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II Year – I SEMESTER	L	T	P	C
	3	1	0	3

16CE3T01 -BUILDING MATERIALS & CONSTRUCTION

Course Learning Objectives:

To develop knowledge of building materials

1. To learn the availability, types, uses and various tests for building materials.
2. To know about materials that is used for protection and functional purpose.
3. To know about various components of building.

Course Outcomes:

Identify the sources, properties and applications of common building materials

1. Demonstrate how materials are manufactured and assembled into building component parts
2. Explain materials like lime, cement, wood, geo-synthetics, bricks and stone masonry in building construction and also their importance
3. Identify structural components, including foundations, slabs-on-grade, frames and elevated slabs
4. Illustrate various building components and finishing's in building construction
5. Illustrate the basic functions, options, and differences between building systems

Syllabus:

UNIT - I

STONES, BRICKS AND TILES

Properties of building stones – relation to their structural requirements, classification of stones – stone quarrying – precautions in blasting, dressing of stone, aggregates-coarse & fine aggregate ,composition of good brick earth, various methods of manufacturing of bricks. Characteristics of good tile - manufacturing methods, types of tiles. Uses of materials like Aluminum, Gypsum, Glass and Bituminous materials – their quality.

UNIT - II

MASONRY,LIME & CEMENT

Types of masonry, English and Flemish bonds, Rubble and Ashlar Masonry. Cavity and partition walls. Lime: Various ingredients of lime – Constituents of lime stone – classification of lime – various methods of manufacture of lime. Cement: Portland cement- Chemical Composition – Hydration, setting and fineness of cement. Various types of cement and their properties.

UNIT – III

TIMBER & TIMBER PRODUCTS

WOOD: Structure – Properties- Seasoning of timber- Classification of various types of woods used in buildings- Defects in timber. Alternative materials for wood – Galvanized Iron, Fiber – Reinforced Plastics, Steel, Aluminium.

UNIT – IV

BUILDING COMPONENTS

Lintels, arches, vaults, stair cases – types. Different types of floors – Concrete, Mosaic, Terrazzo floors, Pitched, flat roofs. Lean to roof, Coupled Roofs. Trussed roofs – King and Queen post Trusses. R.C.C Roofs, Madras Terrace and Pre fabricated roofs.

UNIT - V

FINISHINGS

Damp Proofing and water proofing materials and uses – Plastering Pointing, white washing and distempering – Paints: Constituents of paint – Types of paints – Painting of new/old wood-Varnish. Form Works and Scaffoldings.

UNIT – VI

PIPES , ADHESIVES & SEALANTS

Pipes used in building construction- cast iron, plastic, GI ,stoneware , asbestos & concrete , Adhesives- Used in timber , tile fixing , Joining concrete , claddings , sealing compounds & joint fillers.

Text Books:

1. Building Materials by S.S. Bhavikatti, Vices publications House private ltd.
2. Building Construction by S.S. Bhavikatti, Vices publications House private ltd.
3. Building Materials by B.C. Punmia, Laxmi Publications private ltd.
4. Building Construction by B.C. Punmia, Laxmi Publications (p) ltd.

Reference Books:

1. Building Materials by S.K.Duggal, New Age International Publications.
2. Building Materials by P.C.Verghese, PHI learning (P) ltd.
3. Building Materials by M.L.Gambhir, Tata McGraw Hill Publishing Co. Ltd. New Delhi.
4. Building construction by P.C.Verghese, PHI Learning (P) Ltd.

Web Reference:

http://freevideolectures.com/Course/86/Building-Materials-and-Construction

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II Year – I SEMESTER	L	T	P	C
	3	1	0	3

16CE3T02 -FLUID MECHANICS

Course Learning Objectives:

Basic concepts of fluids and fluid flow are essential in all the engineering Disciplines to get better understanding of the courses in the professional Programmes and obviously its importance as a core subject need not be over emphasized. Hence, it is mandatory to learn the fundamental concepts in the field of fluid mechanics.

Course Outcomes:

- To understand the importance, application and inter-relationship of various Properties of fluids.
- To study the features and function of various devices used to measure the pressure of fluid.
- To study the features and function of various devices used to measure the velocity and discharge of different types fluids.
- To obtain the knowledge regarding various theories:
- Those explain the behavior and performance of fluid at rest and in motion.
- Those explain the behavior and performance of fluid flowing through the pipe.

Syllabus:

UNIT I

INTRODUCTION : Dimensions and units, Physical properties of fluids, specific gravity, viscosity, surface tension, vapor pressure and their influences on fluid motion, pressure at a point, Pascal's law, Hydrostatic law- Relationship between pressures- measurement of pressure- Pressure gauges, Manometers: Differential and Micro Manometers.

UNTI – II

HYDROSTATICS: Hydrostatic forces on submerged plane-Horizontal, Vertical, inclined and curved surfaces – Center of pressure. Derivations and problems.

FLUID KINEMATICS: Description of fluid flow, Stream line, path line and streak lines and stream tube. Classification of flows: Steady, unsteady, uniform, non-uniform, laminar, turbulent, rotational and irrotational flows – Equation of continuity for one, two , three dimensional flows – stream and velocity potential functions, Flow net; Vortex flow – free vortex and forced, vertex flow.

UNIT – III

FLUID DYNAMICS: Surface and body forces – Euler's and Bernoulli's equations for flow along a stream line for 3-D flow, Navier – Stokes equations (Explanationary) Momentum equation and its application – forces on pipe bend.

UNIT – IV

BOUNDARY LAYER THEORY: Boundary layer – concepts, Prandtl contribution, Characteristics of boundary layer along a thin flat plate, Vonkarmen momentum integral equation, laminar and turbulent Boundary layers, no deviations BL in transition, separation of BL, Control of BL, Introduction to drag & lift.

UNIT – V

LAMINAR FLOW: Reynolds's experiment – Characteristics of Laminar & Turbulent flows. Flow between parallel plates, Flow through long tubes, flow through inclined tubes.

CLOSED CONDUIT FLOW: Laws of Fluid friction – Darcy's equation, Minor losses – pipes in series – pipes in parallel – Total energy line and hydraulic gradient line. Pipe network problems, Moody's Chart.

UNIT – VI

MEASUREMENT OF FLOW: Pitot tube, Venturimeter and Orifice meter– classification of orifices, small orifice and large orifice, flow over rectangular, triangular and trapezoidal and stepped notches - Broad crested weirs. Classification of mouthpieces; Flow through external and internal cylindrical mouthpiece.

Text Books:

1. Fluid Mechanics and Hydraulic Machines by R. K. Bansal; Laxmi Publications; New Delhi.
2. Hydraulics & Fluid Mechanics by P. N. Modi & S. N. Seth; Standard Book house, New Delhi
3. Rajput R.K., Fluid Mechanics and Hydraulic Machines, S.Chand and Company Ltd., 2005.

Reference Books:

1. Fluid Mechanics by A. K. Jain; Khanna Publishers, Delhi
2. K.Subramanya, Theory and Applications of Fluid Mechanics, Tata McGraw Hill Publishing Company, 2002.
3. Fluid Mechanics by A.K. Mohanty, Prentice Hall of India Pvt. Ltd. New Delhi
4. Introduction to Fluid Machines by Edward J. Shaughnessy, Jr, Ira M.Katz and James P. Schaffer, Oxford University Press, New Delhi
5. Fluid Mechanics by Merie C. potter and David C. Wiggert, Cengage learning

Web Reference:

1. Dr. T. I. Eldho, IIT / Bombay – Fluid Mechanics www.nptel.ac.in/courses/105101082/
2. Dr. SubhashivaDutta& Dr. N. Sahoo, IIT/Guwahati – FluidMechanicswww.nptel.ac.in/courses/105103095/xc

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II Year – I SEMESTER

L	T	P	C
3	1	0	3

16CE3T03 -STRENGTH OF MATERIALS-I

Course Learning Objectives:

The behavior of materials and structural bodies under the action of loads is quantified through expressions. The relation between the external loads, internal strength parameters and displacements are well interconnected in this course

1. To give preliminary concepts of Strength of Material and Principles of Elasticity and Plasticity Stress strain behavior of materials and their governing laws. Introduce student the moduli of Elasticity and their relations.
2. To impart concepts of Bending Moment and Shear force for beams with different boundary and loading conditions and to draw the diagrams of variation across the length.
3. To give concepts of stresses developed in the cross section and bending equations calculation of section modulus of sections with different cross sections.
4. The concepts above will be utilized in measuring deflections in beams under various loading and support conditions.
5. To classify cylinders based on their thickness and to derive equations for measurement of stresses across the cross section when subjected to external pressure.

Course Outcomes:

1. The student will be able to understand the basic materials behavior under the influence of different external loading conditions and the support conditions.
2. To draw the diagrams indicating the variation of the key performance features like bending moment and shear forces.
3. Illustrate knowledge of bending concepts and calculation of section modulus and for determination of stressed developed in the beans due to various loading conditions.
4. To assess stresses across section of the thin and thick cylinders to arrive at optimum sections to withstand the internal pressure.

Syllabus:

UNIT – I

SIMPLE STRESSES AND STRAINS: Elasticity and plasticity – Types of stresses and strains – Hooke'slaw – stress – strain diagram for mild steel – Working stress – Factor of safety – strain energy-gradual &sudden loads,Lateral strain, Poisson's ratio and volumetric strain – Elastic modules and the relationship between them – Bars of varying section – composite bars – Temperature stresses.

UNIT – II

SHEAR FORCE AND BENDING MOMENT: Definition of beam – Typesof beams – Concept of shear force and bending moment – S.F and B.M diagrams for cantilever, simply supported and overhanging beams subjected to point loads, uniformly distributed load.,

uniformly varying loads and combination of these loads– Point of contra flexure – Relation between S.F., B.M and rate of loading at a section of a beam.

UNIT – III

FLEXURAL STRESSES: Theory of simple bending – Assumptions –Derivation of bending equation: M/I = f/y = E/R Neutral axis – Determination bending stresses – section modulus of rectangular and circular sections (Solid and Hollow), I, T, Angle and Channel sections – Design of simple beam sections.

UNIT –IV

SHEAR STRESSES: Derivation of formula – Shear stress distributionacross various beam sections like rectangular, circular, triangular, I, T angle sections, built up beams, shear centre for Channel Sections and I-Sections.

UNIT – V

DEFLECTION OF BEAMS: Bending into a circular arc – slope, deflectionand radius of curvature – Differential equation for the elastic line of a beam – Double integration and Macaulay's methods – Determination of slope and deflection for cantilever and simply supported beams subjected to point loads, - U.D.L. Uniformly varying load.-Mohr's theorems – Moment area method – application to simple cases including overhanging beams.

UNIT – VI

THIN CYLINDERS: Thin seamless cylindrical shells –Derivation of formula for longitudinal and circumferential stresses – hoop, longitudinal and volumetric strains – changes in diameter, and volume of thin cylinders – Thin spherical shells.

Text Books:

1. Strength of Materials by S. S. Bhavakatti
2. Strength of materials by R.K.Bansal vol 1 & 2

Reference Books:

1. Strength of Materials by S.S. Rattan, Tata McGraw Hill Education Pvt., Ltd.
2. Strength of materials by R.K. Rajput, S. Chand & Co, New Delhi.
3. Strength of Materials by S.Ramamrutham Dhanpat Rai Publishing Co., (P) Ltd. New Delhi
4. Theory of Structures by S.P.Timoshenko & DH. Young.

Web References:

NPTEL http://nptel.ac.in/courses/105105108/1

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II Year – I SEMESTER	L	T	P	C
	3	1	0	3

16CE3T04 -SURVEYING

Course Learning Objectives:

To introduce the students to basic principles of surveying, various methods of linear and angles measuring instruments and enable the students to use surveying equipments.

Course Outcomes:

Upon successful completion of the course, the student will be able:

1. To demonstrate the basic surveying skills
2. To use various surveying instruments.
3. To perform different methods of surveying
4. To compute various data required for various methods of surveying.
5. To integrate the knowledge and produce topographical map.

Syllabus:

UNIT – I

INTRODUCTION: definition-Uses of surveying, Objectives, Principles and classifications – Errors in survey measurements.

DISTANCE MEASUREMENT CONVENTIONS ANDMETHODS: Use of chain and tape,Errors and corrections to linear measurements, overview of plane table surveying.

UNIT – II

COMPASS SURVEY: compass survey - Meridians, Azimuths and Bearings, declination, computation of angle. Traversing - Purpose-types of traverse-traverse computation - traverse adjustments - omitted measurements.

UNIT – III

LEVELING AND CONTOURING: Concept and Terminology, LevellingInstruments and their Temporary and permanent adjustments- method of levelling. Characteristics and Uses of contours- methods of conducting contour surveys and their plotting.

UNIT – IV

THEODOLITE: Theodolite, description, principles-uses and adjustments –temporary and permanent, measurement of horizontal and vertical angles. Principles of Electronic Theodolite - Trigonometrical leveling.

TACHEOMETRIC SURVEYING: Stadia and tangential methods ofTachometry. Distance and Elevation formulae for Staff vertical position.

UNIT – V

CURVES: Types of curves, design and setting out – simple and compoundcurves- transition

curves. Introduction to geodetic surveying, Total Station and Global positioning system.

UNIT – VI

COMPUTATION OF AREAS AND VOLUMES: Area from field notes,computation of areas along irregular boundaries and area consisting of regular boundaries. Embankments and cutting for a level section and two level sections with and without transverse slopes, determination of the capacity of reservoir, volume of barrow pits.

Text Books:

1. Surveying (Vol No.1, 2 &3) by B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain – Laxmi Publications (P) ltd, New Delhi.
2. Advance Surveying by Satish Gopi, R. Sathi Kumar and N. Madhu, Pearson Publications.
3. Text book of Surveying by C. Venkataramaiah, University press, India (P) limited.
4. Surveying and levelling by R. Subramanian, Oxford University press.

Reference Books:

1. Text book of Surveying by S.K. Duggal (Vol No. 1&2), Tata McGraw Hill Publishing Co. Ltd. New Delhi.
2. Text book of Surveying by Arora (Vol No. 1&2), Standard Book House, Delhi.
3. Higher Surveying by A.M. Chandra, New Age International Pvt Ltd.
4. Fundamentals of surveying by S.K. Roy – PHI learning (P) Ltd.
5. Plane Surveying by Alak de, S. Chand & Company, New Delhi.

Web Reference:

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II Year – I SEMESTER

L	T	P	C
0	0	3	2

16CE3L01 -STRENGTH OF MATERIALS LAB

List of Experiments:

1. Tension test on Mild Steel bar.
2. Bending test on (Steel / Wood) Cantilever beam.
3. Bending test on simple support beam.
4. Torsion test
5. Hardness test
6. Spring test
7. Compression test on wood or concrete
8. Impact test
9. Shear test
10. Verification of Maxwell's Reciprocal theorem on beams.
11. Use of Electrical resistance strain gauges
12. Continuous beam – deflection test.

List of Major Equipment:

1. UTM for conducting tension test on rods
2. Steel beam for flexure test
3. Wooden beam for flexure test
4. Torsion testing machine
5. Brinnell's / Rock well's hardness testing machine
6. Setup for spring tests
7. Compression testing machine
8. Izod Impact machine
9. Shear testing machine
10. Beam setup for Maxwell's theorem verification.
11. Continuous beam setup
12. Electrical Resistance gauges.

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II Year – I SEMESTER	L	T	P	C
	0	0	3	2

16CE3L02 -SURVEYING FIELD WORK-I

List of Field Works:

1. Survey by chain survey of road profile with offsets in case of road widening.
2. Survey in an area by chain survey (Closed circuit).
3. Determination of distance between two inaccessible points by using compass.
4. Finding the area of the given boundary using compass (Closed Traverse).
5. Plane table survey: finding the area of a given boundary by the method of Radiation.
6. Plane table survey: finding the area of a given boundary by the method of intersection.
7. Two Point Problem by the plane table survey.
8. Fly levelling: Height of the instrument method (differential levelling).
9. Fly levelling: rise and fall method.
10. Fly levelling: closed circuit/ open circuit.
11. Fly levelling: Longitudinal Section and Cross sections of a given road profile.

Note: Any 10 field work assignments must be completed.

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II Year – II SEMESTER

L	T	P	C
3	1	0	3

16CE4T05 -BUILDING PLANNING & DRAWING

Course Learning Objectives:

1. To understand the principles of planning & bylaws.
2. To draw plan, elevation and section of public and industrial structures.
3. To prepare detailed working drawing for doors, windows, etc.

Course Outcomes:

1. Explain various building bye-Laws laid by town planning authorities and local regulatory bodies
2. Apply techniques for effective project planning and management
3. Plan the different types of residential buildings based on the minimum requirements
4. Plan various public buildings like educational, office buildings and hospital buildings
5. Develop the building drawing as per standards in various phases of a project
6. Outline the detailing in building construction

Syllabus:

UNIT- I

BUILDING BYELAWS AND REGULATIONS

Introduction- terminology- objectives of building byelaws- floor area ratio-floor space index-principles under laying building bye laws- classification of buildings- Floor Area Ratio (FAR). Floor Space Index (FSI).Open space requirements – built up area limitations- height of buildings- wall thickness – lightening and ventilation requirements- Principles of Vaasthu in building planning.

UNIT - II

RESIDENTIAL BUILDINGS

Minimum standards for various parts of buildings- requirements of different rooms and their grouping- characteristics of various types' residential buildings.

UNIT - III

PUBLIC BUILDINGS

Planning of educational institutions, hospitals, dispensaries, office buildings, banks, industrial buildings, hotels & motels, buildings for recreation.Requirements and Minimum Standards for Residential Buildings- Requirements and Minimum Standards for various Public Buildings.

UNIT - IV

SIGN CONVENTIONS AND BONDS

Brick, stone, plaster, sand filling, concrete, glass, steel, cast iron, copper alloys, aluminium alloys etc., lead, zinc, tin etc., earth, rock, timber and marbles.English bond and Flemish bond- odd and even courses for one, one-half, two and two & half brick walls in thickness at the junction of a corner.

UNIT - V

DOORS, WINDOWS, VENTILATORS AND ROOFS

Panelled door, panelled and glassed door, glassed windows, panelled windows, swing ventilators, fixed ventilators, coupled roof, collar roofs.King Post truss, Queen Post trussSloped and flat roof buildings: drawing plans, Elevations and Cross Sections of given sloped roof buildings.

UNIT - VI

PLANNING AND DESIGNING OF BUILDINGS

Draw the Plan, Elevation and sections of a Residential & Public buildings from the given line diagram-staircases.

Text Books:

1. Planning and Design of buildings by Y.S. Sane
2. Planning, designing and Scheduling by Gurucharan Singh and Jagadish Singh
3. Building planning and drawing by M. Chakravarthi.
4. 3. 'A' Series & 'B' Series of JNTU Engineering College, Anantapur,

Reference Books:

1. Building drawing by Shah and Kale.
2. 'The Hindu Science of Architecture and Vaasthu' , D.N.Sukhla.

INTERNAL EXAMINATION PATTERN:

The total internal marks (30) are distributed in three components as follows:

1.	Descriptive (subjective type) examination	: 25 marks
2.	Assignment	: 05 marks

FINAL EXAMINATION PATTERN:

The end examination paper should consist of Part A and Part B. Part A consist of five questions in planning portion out of which three questions are to be answered. Part B should consist of two questions from drawing part out of which one is to be answered in drawing sheet. Weight age for Part – A is 60% and Part- B is 40%.

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II Year – II SEMESTER	L	T	P	C
	3	1	0	3

16CE4T06 -CONCRETE TECHNOLOGY

Course Learning Objectives:

- To learn the concepts of Concrete production and its behavior in various environments.
- To learn the test procedures for the determination of properties of concrete.
- To understand durability properties of concrete in various environments.

Course Outcomes:

Upon successful completion of this course, student will be able to

- Understand the basic concepts of concrete.
- Realise the importance of quality of concrete.
- Familiarise the basic ingredients of concrete and their role in the production of concrete and its behavior in the field.
- Test the fresh concrete properties and the hardened concrete properties.
- Evaluate the ingredients of concrete through lab test results.
- Design the concrete mix by BIS method.
- Familiarise the basic concepts of special concrete and their production and applications.
- Understand the behavior of concrete in various environments.

Syllabus:

UNIT - I

INGREDIENTS OF CONCRETE

CEMENTS & ADMIXTURES: Portland cement – Chemical composition –Hydration, Setting of cement, Fineness of cement, Structure of hydrate cement – Test for physical properties – Different grades of cements – Admixtures – Mineral and chemical admixtures – accelerators, retarders, air entrainers, plasticizers, super plasticizers, fly ash and silica fume.

AGGREGATES: Classification of aggregate – Particle shape & texture –Bond, strength & other mechanical properties of aggregates – Specific gravity, Bulk density, porosity, adsorption & moisture content of aggregate – Bulking of sand –Deleterious substance in aggregate – Soundness of aggregate – Alkali aggregate reaction – Thermal properties – Sieve analysis – Fineness modulus – Grading curves – Grading of fine & coarse Aggregates – Gap graded and well graded aggregate as per relevant IS code – Maximum aggregate size. Quality of mixing water.

UNIT – II

FRESH CONCRETE: Steps in Manufacture of Concrete–proportion,mixing, placing, compaction, finishing, curing – including various types in each stage. Properties of fresh concrete-Workability – Factors affecting workability – Measurement of workability by different tests, Setting times of concrete, Effect of time and temperature on workability – Segregation

&bleeding – Mixing and vibration of concrete, Ready mixed concrete, Shotcrete.

UNIT – III

HARDENED CONCRETE: Water / Cement ratio – Abram's Law –Gel space ratio – Nature of strength of concrete –Maturity concept – Strength in tension & compression – Factors affecting strength – Relation between compression & tensile strength – Curing, Testing of Hardened Concrete: Compression tests – Tension tests – Factors affecting strength – Flexure tests – Splitting tests – Non-destructive testing methods – codal provisions for NDT.

UNIT – IV

ELASTICITY, CREEP & SHRINKAGE – Modulus of elasticity –Dynamic modulus of elasticity – Poisson's ratio – Creep of concrete – Factors influencing creep – Relation between creep & time – Nature of creep – Effects of creep – Shrinkage –types of shrinkage.

UNIT – V

MIX DESIGN: Factors in the choice of mix proportions – Durability ofconcrete – Quality Control of concrete – Statistical methods – Acceptance criteria – Concepts Proportioning of concrete mixes by various methods – BIS method of mix design.

UNIT – VI

SPECIAL CONCRETES: Ready mixed concrete, Shotcrete -Light weightaggregate concrete – Cellular concrete – No-fines concrete, High density concrete, Fibre reinforced concrete – Different types of fibres – Factors affecting properties of F.R.C, Polymer concrete – Types of Polymer concrete – Properties of polymer concrete, High performance concrete – Self consolidating concrete, SIFCON, self healing concrete.

Text Books:

1. Concrete Technology by M. S. Shetty. – S. Chand & Co.; 2004.
2. Concrete Technology by M. L. Gambhir. – Tata Mc. Graw Hill Publishers, New Delhi.

Reference Books:

1. Properties of Concrete by A. M. Neville – PEARSON – 4th edition.
2. Concrete Technology by A.R. Santha Kumar, Oxford University Press, New Delhi.

Web Reference:

http://freevideolectures.com/Course/3357/Concrete-Technology

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II Year – II SEMESTER	L	T	P	C
	3	1	0	3

16CE4T07 -ENGINEERING GEOLOGY

Course Learning Objectives:

The objective of this course is:

1. To introduce the Engineering Geology as a subject in Civil Engineering.
2. The objectives of Engineering Geology are to introduce the student to geology and to the effect of geology on the design and construction of civil engineering constructed facilities. Students will learn engineering elements of rock and geologic processes from the following engineering perspective.
3. To identify the seismic hazards posed at any given site;

Course Outcomes:

Upon the successful completion of this course, the students will be able to:

- Identify and classify the geological minerals.
- Measure the rock strengths of various rocks.
- Classify and measure the earthquake prone areas to practice the hazard zonation.
- Classify, monitor and measure the Landslides and subsidence.
- Prepares analyses and interpret the Engineering Geologic maps.
- Test the geological material and ground to check the suitability of civil engineering project construction.
- Investigate the project site for mega/mini civil engineering projects. Site selection for mega engineering projects like Dams, Tunnels, disposal sites etc…
- Explain the importance of rock structures present in the project site.

Syllabus:

UNIT-I

Introduction: Branches of Geology, Importance of Geology in CivilEngineering with case studies.

Weathering: Weathering of rocks, Geological agents, weathering process ofRock, River process and their development.

UNIT-II

Mineralogy And Petrology: Definitions of mineral and rock, Differentmethods of study of mineral and rock, The study of physical properties of minerals and rocks for megascopic study for the following minerals and rocks, Common rock forming minerals are Feldspar, Quartz Group, Olivine, Augite, Hornblende, Mica Group, Asbestos, Talc, Chlorite, and other ore forming minerals are Pyrite, Hematite, Magnetite, Chlorite, Graphite, Chromite, Magnetite And Bauxite. Classification, structures, textures and forms of Igneous rocks, Sedimentary rocks,

Metamorphic rocks, and their megascopic study of granite varieties, (pink, gray, green). Pegmatite, Dolerite, Basalt etc., Shale, Sand Stone, Lime Stone, Laterite, Quartzite, Gneiss, Schist, Marble, Khondalite and Slate.

UNIT-III

Structural Geology: Strike , Dip and Outcrop study of common geologicalstructures associating with the rocks such as Folds, Faults, Joints and Unconformities- parts, types, mechanism and their importance in Civil Engineering.

UNIT-IV

Ground Water: Water table, Cone of depression, Geological controls ofGround Water Movement, Ground Water Exploration Techniques.

Earthquakes And Land Slides: Terminology, Classification, causes andeffects, Shield areas and Seismic bells, Richter scale intensity, Precautions of building constructions in seismic areas. Classification of Landslides, Causes and Effects, measures to be taken prevent their occurrence at Landslides.

UNIT-V

Geophysics: Importance of Geophysical methods, Classification, Principlesof Geophysical study by Gravity method, Magnetic method, Electrical methods, Seismic methods, Radiometric method and Electrical resistivity methods and Engineering properties of rocks.

UNIT-VI

Geology of Dams, Reservoirs and Tunnels: Types and purpose of Dams,Geological considerations in the selection of a Dam site. Life of Reservoirs Purpose of Tunnelling, effects, Lining of Tunnels. Influence of Geology for successful Tunnelling.

Text Books:

1. 'Engineering Geology' by N. ChennaKesavulu, Trinity Press (Laxmi Publications), 2nd Edition, 2014.
2. 'Engineering Geology' by Subinoy Gangopadhay, Oxford University press.
3. 'Engineering Geology' by D. Venkat Reddy, Vikas Publishing House pvt. Ltd, 2013.
4. 'Engineering Geology' by Vasudev Kanithi, University Press.

Reference Books:

1. 'Engineering Geology for Civil Engineers' by P.C. Varghese, PHI learning pvt. Ltd.
2. 'Geology for Engineers and Environmental Society' by Alan E Kehew, person publications, 3rd edition.
3. 'Fundamentals of Engineering Geology' by P.G. Bell, B.S.P. Publications, 2012.

4. ‘Engineering Geology’ by V.Parthesarathi et al., Wiley Publications.
5. ‘Environmental Geology’ by K.S. Valdiya, McGraw Hill Publications, 2nd ed.

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II Year – II SEMESTER

L	T	P	C
3	1	0	3

16CE4T08 -HYDRAULICS & HYDRAULIC MACHINERY

Course Learning Objectives:

1. To get exposure about the applications of Hydraulic Engineering in the field by means of studying the various devices, equipments and machinery.
2. To learn applications of hydraulics & hydraulic machines.
3. To study about different types of turbo machinery.

Course Outcomes:

1. To study theories those explain the behavior and performance of fluid when the fluid is flowing in an open channel.
2. To understand the components, function and use of different types of pumps.
3. To understand the components, function and use of different types of turbines.
4. To understand the utilization of dimensional analysis as a tool in solving problems in the field of fluid mechanics.

Syllabus:

UNIT – I

OPEN CHANNEL FLOW I: Types of flows - Type of channels – Velocity distribution – Energy and momentum correction factors – Chezy's, Manning's; Kutter's Equations; and Bazin formulae for uniform flow – Most Economical sections. Critical flow: Specific energy-critical depth – computation of critical depth –critical sub-critical and super critical flows.

UNIT – II

OPEN CHANNEL FLOW II: Non uniform flow-Dynamic equation forG.V.F., Mild, Critical, Steep, horizontal and adverse slopes-surface profiles directstep method- Rapidly varied flow, Applications of hydraulic jump, energy dissipation.

UNIT – III

HYDRAULIC SIMILITUDE: Dimensional analysis-Rayleigh's method and Buckingham's pi theorem-study of Hydraulic models – Geometric, kinematic and dynamic similarities-dimensionless numbers – model and prototype relations.

UNIT – IV

BASICS OF TURBO MACHINERY: Hydrodynamic force of jets on stationary and moving flat inclined and curved vanes, jet striking centrally and at tip, velocity triangles at inlet and outlet, expressions for work done and efficiency-Angular momentum principle.

UNIT – V

HYDRAULIC TURBINES – I: Layout of a typical Hydropower installation – Heads and efficiencies - classification of turbines, Pelton wheel - Francis turbine – Kaplan turbine - working, working proportions, velocity diagram, work done and efficiency.

HYDRAULIC TURBINES – II: Draft tube-theory & function efficiency,Governing of turbines-surge tanks-unit and specific turbines-unit speed-unit quantity-unit power-specific speed performance characteristics-geometric similarity-cavitation.

UNIT – VI

CENTRIFUGAL-PUMPS: Pump installation details-classification-work done- Manometric head-minimum starting speed-losses and efficiencies, specific speed, multistage pumps-pumps in parallel- performance of pumps Similarity Considerations. Characteristic curves - NPSH-Cavitations.

RECIPROCATING PUMPS: Introduction, classification of reciprocating pumps, main components of reciprocating pumps, working of a reciprocating pumps, discharge through pumps, indicator diagram, work done by reciprocating pumps, slip of reciprocating pumps.

Text Books:

1. Fluid Mechanics by A. K. Jain; Khanna Publishers, Delhi
2. Hydraulics & Fluid Mechanics by P. N. Modi & S. N. Seth; Standard Book house, New Delhi.
3. Open Channel flow by K. Subramanya, Tata McGraw Hill Publishers
4. A text of Fluid mechanics and hydraulic machines by Dr. R.K. Bansal
- Laxmi Publications (P) Ltd., New Delhi

Reference Books:

1. Hydraulic Machines by Jagadhishlal; Metropoliton Company, Delhi.
2. Fluid Mechanics & Hydraulic Machines by Dr. R. K. Bansal; Laxmi Publications, New Delhi.
3. Rajput R.K., Fluid Mechanics and Hydraulic Machines, S.Chand and Company Ltd., 2005.
4. Fluid Mechanics & Fluid Power Engineering by D.S. Kumar Kataria& Sons.
5. K.Subramanya, Open Channel Flow, Tata McGraw Hill Publishing Company,2002.

Web Reference:

www.nptel.ac.in/courses/105101082/
www.nptel.ac.in/courses/105103095/xc

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II Year – II SEMESTER	L	T	P	C
	3	1	0	3

16CE4T09 -STRENGTH OF MATERIALS-II

Course Learning Objectives:

1. To give preliminary concepts of Principal stresses and strains developed in cross section of the beams analytically as well as graphically due to stresses acting on the cross section and stresses on any inclined plane.
2. To impart concepts of failures in the material considering different theories.
3. To give concepts of torsion and governing torsion equation, and there by calculate the power transmitted by shafts and springs and design the cross section when subjected to loading using different theories of failures.

Course Outcomes:

Upon successful completion of this course:

1. The student will be able to understand the basic concepts of Principal stresses developed when subjected to stresses along different axes and design the sections.
2. The student can assess stresses in different engineering applications like shafts, springs, columns and struts subjected to different loading conditions.
3. The student will be able to assess forces in different types of trusses used in construction.

Syllabus:

UNIT- I

PRINCIPAL STRESSES AND STRAINS AND THEORY OF FAILURES: Introduction – Stresses on an inclined section of a bar underaxial loading – compound stresses – Normal and tangential stresses on an inclined plane for biaxial stresses – Two perpendicular normal stresses Accompanied by a state of simple shear – Mohr's circle of stresses – Principal stresses and strains – Analytical and graphical solutions.

THEORIES OF FAILURES: Introduction – Various Theories of failureslike Maximum Principal Stress theory – Maximum Principal Strain theory – Maximum shear stress theory – Maximum strain energy theory – Maximum shear strain energy theory.

UNIT – II

TORSION OF CIRCULAR SHAFTS AND SPRINGS: Theory of puretorsion – Derivation of Torsion equations: $T/J = q/r = N\phi/L$ – Assumptions made in the theory of pure torsion – Torsional moment of resistance – Polar section modulus – Power transmitted by shafts – Combined bending and torsion and end thrust – Design of shafts according to theories of failure.

SPRINGS: Introduction – Types of springs – deflection of close and opencoiled helical springs under axial pull and axial couple – springs in series and parallel – Carriage or leaf springs.

UNIT – III

COLUMNS AND STRUTS: Introduction – Types of columns – Short,medium and long columns – Axially loaded compression members – Crushing load – Euler's theorem for long columns- assumptions- derivation of Euler's critical load formulae for various end conditions – Equivalent length of a column – slenderness ratio – Euler's critical stress – Limitations of Euler's theory – Rankine – Gordon formula – Long columns subjected to eccentric loading – Secant formula – Empirical formulae – Straight line formula – Prof. Perry's formula. Laterally loaded struts – subjected to uniformly distributed and concentrated loads – Maximum B.M. and stress due to transverse and lateral loading. Columns with Initial Curvatures

UNIT – IV

DIRECT AND BENDING STRESSES: Stresses under the combined actionof direct loading and B.M. Core of a section – determination of stresses in the case of chimneys, retaining walls and dams – conditions for stability – stresses due to direct loading and B.M. about both axis.

UNIT – V

THICK CYLINDERS: Introduction Lame's theory for thick cylinders –Derivation of Lame's formulae – distribution of hoop and radial stresses across thickness – design of thick cylinders – compound cylinders – Necessary difference of radii for shrinkage – Thick spherical shells.Introductionto Unsymmetrical Bending.

UNIT – VI

ANALYSIS OF PIN-JOINTED PLANE FRAMES: Determination ofForces in members of plane, pin-jointed, perfect trusses by (i) method of joints and (ii) method of sections. Analysis of various types of cantilever and simply supported trusses by method of joints, method of sections.

Text Books:

1. Mechanics of Materials- by R. C. Hibbler
2. Strength of materials by S. S. Bhavakatti
3. Strength of materials by R.K.Bansal vol 1 & 2

Reference Books:

1. Fundamentals of Solid Mechanics M.L. Gambhir, PHI Learning Pvt. Ltd., New Delhi.
2. Introduction to text book of Strength of Material by U.C. Jindal, Galgotia publications.
3. Strength of materials by R. Subramanian, Oxford university press, New Delhi.
4. Strength of Materials by S.Ramamrutham Dhanpat Rai Publishing Co., (P) Ltd. New Delhi
5. Theory of Structures by S.P.Timoshenko & DH. Young

Web Reference:
http://nptel.ac.in/courses/105102090/
http://nptel.ac.in/courses/105106116/1

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II Year – II SEMESTER	L	T	P	C
	3	1	0	3

16CE4T10 -STRUCTURAL ANALYSIS -I

Course Learning Objectives:

1. To give preliminary concepts of assessment of bending moment and shear force in Propped cantilevers, fixed beams and continuous beams due to various loading conditions.
2. To impart concepts of Bending Moment and Shear force for beams with different boundary and loading conditions and to draw the diagrams of variation across the length.
3. The procedure for development of slope deflection equations and to solve application to continuous beams with and without settlement of supports.

Course Outcomes:

Upon successful completion of this course,

1. The student will be able to estimate the bending moment and shear forces in beams of different fixity conditions.
2. The student can analyze the continuous beams using tan important method of slope deflection which impart basic concepts for other methods of analysis to be discussed in next level analysis course.
3. The student will be able to analyze the loads in Pratt and Warren trusses when loads of different types and spans ware passing over the truss. These concepts will be used in to understand the performance and to design of bridge structures in next level courses.

Syllabus:

UNIT – I

PROPPED CANTILEVERS: Analysis of propped cantilevers-shear forceand bending moment diagrams-Deflection of propped cantilevers.

UNIT – II

FIXED BEAMS – Introduction to statically indeterminate beams with U. D.load central point load, eccentric point load. Number of point loads, uniformly varying load, couple and combination of loads shear force and bending moment diagrams-Deflection of fixed beams effect of sinking of support, effect of rotation of a support.

UNIT – III

CONTINUOUS BEAMS: Introduction-Clapeyron’s theorem of threemoments- Analysis of

continuous beams with constant moment of inertia with one or both ends fixed-continuous beams with overhang, continuous beams with different moment of inertia for different spans-Effects of sinking of supports-shear force and Bending moment diagrams.

UNIT-IV

SLOPE-DEFLECTION METHOD: Introduction, derivation of slopedeflection equation, application to continuous beams with and without settlement of supports.

UNIT – V

ENERGY THEOREMS: Introduction to Strain energy, Strain energy in linear elastic system,expression of strain energy due to axial load, bending moment and shear forces - Castigliano's first theorem-Deflections of simple beams and pin jointed trusses.

UNIT – VI

MOVING LOADS and INFLUENCE LINES: Introduction maximum SFand BM at a given section and absolute maximum S.F. and B.M due to single concentrated load U. D load longer than the span, U. D load shorter than the span, two point loads with fixed distance between them and several point loads-Equivalent uniformly distributed load-Focal length.

INFLUENCE LINES: Definition of influence line for SF, Influence line forBM- load position for maximum SF at a section-Load position for maximum BM at a sections, ingle point load, and U.D.L longer than the span, U.D.L shorter than the span- Influence lines for forces in members of Pratt and Warren trusses.

Text Books:

1. Structural Analysis by V.D. Prasad Galgotia publications, 2nd Editions.
2. Analysis of Structures by T.S. Thandavamoorthy, Oxford University Press, New Delhi.

Reference Books:

1. Theory of Structures by Gupta, Pandit & Gupta; Tata McGraw Hill, New Delhi.
2. Theory of Structures by R.S. Khurmi, S. Chand Publishers.
3. Structural analysis by R.C. Hibbeler, Pearson, New Delhi
4. Determinate &Indeterminate structures by R.C.Jindal

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II Year – II SEMESTER

L	T	P	C
0	0	3	2

16CE4L03 -FLUID MECHANICS & HYDRAULIC MACHINERY LAB

List of Experiments

1. Calibration of Venturimeter & Orifice meter
2. Determination of Coefficient of discharge for a small orifice by a constant head method.
3. Determination of Coefficient of discharge for an external mouth piece by variable head method.
4. Calibration of contracted Rectangular Notch and /or Triangular Notch
5. Determination of Coefficient of loss of head in a sudden contraction and friction factor.
6. Verification of Bernoulli's equation.
7. Impact of jet on vanes
8. Study of Hydraulic jump.
9. Performance test on Pelton wheel turbine
10. Performance test on Francis turbine.
11. Efficiency test on centrifugal pump.
12. Efficiency test on reciprocating pump.

List of Equipment:

1. Venturimeter setup.
2. Orifice meter setup.
3. Small orifice setup.
4. External mouthpiece setup.
5. Rectangular and Triangular notch setups.
6. Friction factor test setup.
7. Bernoulli's theorem setup.
8. Impact of jets.
9. Hydraulic jump test setup.
10. Pelton wheel and Francis turbines.
11. Centrifugal and Reciprocating pumps.

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II Year – II SEMESTER

L	T	P	C
0	0	3	2

16CE4L04 -SURVEYING FIELD WORK-II

List of Experiments

1. Theodolite Survey: Determining the Horizontal and Vertical Angles by the method of repetition method.
2. Theodolite Survey: Finding the distance between two inaccessible points.
3. Theodolite Survey: Finding the height of far object.
4. Tachometric survey: Heights and distance problems using tachometric principles.
5. One Exercise on Curve setting.
6. One Exercise on contours.
7. Total Station: Introduction to total station and practicing setting up, leveling up and elimination of parallax error.
8. Total Station: Determination of area using total station.
9. Total Station : Traversing
10. Total Station : Contouring
11. Total Station: Determination of Remote height.
12. Total Station: distance between two inaccessible points.

Note: Any 10 field work assignments must be completed.

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