B. E. SYLLABUS

CIVIL ENGINEERING

V & VI SEMESTER

With

Scheme of Teaching
& Examination

DEPARTMENT: CIVIL ENGINEERING
## DEPARTMENT: CIVIL ENGINEERING

<table>
<thead>
<tr>
<th>No.</th>
<th>Name</th>
<th>Qualification</th>
<th>Position</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Dr. I. Ramesh Mithantaya</td>
<td>Ph.D.</td>
<td>Professor/ Vice Principal/Dean (Aca.)</td>
</tr>
<tr>
<td>2</td>
<td>Dr. N. Bhavani Shankar Rao</td>
<td>Ph.D.</td>
<td>Professor</td>
</tr>
<tr>
<td>3</td>
<td>Dr. Udaya Kumar G.</td>
<td>Ph.D.</td>
<td>Professor</td>
</tr>
<tr>
<td>4</td>
<td>Dr. Srinath Shetty K.</td>
<td>Ph.D.</td>
<td>Professor and HOD</td>
</tr>
<tr>
<td>5</td>
<td>Dr. Radhakrishnan K.</td>
<td>Ph.D.</td>
<td>Professor</td>
</tr>
<tr>
<td>6</td>
<td>Mr. S.K. Mahadeve Gowda</td>
<td>M.Tech</td>
<td>Associate Professor</td>
</tr>
<tr>
<td>7</td>
<td>Mr. Y.R. Suresh</td>
<td>M.E., M.Tech</td>
<td>Associate Professor</td>
</tr>
<tr>
<td>8</td>
<td>Mr. J.K. Lokesh</td>
<td>M.Tech</td>
<td>Asst. Prof. Gd III</td>
</tr>
<tr>
<td>9</td>
<td>Mr. Y. Umashankar Shetty</td>
<td>M.Tech</td>
<td>Asst. Prof. Gd III</td>
</tr>
<tr>
<td>10</td>
<td>Dr. Akshatha Shetty</td>
<td>Ph.D.</td>
<td>Asst. Prof. Gd III</td>
</tr>
<tr>
<td>11</td>
<td>Mr. Sundip Shenoy R.</td>
<td>M.Tech</td>
<td>Asst. Prof. Gd II</td>
</tr>
<tr>
<td>12</td>
<td>Mr. Pushparaj A Naik</td>
<td>M.Tech</td>
<td>Asst. Prof. Gd II</td>
</tr>
<tr>
<td>13</td>
<td>Mr. Leeladhar Pammar</td>
<td>M.Tech</td>
<td>Asst. Prof. Gd I</td>
</tr>
<tr>
<td>14</td>
<td>Mr. T.N. Shridharan</td>
<td>M.Tech</td>
<td>Asst. Prof. Gd I</td>
</tr>
<tr>
<td>15</td>
<td>Mr. Gururaj Aharya</td>
<td>M.Tech</td>
<td>Asst. Prof. Gd I</td>
</tr>
<tr>
<td>16</td>
<td>Mr. Prashanth Kumar</td>
<td>M.Tech</td>
<td>Asst. Prof. Gd I</td>
</tr>
<tr>
<td>17</td>
<td>Mr. Akshay N.K</td>
<td>M.Tech</td>
<td>Asst. Prof. Gd I</td>
</tr>
<tr>
<td>18</td>
<td>Mr. Rakshith Kumar Shetty</td>
<td>M.Tech</td>
<td>Asst. Prof. Gd I</td>
</tr>
<tr>
<td>19</td>
<td>Mr. Manjunath M.</td>
<td>M.Tech</td>
<td>Asst. Prof. Gd I</td>
</tr>
<tr>
<td>20</td>
<td>Mr. Roshan Rai</td>
<td>M.Tech</td>
<td>Asst. Prof. Gd I</td>
</tr>
<tr>
<td>21</td>
<td>Mr. Anil Kumar</td>
<td>M.Tech</td>
<td>Asst. Prof. Gd I</td>
</tr>
<tr>
<td>22</td>
<td>Ms. Thangamani R.</td>
<td>M.Sc.</td>
<td>Asst. Prof. Gd I</td>
</tr>
<tr>
<td>23</td>
<td>Mr. Prithviraj H K</td>
<td>M.Tech</td>
<td>Asst. Prof. Gd I</td>
</tr>
<tr>
<td>24</td>
<td>Mr. Shriram P Marathe</td>
<td>M.Tech</td>
<td>Asst. Prof. Gd I</td>
</tr>
<tr>
<td>25</td>
<td>Mr. Sheik Kabeer Ahmed</td>
<td>M.Tech</td>
<td>Asst. Prof. Gd I</td>
</tr>
</tbody>
</table>
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:

The Department of Civil Engineering will strive hard to

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

Programme Educational Objectives (PEOs):

The graduates of the programme will be

1. Equipped with fundamentals of Civil Engineering along with interdisciplinary science, Engineering and Management concepts.
2. Equipped with advanced and emerging field of Civil Engineering practices to complete and match with the industrial requirements.
3. Competent enough to conceive the ideas, prepare plan, design, execute, monitor and manage the project with the effective utilization of 4 M’s (i.e. men, material, machine and money) along with time effectively.
4. Continue to learn and adapt to suit the needs and challenges of real world problems and come up with optimal solutions.

**Programme Outcomes (POs):**

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

a. Acquire sound knowledge of mathematics, science, fundamentals of engineering and apply their knowledge in solving practical problems in the field of Civil Engineering.

b. Comprehend, identify and analyse actual field problems of Civil Engineering.

c. Design a suitable solution for the existing Civil Engineering problem and develop methodology/ technology to implement the solution successfully.

d. Apply their analytical ability to investigate possible methods to solve complex problems in Civil Engineering.

e. Use modern engineering tools useful for Insitu measurements and IT tools for modelling complex boundary value problems in Civil Engineering.

f. 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.

g. Understand the impact of Civil Engineering solutions on existing ecology of a region and demonstrate the knowledge and need for sustainable development.

h. Know ethical principles and need to commit to professional ethics and responsibilities as well as norms of Civil Engineering practice.
i. Function effectively as an individual member or leader in diverse teams and multidisciplinary settings.

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

k. Demonstrate the knowledge and understanding of the Engineering as well as Management principles and apply these to implement/manage projects.

l. 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

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Code</th>
<th>Subject</th>
<th>Theory/Tuto./Prac./ Self Study</th>
<th>Total Hrs./Week</th>
<th>C.I.E.</th>
<th>S.E.E.</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>13CV501</td>
<td>Structural Analysis-II</td>
<td>3+2+0+0</td>
<td>5</td>
<td>50</td>
<td>50</td>
<td>4</td>
</tr>
<tr>
<td>2</td>
<td>13CV502</td>
<td>Design of RCC Structural Elements</td>
<td>3+2+0+0</td>
<td>5</td>
<td>50</td>
<td>50</td>
<td>4</td>
</tr>
<tr>
<td>3</td>
<td>13CV503</td>
<td>Geotechnical Engg. I</td>
<td>4+0+0+0</td>
<td>4</td>
<td>50</td>
<td>50</td>
<td>4</td>
</tr>
<tr>
<td>4</td>
<td>13CV504</td>
<td>Transportation Engg. I</td>
<td>3+0+0+S</td>
<td>3</td>
<td>50</td>
<td>50</td>
<td>3</td>
</tr>
<tr>
<td>5</td>
<td>13CV505</td>
<td>Environmental Engg. I</td>
<td>3+0+0+0</td>
<td>3</td>
<td>50</td>
<td>50</td>
<td>3</td>
</tr>
<tr>
<td>6</td>
<td>13CV51X</td>
<td>Elective –I</td>
<td>3+0+0+0</td>
<td>3</td>
<td>50</td>
<td>50</td>
<td>3</td>
</tr>
<tr>
<td>7</td>
<td>13CV506</td>
<td>Hydraulics &amp; Hydraulic Machinery Lab</td>
<td>0+0+3+0</td>
<td>3</td>
<td>50</td>
<td>50</td>
<td>2</td>
</tr>
<tr>
<td>8</td>
<td>13CV507</td>
<td>Computer Aided Design Lab</td>
<td>0+0+3+0</td>
<td>3</td>
<td>50</td>
<td>50</td>
<td>2</td>
</tr>
<tr>
<td>9</td>
<td>13IL001</td>
<td>Employability Skill Development</td>
<td>1+0+0+0</td>
<td>1</td>
<td>50</td>
<td>-</td>
<td>0</td>
</tr>
</tbody>
</table>

**TOTAL**  | **30** | **30** | **400** | **400** | **25**
# DEPARTMENT OF CIVIL ENGINEERING
## SCHEME OF TEACHING AND EXAMINATION

### VI Semester

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Code</th>
<th>Subject</th>
<th>Theory/Tuto./Prac./ Self Study</th>
<th>Total Hrs./Week</th>
<th>C.I.E.</th>
<th>S.E.E.</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>13CV601</td>
<td>Design &amp; Drawing of RCC Structures</td>
<td>2+0+3+0</td>
<td>5</td>
<td>50</td>
<td>50</td>
<td>4</td>
</tr>
<tr>
<td>2</td>
<td>13CV602</td>
<td>Geotechnical Engg. – II</td>
<td>3+0+0+0</td>
<td>3</td>
<td>50</td>
<td>50</td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td>13CV603</td>
<td>Transportation Engg. –II</td>
<td>4+0+0+0</td>
<td>4</td>
<td>50</td>
<td>50</td>
<td>4</td>
</tr>
<tr>
<td>4</td>
<td>13CV604</td>
<td>Environmental Engg. –II</td>
<td>3+0+0+S</td>
<td>3</td>
<td>50</td>
<td>50</td>
<td>3</td>
</tr>
<tr>
<td>5</td>
<td>13CV61X</td>
<td>Elective-II</td>
<td>3+0+0+0</td>
<td>3</td>
<td>50</td>
<td>50</td>
<td>3</td>
</tr>
<tr>
<td>6</td>
<td>13CV62Y</td>
<td>Elective-III</td>
<td>3+0+0+0</td>
<td>3</td>
<td>50</td>
<td>50</td>
<td>3</td>
</tr>
<tr>
<td>7</td>
<td>13CV605</td>
<td>Geotechnical Engg. Lab</td>
<td>0+0+3+0</td>
<td>3</td>
<td>50</td>
<td>50</td>
<td>2</td>
</tr>
<tr>
<td>8</td>
<td>13CV606</td>
<td>Environmental Engg. Lab</td>
<td>0+0+3+0</td>
<td>3</td>
<td>50</td>
<td>50</td>
<td>2</td>
</tr>
<tr>
<td>9</td>
<td>13CV607</td>
<td>Extensive Survey Project/Mini Project</td>
<td>2 weeks</td>
<td>-</td>
<td>50</td>
<td>50</td>
<td>1</td>
</tr>
<tr>
<td>10</td>
<td>13CV608</td>
<td>IGW</td>
<td>1 week</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>0</td>
</tr>
<tr>
<td>11</td>
<td>13IL002</td>
<td>Employability Skill Development</td>
<td>1+0+0+0</td>
<td>1</td>
<td>50</td>
<td>-</td>
<td>0</td>
</tr>
</tbody>
</table>

**TOTAL**

|     | 28 | 28 | 450 | 450 | 25 |
## LIST OF ELECTIVES

<table>
<thead>
<tr>
<th>Sem</th>
<th>Group</th>
<th>Code</th>
<th>Elective Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>V</td>
<td>Elective - I</td>
<td>13CV511</td>
<td>Advanced Surveying</td>
</tr>
<tr>
<td></td>
<td></td>
<td>13CV512</td>
<td>Advanced Applied Engg Geology</td>
</tr>
<tr>
<td></td>
<td></td>
<td>13CV513</td>
<td>Design of Masonry Structures</td>
</tr>
<tr>
<td></td>
<td></td>
<td>13CV514</td>
<td>Advanced Hydraulics</td>
</tr>
<tr>
<td></td>
<td></td>
<td>13CV515</td>
<td>Alternative Building Materials &amp; Technologies</td>
</tr>
<tr>
<td></td>
<td>Elective - II</td>
<td>13CV611</td>
<td>Matrix Method of Structural Analysis</td>
</tr>
<tr>
<td></td>
<td></td>
<td>13CV612</td>
<td>Traffic Engineering</td>
</tr>
<tr>
<td></td>
<td></td>
<td>13CV613</td>
<td>Rural Water Supply and Sanitation</td>
</tr>
<tr>
<td></td>
<td>Elective - III</td>
<td>13CV621</td>
<td>Groundwater Hydrology</td>
</tr>
<tr>
<td></td>
<td></td>
<td>13CV622</td>
<td>Ground Improvement Techniques</td>
</tr>
<tr>
<td></td>
<td></td>
<td>13CV623</td>
<td>Remote Sensing &amp; GIS</td>
</tr>
</tbody>
</table>
STRUCTURAL ANALYSIS – II

Sub Code : 13CV501  Credits :  04
Hrs/Week :  3+2+0+0  Total Hours :26+16

Course Outcomes:

At the end of the course the student will be able to
1. Able to analyze the indeterminate structures.
2. Development of slope deflection equation for continuous beams and frames, and able to analyze.
3. Understand the concept of carry-over moment and able to compute the end moments by number of iterations.
4. Understand the concept of carry-over moment and able to compute the end moments by number of iterations.
5. Understand the basic definition of Flexibility and Stiffness, able to develop relationship between flexibility and stiffness matrices and solve the problem by matrix approach.

UNIT – I

REDUNDANT TRUSSES
Introduction, Analysis of statistically indeterminate structures using strain energy method, Analysis of trusses (Redundant up to second degree), Lack of fit in member of indeterminate trusses. Temperature stress in redundant trusses. 8 Hours

UNIT-II

SLOPE DEFLECTION METHOD
Introduction, Sign convention, Development of slope – deflection equations, Analysis of continuous beams, Analysis of frames (Kinematics indeterminacy <3) 10 Hours

UNIT-III

MOMENT DISTRIBUTION METHOD
Introduction, Definition of terms, Development of method, Analysis of continuous beams, Analysis of frames (Static indeterminacy <3)

10 Hours

UNIT-IV

KANI’S METHOD
Introduction, Basic concept, Analysis of continuous beams, Analysis of frames with no lateral translation of joints, Analysis of symmetrical frames.

10 Hours

UNIT –V

MATRIX METHOD OF ANALYSIS

14 Hours

TEXT BOOKS:

REFERENCE BOOKS:

**************************

DESIGN OF RCC STRUCTURAL ELEMENTS

Sub Code : 13CV502  Credits : 04
Hrs/Week : 3+2+0+0  Total Hours : 52

**Course Outcomes:**
At the end of the course the student will be able to
1. Understand the principles of limit state design.
2. Implement the concept of developmental length.
3. Design singly reinforced and doubly reinforced beam.
4. Designsimply supported, cantilever and continuous slabs.
5. Design circular subject to combined axial load and uniaxial moment and biaxial moment.
6. Design footings subjected to axial load and uniaxial moment.
7. Design stair case as per Codal provisions.

UNIT- I

**GENERAL FEATURES OF REINFORCED CONCRETE:**

**PRINCIPLES OF LIMIT STATE DESIGN AND ULTIMATE STRENGTH OF R.C. SECTION:** Philosophy of limit state design, Principles of limit states, Factor of Safety, Characteristic and design loads, Characteristic and design strength, General aspects of Ultimate strength, Stress block parameters for limit state of collapse, Ultimate flexural strength of singly reinforced rectangular sections, Ultimate flexural strength of doubly reinforced rectangular sections, Ultimate flexural strength of flanged sections, Ultimate shear strength of RC sections, Ultimate torsional strength of RC sections. 10 Hours
UNIT – II

Concepts of development length and anchorage, Analysis examples of singly reinforced, doubly reinforced, flanged sections, shear strength and development length.  

10 Hours

UNIT-III

SERVICEABILITY LIMIT STATES: General aspects, Deflection limits in IS: 456 - 2000, Calculation of deflection (Theoretical method), Cracking in structural concrete members, Calculation of deflections and crack width.

DESIGN OF BEAMS: Practical requirements, Size of beam, Cover to reinforcement, spacing of bars, Design procedures for critical sections for moments and shears, Anchorages of bars, check for development length, Reinforcement requirements, Slenderness limits for beams to ensure lateral stability, Design examples for Simply supported and Cantilever beams for rectangular and flanged sections.  

12 Hours

UNIT-IV

DESIGN OF SLABS: General consideration of design of slabs, Rectangular slabs spanning one direction, Rectangular slabs spanning in two directions for various boundary conditions. Design of simply supported, cantilever and continuous slabs as per IS: 456 – 2000.

DESIGN OF COLUMNS: General aspects, effective length of column, loads on columns, slenderness ratio for columns, minimum eccentricity, design of short axially loaded columns, design of column subject to combined axial load and uniaxial moment and biaxial moment using SP - 16.  

10 Hours

UNIT –V


DESIGN OF STAIRCASES: General features, types of stair case, loads on stair cases, effective span as per IS code provisions, distribution of loading on stairs, Design of stair cases. 

10 Hours
TEXT BOOKS:

REFERENCE BOOKS:
5. Relevant IS codes (Latest Edition)

GEOTECHNICAL ENGINEERING – I

Sub Code : 13CV503 Credits : 04
Hrs/Week : 4+0+0+0 Total Hours : 52

Course Outcomes:
At the end of the course the student will be able to
1. Have a clear knowledge of Soil as a three system and Explain various terminology.
2. Understand the need for soil classification and explain various classification systems.
3. Explain the ‘Soil Structure’ and concept of ‘Clay Mineralogy’.
4. Know about Permeability and Capillarity of soils in the field of engineering.
5. Understand the moisture-density relation and Compaction Characteristics and field applications.
6. To understand and implementation of Consolidation Characteristic on soil.

7. Assess importance the Shear Strength of soil in in the field of engineering.

UNIT - I

INTRODUCTION: Phase Diagram, Definitions- void ratio, porosity, degree of saturation, percentage air voids, air content, specific gravity, water content, soil densities, functional relationships, field identification of soils.

INDEX PROPERTIES OF SOILS AND THEIR DETERMINATION: Grain size distribution, Atterberg’s Limits and Indices, Insitu density, density index Laboratory determination: specific gravity, grain size distribution-sieve analysis and sedimentation analysis (Hydrometer Method), Liquid Limit (Casagrande Method), plastic limit and shrinkage limit.  

10 Hours

UNIT - II

CLASSIFICATION OF SOILS: Need for classification, unified soil classification and IS classification - plasticity chart and its importance.

SOIL STRUCTURE AND CLAY MINERALOGY: Soil structure – Single grained, honey combed, flocculent and dispersed structures. 

Valence bonds, Soil-water system- diffuse double layer, adsorbed water, base-exchange capacity; Common clay minerals - Kaolinite, Illite and Montmorillonite.

10 Hours

UNIT - III


Effective stress principle - total pressure and effective stress, quick sand phenomenon. Capillary phenomenon.
COMPACTION OF SOILS: Moisture Content – Dry density relationship, Zero-air void line, Laboratory compaction tests. Factors affecting compaction; properties. Field compaction methods, Field compaction control - Proctor needle method  
12 Hours

UNIT – IV

COMPRESSIBILITY AND CONSOLIDATION OF SOILS: The consolidation process - spring analogy, compressibility of soil and volume change - coefficient of compressibility and compression index, normally consolidated and over consolidated soils, pre-consolidation pressure and its determination (Casagrande method), Modulus of volume change and consolidation settlement. Terzaghi's theory of one dimensional consolidation - assumptions. Coefficient of consolidation - Time fitting methods.  
10 Hours

UNIT - V

SHEAR STRENGTH OF SOIL: Stress – strain curve, Mohr - Coulomb failure criterion, peak and residual strength theory. Laboratory measurement of shear strength- drainage conditions, direct shear test, unconfined compression test, triaxial compression test and vane shear test. Failure envelops - conventional and modified. Total and effective shear strength parameters. Factors affecting shear strength of soils, sensitivity and thixotropy. Pore pressure coefficient – measurement and application.  
10 Hours

TEXT BOOKS:
REFERENCE BOOKS:

*******************************

TRANSPORTATION ENGINEERING – I

Sub Code : 13CV504
Credits : 03
Hrs/Week : 3+0+0+S*
Total Hours : 39

*S 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. To plan the Road network for a given area.
2. Design road cross-section elements of the road.
3. To understand the elements of traffic engineering, Pavement materials and Design.
4. To critically analyze the economics and performance of road.
5. To select the optimum site for construction of bridges.

UNIT -1

Introduction: Importance of transportation, Modes, characteristics – comparison of different modes. Jayakar committee recommendations and
implementation, road development in India – Third 20 year plan and problems.
Highway Planning and alignment: Road patterns, planning surveys – Master plan – Saturation system of road plan – factor affecting alignment – Ideal alignment – surveys for new and realignment projects.  

UNIT - II

Design Principles: Highway geometric design, Importance, cross sectional elements, Width of carriage way, camber, Shoulder width, Design speed, Sight distance, design of horizontal and vertical alignment.
Pavement design: Types of pavements, design factors,  

UNIT - III

Pavement materials and Construction: Properties and requirements of Subgrade soils, CBR and Plate load test on soil, Properties and requirements of road aggregates, Bitumen, Tar, emulsion, Cutback – Specifications.  

UNIT – IV

Subsurface drainage system for road pavement, Types, Functions and basic design principles.  

UNIT – V

Introduction to bridges: Selection of sites, Types of bridges, Components and functions. Pavement maintenance: Principles of pavement evaluation, Types of pavement failures, Maintenance measures for road.  

TEXT BOOKS:
REFERENCE BOOKS:
2. Relevant IRC codes

ENVIRONMENTAL ENGINEERING – I

Sub Code : 13CV505
Credits : 03
Hrs/Week : 3+0+0+0
Total Hours : 39

Course Outcomes :
At the end of the course the students will be able to:
1. Trace the objectives of water treatment
2. Solve the problems connected to population forecasting
3. Explain the characteristics of water
4. Solve the problems on various water treatment units
5. Design miscellaneous water treatment options.

UNIT – I

Introduction- Human activities and environmental pollution; requirement of water for various beneficial uses; need for protected water supply

Demand of water; Types of water demands – domestic demand (in detail), institutional and commercial, public uses, fire demand; Per capita consumption – Factors affecting per capita demand
Syllabus of V & VI Semester B.E./ Civil Engg.

Population forecasting – Different methods with merits & demerits; Variations in water demand
Fire demand – estimation by Kuichling’s formula, Freeman formula & National board of fire underwriters’ formula; Peak factors; Design period & factors governing the design period  

UNIT – II

Quality of water; Objectives of water quality management; concept of safe water, wholesomeness, palatability and potable water; Water borne diseases
Examination of water – objectives – Physical, chemical and microbiological examinations using analytical and instrumental techniques; Drinking water standards – BIS & WHO guidelines; Health significance of fluoride, nitrates and heavy metals like mercury and cadmium; Sampling of water for examination
Sources, collection and conveyance of water - Surface and subsurface sources – suitability with regard to quality and quantity; Intake structures – different types of intakes, factor of selection and location of intakes
Pumps – Necessity; types, power of pumps, factors for the selection of a pump; design of the economical diameter for the rising main.  

UNIT – III

Water treatment – Objectives, flow-chart of treatment process; Aeration – principles, types of aerators
Sedimentation- Theory, settling tanks, types, design; Sedimentation aided with coagulants, dosages; chemical feeding, flash mixing and flocculators
Filtration – Mechanism, theory of filtration, types of filters, slow sand, rapid sand and pressure filters including construction, operation, cleaning and their design – excluding under drainage system – back washing of filters.  

7 Hours

8 Hours

8 Hours
UNIT –IV

Disinfection – Theory of disinfection, methods of disinfection, chlorination, chlorine demand, residual chlorine, use of bleaching powder
Softening – Definition, methods of removal of hardness by lime soda process and zeolite process
Miscellaneous Treatment – Removal of color, odour, taste with methods like aeration, activated carbon treatment; oxidizing organic matters; removal of iron and manganese; fluoridation and defluoridation. 8 Hours

UNIT-V

Methods of distribution systems – System of supply, service reservoirs and their capacity determination, methods of layout distribution
Miscellaneous – Pipe appurtenances, various valves, type of fire hydrants; location of water supply pipes in buildings 8 Hours

TEXT BOOKS:

REFERENCE BOOKS:

**************************
ADVANCED SURVEYING

Sub Code : 13CV511          Credits : 03
Hrs/Week : 3+0+0+0           Total Hours : 39

Course Outcomes :

1. The students are able to develop the knowledge on errors and distribution of errors in surveying.
2. To make the students familiar with the various modern surveying instruments like Total station and their applications in the field.
3. To make the students familiar with the solar systems and different units of time.
4. Students will be able to explain methods of sounding, sounding instruments used in photogrammetric surveying.
5. At the end of the course, students should be able to mark the centerline of the various civil engineering structures.

UNIT – I

THEORY OF ERRORS AND TRIANGULATION ADJUSTMENT

UNIT – II

ELECTRONIC DISTANCE MEASUREMENT (EDM): Introduction, Electro magnetic (EM) waves. Phase comparison and modulations. Distomat, Range finders, Introduction to GPS. Total station: basic principles, working and use of total station in surveying and leveling operations.

UNIT - III

FIELD ASTRONOMY
Earth celestial sphere, Solar system, Position by altitude and azimuth system-spherical triangle and spherical trigonometry. Astronomical triangle. Sidereal time, Greenwich mean time-standard time. Meridian and azimuth-their determination-latitude and its determination. **8 Hours**

**UNIT - IV**

**HYDROGRAPHIC SURVEYING AND PHOTOGRAMMETRIC SURVEYING**
Methodsof sounding and applications. Instruments, Three point problem, Solution to three point problem. Photogrammetric surveying: Introduction, basic principles, phototheodolite, aerial camera, Scale of vertical photograph. **8 Hours**

**UNIT - V**

**SETTING OUT WORKS**
Introduction: Setting out of buildings, culverts, bridge, pipeline and sewers, tunnels **8 Hours**

**TEXT BOOKS:**

**REFERENCE BOOKS:**

**************************
DESIGN OF MASONRY STRUCTURES

Sub Code : 13CV513  Credits : 03
Hrs/Week : 3+0+0+0  Total Hours : 39

Course Outcomes :

1. Students will know about the masonry units and mortar, properties of different masonry units and mortar. Defects and errors in masonry construction will be understood by them. Strength and stability of concentrically loaded masonry walls and factors affecting them will be understood by them. Strength formulae and mechanism of failure of masonry subjected to direct compression will be known to the students.

2. Students will understand the emerging permissible compressive, tensile and shear stress and factors influencing them for masonry elements. They come to know how to consider loads for masonry walls subjected to axial, eccentric and lateral loads as well as walls with opening and free standing wall.

3. Students will understand the concept of effective height of walls and columns, effective length, effective thickness of wall and factors affecting them. They also come to know about evaluation of slenderness ratio resultant eccentricity ratio and the concept of load dispersion, arching action and lintels.

4. Students will know how to design load bearing masonry walls for buildings up to three storeys using IS:1905 and SP-20.

5. Students will understand the concept of reinforced masonry and its applications, and how to bring flexural and compression elements (beams and columns) of reinforced masonry shear walls. They also understand the concept of composite wall beam elements and in filled frames. They will know how to design these masonry structures.

UNIT – I

Strength and stability of concentrically loaded masonry walls, effect of unit strength, mortar strength, joint thickness, rate of absorption, effect of ageing, workmanship, strength formulae and mechanism of failure of masonry subjected to direct compression.  

8 Hours

UNIT – II

Permissible compressive stresses, stress reduction and shape reduction factors, increase in permissible stresses for eccentric vertical and lateral loads, permissible tensile and shear stresses.

Load considerations for masonry: walls carrying axial load, eccentric load with different eccentric ratios—walls with openings and free standing wall.  

8 Hours

UNIT – III

Design considerations: Effective height of walls and columns, opening in walls, effective length, effective thickness, slenderness ratio, eccentricity, load dispersion, arching action and lintels.  

8 Hours

UNIT – IV

Design of load bearing masonry walls for building up to 3storeys using IS 1905 and SP20 procedure.  

8 Hours

UNIT – V

Reinforced masonry and its application, flexural and compression elements of reinforced masonry, shear walls.

Composite masonry walls, composite wall beam elements, infilled frames.  

7 Hours

TEXT BOOKS:

**REFERENCE BOOKS:**

*ALTERNATIVE BUILDING MATERIALS & TECHNOLOGIES*

Sub Code : 13CV515
Credit : 03
Hrs/Week : 3+0+0+0
Total Hours : 39

**Course Outcomes :**
Upon successful completion of this course student will be able to;
1. Solve the problems of Environmental issues concerned to building materials and cost effective building technologies;
2. Suggest appropriate type of masonry unit, mortar for civil engineering constructions and able to design the structural masonry under axial compression
3. Understand the Fiber reinforced materials and effectively use the agro and industrial wastes in building materials;
4. Know the present and alternative technologies for arches, foundation, walls, construction methods and roofing systems.
5. Efficiently design the green building or energy efficient building and able to understand production of stabilized blocks & precast elements
UNIT - I

Introduction
Energy in building materials, Environmental issues concerned to building materials, Global warming and construction industry, Green concepts in buildings, Rating, Rainwater harvesting & solar passive architecture. Environmental friendly and cost effective building technologies, Requirements for buildings of different climatic regions  

UNIT - II

Elements of Structural Masonry
Masonry materials, requirements of masonry units’ characteristics of bricks, stones, clay blocks, concrete blocks, stone boulders laterite Blocks, Fal G blocks and Stabilized mud block. Manufacture of stabilized blocks.
Mortars – cementations materials, sand - natural & manufactured, types of mortars, classification of mortars as per BIS, characteristics and requirements of mortar, selection of mortar.
Uses of masonry, masonry bonding, Compressive strength of masonry elements - Factors affecting compressive strength, Strength of Prisms/wallets and walls, Effect of brick bond on strength, Bond strength of masonry: Flexure and shear, Elastic properties of masonry materials and masonry, Design of masonry compression elements subjected to axial load.  

UNIT - III

Alternative Building Materials

UNIT – IV

Alternative Building Technologies

**Alternative Roofing Systems**

Concepts, Filler slabs, Composite beam panel roofs, Masonry vaults and domes.  

**UNIT – V**

Equipment for production of stabilised blocks, moulds and methods of production of precast elements.

Green Building Design- Cost concept & Case studies.  

**TEXT BOOKS:**


**REFERENCE BOOKS:**

1. Relevant IS Codes.

*******************
DESIGN & DRAWING OF RCC STRUCTURES

Sub Code   : 13CV601                                    Credits          :   04
Hrs/Week   : 2+0+3+0                                    Total Hours   :   52

Course Outcomes :

1. Students will be able to analyze and draw general Layout out of building, reinforcement details for beam and slab floor system and continuous beam, stair case and footing along with the bar bending schedule for the given structural member.
2. Students will be able to analyze, design and detailing of reinforcement for the following structural units- Portal frames, circular and rectangular water tank using IS 3370 (Part IV), Cantilever Retaining walls, Combined footing.

UNIT – I

1. Layout Drawing: General layout of building showing, position of columns, footings, beams and slabs with notations and abbreviations.
2. Beam and Slab floor system, continuous beams.
3. Staircase: Dog legged and Open well.
4. Column footing: Column and footing (Square and Rectangle)  

   20 Hours

UNIT – II

2. Circular and Rectangular water tanks resting on ground (Flexible base and Rigid base), using IS: 3370 (Part IV) only.
4. Combined footing (Rectangular), slab and beam type.

   32 Hours

TEXT BOOKS:

REFERENCE BOOKS:
6. SP 34 – Handbook on concrete reinforcement and detailing, Bureau of Indian Standard, New Delhi

Note: All designs except water tanks shall be with limit state method only using SP – 16.

******************************
GEOTECHNICAL ENGINEERING – II

Sub Code : 13CV602     Credits : 03
Hrs/Week : 3+0+0+0     Total Hours : 39

Course Outcomes:

1. Capable of knowing the various method involved in soil exploration in laboratory and field condition.
2. Understand the various types and methods involved in the study of stresses under various types of loadings.
3. Capable to understand the flow of water in soil and studies related to seepage.
4. Students are capable to evaluate, Design the lateral stress due various types of movement from the earth.
5. Capable of designing and study the safety of slopes.
6. Students are exposed to foundation design for various types of footing and implement in field.
7. Able to understand the various types of settlement.

UNIT - I

SOIL EXPLORATION
:Objectives of soil exploration, Methods of Boring, Types of soil samples and Samplers, Sample disturbance, inside clearance, outside clearance, Area ratio, Recovery ratio, Spacing and depth of exploration, Ground water observation – Hvorselev’s method , Indirect methods of exploration - Sounding Tests (Cone penetration Tests and Standard penetration tests), Geophysical methods - Electrical resistivity and Seismic refraction methods, Borehole logs, Site investigation reports. 8 Hours

UNIT- II

STRESS DISTRIBUTION IN SOILS: Boussinesq’s theory – point load, line load, strip load, uniformly loaded circular area, Vertical stress distribution diagrams, Newmark’s influence chart, Westergard’s equation, Comparison, Contact pressure.
SEEPAGE FLOW THROUGH SOILS: Laplace equation (no derivation), Flow nets, Characteristics and uses, flownet construction – graphical method. Determination of quantity of seepage, seepage pressure, uplift pressure, exit gradient, determination of phreatic line in earthen dams with and without filter, piping mechanism and its control.  

9 Hours

UNIT – III

LATERAL EARTH PRESSURE: Effect of wall movement on earth pressure, Earth’s pressure at rest, Earth pressure theories, Rankine’s and Coulomb's theories. Graphical solutions to earth pressure theories (cohesion less soils only) - Culmann's method and Rebhan's construction.  

7 Hours

UNIT – IV

STABILITY OF SLOPES: Types of slopes, Causes and types of failure of finite slopes; Factor of safety; Stability of finite slopes – Φ = 0 analysis, C - Φ analysis - Method of slices, Location of most critical circle, Friction Circle method, Taylor's stability number.  

7 Hours

UNIT - V

BEARING CAPACITY OF SHALLOW FOUNDATIONS: Terms related to bearing capacity - ultimate, net and safe bearing capacity, Types of failure in soils, Terzaghi’s and Brinch Hansen's bearing capacity equations, Effect of ground water table on bearing capacity, IS code recommendations for bearing capacity. Plate load test, Safe bearing pressure from SPT and CPT value.


8 Hours

TEXT BOOKS:

**REFERENCE BOOKS:**

***************

**TRANSPORTATION ENGINEERING – II**

<table>
<thead>
<tr>
<th>Sub Code</th>
<th>13CV603</th>
<th>Credits</th>
<th>04</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hrs/Week</td>
<td>4+0+0+0</td>
<td>Total Hours</td>
<td>52</td>
</tr>
</tbody>
</table>

**Course Outcomes:**

1. To understand the various elements of the railway track and to calculate the quantity of materials required to lay a railway track
2. To know different types of gradients in the railway track and to calculate the resistances to the moment of the train
3. To study different types of level crossing, Signals and Station Yards
4. To understand different types of tunneling methods while laying railway track
5. To impart basic knowledge about the layout of airport and different elements of it.
6. To study the basic runway requirements and classification of different airports
7. To study the layout and design of exit taxiway, To know the various component and typical layout of airport

UNIT - I

Railways: Role and selection of routes.
Permanent way: Gauges in railways, railway track, cross sections, coning of wheels, rails, rail sections, ballast, sleepers, creep of rails, rail fixtures, calculation of quantity of materials. 11 Hours

UNIT – II

Traction and tractive resistances, tractive power, hauling capacity.
Geometric design of track – grade, types of grade, speed of train, super elevation, cant deficiency, negative cant, speed calculations based on IR formula. 10 Hours

UNIT – III

Points and crossing, turnout, station and yards, signals, level crossing.
Tunnels – tunnels for railways and roads, cross sections, tunneling in soft soils: Forepoling method, Needle beam method, principle of tunneling through hard and soft rocks: Drift method, Heading and bench method, Full face method, Objects tunnel lining. 10 Hours

UNIT – IV

Airport planning, aircraft characteristics, airport classifications, site selection and regional Planning.
Runway design, analysis of wind data, determination of best orientation of runway configuration, basic length, corrections to runway length by ICAO and FAA specifications, runway cross section. 10 Hours
UNIT – V

Taxiway design, factors affecting the layout and geometrics of Taxiway, design of exit taxiway – ICAO specifications. Visual aids – ILS. Harbours – types, components, typical layout, objects and function of different elements of harbour. 11 Hours

TEXT BOOKS:
1. Arora & Saxena, “Railway Engineering”, Dhanpath Rai and Sons
2. Khanna, Arora & Jain, “Airport Planning and design”, Laxmi Publications, Bangalore

REFERENCE BOOKS:
1. Horenjeff, “Planning, Design of Airports”.

ENVIRONMENTAL ENGINEERING – II

Sub Code : 13CV604 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:
Upon successful completion of this course student will be able to:
1. Identify the waste water source and estimate quantity of wastewater generated.
2. Design sewers flowing full and partially full and have gained knowledge of materials used for construction of sewers.
3. Describe various sewer appurtenances and their uses in sewer line and how beneficial it can be utilized.
4. Analyze characteristics of wastewater.
5. Find out various zones of pollution of a river and importance of oxygen in self-purification phenomenon.
6. Design of primary and secondary treatment units.
7. Mention various methods of disposing the sludge and how effectively the wastewater can recycle and reused.

UNIT – I

Introduction: Necessity for sanitation; methods of domestic waste water disposal; types of sewerage systems and their suitability.

Quantity of sewage: Dry weather flow; factors affecting dry weather flow, flow variations and their effects on design of sewerage system; computation of design flow, estimation of storm flow, rational method and empirical formulae of design of storm water drain; Time of concentration
Design of sewers: Hydraulic formulae for velocity, effects of flow variations on velocity, self cleansing and non scouring velocities, Design of hydraulic elements for circular sewers flowing full and flowing partially full

UNIT – II

Sewer materials; shapes of sewers; laying of sewers; joints and testing of sewers; ventilation and cleaning of sewers.
Sewer appurtenances: Catch basins, manholes, flushing tanks, oil and grease traps, drainage traps; Basic principles of house drainage, typical layout plan showing house drainage connections, maintenance of house drainage

Sewage pumping: Need, Types of pumps and pumping stations
UNIT – III

Analysis of sewage: Physical, chemical and biological characteristics; concepts of aerobic and anaerobic activity; CNS cycles; BOD and COD; Sampling – significance, techniques and frequency.
Disposal of effluents: Disposal by dilution, self-purification phenomenon, Oxygen sag curve; Zones of purification; Sewage farming, sewage sickness; effluent disposal standards for land, surface water & ocean

UNIT – IV

Treatment of sewage: Flow diagram of municipal wastewater treatment plant; Preliminary treatment – Screening, grit chambers, skimming tanks
Primary sedimentation tanks – design; Secondary treatment – Trickling filter – theory and operation, types and design

UNIT – V

Activated sludge process – Principle and flow diagram, methods of aeration; modifications; F/M ratio, design of ASP; Methods of sludge disposal, Sludge drying beds, sludge digestion and filter beds.

Miscellaneous treatment methods: Septic tank and Oxidation Pond – design; Introduction to RBC, UASB and anaerobic filters.

TEXT BOOKS:

REFERENCE BOOKS:

GEOTECHNICAL ENGINEERING LABORATORY

Sub Code : 13CV605  Credits : 02
Hrs/Week : 0+0+3+0

Tests for determination of specific gravity and moisture content.
1. Grain size analysis of soil sample (sieve analysis).
2. In situ density by core cutter and sand replacement methods.
3. Consistency Limits – Liquid Limit (Casagrande Method), plastic limit and shrinkage limit.
5. Coefficient of permeability by constant head and variable head methods.
6. Strength Tests
   a. Unconfined Compression Test
   b. Direct Shear Test
   c. Triaxial Compression Test (undrained)
7. Consolidation Test- Determination of coefficient of consolidation.
8. Laboratory vane shear test
9. determination of California Bearing resistnace.
10. Demonstration tests:
    a. Miscellaneous equipments such as Augers, Samplers, Rapid Moisture meter, Proctor’s needle.
    b. Hydrometer Test.
c. Free Swell Index and Swell Pressure Test
d. Determination of relative density of sands.

REFERENCE BOOKS:
4. Relevant IS codes (latest edition)

***************
ENVIRONMENTAL ENGINEERING LAB
Sub Code   : 13CV606          Credits       : 02
Hrs/Week   : 0+0+3+0

   3 Hours

2. Determination of electrical conductivity, turbidity and Sulphates.  
   3 Hours

2. Determination of Chlorides.
3. Determination of Alkalinity, Acidity and pH.
4. Determination of Calcium, Magnesium and Total Hardness.
6. Determination of BOD.
7. Determination of COD.

Note: (give only test name)

REFERENCE BOOKS:
3. Relevant IS codes (latest edition)

************************

EXTENSIVE SURVEY PROJECT /MINI PROJECT

Sub Code : 13CV607  
Credits : 01
Hrs/Week : 2 weeks

Objectives of the course:
1. To study the practical applications of Surveying.
2. To study the usage of Total station and other Electronic equipments.
(To be conducted between 5th & 6th Semester for a period of 2 weeks; Viva Voce conducted along with 6th Sem. Exams)

An extensive survey training involving investigation and design of the following projects is to be conducted for 2 weeks (14 days). The students shall submit a project report consisting of designs drawings.

1. General instruction, Reconnaissance of the sites and fly leveling to establish bench marks.

2. NEW TANK PROJECT:
The work small consist of:
   i) Alignment of center line of the proposed bund.
      Longitudinal and cross-sections the center line.
ii) Capacity surveys.
iii) Details at waste weir and sluice points.
iv) Canal alignment.

3. RESTORATION OF AN EXISTING TANKS
The work shall consist of:
   i) Alignment of center line of the existing bund, Longitudinal and cross sections along the center line
   ii) Capacity survey, details at sluice waste weir.

4. WATER SUPPLY AND SANITARY PROJECTS:
Examination of sources of water supply, Calculation of quantity of required based on existing and projected population. Preparation of village map by any suitable method of surveying (like plane tabling) location of sites for ground level and overhead tanks, underground drainage system surveys for laying the sewers.

5. HIGHWAY PROJECT:
Preliminary and detailed investigations to align anew road between two obligatory points. The investigations shall consist of topographic surveying of strip of land for considering alternate routes and for final alignment. Report should justify the selected alignment with details of all geometric designs for traffic and design speed assumed. Drawing shall include key plan, initial alignment, final alignment, longitudinal section along final alignment, typical cross sections of road.

Scheme of examinations:
1. Evaluation of reports and drawings: 30 marks
2. Viva voice: 20 marks

*****************************************************************************

ENTRY EDGE: IMMERSIVE GROUP WORKSHOP (IGW)
Module 1: Minds-on and hands-on simulation project
- Understanding Task environment – Goals, responsibilities, Task focus
- Working in Teams towards common goals
- Organizational performance expectations–technical and behavioural competencies.  
  7.5 Hours

Module 2: Re-enforcement of critical individual skills and behaviours
- Application of individual effectiveness skills in team and organizational context – improving self-awareness, goal setting, time management, communication and presentation skills.  
  3.5 Hours

Module 3: Etiquettes and Ethics
- Professional etiquettes at workplace – dressing, telephone, e-mail, meeting and general behaviour
- Basic honesty & respect for law / rules
- Conflict of interest
- Use of organizational resources
- Misrepresentation and misappropriation
- Intellectual property
- Whistle blowing  
  7 Hours

Module 4: Interpersonal Behaviour& relationship skills
- Establishing trust based relationships in team & organizational environment
- Trust equation – credibility, responsiveness, integrity, self-interest  
  3.5 Hours

Module 5: Dealing with Conflicts
Orientation towards conflicts in team and organizational environment
- Understanding sources of conflicts
- Conflict resolution styles and techniques  
  3.5 Hours

Pedagogical tools & techniques used in the workshop
- Organizational templates for simulating a organizational context-structures, units, roles and activities
• Metaphoric scenarios for simulating real-life tasks and dynamics in a team/project context
• LEGO™ building blocks for simulating last-mile technical activity in teams
• Case studies, Role play scenarios group learning activities, observation and feedback.

**Note:** Evaluation is done and a grade of P (pass) or NP (not pass) is awarded

--------------------

**MATRIX METHODS OF STRUCTURAL ANALYSIS**

Sub Code : 13CV611  
Credits : 03  
Hrs / Week : 3  
Total Hours : 39

**Course Outcomes:**

1. Students should understand the structural behaviour under the action of forces and the reactions developed to restore the deformations.
2. They should learn the applications of matrix algebra for the determination of flexibility coefficients and hence to derive the flexibility matrix for a given determinate structure.
3. They must solve problems on finding the unknown forces and reactions in structural systems like beams, trusses, rigid jointed and pin jointed frames by adopting flexibility approach.
4. They should learn the fundamental concepts of stiffness coefficient and develop stiffness matrix for a given determinate structure.
5. They must arrive at the solution of analysis of problems on beams, frames, trusses by element approach of stiffness method.
6. They must understand the system approach of stiffness method and solve problems on beams and trusses.
7. They should be clear in the fundamentals of the matrix methods of structural analysis since it is the first step for understanding the finite element analysis of structures

UNIT - I

Introduction to flexibility method, Element flexibility matrix, Principle of contragradience, and Force Transformation Matrix, Member Flexibility matrix, Construction of structure flexibility matrix. Matrix determination of the displacement vector, Determination of member forces. Analysis of trusses by flexibility method using force transformation matrix. **8 Hours**

UNIT - II

Analysis of axially rigid continuous beams and rigid plane frames with axially rigid members by flexibility method using Force transformation Matrix **8 Hours**

UNIT – III

Fundamentals of the stiffness method, equivalent joint loads, Displacement Transformation matrix. Member stiffness matrix, Total or System stiffness matrix, Truss analysis by stiffness method using Displacement Transformation Matrix. **8 Hours**

UNIT – IV

Continuous Beam and rigid frame analysis with axially rigid members by stiffness method using displacement transformation matrix. **7 Hours**

UNIT – V

Introduction to direct stiffness method, local and global co-ordinate system, transformation of variables, transformation of the member displacement matrix, force matrix, stiffness matrix, transformation of the stiffness matrix of the member of a truss, transformation of the stiffness matrix of the member of the rigid frame, overall stiffness matrix, boundary conditions, computation of internal forces.
Analysis of trusses, pin jointed frames and continuous beams by direct stiffness method.  

8 Hours

NOTE:

i. Determination of member forces, displacement and reactions using matrices only

ii. Number of indeterminacy shall be \( \leq 3 \) (for paper setting)

TEXT BOOKS:


REFERENCE BOOKS:


*******************

TRAFFIC ENGINEERING

Sub Code  : 13CV612  
Credits     : 03  
Hrs / Week  : 3  
Total Hours : 39

Course Outcomes :

1. To have clear knowledge on objective and Scope of traffic engineering
2. To understand the importance of Traffic volume, Speed & delay, Origin & Destination studies
3. To impart the Knowledge on Traffic-flow theories & Correlation and regression analysis in Traffic Engineering
4. To clearly understand various traffic regulations and control of Traffic
5. To understand Traffic rotary and Impart the basics of ITS

UNIT - I

Introduction: Definition; Objectives; Scope of traffic Engineering
Road User and Vehicle Characteristics: Static and Dynamic Characteristics- Power performance of vehicles-Resistances to the motion of vehicles-Reaction time of driver. 7 Hours

UNIT – II

Traffic parameter Studies and Analysis: Objectives and method of study-
Definition of study area- Sample size-Data Collection and Analysis-
Interpretation of following Traffic Studies- Volume, Spot Speed, Origin and Destination, Speed and Delay- Parking- on Street and Off Street Parking- Accidents- Causes, Analysis (right angle collision only with parked vehicle)- Measures to reduce Accident. 9 Hours

UNIT – III

Traffic Flow Theories: Traffic flow theory Green shield theory-Goodness of fit-correlation and regression analysis (linear only) –Queuing theory – car following theory. Traffic forecast- simulation technique. 8 Hours

UNIT – IV

Traffic Regulation and Control: Driver, Vehicle and Road controls-
Traffic Regulations- One Way-Traffic Signs-Traffic Markings- Traffic signals-Vehicle actuated and synchronized signals –Signal Coordination-Webster’s method of signal Design, IRC Method. 8 Hours

UNIT – V

Traffic Rotary elements and traffic operation-Street lighting-road side Aboriculture.
Intelligent Transport system-case studies. 7 Hours
TEXT BOOKS:

REFERENCE BOOKS:
5. Mc Shane and Roess, “Traffic Engineering”, PHI.

RURAL WATER SUPPLY AND SANITATION

Sub Code : 13CV613                      Credits :  03
Hrs / Week :  3                        Total Hours :  39

Course Outcomes :
Upon successful completion of this course student will be able to:
1. Provide a protected water supply with various systems
2. Remove impurities from water by suitable methods.
3. Identify suitable disposal methods.
4. Design a rainwater harvesting system and its uses
5. Understand the various types of diseases and preventive measures for the same.
6. Collection and transporting methods of refuse and disposal.
7. Maintain hygiene in cowshed so that quality of milk is maintained and avoid diseases from cattle.
UNIT – I

Rural water supply- introduction; need for a protected water supply, well waters, water-borne diseases. Types of systems viz., BWS, MWS, PWS water treatment defluoridation, hardness and iron removal, ground water contamination and control 8 Hours

UNIT – II

Rural sanitation-conservancy, public latrine, concept of eco sanitation, trenching and composting methods, two pit latrines, aqua privy, W.C., septic tank, soak pit, sullage disposal, rain water harvesting and uses 8 Hours

UNIT – III

Communicable diseases- Terminology, classifications, methods of communication, general methods of control. Disease vectors: mosquito and house fly, control measures 8 Hours

UNIT – IV

Refuse collection and disposal-garbage, ash, rubbish, collection methods, transportation, disposal- salvaging, dumping, controlled tipping, incineration, composting, dung disposal-digester, biogas plant 8 Hours

UNIT – V

Milk sanitation- Essentials, test for milk quality, pasteurization, quality control, cattle borne diseases, planning for a cow shed. 7 Hours

TEXT BOOKS:

REFERENCE BOOKS:

***********************************************************************************************************************************************

GROUND WATER HYDROLOGY

Sub Code : 13CV621                      Credits : 03
Hrs / Week : 3                          Total Hours : 39

Objectives:
To make the students to understand the fundamentals and importance of groundwater, its exploration, development and management techniques.

UNIT - I


GROUND WATER EXPLORATION: Seismic method. Electrical resistivity method – principles, yield of a well. 8 Hours

UNIT – II

FUNDAMENTALS OF GROUND WATER FLOW: Aquifer parameters - Specific yield and specific retention, porosity, storage coefficient: derivation of the expression. Darcy’s law, hydraulic conductivity, coefficient of permeability and intrinsic permeability, transmissibility, permeability in isotropic - unisotropic layered soils, steady one dimensional flow - different cases with recharge. 8 Hours
UNIT – III

WELL HYDRAULICS STEADY FLOW: Radial flow in Confined and Unconfined aquifers, pumping tests, well recuperation tests  

UNIT – IV

WELL HYDRAULICS-UNSTEADY FLOW: General equation derivation; Theiss method, Cooper and Jacob method, Chow’s method. Solution of unsteady flow equations. Leaky aquifers (only introduction); Interference of wells - Image well theory.

UNIT – V

GROUND WATER DEVELOPMENT: Types of wells. Methods of construction, tube well design, dug wells, pumps for lifting water - working principles, power requirement. Conjunctive use - necessity, techniques and economics.

TEXT BOOKS:


REFERENCE BOOKS:


*******************************
GROUND IMPROVEMENT TECHNIQUES

Course Outcomes:
Upon successful completion of this course student will be able to:
1. Capable to understand the need of ground improvement and the types of ground modifications.
2. Capable to understand the various methods of mechanical modifications in the soil improving techniques.
3. Capable of implementation of various methods involved in ground modification by hydraulic methods.
4. Understand about chemical modifications applied in field conditions.
5. Capable in implementation of various method by Grouting.
6. Knowledge about various new methods involved in soil improvement.

UNIT – I

GROUND IMPROVEMENT: Definition, Objectives of soil improvement. Classification of ground improvement techniques. Factors to be considered in the selection of the best soil improvement technique.

MECHANICAL MODIFICATION: Type of mechanical modification, compaction, Principle of modification for various types of soils. Effect of grain size distribution on compaction for various soil types like BC soil, latertic soil, coarse-grained soil, micaceous soil. Effect of compaction on engineering behaviour like Compressibility, Swelling and Shrinkage, Permeability, relative density, liquefaction potential. Field compaction - static, dynamic, impact and vibratory type. Specification of compaction. Tolerance of compaction. 9 Hours
UNIT - II

HYDRAULIC MODIFICATION: Definition, aim, principle, techniques, gravity drain, lowering of water table, multistage well point, vacuum dewatering, design of dewatering system including pipe line effects of dewatering. Drainage of slopes, preloading, vertical drains, sand drains, Electro osmotictic dewatering. 8 Hours

UNIT - III


UNIT – IV

GROUTING: Introduction,Effects of grouting,Chemicals and materials used, Types of grouting, Grouting procedure and Applications of grouting. 7 Hours

UNIT – V

MISCELLANEOUS METHODS (only Concepts):Introduction, Soil reinforcement., Thermal methods, Ground improvement by confinement - Crib walls, Gabions &Mattresses, Anchors, Rock bolts and soil nailing. 7 Hours

TEXT BOOKS :

REFERENCE BOOKS :

REMOTE SENSING AND GIS APPLICATIONS IN CIVIL ENGINEERING

Sub Code : 13CV623
Credits : 03
Hrs / Week : 3
Total Hours : 39

Course Outcomes:
At the end of the course the student will be able to:
1. Define and Describe the Global Positioning System, Remote sensing and Geographic Information Systems
2. List and Explain the fundamentals of Global Positioning System, Remote sensing and Geographic Information Systems
3. Assess and Explain the significance of Geomatics in Civil Engineering practices
4. Explain the Image interpretation Techniques and analyze the satellite imageries

UNIT – I

UNIT - II

Photogrammetry- basic principles and photo interpretation, application of aerial photo interpretation to various disciplines like water resources, terrain evaluation, pedology, forestry., Interpretation and Analysis techniques: Multispectral, Multitemporal, Multisensoral, Multistage concepts, Photo-interpretation techniques for aerial photos and satellite imagery, Visual & Digital Image interpretation, interpretation elements, false colour composites  

8 Hours

UNIT – III

Digital Analysis: Preprocessing and processing (DIP), image restoration/enhancement procedures, information extraction, pattern recognition concepts, post processing procedures. Output products: Format, scale, legends  

8 Hours

UNIT - IV

Fundamentals of GIS, spatial and non-spatial data, vector and raster GIS, GIS softwares, georeferencing, digitization, thematic maps, GPS, operation of GIS, Map projections, Map scale, data display and cartography  

9 Hours

UNIT – V

Applications in Civil Engineering: River drainage and flood flow, water shed characteristics, irrigation command area mapping, Ground water inventory, soil moisture, water quality assessment and monitoring, coastal environmental studies  

7 Hours

TEXT BOOKS:
REFERENCE BOOKS:
2. Heywod, Ian, Sarah Cornelius & Steve Karvar An Introduction to GIS 2nd Ed., Pierson Education Ltd.,
5. Geographic Information Systems and Science John Wiley & Sons Ltd., ESRI Press.

**************************************************

EMPLOYABILITY SKILL DEVELOPMENT

<table>
<thead>
<tr>
<th>Sub Code</th>
<th>13IL001/002</th>
<th>Credits</th>
<th>Nil (MLC)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hrs/Week</td>
<td>1+0+0+0</td>
<td>Total Hours</td>
<td>12</td>
</tr>
</tbody>
</table>

UNIT - I
Analytical Aptitude Skill: concept of analytical skill, definition- logical thinking and testing of Analytical Aptitude

UNIT - II
Quantitative Aptitude skill-Concept-definition-Preliminary requirement for development of quantitative skill- testing of quantitative skill.
UNIT - III

Verbal and ability skill – Knowledge and Vocabulary and grammar-comprehension-Verbal Reasoning skill

REFERENCE BOOKS:


Examination pattern:
This course is a mandatory learning course without credit. Continuous internal examination (CIE) consists of 2 internal exams (20 marks each) and tasks (10 marks). There is no semester end examination (SEE). The student will be awarded PP or NP grade as per autonomous regulations.

***************