marks *SEE: 70 marks*
Credits : 3

Objectives:

- Know the IS codal provisions as applicable for the designs.
- Understand the design philosophies and basics of RCC structural designs.
- Understand the design principles in flexure, shear and torsion.
- Learn the design of various components of RCC structures.

UNIT - I

Design philosophies: Development of design philosophies-Working stress method, Ultimate load method, and Limit state method - Concepts, Characteristics loads and strengths, Partial safety factors, Stress-strain relationship for concrete and steel, stress block parameters.

Working stress method: Design of RCC beams - Balanced, under-reinforced and over reinforced sections - Rectangular, T and L sections, Design of singly and. doubly reinforced rectangular, T and L sections.

UNIT - II

Limit state of collapse in flexure: Assumptions, Design for flexure - Singly and doubly reinforced rectangular, T and L sections.

Limit state of collapse in shear and torsion: Design for shear and torsion. Limit states of serviceability: Check for deflection and cracking.

UNIT - III

Design of slabs (Limit state method): Design of one way and two way slabs - Simply supported and continuous slabs subjected to uniformly distributed loads, Detailing of reinforcement, Check for serviceability of slabs.

Design of stair cases (Limit state method): Types of stairs, Effective span, Distribution of loading on stairs, Design and detailing of dog-legged stair cases.

UNIT - IV

Design of columns (Limit state method): Assumptions, Design of axially loaded circular, square and rectangular columns, Design of columns with uni-axial and bi-axial bending , interaction diagrams.

UNIT - V

Design of footings (Limit state method): Design of isolated footings of uniform depth and sloped footings, Deign of square, rectangular and circular footings as per IS code, Design of combined rectangular slab footing, Combined rectangular beam and slab footing for two columns.

Suggested Reading:

1.Punmia B.C., Jain A.K. and Jain A.K., RCC Designs, Laxmi Publications, 2006.
2.Krishna Raju N. and Pranesh R.N., Reinforced Concrete Design, New Age International Pvt. Ltd., 003.
3.Varghese P.C; Limit State Design of Reinforced Concrete, Prentice Hall of India Pvt. Ltd." 2002.
4.Varghese P.C; Design of Reinforced Concrete Foundations, PHI Learning Pvt. Ltd., 2009.
5.D.S. Prakash Rao, Design Principles and Detailing of Concrete Structures, .Tata Mcfiraw Hill Publishing Co. Ltd., 1995.

Note: All relevant latest IS codes necessary for this course may be referred (i.e. IS 456-2000 etc.)

With effect from the Academic Year 2016 – 2017

HS 401 BT

ENVIRONMENTAL SCIENCES

Instruction: 3 periods per week *Duration of Semester End Examination: 3 hours*
CIE: 30 marks *SEE: 70 marks*
Credits : 3U

Objectives:

- Study the sources of water, floods and its impact on environment
- Know about the ecosystem and energy resource system
- Understand the Biodiversity concept and its advantages
- Study different types of pollution and its impact on environment
- Know the social and environment related issues and their preventive measures

UNIT - I

Environmental studies: Definition, scope and importance, need for public awareness. Natural resources: Water resources; use and over utilization of surface and ground water, Floods, drought, conflicts over water, dams-benefits and problems. Effects of modem Agriculture, fertilizer- pesticide problems, water logging and salinity.

UNIT - II

Ecosystems: Concept of an ecosystem, structure and function of an ecosystem, producers, consumers and decomposers, energy flow in ecosystem, food chains, ecological pyramids, aquatic ecosystem (ponds, streams, lakes, rivers, oceans, estuaries).'
Energy resources: Growing energy needs renewable and non-renewable energy sources. Land Resources, land as resource, land degradation, soil erosion and desertification.

UNIT - III

Biodiversity: Genetic species-and ecosystem diversity, bio-geographical classification of India. Value of biodiversity, threats to biodiversity, endangered and endemic species of India, conservation of biodiversity.

UNIT - IV

Environmental Pollution: Causes, effects and control measures of air pollution, water Pollution, soil pollution, noise pollution, thermal pollution and solid and liquid waste management.

UNIT - V

Air Pollution: Types of pollutants. their sources and impacts. air pollution meteorology and control. air quality standards and limits.

Noise Pollution: Impacts of noise. permissible limits of noise pollution. measurement of noise. and control of noise pollution.

Suggested Reading:

1. Fair. G. M. and Geyer. J. C. Water and Wastewater Engineering. vol. I and II. John Wiley & Sons Inc., New York
2. White. J.B .. Wastewater Engineering. Edward Arnold. London.1978
3. Hammer. MJ. and Hammer. MJ. Jr., Water and Wastewater Technology. Prentice-Hall of India Pvt. Ltd., New Delhi. 1998
4. Metcalf & Eddy., Wastewater Engg., Treatment, Disposal, and Reuse, Tata Mc-Graw Hill publishing Company Ltd., New Delhi, 1995
5. Sasi Kumar, K. and Sanoop Gopi Krishna., Solid waste Management, Prentice-Hall of India Pvt. Ltd., New Delhi, 2009
6. Gilbert, M. Masters Introduction to Environmental Engineering and Science, Prentice-Hall . of India Pvt. Ltd., New Delhi, 1995

With effect from the Academic Year 2016 – 2017

ES 451 CE

MATERIAL TESTING LABORATORY

Instruction: 2 periods per week *Duration of Semester End Examination: 3 hours*
CIE: 25 marks *SEE: 50 marks*
Credits : 1

Objectives:

- Understand the experiments on various materials to assess their behavior and limitations
- Learn the brittle and ductile material failure patterns
- Understand the shear force, bending moment and deflection for different types of beams
- Know the rigidity modulus by conducting spring and torsion test

Outcomes:

- Evaluate Young's modulus, rigidity modulus, hardness number, flexural rigidity and impact strength of given specimens
- Find the cracking stress and compressive strength of bricks
- Determine the stiffness of close coiled helical springs
- Find the deflection of a beam

Cycle - I

1. Uni-axial tension test on a specimen of ductile material
2. Stress-Strain characteristics of a ductile material
3. Brinell's hardness test
4. Compression test on brick
5. Bending test on simply supported beam of timber

Cycle - II

6. Torsion test on a specimen of ductile material
7. Compression test on close coiled helical spring
8. Bending test on simply supported beam of steel
9. Bending test on fixed beam of steel
10. Izod impact test

e-Resources:

1. http://nptel.ac.in/
2. http://mhrd.gov.in/e-contents
3. http://vlab.co.in/

With effect from the Academic Year 2016 – 2017

ES 452 CE

FLUID MECHANICS - I LABORATORY

Instruction: 2 periods per week *Duration of Semester End Examination: 3 hours*
CIE: 25 marks *SEE: 50 marks*
Credits : 1

Objectives:

- Calibration of flow measuring devices
- Verification of the Bernoulli's theorem
- Demonstration of the various losses in pipes

Outcomes:

- Ability to measure flow in closed conduits and flumes
- Application of Bernoulli's principle in Hydraulics
- Computation of various losses in pipes and pipe fittings

List of Experiments:

1. Determination of C_d and C_v of an orifice
2. Calibration of a mouth piece
3. Determination of C_d of a mouth piece for unsteady flow in a hemi-spherical tank
4. Calibration of a rectangular notch
5. Calibration of a triangular notch
6. Calibration of a broad crested weir
7. Verification of Bernoulli's principle
8. Determination of types of flows
9. Determination of major and minor losses in the pipes
10. Calibration of a Venturi meter

With effect from the Academic Year 2016 – 2017

PC 451 CE

SURVEYING - II LABORATORY

Instruction: 2 periods per week *Duration of Semester End Examination: 3 hours*
CIE: 25 marks *SEE: 50 marks*
Credits : 3

Objectives:

- Know the importance of theodotite, total station and their practical applications
- Study the basic concept of trigonometrical leveling, and field applications
- Analyze the horizontal and vertical curves for survey work related to Roads and Railways
- Know the principles of aerial photogrametry and its applications
- Study the various applications of GPS, GIS and remote sensing for field work.

Outcomes:

- Understand the basic working principles of theodolite and total station
- Calculation of applicable corrections to the measured values
- Computation of omitted measurements areas
- Computation of setting out data for setting out of horizontal and vertical curves by various methods
- Understand and learn the basic concepts related to Photogrammetry, GIS and GPS
- Learn various applications of the Photogrammetry, GIS and GPS for land surveying

1. Measurement of horizontal angles by repetition and reiteration methods using Vernier Theodolite.
2. Theodolite traversing using Gale's traverse table and balancing of the traverse by Bowditch's method
3. Measurement of vertical angle: Application to simple problems of height and distance by measuring angle of elevation and depression
4. Single plane method : Determination of R.L. of an elevated Object using two Instrument Stations which are placed in a same vertical plane- when base of the Object inaccessible.
5. Two plane method: Determination ofR.L. of an elevated Object using two Instrument Stations which are not placed in the same vertical plane- when base of the Object inaccessible.
6. Setting out of a simple circular curve by linear method
7. Setting out of a simple circular curve by angular method
8. Setting out of a transition curve by linear method
9. Setting out of a transition curve by angular method
10. Introduction to Total station and applications: To determine difference in elevation of any two given points. The introduction includes, setting up of the Total station over a station, input values, field measurements, downloading of the data in to a computer.

11. Total station and applications: Application to simple problems of height and distance by measuring angle of elevation and depression and determination of **R.L** of the target object.
12. Total station and applications: Determination of area enclosed in a closed traverse having minimum 5 stations. Plot the measured values by using a software package.
13. Geographic Position System (GPS),Geographical Information system(GIS) and their applications: Determination of Latitude and Longitude of any four stations and computation of the area. Check trust worthiness of the measured results.
14. Visual interpretation of given aerial photograph/satellite imagery
15. Study of topographic map.