B. E. SYLLABUS

CIVIL ENGINEERING

III & IV SEMESTER

With
Scheme of Teaching
& Examination
## DEPARTMENT: CIVIL ENGINEERING

<table>
<thead>
<tr>
<th></th>
<th>Name</th>
<th>Qualification</th>
<th>Position</th>
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<tbody>
<tr>
<td>1</td>
<td>Dr. I. Ramesh Mithantaya</td>
<td>Ph.D.</td>
<td>Professor/ Vice Principal/Dean (Aca.)</td>
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<tr>
<td>2</td>
<td>Dr. N. Bhavani Shankar Rao</td>
<td>Ph.D.</td>
<td>Professor</td>
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<tr>
<td>3</td>
<td>Dr. Udaya Kumar G.</td>
<td>Ph.D.</td>
<td>Professor</td>
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<tr>
<td>4</td>
<td>Dr. Srinath Shetty K.</td>
<td>Ph.D.</td>
<td>Professor and HOD</td>
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<tr>
<td>5</td>
<td>Dr. Radhakrishnan K.</td>
<td>Ph.D.</td>
<td>Professor</td>
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<tr>
<td>6</td>
<td>Mr. S.K. Mahadeve Gowda</td>
<td>M.Tech</td>
<td>Associate Professor</td>
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<tr>
<td>7</td>
<td>Mr. Y.R. Suresh</td>
<td>M.E., M.Tech</td>
<td>Associate Professor</td>
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<tr>
<td>8</td>
<td>Mr. J.K. Lokesh</td>
<td>M.Tech</td>
<td>Asst. Prof. Gd III</td>
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<tr>
<td>9</td>
<td>Mr. Y. Umashankar Shetty</td>
<td>M.Tech</td>
<td>Asst. Prof. Gd III</td>
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<tr>
<td>10</td>
<td>Dr. Akshatha Shetty</td>
<td>Ph.D.</td>
<td>Asst. Prof. Gd III</td>
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<tr>
<td>11</td>
<td>Mr. Sundip Shenoy R.</td>
<td>M.Tech</td>
<td>Asst. Prof. Gd II</td>
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<tr>
<td>12</td>
<td>Mr. Pushparaj A Naik</td>
<td>M.Tech</td>
<td>Asst. Prof. Gd II</td>
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<tr>
<td>13</td>
<td>Mr. Leeladhar Pammar</td>
<td>M.Tech</td>
<td>Asst. Prof. Gd I</td>
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<tr>
<td>14</td>
<td>Mr. T.N. Shridharan</td>
<td>M.Tech</td>
<td>Asst. Prof. Gd I</td>
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<td>15</td>
<td>Mr. Gururaj Aharya</td>
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<td>16</td>
<td>Mr. Prashanth Kumar</td>
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<td>17</td>
<td>Mr. Akshay N.K</td>
<td>M.Tech</td>
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<td>18</td>
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<td>19</td>
<td>Mr. Manjunath M.</td>
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<td>Mr. Roshan Rai</td>
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<td>Mr. Anil Kumar</td>
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<td>22</td>
<td>Ms. Thangamani R.</td>
<td>M.Sc.</td>
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<td>Mr. Prithviraj H K</td>
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<td>24</td>
<td>Mr. Shriram P Marathe</td>
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<tr>
<td>25</td>
<td>Mr. Sheik Kabeer Ahmed</td>
<td>M.Tech</td>
<td>Asst. Prof. Gd I</td>
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DEPARTMENT OF CIVIL ENGINEERING

Vision:

To uphold the Department as a leader in innovation and excellence in the field of Civil Engineering by offering world class curricula, training for students and research and consultancy services to meet the global challenges and market demands.

Mission:

- Provide the students a strong theoretical knowledge to understand the basic concept in each stream
- Highlight the significance of the Civil Engineering subjects through practical applications
- Prepare the students to face the scholastic competitions to upgrade their knowledge
- Encourage the students to develop professional ethics through discipline and principles

Programme Educational Objectives (PEOs) :

Students will be guided to

1. Acquire both theoretical and practical knowledge to solve Civil Engineering problems

2. Gain potentiality in the subjects to tackle the practical problems with enthusiasm

3. Develop eagerness to learn more and more to face the challenges involved to meet the global demands
Programme Outcomes (POs):

After successful completion of the program students will be able to:

1. Acquire sound knowledge of mathematics, science, fundamentals of engineering and apply their knowledge in solving practical problems in the field of civil engineering.

2. Comprehend, identify and analyse actual field problems of civil engineering.

3. Design a suitable solution for the existing civil engineering problem and develop methodology/technology to implement the solution successfully.

4. Apply their analytical ability to investigate possible methods to solve slightly complex problems in civil engineering.

5. Use modern engineering tools useful for Insitu measurements and IT tools for modelling complex boundary value problems in civil engineering.

6. Apply method of reasoning understood by the knowledge of social sciences to assess various issues of society and understand consequent responsibilities of a professional civil engineer.

7. Understand the impact of civil engineering solutions on existing ecology of a region and demonstrate the knowledge of and need for sustainable development.

8. Know ethical principles and need to commit to professional ethics and responsibilities as well as norms of civil engineering practice.

9. Function effectively as an individual member or leader in diverse teams and multidisciplinary settings.

10. Communicate properly with fellow workers and general public, and write effective reports and design documents, make effective presentation and give and receive clear instructions.

11. Demonstrate the knowledge and understanding of the engineering and management principles and apply these to implement/manage projects.
12. Recognize the need for and develop ability to engage in independent and lifelong learning of technological developments and changes.
### DEPARTMENT OF CIVIL ENGINEERING
### SCHEME OF TEACHING AND EXAMINATION

#### III SEMESTER B.E.

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Code</th>
<th>Subject</th>
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<td>Basic Materials Testing Lab</td>
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### IV SEMESTER B.E.  

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ENGINEERING MATHEMATICS – III

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Course Outcomes:
1. At the end of the course the student is expected to,
2. Apply operators like gradient, divergence and curl to scalar functions and vector functions suitably.
3. Understand the concept of complex functions and line integral in the complex plane so that they can evaluate complex integrals over closed paths by using Cauchy’s theorems.
4. Able to analyze periodic and non periodic nature of functions and represent them as Fourier Series and hence find their transformations.
5. Able to understand different finite difference operators and the concept of interpolation and its application for different types of data.
6. Apply numerical differentiation and integration methods whenever analytical methods of differentiation and integration fail or very complicated.

UNIT – I

Vector Calculus: Vector algebra, Vector differentiation- gradient, divergence, curl, laplacian, solenoidal and irrotational vectors.  

8 Hours

UNIT – II

Line integrals in complex plane, Cauchy’s theorem, Power series, Residues, Cauchy’s residue theorem, Evaluation of standard real integrals using contour integration.  

12 Hours
UNIT – III

Fourier Analysis: Periodic functions, Euler’s formulae, Fourier series of odd and even functions, functions with arbitrary period, half range series. Harmonic Analysis. Fourier integral theorem, Fourier Transforms, Inverse Fourier transform, Convolution theorem and Parseval’s identity. Fourier sine and Fourier cosine transforms, Inverse Fourier sine and Inverse Fourier cosine transforms. 10 Hours

UNIT – IV

Numerical Analysis: Finite differences: forward, backward and central difference operators, Newton-Gregory forward and backward interpolation formulae, Lagrange’s interpolation formula, Lagrange’s Inverse interpolation formula. Newton’s divided difference interpolation formula, Central differences- Stirling’s and Bessel’s formulae (Without proof) 11 Hours

UNIT – V

Numerical differentiation using Newton’s forward & backward formulae. Numerical integration: General quadrature formula, Trapezoidal rule, Simpson’s one third rule, Simpson,s three eigth rule, Weddle’s rule and errors 11 Hours

TEXT BOOKS:

REFERENCE BOOKS:
3) Murray R. Spiegel: Vector Analysis, Schuam publishing Co.

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MATERIALS OF CONSTRUCTION

Sub code : 14CV302  Credits : 03
Hrs/Week : 3+0+0+S*  Total Hours : 39

*Self Study to be exercised under the supervision of course instructor and to be restricted to not more than 10% of the total teaching hours.

Course Outcomes:
1. Student will be able to understand and know the types, uses, manufacturing process and properties of building materials like stone, brick and tiles.
2. Student will be able to understand the properties, types, uses of timber, lime and structural steel.
3. Student will be able to know the uses and properties of plastics, bitumen and other miscellaneous materials.
4. Student will be able to know and apply different properties and test on cement, aggregates for making concrete.
5. Student will be able to know and understand the workability and its assessment of concrete in fresh state and during its production with influence of admixture usage.
6. Student will be able to know properties of concrete in hardened concrete, dimensional stability, associated tests and durability aspects.

UNIT - I

BUILDING STONE: Common building stones and their uses, Quarrying of stones, Dressing of stones, Deterioration of stones, preservation of stones.
BRICKS: Classification of bricks, Manufacture of bricks, Tests on bricks, Quality of bricks as per BIS and their uses.
TILES: Types of tiles and their uses, Tests on roof tiles, Classification of Mangalore tiles.

8 Hours
UNIT - II

TIMBER: Varieties and uses, defects in timber, seasoning of timber, tests for good timber, plywood and its uses, wood boards.
LIME: Types of lime, manufacture of hydraulic and fat limes, activated lime- lime pozzolana mixture, lime mortar and its uses
OTHER BUILDING MATERIALS: Properties and uses of - reinforcing steel and structural steel, cast iron and plain carbon steel, glasses, electrical, thermal and sound insulating materials, paints, varnishes and enamels, plastics, rubber, bitumen and asphalt. 7 Hours

UNIT - III

Testing of Cement: Field testing, fineness by sieve test and Blaine’s air permeability test, normal consistency, setting time and soundness. Quality of mixing water, compressive strength of cement and grades of cement. Fine aggregate- grading as per B I S using sieve analysis, specific gravity, bulking, moisture content and deleterious materials. Coarse aggregate—Importance of size, shape and texture, grading by sieve analysis, specific gravity, flakiness and elongation index. Crushing, impact and abrasion tests. 8 Hours

UNIT - IV


UNIT - V

HARDENED CONCRETE: Factors affecting strength – w/c ratio, gel/space ratio and maturity concept. Effect of aggregate properties. Relation between compressive strength and tensile strength, bond

8 Hours

TEXT BOOKS:

REFERENCE BOOKS:

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STRENGTH OF MATERIALS

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<th>Hrs/Week</th>
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Course Outcomes:
1. Understand the behavior of elastic bodies under the action of external forces and establish the relation between elastic moduli.
2. Determine principal stresses and principal planes, normal stress and shear stress on a given plane in a general 2-D stress system
3. Design thin and thick cylinders subjected to fluid pressure
4. Draw BMD and SFD for determinate beams
5. Find the bending stress and shear stress across various beam sections
6. Design a shaft subjected to torque.
7. Understand the behavior of different types of columns subjected to axial load and compute buckling load of long columns.

UNIT - I

Simple Stresses and Strain:
12 Hours

UNIT – II

Compound stresses and Thin& Thick Cylinders:
Introduction, Stress components on inclined planes, General two dimensional stress system, Principal planes and principal stresses, Mohr’s circle of stresses. Thin cylinders subjected to internal pressure, change in length, diameter and volume, Thick cylinders - Lame’s equations (excluding compound cylinders).  
10 Hours

UNIT – III

Bending moment and shear force in beams:
Introduction, Types of beams, loadings and supports, Shear force in beams, Bending moment, Sign convention, Relationship between loading, shear force and bending moment, Shear force and bending
moment equations, SFD and BMD for statistically determinate beams considering point loads, UDL, UVL and Couple.  

8 Hours

UNIT - IV

Bending stresses and shear stresses in Beams:
Introduction – Bending stress in beams, Simple bending theory, derivation of Bending equations, Modulus of rupture, Section modulus, Flexural rigidity, Expression for horizontal shear stress in beam, Shear stress diagram for rectangular, ‘I’ and ‘T’ section (Fletched beams not included).
Deflection of beams:
Introduction – Definitions of slope and deflection, Elastic curve, derivation of differential equation, Sign convention, Slope and deflection for statistically determinate beams using first principles and Mecaulay’s method subjected to point loads, UDL and Couple.  

12 Hours

UNIT - V

Torsion of circular shafts:
Introduction – Pure torsion-Torsion equations for circular shafts, Torsional rigidity and polar modulus, Power transmitted by shaft of solid and hollow circular sections.

Columns and Struts:
Introduction – Short and long columns, Euler’s theory for columns with both ends hinged, Effective length, slenderness ratio, Radius of gyration, Euler’s Buckling load for different end conditions, Limitations of Euler’s theory, Rankine’s formula.  

10 Hours

TEXT BOOKS:

REFERENCE BOOKS :
FUNDAMENTALS OF SURVEYING

Sub code : 14CV 304
Credits : 03
Hrs/ Week : 3+0+0+0
Total Hours : 39

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

1. Describe the principles and classification of surveying and read/interpret the maps needed for the site selection, development and design of various civil engineering projects;
2. Use various instruments for taking surveying measurements and apply geometric and trigonometric principles to basic surveying calculations;
3. Acquire knowledge in taking measurements in various planes;
4. Measure levels and draw contours;
5. Accurate computations and analysis to be a professional surveyor.

UNIT - I

Introduction
Definition of surveying, Objectives and importance of surveying.
Primary divisions of surveying, Classification of surveys.
Surveying measurements and errors, types of errors, precision and accuracy.
Maps, classification of maps, map scale, conventional symbols, topographic maps, map layout, Map numbering systems.

Measurement of Distances
Distance, Measurement using tapes, Equipment for taping, Taping on Level ground and sloping ground, Systematic errors in taping and tape corrections, ranging of lines, direct and indirect methods of ranging, Electronic distance measurement, basic principle.

8 Hours
UNIT – II

Measurement of Directions and Angles
Basic definitions, meridians, bearings, magnetic and true bearings, compasses, prismatic and surveyor’s compasses, temporary adjustments, declination, local attraction.

Vernier theodolite, fundamental axes, temporary adjustments, measurement of horizontal and vertical angles. Electronic theodolite

8 Hours

UNIT - III

Leveling and Contouring
Basic terms and definitions, Methods of leveling, instruments, dumpy level, auto level, digital and laser levels. Curvature and refraction.

Booking and reduction of levels, plane of collimation and rise-fall methods, Differential leveling, profile leveling, trigonometric leveling (heights and distances- single plane and double plane methods) Contours, characteristics and uses.

8 Hours

UNIT - IV

Traverse Survey and Computations
Traverse, types, procedures, control establishment. Latitudes and departures, Local attraction, determination and corrections, Checks for closed traverse and determination of closing error. Bowditch’s graphical method of adjustment of closed traverse, Bowditch’s rule and transit rule.

7 Hours

UNIT - V

Areas and Volumes
Measurement of area – by dividing the area into geometrical figures, area from offsets, mid ordinate rule, trapezoidal and Simpson’s one third rule, area from co-ordinates, introduction to planimeter, digital planimeter.
Measurement of volumes- trapezoidal and prismoidal formula, volume from contour maps. \textbf{8 Hours}

**TEXT BOOK:**


**REFERENCE BOOKS:**


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**FLUID MECHANICS**

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<td>Hrs/Week</td>
<td>4+0+0+0+0</td>
<td>Total Hours</td>
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**Course Outcomes:**

1. The students should understand the basic properties of fluids with their SI units, types of fluids and the importance of viscosity
2. They should analyze problems related to fluid pressure measurements, calculation of hydrostatic pressure on the objects
3. They must understand the procedure to find the velocity and acceleration of fluid motion along with classification of fluid flows
4. They should understand the various forces acting in a fluid motion and the relation between pressure and velocity in a flow
5. They must know the flow mechanism in pipes along with various losses and their estimation with simple design of pipes
6. They should have the knowledge of some of the flow measuring devices in pipes and channels with their principle of working

UNIT - I

INTRODUCTION
Scope and Importance of the subject, Definition of fluid, Distinction between solids & fluids, liquid & gas, fluid continuum.

FLUID PROPERTIES AND CLASSIFICATION OF FLUIDS
Definitions: Mass density, Specific Volume, Specific Weight, Relative density, units and dimensions, Viscosity, Newton’s law of viscosity, Newtonian and Non-Newtonian Fluids, Ideal and Real fluids, Compressibility, Vapour pressure, Surface tension, Equation for stability of bubble, Capillarity, Related problems with applications. 9 Hours

UNIT- II

FLUID PRESSURE AND ITS MEASUREMENT
Definition of pressure, Units and dimensions, Pressure at a point, Pascal’s law, Hydrostatic pressure law, Absolute and Gauge pressure, Measurement of pressure, Simple & Differential manometers, Mechanical pressure gauges.

HYDROSTATICS
Definition of total pressure, Center of pressure, Centroid, centroidal depth, depth of center of pressure, Equation for hydrostatic force and depth of center of pressure for plane surfaces (vertical and inclined), Hydrostatic force on curved submerged surfaces, concept of pressure diagram, Related practical problems. 12 Hours
UNIT - III

KINEMATICS OF FLUIDS
Description of fluid flow, Lagrangian and Eulerian approaches. Classification of flow, steady & unsteady, Uniform and non-uniform, Definition of path line, Streamline, Streak line, Stream tube, One, Two, Three dimensional flows, Rotational and irrotational flow, Acceleration of flow, Derivation of continuity equation in differential form, Definition of velocity potential, Stream functions, Stream line, Equipotential line, Relation between velocity potential and stream function, Laplace equation, Related problems.

9 Hours

UNIT - IV

DYNAMICS OF FLUID FLOW
Concept of Inertia force and other forces causing motion, Derivation of Euler’s equation and Bernoulli’s equation with assumptions and limitations, Modification of Bernoulli’s equation, Application of Bernoulli’s equation - Pitot tube, Venturimeter, Momentum equation.

FLOW THROUGH PIPES
Flow through pipes, Reynolds number, Classification of flow, Definition of hydraulic gradient line, Energy gradient line, Major and minor losses in pipe flow, Equation for head loss due to friction (Darcy-Weishbach equation), Friction factor for commercial pipes, Minor losses (types), Equation for head loss due to sudden expansion. Pipes in series, Parallel and equivalent pipe, Related problems.

12 Hours

UNIT - V

FLOW MEASUREMENTS
Flow through Orifices; classification, Hydraulic co-efficients of an Orifice and relationship between them, Submerged and large rectangular Orifices, Flow through mouth pieces, Classification, Equation for discharge and pressure head for an external cylindrical mouth piece.
Flow over notches, classification, Equation for discharge over rectangular, trapezoidal, V-notch, Cipoletti notch, Flow over broad crested weirs, Submerged weirs, Types of Nappe, Ventilation of weirs.

10 Hours
TEXT BOOKS:

REFERENCE BOOKS:

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APPLIED ENGINEERING GEOLOGY

Sub code : 14CV306 Credits : 03
Hrs/Week : 3+0+0+0 Total Hours : 39

Course Outcomes:

At the end of the course, upon successful completion, each student will be able to:

1. **Identify, Explain and Appraise** the significance of Geology in Civil Engineering practices.
2. **Define and Describe** the structure and composition of the Earth.
3. **Identify, Differentiate, Distinguish, Describe and Assess** the earth materials and natural resources such as minerals, rocks, soil, water, etc.
4. **Identify, Analyze, Explain and Appraise** the forces and processes operating on the Earth and the geological structures formed

5. **Identify, Analyse, Interpret, Evaluate, Appraise and Solve** the geological problems coming under Civil Engineering practices

**UNIT - I**
Physical Geology: Geology and its importance in Civil Engineering practices; Parts of the Earth- Internal Structure and its Composition; Earthquakes- Causes and effects, Seismographs, concept of plate tectonics, seismic resistant structures and engineering considerations; Rivers- Drainage pattern, drainage basin, concept of watershed, geological work of rivers, major erosional and depositional landforms, engineering significance; Weathering- agents, types and engineering significance, influence of climate and lithology on weathering; Soil- Soil Profile, Geological classification, soil erosion and its control. 7 Hours

**UNIT - II**
Materials of the Earth: Minerals and Rocks, rock forming minerals and economic minerals; physical properties of Minerals; classification, chemical composition, general characteristics, properties and uses of common rock forming minerals- Quartz group, Feldspars, Pyroxenes, Amphiboles, Micas, Carbonates, Olivine, Asbestose, Garnet, Talc, Gypsum, magnetite and Kaolinite; economic minerals and their uses. Rocks- definition, threefold division of rocks, Rock cycle, distinguishing features of igneous, sedimentary and metamorphic rocks; Characteristics and identification factors of rocks- textures and structures. 8 Hours

**UNIT - III**
Petrology: Igneous rocks– forms, textures and structures, classification, Tabular classification; varieties- Granite, Gabbro, Dunite, Dolerite, Pegmatite and Basalt, their engineering properties and uses. Sedimentary rocks – classification, textures and structures, varieties- Sandstone, Limestone, Shale, Breccia, Conglomerate and Laterite, their engineering importance and uses. Metamorphic Rocks- Metamorphism, process, agents, types, textures and structures; varieties- Gneiss, Quartzite, Marble, Slate, Phyllite, Schists, their engineering importance and uses. Qualities of good Building stones, Road Metals, Railway Ballasts and
Concrete aggregates. Rocks as building materials for foundation, decorative stones, flooring and roofing with examples. \textbf{8 Hours}

\textbf{UNIT - IV}
Structural Geology: definition, forces, stress, strain; Attitude of beds, Clinometer compass, outcrops, escarpments, outlier and inlier. Folds, Faults, Joints and Unconformities- definition, causes, parts, classification, recognition and engineering importance. \textbf{8 Hours}

\textbf{UNIT - V}
Engineering Geology: Groundwater- source, occurrence, zones, aquifers-types and properties; Groundwater investigation- Selection of Well sites, geological, hydrological and geophysical methods (electrical resistivity method); Engineering Geology in Dams and Reservoirs, silting up of reservoirs and its control; Engineering geology in tunneling practice. Mass movements- causes, classification and control.

\textbf{TEXT BOOKS}

\textbf{REFERENCE BOOKS}
**BASIC MATERIAL TESTING LAB**

**Sub Code**: 14CV307  
**Credits**: 02  
**Hrs/ Week**: 0+0+3+0

1. Tension test on Mild steel and HYSAD bars.  
2. Compression test of Mild Steel, Cast iron and Wood.  
3. Torsion test on Mild Shaft.  
4. Bending Test on Wood Under two point loading  
5. Shear Test on Mild steel and Wood  
6. Impact test on Mild Steel (Charpy & Izod)  
7. Hardness tests on ferrous and non-ferrous metals – Brinell’s, Rockwell and Vicker’s  
8. Tests on Fine aggregates – Moisture content, Specific gravity, Bulk density, Sieve analysis and Bulking  
9. Demonstration of Strain gauges and Strain indicators

**NOTE:** All tests to be carried out as per relevant BIS Codes

**REFERENCE BOOKS:**

2. Relevant IS Codes

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**SURVEYING PRACTICE – I**

**Sub code**: 14CV308  
**Credits**: 02  
**Hrs/Week**: 0+0+3+0

**Exercise – 1**  
Study of topographic maps and preparation of a chart of conventional symbols.

**Exercise – 2**
Measurement of bearing /directions using prismatic compass.

**Exercise – 3**  
Determination of reduced levels of points using dumpy level

**Exercise – 4**  
Determination of reduced levels of points using auto level

**Exercise – 5**  
To conduct profile leveling and cross sectioning, plotting

**Exercise – 6**  
Study of parts of a vernier theodolite and practice of taking readings.

**Exercise – 7**  
Measurement of horizontal angle by repetition and reiteration methods.

**Exercise – 8**  
Measurement of vertical angles using theodolite.

**Exercise – 9**  
To determine the elevation of the top of a tower/building using single plane method.

**Exercise – 10**  
To determine the elevation of the top of a tower/building using double plane method.

**REFERENCES**


5. K.R. Arora, “Surveying (Vol. 1, 2, 3)” Standard Book House, New

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ENGINEERING MATHEMATICS- IV

<table>
<thead>
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<th>Sub code</th>
<th>14CV401</th>
<th>Credits</th>
<th>04</th>
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<td>Hrs/Week</td>
<td>4+0+0+0</td>
<td>Total Hours</td>
<td>52</td>
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Course Outcomes:

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

1. Understand and appreciate probabilistic models.
2. Understand and appreciate the application of statistics in data collection and analysis and also apply probability distributions in practical situations.
3. Understand the concepts of random samples and sampling distributions.
4. Understand and apply various numerical methods to solve initial value problems.
5. Able to apply numerical methods to solve partial differential equations.

UNIT – I

Introduction to probability: Finite sample space, conditional probability and independence. Baye’s theorem. One dimensional random variable: discrete and continuous random variable, probability distribution function, cumulative distribution function. Mean and variance. 12 Hours

UNIT – II

Probability Distributions and Curve filling: Binomial, Poisson, Normal, Uniform and Exponential distributions.
Curve fitting: curve fitting by the method of least squares: \( y = a + bx \), 
\( y = a + bx + cx^2 \), \( y = ab^x \). correlation and regression.  

**UNIT – III**

**Sampling theory:** Random samples, sampling distributions, T&F distributions. Moment generating functions, Central limit theorem and its applications.  

**UNIT – IV**

**Partial differential equations:** Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions. Derivation of one dimensional heat and wave equations, Solution of PDEs by the method of separation of variables, method of transformation.  

**UNIT – V**

**Numerical methods to solve Partial differential equations:**  

**TEXT BOOKS:**


**REFERENCE BOOKS:**

STRUCTURAL ANALYSIS – I

Sub code : 14CV402
Credits : 04
Hrs/ Week : 3+2+0+0
Total Hours : 52

Course Outcomes:
At the end of the course the students will be able to solve the problems by using various methods and concept.

1. Understand basic components of truss, compute member force by method of joint and section.
2. To know the moment area and conjugate beam concept, determination of deflection of determinate structures by Moment area and conjugate beam method
3. To understand the basic concept of strain energy, compute the deflection of structures by using strain energy methods.
4. To know the basics concept of Consistent deformation and Clapeyron’s theorem, and able to solve the reactions at the supports of indeterminate structures.
5. To know the components of arches and cables, able to compute the reactions and length of cables.

UNIT - I

STRUCTURAL SYSTEMS
Forms of structures, Conditions of equilibrium, Degree of freedom, Linear and Non linear structures, one, two, three dimensional structural systems, Determinate and indeterminate structures [Static and Kinematics].

PLANE TRUSSES
Introduction, Assumptions, Analysis by method of joints, Analysis by method of sections. 10 Hours

UNIT - II

STRAIN ENERGY
Strain energy and complimentary strain energy, Strain energy due to axial load, bending and shear, Theorem of minimum potential energy,
Law of conservation of energy, Principle of virtual work, The first theorem of Castigliano- problems on beams, frames and trusses, Betti’s law, Clarke - Maxwell’s theorem of reciprocal deflection. Deflection of beams and trusses using strain energy and unit load Methods. 12 Hours

UNIT - III

DEFLECTION OF BEAMS
Moment area method, Conjugate beam method 8 Hours

UNIT - IV

ANALYSIS OF BEAMS
Consistent deformation method – Propped cantilever and fixed beams, second theorem of castigliano-(minimum Strain Energy method) – Propped cantilever and fixed beams. Clapeyron’s theorem of three moments – continuous beams and fixed beams. 10 Hours

UNIT - V

ARCHES AND CABLES
Three hinged circular and parabolic arches with supports at same levels and different levels, Determination of thrust, shear and bending moment, Analysis of cables under point loads and UDL, length of cables (Supports at same levels and at different levels).
Two hinged parabolic arch, two hinged Circular arch. 12 Hours

TEXT BOOKS :

REFERENCE BOOKS:

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HIGHER SURVEYING

<table>
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<th>Hrs/ Week</th>
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<td>03</td>
<td>3+0+0+0</td>
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Course Outcomes:
1. The students are able to develop the knowledge on errors and distribution of errors in surveying.
2. At the end of the course, the students should be able to locate the shortest routes, suitable curves, alignment of highways.
3. To make the students familiar with the total station and its application in the field and should able to describe GPS and its applications.
4. Upon the completion of this course, students will be able to mark the centerline of various civil engineering structures.
5. The desired outcome of this course is to make students aware about use of Photogrammetry.

UNIT -I

Adjustment Computations

Introduction to triangulation and trilateration. Triangulation measurements and computations. Errors, accuracy, precision, systematic and random errors, laws of weights, RMS error, observation equations, condition equations, weighted observations, principle of least squares, normal equations, triangulation adjustments, station and figure adjustments, method of differences, method of correlates (simple numerical problems) 9 Hours
UNIT-II

**Route And Construction Surveys**
General requirements and specifications for engineering project surveys, reconnaissance, preliminary and location surveys for highways. Curves for horizontal and vertical alignment, elements of simple Circular curves, setting out a curve by deflection angles. Introduction to transition curves and vertical curves (no derivations and numerical problems) 8 Hours

UNIT-III

**Total Station Instrument**
Introduction, basic concepts, measurement of distance using phase difference, total station, components, adjustments, uses of total station, errors, accuracy, effect of atmospheric conditions.

**Global Positioning Systems**
Global positioning systems, segments of GPS, working principle, Hand held GPS and differential GPS, methods of GPS surveying, errors and accuracy, applications of GPS. 8 Hours

UNIT – IV

**Setting Out Works**
Setting out buildings, tunnels, bridges, culverts, sewers, pipelines. surface and underground surveys. 7 Hours

UNIT-V

**Introduction to Aerial Photogrammetry**
Definitions, advantages, applications. Geometry of vertical aerial photographs - scale, ground coordinates, relief displacement, photographic overlaps, flight planning 7 Hours

TEXT BOOK:
REFERENCE BOOKS:

HYDRAULICS & HYDRAULIC MACHINES
Sub Code : 14CV404 Credits : 04
Hrs/ Week : 4+0+0+0 Total Hours : 52

Course Outcomes :
At the end of the course the students will be able to:
1. Understand open channels and their classification
2. Understand uniform flow in open channels, Chezy’s and Manning’s formulae
3. Understand Most economical open channels
4. Understand Specific energy, Hydraulic jump in rectangular channels
5. Understand Dimensional Analysis by Raleigh’s & Buckingham’s method and Model studies
6. Understand water hammer in pipes and its control
7. Understand force exerted by a jet on a fixed and moving flat and curved vanes
8. Know the types and classifications of different types of turbines and their working
9. Know the characteristics curves of a turbine
10. Understand centrifugal pumps, priming, working principle, efficiencies and other commercial pumps

UNIT - I

FLOW IN OPEN CHANNELS
Definition of open channels, classification, difference between pipe flow & open channel flow, types of flow, Geometric properties of open channels, Uniform flow in open channels, Chezy’s and Manning’s formulae, Most economical open channels. Derivation of conditions for most economical rectangular, triangular and trapezoidal sections, Specific energy, specific energy curve, conditions for minimum specific energy and maximum discharge, Critical flow in rectangular channels, Hydraulic jump in rectangular channels, Froude number concept, Venturi flume and standing wave flume  12 Hours

UNIT – II

DIMENSIONAL ANALYSIS & MODEL SIMILITUDE
Introduction to Dimensional Analysis, units & dimensions, Dimensional Homogeneity, Methods of Analysis-Raleigh’s & Buckingham’s method, Model Studies, Similitude, Dimensionless parameters, Types of models, Froude’s and Reynolds’s models, Scale effects.  8 Hours

UNIT – III

WATER HAMMER IN PIPES
Definition, Equations for pressure rise due to gradual and sudden closure of valves in rigid & elastic pipes, Surge tanks, Functions & types.

IMPACT OF JET ON VANES
Introduction, Impulse – momentum equation and its applications, Force exerted by a jet on a fixed and moving vanes, Force exerted by a jet on a series of curved vanes, Concept of velocity triangles, Equation for work done & efficiency,  12 Hours
UNIT - IV

HYDRAULIC TURBINES
Introduction, Types and classifications, Pelton Wheel, Francis Turbine and Kaplan Turbine- Theory, Equation for work done and efficiency, Design parameters, Draft tubes- types, Efficiency, Cavitations and governing of turbines, Specific speed of a turbine, Unit quantities of a turbine, Characteristics curves of a turbine, General layout of an hydroelectric plant.  

12 Hours

UNIT - V

CENTRIFUGAL PUMPS AND OTHER COMMERCIAL PUMPS
Definition of pump, classification, Description & general principle of working, priming, Work done & efficiencies of a centrifugal pump, Minimum starting speed, Cavitation in centrifugal pumps, Multistage pumps, Description and working principle of jet pump and submersible pump

8 Hours

TEXT BOOKS:

REFERENCE BOOKS:

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BUILDING CONSTRUCTION

Sub Code : 14CV405
Credits : 03
Hrs/Week : 3+0+0+S*
Total Hours : 39

*Self Study to be exercised under the supervision of course instructor and to be restricted to not more than 10% of the total teaching hours.

Course Outcomes:

1. Student will be able to understand and apply the knowledge of bearing capacity in foundation design, discuss different foundation types and their suitability.
2. Student will be able to understand the masonry patterns, arches, lintels, canopy, chajjah and balcony in buildings.
3. Student will be able to know the different types of stairs, roof and flooring components and their usage suitability.
4. Student will be able to know and apply different types of doors and windows, understand plastering works and painting of buildings.
5. Student will be able to know and understand the availability of alternative building materials and cost effective construction.
6. Student will be able to know application of scaffolding, shoring, underpinning and formworks as a supporting process of building construction.

UNIT – I

Foundations: Preliminary investigation of soil, bearing capacity, safe bearing capacity, allowable bearing capacity, determination of bearing capacity by plate load test and by method of dropping weight. classification of foundations, introduction to different type of foundations- masonry footings, isolated footings, combined and strap RCC footings, raft footing. Pile foundations (friction and load bearing piles). 8 Hours
UNIT - II


UNIT – III

Floors, Roofs and Stair case: Types of flooring(materials and method of laying), granololitic, mosaic, ceramic, marble, granite, vitrified tile, industrial flooring. Flat roof (R.C.C.), sloped roof (R.C.C and tile roof), lean to roof. wooden truss (king post and queen post trusses), steel trusses, weather proof course for RCC roof, types (classifications) and technical terms in stairs, requirement of a good stair, geometric design of RCC dog legged and open well stairs. (Plan and sectional elevation of stairs). 8 Hours

UNIT – IV

Doors, Windows, Plastering and Painting: Doors, types - paneled doors, glazed doors, flush doors, collapsible and rolling shutters, louvered doors, revolving, sliding and swing doors. Windows - paneled, glazed, bay window, dormer window louvered and corner window, ventilators. Purposes of plastering, materials of plastering, lime mortar, cement mortar. Methods of plastering- stucco plastering, lath plastering. Purpose of painting, types of paints, application of paints to new and old surfaces. Distemper, plastic emulsion, enamel, powder coated painting to walls and iron and steel surfaces, polishing of wood surfaces. 8 Hours

UNIT - V

Introduction to cost effective construction: Necessity, advantages, pre fabrication techniques, pre cast doors and windows (Pre cast frames and

7 Hours

TEXT BOOKS:

REFERENCE BOOKS:

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BUILDING PLANNING AND DRAWING

Sub code : 14CV406
Credits : 03
Hrs/ Week : 1+0+4+0
Total Hours : 52

Course Outcomes:

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

1. Know different notations, symbols and representations used in building drawing.
2. Draw the different views like elevation, section and plan from given line diagram.
3. Describe the different terminologies used in building drawing.
4. Draw the water supply and sewerage lines for a residential building showing all the check points.
5. Plan and develop line diagram for the client’s requirement.
6. Know the concept of connectivity diagram and thereby plan the line diagram based on requirements.

UNIT - I
To prepare working drawing of component of buildings: i) Stepped wall footing and isolated RCC column footing, ii) Fully paneled and flush doors, iii) Half paneled and half-glazed window, iv) RCC dog legged and open well stairs, v) Steel truss. 12 Hours

UNIT - II
Functional design of buildings (Residential, Industrial and Public), positioning of various components of buildings, orientation of buildings, building standards, bye laws, set back distances and calculation of carpet area, plinth area and floor area ratio. 9 Hours

UNIT - III
Development of plan, elevation, section and schedule of openings from the given line diagram of residential buildings
   i) Two bed room building, ii) Two storeyed building. 18 Hours

UNIT - IV
Functional designs of building using inter connectivity diagrams: i) Primary health centre, ii) Primary school building, iii) College canteen, iv) Office building. 8 Hours

UNIT - V
For a given single line diagram, preparation of water supply, Sanitary and electrical layout. 5 Hours

TEXT BOOKS:
REFERENCE BOOKS:
4. Dr. B.P.Verma, Civil Engineering Drawing & Housing, Khanna Publishers, Delhi, edition 11, 2014

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SURVEYING PRACTICE – II

Sub code : 14CV407 Credit : 02
Hrs/Week : 0+0+3+0

Exercise – 1
Introduction to total station, components, temporary adjustments

Exercise – 2
Horizontal and sloping distance measurement using total station

Exercise – 3
Measurement of horizontal and vertical angles using total station

Exercise – 4
Orientation of total station using compass and measurement of magnetic bearings

Exercise – 5
Measurement of coordinates (N, E, Z) of various points from one instrument position.
Exercise – 6
Traversing using total station (orientation at the first station by compass and at subsequent stations by back sighting) and area measurement.

Exercise – 7
Detailed survey of an area including creation of job file, selecting appropriate point codes, measurement of coordinates, downloading of data and preparation of contour map.

Exercise – 8
Determination of heights of buildings/towers/power line (remote elevation measurement), determination of distance between two points (missing line measurement).

Exercise – 9
Setting out works- distances, angles and coordinates

Exercise – 10
Setting out a simple circular curve by deflection angles

Exercise – 11
Setting out positions of column centers of a multi storey building

Exercise – 12
Use of hand held GPS for coordinate measurement

Exercise – 13
Demonstration of Mapping Software

REFERENCE BOOKS:

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APPLIED ENGINEERING GEOLOGY LABORATORY

Sub code : 14CV408
Hrs/Week : 0+0+3+0
Credits : 02

Course Objective:-

1. To equip the students with the skills to identify and distinguish the common minerals and rocks which are of significance in Civil Engineering practices

2. To make them equip with the skills of understanding and solving geological and structural problems through preparation of geological maps, sections and map reading.

Pre-requisites of the Course: Engineering Geology (CV 306) course.

1. Identification and description of rock forming minerals: Quartz group, Feldspars (orthoclase, microcline and microcline), Micas (biotite & Muscovite), Carbonates (Calcite, dolomite & Magnestie), hornblende and Olivine.

2. Identification and description of economic minerals: Sulphides (Pyrite, Galena), Sulphates (Gypsum, Barite), Ore Minerals (Magnetite, Hematite, Limonite, Chromite, Bauxite, Chalcopyrite) & Industrial Minerals (Asbestos, Kaolin, Talc, Garnet, Corundum).

3. Igneous rocks: Textures and structures, identification, description, engineering properties and uses of - Granite, Gabbro, Dunite, Porphyries, Dolerite, Pegmatite and Basalt
4. Sedimentary rocks: Textures and structures, identification, description, engineering properties and uses of Sandstone, Limestone, Shale, Breccia, Conglomerate and Laterite
5. Metamorphic Rocks: Textures and structures, identification, description, engineering properties and uses of Gneiss, Quartzite, Marble, Slate, Phyllite and Schists
6. Width of outcrop problems-plane ground (Graphical and Mathematical methods)
7. Dip and Strike Problems I (Graphical, cotangent and Mathematical methods)
8. Dip and Strike Problems II (Graphical, cotangent and Mathematical methods)
9. Bore hole problems
10. Contour Maps – profiling, study and interpretation of topography, map reading

**Demonstration only**


**TEXT BOOKS :**

**REFERENCE BOOKS:**
INDIVIDUAL EFFECTIVENESS LABS (IEL)

Introduction
Entry Edge (E^2) is an industry readiness program designed for technology undergraduates to help them enhance important individual behavior & skills, and become productive from the very beginning of their corporate carrier. The program places a high emphasis on the pedagogy of learning by doing.

As part of the program, students first go through individual behavior & skill labs (Individual Effectiveness Labs) in their II year of engineering curriculum and then participate in “hands on” and “minds on” team activities in a simulated work environment, to accomplish tasks and to solve real-world organizational issues during a week long Immersive Group Workshop (IGW) held in the III year of their engineering course.

This document provides the syllabus and evaluation framework for Individual Effectiveness Labs (IEL).

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INDIVIDUAL EFFECTIVENESS LABS (IEL)

Sub code: 14CV409
Credits: 02
Hrs / Week: 0+0+3+0

Course Outcome:
1. To help the students understand themselves. Identify and analyze personality/behavioral attributes of personal effectiveness – exploratory orientation, self-disclosure, receptivity to feedback and sensitivity to others.
2. To help the students identify their primary and secondary motivators – what drives them for achievement?
   a. Understanding the student’s need for achievement
   b. Understanding how positive expectations lead to positive results.
3. To help the students to develop a goal driven mindset and to take the first steps into individual personal planning, controlling and measuring results.
4. To make the students aware of importance of communication and typical barriers to communication.
5. To help the students develop effective oral communication skills.
6. To help the students develop effective written communication skills.
7. To help the students develop listening skills.
8. To help the students participate in group discussions.
9. To help the students develop effective business presentation skills.
10. To help the students receive feedback with an open mind, respond to feedback and take the action on them.
11. To help the students develop time management and organization skills.

Contents

Module 1: Know Yourself
Self assessment profilers to identify and assess the following – Identify and analyze personality/behavioral attributes of personal effectiveness – exploratory orientation, self disclosure, receptivity to feedback, sensitivity to others. 8 Hours

Module 2: Achievement Motivation & Goal Setting
- Identifying primary and secondary motivators using a motivational profiler.
- Understanding need for achievement.
- Developing goal driven mindset.
- First steps into career planning. 8 Hours

Module 3: Communication Skills
- Effective oral communication
- Effective written communication
- Constructing effective messages (memo, letters, e-mails)
- Writing persuasively
- Correspondence etiquettes – letters & email
- Importance of listening responsively
- Handling conversations
• Effective group discussions 15 Hours

Module 4: Presentation Skills
• Understanding audience, presentation objectives, best practices & tools in preparation of presentation.
• Improving quality of presentation through better use of voice, eyes, gestures, visual aids.
• Presenting to groups
• Presenting one-on-one. 13 Hours

Module 5: Handling Feedback
• Seeking feedback
• Accepting feedback with an open mind
• Responding to feedback
• Actionizing feedback 6 Hours

Module 6: Time Management
• Introduction to Time Management and importance of managing self
• Beating procrastination
• Action plans-starting to achieve in a small way
• Scheduling skills 6 Hours

REFERENCE BOOKS:
2. Online reference materials provided as part of the Entry Edge program.