

<b>UG/PG:</b> UG	<b>Department:</b> Civil Engineering
<b>Course Code:</b> CET 221	<b>Course Name:</b> Building Technology
<b>Credit:</b> 2	<b>L-T-P:</b> 2-0-0
<b>Pre-requisite course:</b>	
<p><b>Syllabus</b></p> <p>Classification of Buildings, low-rise and high-rise buildings, load bearing and framed construction; Building planning, building planning concepts, and Introduction to National building codes and byelaws; Concepts of various foundation types, foundation of walls, columns etc., foundation layout, foundation construction practices and failure issues; Stone and brick masonry construction, reinforced brick construction, lintel and arches; Roof construction and roofing materials, flat and pitched roofs, drainage of roofs, green roof concepts; Doors and windows Stairs and ramps, Lifts and Escalators, floors and floor finishes, wall finish; Thermal insulation, damp and fire proofing, Expansion and construction joints; Temporary supporting structures concepts for construction of buildings; Advances in building construction practices, prefabrication and pre-casting, modular construction.</p> <p><b>Text books</b></p> <ol style="list-style-type: none"> <li>1 Handbook of Building Construction Vol 1, M M Goyal, 2010, Jain Book Depot</li> <li>2 Brick and Reinforced Brick Structures Dayaratnam P, Oxford &amp; IBH</li> </ol> <p><b>Reference books</b></p> <ol style="list-style-type: none"> <li>1 National Building Code of India, BIS, Delhi.</li> <li>2 Building Construction Handbook, R Chudley and Roger Greeno, 2013</li> </ol>	

<b>UG/PG:</b> UG	<b>Department:</b> Civil Engineering
<b>Course Code:</b> CET 222	<b>Course Name:</b> Pipe & Channel Hydraulics
<b>Credit:</b> 4	<b>L-T-P:</b> 3-1-0
<b>Version:</b>	<b>Approved on:</b>
<b>Pre-requisite course:</b>	
<p><b>Syllabus</b></p> <p>Comparison of Pipe and Channel Flows, Types of flows, Velocity distribution in Channels, Most Economical Channels: Rectangular and other geometrical channel sections, Concept of Specific Energy, Specific Force Concept, Gradually Varied Flow and Types Surface Profiles, Direct Step Method, Rapidly Varied Flow, Hydraulic jump and Surges.</p> <p>Navier-Stokes equation, Laminar &amp; Turbulent Flow in pipes, Laminar Flow, Hagen-Poiseuille Flow equation, Turbulent Flow, Hydro-dynamically Smooth and Rough pipes, Pandtl's mixing length theory, Moody's diagram.</p> <p>Boundary Layer theory, laminar sub-layer, various b.l. thicknesses, Application of equations in b.l. including momentum integral equations, Establishment of flow, reduction of b.l. Concept of Drag and lift, flow around immersed bodies.</p> <p>Hydraulic Machines- Introduction, Impact of free jets on flat and curved plates/vanes, efficiency of water wheel, efficiency, Power and related concepts.</p> <p>Brief introduction to various Types of turbines and pumps.</p> <p><b>Books</b></p> <ol style="list-style-type: none"> <li>1. Open Channel Hydraulics by Subramanya</li> <li>2. Hydraulics &amp; Hydraulic Machines by Modi &amp; Seth</li> <li>3. Fluid Mechanics and Fluid Power Engineering by D.S. Kumar</li> <li>4. Open Channel Hydraulics by V.T. Chow</li> </ol>	

<b>UG/PG :</b> UG	<b>Department:</b> Civil Engineering
<b>Course Code:</b> CET 223	<b>Course Name:</b> Advance Surveying
<b>Credit:</b> 2	<b>L-T-P:</b> 2-0-0
<b>Version:</b>	<b>Approved on:</b>
<b>Pre-requisite course:</b>	
<p><b>Syllabus</b></p> <p>Theory of errors; Adjustment of surveying observations; Triangulation and Trilateration; Various triangulation schemes; Type of triangulations; Triangulation measurements; Adjustment of triangulation scheme; Principles of photogrammetry; Aerial photography, Interpretation, Measurements from aerial photographs; Introduction to astronomy ; Terms of reference planes and astronomical coordinates; Astronomical triangle /shortest distance determination; Time in astronomy; Uses of Total Station and other Advance surveying instruments.</p> <p><b>Text Books</b></p> <ol style="list-style-type: none"> <li>1. Wolf, P. R., A text book on Photogrammetry, 4<sup>th</sup> edition, 2012.</li> <li>2. C.D. Burnside, Electromagnetic Distance Measurement, Crosby Lockwood and Son Ltd., London.</li> <li>3. Punmia, B.C., Surveying Vol. II &amp; III, 2005.</li> </ol> <p><b>Reference Books</b></p> <ol style="list-style-type: none"> <li>1. Kavanagh, B., Surveying Principles and Applications, Seventh Edition, Prentice Hall, 8<sup>th</sup> edition, 2008.</li> <li>2. G.L. Hosmer, Geodesy, John Wiley &amp; Sons, New York, 1946.</li> </ol>	

<b>UG/PG:</b> UG	<b>Department:</b> Civil Engineering
<b>Course Code:</b> CET 224	<b>Course Name:</b> Highway Engineering
<b>Credit:</b> 3	<b>L-T-P:</b> 3-0-0
<b>Pre-requisite course:</b>	
<p><b>Syllabus</b></p> <p>Introduction: Highway Material subgrade soil, stone aggregates, Cement, Concrete &amp; bituminous material viz. bitumen, tar, cut back emulsions, Significance, and application of various tests on soil, stone aggregate bitumen and modified Binders..</p> <p>Proportioning of materials by graphical method, Geometric Design: Highway classification, design, cross-sectional elements, horizontal &amp; vertical alignment, sight distance, types of road crossings, roundabout, grade-separated intersections. Camber, Super-elevation, Radius of curve Horizontal and Transition Curves, Gradients, Valley curve, Summit curve. Design of pavement for Rural Roads as per IRC SP:72.</p> <p>Soil stabilization for rural roads.</p> <p><b>Books</b></p> <ol style="list-style-type: none"> <li>1. Highway Engineering By S. K. Khanna and C.E.G Justo</li> <li>2. Highway Materials by HMSO London .</li> <li>3. IRC SP 72</li> </ol>	

<b>UG/PG :</b> UG	<b>Department:</b> Civil Engineering
<b>Course Code:</b> CET 225	<b>Course Name:</b> Structural Analysis -I
<b>Credit:</b> 4	<b>L-T-P:</b> 3-1-0
<b>Version:</b>	<b>Approved on:</b>
<b>Pre-requisite course:</b> Mechanics of Solids	
<p><b>Syllabus</b></p> <p>Slopes and deflections in determinate beams using conjugate beam method and moment area method; Generalized coordinate system; Principles of real and virtual work; Maxwell's reciprocal theorem; Betti's theorem; Castigliano's theorems; Strain energy expressions; Strain energy method and virtual work (unit load) method for slopes and deflections in statically determinate frames and trusses; Static indeterminacy and released structure; Force method – method of consistent deformation for analysis of statically indeterminate beams, frames and trusses; Three moment theorem; Column analogy method; Moving loads and influence lines; Application to statically determinate structures; Muller Breslau's principle.</p> <p><b>Books</b></p> <ol style="list-style-type: none"> <li>1. Mechanics of Structures, Vol. I &amp; II by S.B. Junnarkar &amp; H.J. Shah</li> <li>2. Theory of Structures, Vol. I&amp; II by G.S. Pandit and S.P. Gupta</li> <li>3. Structural Analysis by C.K. Wang</li> <li>4. Structural Analysis (6/e) by R.C. Hibbeller</li> </ol>	

<b>UG/PG :</b> UG	<b>Department:</b> Civil Engineering
<b>Course Code:</b> CET 226	<b>Course Name:</b> Water Supply Engineering
<b>Credit:</b> 3	<b>L-T-P:</b> 3-0-0
<b>Version:</b>	<b>Approved on:</b>
<b>Pre-requisite course:</b>	
<p><b>Syllabus</b></p> <p>Water supply; Demand; Sources; Quality standards; Water treatment: Method of purification of water; Screens, plain and coagulant aided sedimentation; Filtration-slow sand and rapid sand, disinfection; Water softening; Iron, Manganese, Fluoride, and Nitrate removal; Electro dialysis, R.O. and Ion exchange process, desalination. Different type of pipes and pipe joints, Pumping stations; Rural water supply management. Introduction to the concept of integrated water resources management.</p> <p><b>Books</b></p> <ol style="list-style-type: none"> <li>1. Manual of Water Supply by CPHEEO, Ministry of Urban Dev., GOI</li> <li>2. Water Supply by P.N. Modi</li> <li>3. Water Works Engineering S.R. Qasim, E.M. Motley and G. Zhu</li> </ol>	

<b>UG/PG:</b> UG	<b>Department:</b> Civil Engineering
<b>Course Code:</b> CEP 227	<b>Course Name:</b> Building Drawing
<b>Credit:</b> 1	<b>L-T-P:</b> 0-0-2
<b>Pre-requisite course:</b>	
<p><b>Syllabus</b></p> <p>The lab course intends to train students in reading and developing drawings of various types of buildings. The assignment will include reading various construction drawings, symbols used and strengthen concepts of converting drawings in to reality. The course will focus on developing plans, elevations, and sections of buildings, along with detailing of MEP drawings. The labs also introduces the software (s) used for the same.</p> <p><b>Books/Manual</b></p> <ol style="list-style-type: none"> <li>1. Time Saver Standards.</li> <li>2. Neuferts Architects Data</li> <li>3. Building Planning and Drawings by Shah, Kale and Patki</li> <li>4. NBC -2005</li> </ol>	

<b>UG/PG : UG</b>	<b>Department:</b> Civil Engineering
<b>Course Code: CEP 228</b>	<b>Course Name:</b> Hydraulics Laboratory
<b>Credit: 1</b>	<b>L-T-P:</b> 0-0-2
<b>Version:</b>	<b>Approved on:</b>

**Pre-requisite course:**

**List of Experiments**

1. Experiments on determination of the performance characteristics of Pelton turbine
  - a. Production and analysis of graphs of inlet pressure, flow rate, torque and power against speed for a selection of nozzle positions.
  - b. Determination of overall efficiency of conversion of fluid to mechanical energy, over a range of conditions.
2. Experiments on determination of the performance characteristics of Francis turbine.
  - a. Efficiency of a Francis turbine.
  - b. Performance of a Francis turbine at different flow rates.
  - c. The effect of different guide vane settings on turbine performance.
3. Experiment for Demonstration of the water hammer effect to produce a pumping action in Hydraulic Ram pump.
4. Experiments on Two stage (series & parallel ) pumps.
  - a. Centrifugal pump performance and characteristics, typically head versus flow and efficiency versus flow.
  - b. Non-dimensional performance characteristics
  - c. Operation of centrifugal pumps in series.
  - d. Operation of centrifugal pumps in parallel
5. Experiments on Water hammer & Pipe Surge.
6. Establishment of uniform flow in channels (Tilted bed flume).
7. Study of hydraulic jump in tilted bed flume.

**Books**

1. Open Channel Hydraulics by Subramanya
2. Hydraulics & Hydraulic Machines by Modi & Seth
3. Fluid Mechanics and Fluid Power Engineering by D.S. Kumar
4. Open Channel Hydraulics by V.T. Chow



<b>UG/PG :</b> UG	<b>Department:</b> Civil Engineering
<b>Course Code:</b> CEP 229	<b>Course Name:</b> Advanced Surveying Laboratory
<b>Credit:</b> 1	<b>L-T-P:</b> 0-0-2
<b>Version:</b>	<b>Approved on:</b>
<b>Pre-requisite Course:</b>	
<p><b>List of Experiments</b></p> <ol style="list-style-type: none"> <li>1. To determine horizontal angles in a triangle by 2-4-6 method of repetition.</li> <li>2. To determine horizontal distance and vertical height using tangential method</li> <li>3. To determine Tacheometric constants</li> <li>4. To determine R.L. using Tacheometry</li> <li>5. Contouring using radial method</li> <li>6. To determine horizontal distance by Substrate bar</li> <li>7. Precise leveling using Auto Level</li> <li>8. Triangulation using advance surveying equipments</li> <li>9. Observations on Stereo-pair of photograph</li> <li>10. Total station/EDM</li> </ol> <p><b>Text Books</b></p> <ol style="list-style-type: none"> <li>1. Punmia, B.C., Surveying Vol. II &amp; III, 2005.</li> <li>2. Wolf, P. R., A text book on Photogrammetry, 4<sup>th</sup> edition, 2012.</li> <li>3. C.D. Burnside, Electromagnetic Distance Measurement, Crosby Lockwood and Son Ltd., London.</li> </ol> <p><b>Reference Books</b></p> <ol style="list-style-type: none"> <li>1. Kavanagh, B., Surveying Principles and Applications, Seventh Edition, Prentice Hall, 8<sup>th</sup> edition, 2008.</li> <li>2. G.L. Hosmer, Geodesy, John Wiley &amp; Sons, New York, 1946.</li> </ol>	

<b>UG/PG:</b> UG	<b>Department:</b> Civil Engineering
<b>Course Code:</b> CEP 230	<b>Course Name:</b> Road Material Testing Laboratory
<b>Credit:</b> 3	<b>L-T-P:</b> 0-0-2
<b>Pre-requisite course:</b> (CE- 224) HIGHWAY ENGINEERING	
<p><b>List of Test Experiments</b></p> <ol style="list-style-type: none"> <li>1. Proctor &amp; Modified Proctor Test.</li> <li>2. Sieve Analysis (Sieve Shaker)</li> <li>3. Liquid Limit Test.</li> <li>4. Plastic Limit Test.</li> <li>5. California Bearing Ratio (CBR) Test.</li> <li>6. Aggregate Impact Value Test.</li> <li>7. Aggregate Abrasion Value Test.</li> <li>8. Aggregate Crushing Value Test.</li> <li>9. Specific gravity test (aggregates &amp; bitumen) Pycnometer.</li> <li>10. Flakiness &amp; Elongation Index Test (Thickness Gauge, Length Gauge)</li> <li>11. Bitumen Softening Point Test.</li> <li>12. Bitumen Ductility Value Test.</li> </ol>	

<b>UG/PG:</b> UG	<b>Department:</b> Civil Engineering
<b>Course Code:</b> CEP 231	<b>Course Name:</b> Public Health Engineering Laboratory
<b>Credit:</b> 1	<b>L-T-P:</b> 0-0-2
<b>Pre-requisite course:</b>	
<p><b>Syllabus</b></p> <p>Water quality: principles of measurement and testing of water for parameters like pH, TDS, alkalinity, NO<sub>3</sub>, PO<sub>4</sub>-P, Hardness, Turbidity, residual chlorine, breakpoint chlorination, DO, Chlorides, Jar test for coagulant dosing, Assessment of biological quality of water.</p> <p><b>Books</b></p> <ol style="list-style-type: none"> <li>1. APHA (1995): Standard methods for the examination of water and wastewater. 17th edition APHA, Washington DC.</li> </ol>	