

**PART- II**  
**(5<sup>th</sup> & 6<sup>th</sup> Sem.)**

**CURRICULUM OF DIPLOMA  
PROGRAMME ON  
CIVIL ENGINEERING (CE)  
IN  
MULTI POINT ENTRY & CREDIT SYSTEM**

**For the State of Nagaland**



*Path Finder for Excellence in Technical Education*

**National Institute of Technical Teachers' Training &  
Research, Kolkata**

**Block – FC, Sector – III, Salt Lake City, Kolkata – 700 106**

<http://www.nitttrkol.ac.in>

**2018**



**SAMPLE PATH: TERM - V**

| Sl. No       | Code  | Course                              | Study Scheme  |                      |   | Evaluation Scheme |          |                        |            |            |          |                        | Total Marks | Credit |           |
|--------------|-------|-------------------------------------|---------------|----------------------|---|-------------------|----------|------------------------|------------|------------|----------|------------------------|-------------|--------|-----------|
|              |       |                                     | Pre-requisite | Contact Hours / Week |   |                   | Theory   |                        |            | Practical  |          |                        |             |        |           |
|              |       |                                     |               | L                    | T | P                 | End Exam | Progressive Assessment |            |            | End Exam | Progressive Assessment |             |        |           |
|              |       |                                     |               |                      |   |                   |          | Class Test             | Assignment | Attendance |          | Sessional              |             |        | Viva-voce |
| 1            | CE505 | Estimating II                       | CE504         | 2                    | 0 | 4                 | 75       | 10                     | 10         | 5          | 0        | 25                     | 0           | 125    | 4         |
| 2            | CE509 | Water Supply & Sanitary Engineering | CE406         | 3                    | 0 | 2                 | 75       | 10                     | 10         | 5          | 25       | 25                     | 0           | 150    | 4         |
| 3            | CE502 | Design & Detailing II               | CE501         | 3                    | 0 | 2                 | 75       | 10                     | 10         | 5          | 0        | 25                     | 0           | 125    | 4         |
| 4            | CE506 | Geo-Technical Engineering I         | CE401         | 3                    | 0 | 2                 | 75       | 10                     | 10         | 5          | 0        | 25                     | 0           | 125    | 4         |
| 5            | CE510 | Highway & Transportation Engg.      |               | 3                    | 1 | 2                 | 75       | 10                     | 10         | 5          | 25       | 25                     | 0           | 150    | 5         |
| 6            | CE409 | Theory of Structure                 | CE401         | 3                    | 1 | 0                 | 75       | 10                     | 10         | 5          | 0        | 0                      | 0           | 100    | 4         |
| 7            | CE515 | Professional Practices – IV*        |               | 0                    | 0 | 2                 | -        | -                      | -          | -          | -        | 50                     | 0           | 50     | 1         |
| <b>TOTAL</b> |       |                                     |               | 17                   | 2 | 14                | 450      | 60                     | 60         | 30         | 50       | 175                    | 0           | 825    | 26        |

\*This includes industrial visit

|   |  |  |  |  |  |  |  |  |  |  |     |     |     |    |
|---|--|--|--|--|--|--|--|--|--|--|-----|-----|-----|----|
| * |  |  |  |  |  |  |  |  |  |  | 100 | 100 | 200 | 10 |
|---|--|--|--|--|--|--|--|--|--|--|-----|-----|-----|----|

\* To be conducted after TERM - V

**SAMPLE PATH: TERM - VI**

| Sl. No | Code  | Course                       | Study Scheme  |                      |   |   | Evaluation Scheme |                        |            |            |          |                        |           | Total Marks | Credit |
|--------|-------|------------------------------|---------------|----------------------|---|---|-------------------|------------------------|------------|------------|----------|------------------------|-----------|-------------|--------|
|        |       |                              | Pre-requisite | Contact Hours / Week |   |   | Theory            |                        |            | Practical  |          |                        |           |             |        |
|        |       |                              |               | L                    | T | P | End Exam          | Progressive Assessment |            |            | End Exam | Progressive Assessment |           |             |        |
|        |       |                              |               |                      |   |   |                   | Class Test             | Assignment | Attendance |          | Sessional              | Viva-voce |             |        |
| 1      | G304  | Soft Core II                 |               | 3                    | 0 | 0 | 75                | 10                     | 10         | 5          | 0        | 0                      | 0         | 100         | 3      |
| 2      | CE511 | Irrigation Engineering       | CE406         | 3                    | 0 | 0 | 75                | 10                     | 10         | 5          | 0        | 0                      | 0         | 100         | 3      |
| 3      | CE507 | Geo-Technical Engineering II | CE506         | 3                    | 1 | 0 | 75                | 10                     | 10         | 5          | 0        | 0                      | 0         | 100         | 4      |

|              |           |                             |  |    |   |    |     |    |    |    |   |     |    |     |    |
|--------------|-----------|-----------------------------|--|----|---|----|-----|----|----|----|---|-----|----|-----|----|
| 4            | CE601-604 | Elective I                  |  | 3  | 1 | 0  | 75  | 10 | 10 | 5  | 0 | 0   | 0  | 100 | 4  |
| 5            | CE601-604 | Elective-II                 |  | 3  | 1 | 0  | 75  | 10 | 10 | 5  | 0 | 0   | 0  | 100 | 4  |
| 6            | CE517     | Project                     |  | 0  | 0 | 10 | 0   | 0  | 0  | 0  | 0 | 50  | 50 | 100 | 5  |
| 7            | CE516     | Professional Practices – V* |  | 0  | 0 | 4  | 0   | 0  | 0  | 0  | 0 | 50  | 0  | 50  | 2  |
| <b>TOTAL</b> |           |                             |  | 15 | 3 | 14 | 375 | 50 | 50 | 25 | 0 | 100 | 50 | 650 | 25 |

\*This includes seminar on project

## **TERM - V**

|  |  |
|--|--|
| <b>Name of the course : ESTIMATION – II</b>  |  |
| <b>Course code: CE505</b>  | <b>Semester : FIFTH</b>  |
| <b>Teaching Scheme</b>   | <b>Maximum Marks : 125</b>   |
|  | <b>PA and End Examination Scheme</b>   |
| Theory : 2 hrs/week  | Class test: 10 Marks   |
| Tutorial: 0 hrs/week   | Assignment / Quiz etc.: 10 Marks<br>Attendance : 5 Marks<br>Sessional : 25 Marks         |
| Practical : 4 hrs/week   | End Semester Theory Exam:75 Marks  |
| Credit : 4   | PA & End Semester Practical Exam:  |
| <b>Rationale:</b>  |  |
| The subject of estimating is of prime importance, as the students are required to know the various aspects of rate analysis, types of estimates, details of specifications for arriving at a correct estimate of construction units for civil engineering projects |  |
| <b>Course Objective :-</b>   |  |
| <b>Module/Unit</b>   | After completion of the course, students will be able to:                                |
| UNIT - I   | Analyze rates of various items of construction of simple civil engineering structures    |
| UNIT- II   | Explain different types of estimation techniques and estimate cost of various items      |
| UNIT III   | Consolidate ideas about specifications for various items of work as per IS specification |
| UNIT - IV  | Describe different forms of valuation and develop ideas to value real estate properties  |
| <b>Pre-Requisite :-</b>  |  |
|  | Estimating I   |

| MODULE / UNIT | Contents (Theory)  | Hrs | Marks |
|---------------|--|-----|-------|
| UNIT - I      | <b>1.0 RATE ANALYSIS</b><br>1.1 Analysis of rates of brick work, plain cement concrete work, RCC work, doors, windows, plastering, cement concrete floor, white washing centering and shuttering, damp proof course coverage, carriage of materials, earth work for foundation and for cutting and filling of trenches | 8   | 10    |
| UNIT- II      | <b>2.0 TYPES OF ESTIMATES</b><br>2.1 Plinth area estimate, carpet area estimate, cube rate estimate, revised estimate, supplementary estimate, repair estimate.<br>2.2 Bill of quantities, building cost index, annual repair estimate   | 6   | 10    |

|              |  |           |    |
|--------------|--|-----------|----|
| UNIT- III    | <p><b>4.0 CONTRACTS &amp; TENDERS</b></p> <p>4.1 Definition, types of contracts – - lump sum contract, item rate contract, percentage rate contract, cost plus percentage, cost Plus fixed fee, cost plus variable percentage and cost plus variable fee contract, labour contract, demolition contract, fee contract, Target contract, negotiated contract .</p> <p>4.2 Class of contractor, Registration of contractor.</p> <p>4.3 Filling the tender by contractor and points to be observed by him.</p> <p>4.4 Necessity of tender-sealed quotations and tenders. Tender notice-tender documents EMD and security deposit. Opening of tenders – Scrutiny of tenders – contract agreement – conditions of contract – execution of agreement</p>   | 6         | 14 |
| UNIT IV      | <p><b>3.0 GENERAL AND DETAILED SPECIFICATION</b></p> <p>3.1 Preparation of detailed specification: earth work in excavation, first class brick work , wood work in doors and windows, CGI sheet and AC sheet roofing, rolling and consolidation of road metals, construction of cement concrete floor, RCC slab/box culvert, plastering, white washing, plain concrete, cement mortar, mosaic floor, lime concrete in terracing, centering and shuttering.</p> <p>3.2 Legal aspects of specification</p>   | 10        | 23 |
| UNIT - V     | <p><b>4.0 VALUATION</b></p> <p>4.1 Definition, necessity of valuation, Definitions – cost price, value, difference between them, characteristics of value, factors affecting value.</p> <p>4.2 Types of value: - book value, scrap value, salvage, Value, speculative value, distress value, market value, monopoly value, sentimental value, factors affecting value .</p> <p>4.3 Depreciation, obsolescence, sinking fund; Methods of calculation of depreciation – straight line method, Sinking fund method constant percentage method quantity survey method.</p> <p>4.4 Computation of capitalized value, gross income, outgoing, net Income, years purchase. Types of outgoing and their percentages.</p> <p>4.5 Valuation of lands &amp; buildings, factors affecting their valuation, Book value method, replacement value method and comparison method. Use of valuation tables .deferred value of land.</p> <p>4.6 Fixation of rent as per PWD practice</p> | 12        | 18 |
|              | <b>CLASS TESTS</b>   | 3         |    |
| <b>Total</b> |  | 45<br>hrs | 75 |

**Tutorial Problems**

|    |   |
|----|---|
| 1. | To prepare a detailed estimate of an irrigation canal partly cutting and partly banking   |
| 2. | To prepare a detailed estimate of a double storied RCC framed building with verandah, latrines, septic tank, fencing wall with decorative finish (including plumbing, sanitary, steel and timber works) |
| 3. | To prepare a detailed estimate of finishing items such as plastering, painting, varnishing etc.   |
| 4. | To prepare a supplementary estimate of a RC building for addition, alteration or deviation from the original plan of the building after part execution  |
| 5. | To prepare an estimate for annual repair of a RC building   |
| 6. | To prepare an estimate for RC box culvert.  |

Note: The above exercise will be given to the students as specific guided project work. They will be supplied with necessary drawing details. These exercises should be preferably run in parallel with the theoretical instruction



| <b>Text /Reference Books:</b> |  |                            |
|-------------------------------|--|----------------------------|
| <b>Sl. No.</b>                | <b>Name of Book</b>                            | <b>Author</b>              |
| 1.                            | Estimating and costing                         | B.N. Dutta & R.C. Rangwala |
| 2.                            | A Text Book of Estimating Costing and Accounts | D.D. Kohli & R.C. Kar      |
| 3.                            | Estimating, Costing and Specification          | M. Chakraborty             |
| 4.                            | Estimating & Costing - by                      | S. Ramamrutham;            |

|   |  |   |            |              |
|---|--|---|------------|--------------|
| <b>Name of the course : WATER SUPPLY &amp; SANITARY ENGINEERING</b>   |  |   |            |              |
| <b>Course code: CE509</b>   |  | <b>Semester : FIFTH</b>   |            |              |
| <b>Teaching Scheme</b>  |  | <b>Maximum Marks : 150</b>  |            |              |
|   |  | <b>PA and End Examination Scheme</b>                                      |            |              |
| Theory :  | 3 hrs/week   | Class test: 10 Marks  |            |              |
| Tutorial:   | 0 hrs/week   | Assignment / Quiz etc.: 5 Marks<br>Attendance : 5 Marks<br>Sessional : 25 |            |              |
| Practical :   | 2 hrs/week   | End Semester Theory Exam:75 Marks   |            |              |
| Credit :  | 4  | PA Practical: 25 Marks  |            |              |
| <b>Rationale:</b>   |  |   |            |              |
| Providing potable water, one of the basic necessities of life, to a community is an important activity of a civil engineer. Knowledge and skill in the field of water supply engineering and waste water disposal is essential for maintaining the health and sanitation of a community |  |   |            |              |
| <b>Course Objective :-</b>  |  |   |            |              |
|   | After completion of the course, students will be able to:  |   |            |              |
| 1.  | Protect water supply   |   |            |              |
| 2.  | Calculate water demand for the people  |   |            |              |
| 3.  | Maintain quality of water  |   |            |              |
| 4   | Describe the importance of sanitary system   |   |            |              |
| 5   | Manage the sewage system   |   |            |              |
| 6   | Manage the sewage treatment and disposal process.  |   |            |              |
| <b>Pre-Requisite :-</b>   |  |   |            |              |
| 1.  |  |   |            |              |
| <b>Contents (Theory)</b>  |  |   | <b>Hrs</b> | <b>Marks</b> |
| UNIT – I  | <b>1.0 INTRODUCTION</b><br>1.1 Necessity of protected water supply<br>1.2 Historical development |   | 1          | 2            |

|            |  |   |    |
|------------|--|---|----|
| UNIT- II   | <p><b>2.0 QUANTITY OF WATER:</b></p> <p>2.1 Water requirements and different uses of water</p> <p>2.2 Per capita demand, variation in demand and factors affecting demand</p> <p>2.3 Methods of forecasting population, Numerical problems using different methods</p>   | 3 | 4  |
| UNIT - III | <p><b>3.0 SOURCES OF WATER:</b></p> <p>3.1 Surface sources- Lake, stream, river and impounded reservoir</p> <p>3.2 Underground sources- aquifer type &amp; occurrence- Infiltration gallery, infiltration well, springs, well-types, suitability</p>   | 2 | 3  |
| UNIT - IV  | <p><b>4.0 CONVEYANCE OF WATER:</b></p> <p>4.1 Intakes- types, description of river intake, reservoir intake, canal intake</p> <p>4.2 Pumps for conveyance &amp; distribution types, selection, installation, capacity of pump, most economic diameter of pumping main</p> <p>4.3 Pipe joints-necessity, types of joints, suitability, methods Of jointing</p> <p>[ <i>Note: Detailed study covered under practical, hence students may be asked to prepare detailed sketches as home assignment</i> ]</p>  | 5 | 7  |
| UNIT - V   | <p><b>5.0 QUALITY OF WATER:</b></p> <p>5.1 Impurities in water- organic and inorganic, classification</p> <p>5.2 Harmful effects of impurities</p> <p>5.3 Analysis of water- sampling and tests for physical, chemical and bacteriological quality ,significance of tests (<i>detailed methods of tests will be discussed in laboratory class</i>)</p> <p>5.4 Water quality standards for different uses</p>   | 5 | 7  |
| UNIT - VI  | <p><b>6.0 TREATMENT OF WATER:</b></p> <p>6.1 Flow diagram of conventional water treatment system</p> <p>6.2 Treatment process/units:</p> <p>6.2.1 Aeration:Necessity, types of aerators, essential features</p> <p>6.2.2 Plain Sedimentation:Necessity, working principles, Sedimentation tanks types, essential features, operation &amp; maintenance</p> <p>6.2.3 Sedimentation with coagulation: Necessity, types of coagulants, determination of coagulant dose (<i>procedure of Jar test to be covered under practical</i>)</p> <p>Types, essential,operation of Flash Mixer , Flocculators and Clarifier</p> <p>6.2.4 Filtration: Necessity, principles, types of filters</p> <p>Slow Sand Filter- essential features, operation, clearing &amp; maintenance</p> <p>Rapid Sand Filter- essential features, operation, cleaning &amp; maintenance, comparison with slow</p> | 9 | 12 |

|           |  |   |   |
|-----------|--|---|---|
|           | <p>sandfilter, description &amp; working operation accessories, head-loss gauge etc.,</p> <p>Pressure Filter essential features, operation &amp; maintenance, suitability of use</p> <p>6.2.5 Disinfection: Necessity, methods of disinfection, types of chemical disinfectants</p> <p>Chlorination - free and combined chlorine demand, available chlorine, residual chlorine, pre-chlorination, break-point chlorination, super chlorination,</p> <p>determination of chlorine dose (testing procedure to be covered under practical), chlorinators- types, feeding</p> <p>6.3 Determination of dosage of chemical requirement for coagulation, chlorination, (Jar test, Residual chlorine test to be discussed in laboratory)</p> |   |   |
| UNIT VII  | <p><b>INTRODUCTION ON SANITARY ENGINEERING:</b></p> <p>10.1 Aims and objectives of sanitary engineering</p> <p>10.2 Definition of terms related to sanitary engineering</p> <p>10.3 Systems of collection of wastes- Conservancy and Water Carriage System- features, comparison, suitability</p>  | 5 | 4 |
| UNIT VIII | <p><b>QUANTITY OF SEWAGE:</b></p> <p>11.1 Quantity of sanitary sewage- domestic &amp; industrial Sewage, variations in sewage flow, numerical problem on computation quantity of sanitary sewage, Storm water flow-rational method of computation of flow</p> <p>11.2 Computation of size of sewer, application of Chezy's formula, Limiting velocities of flow- self-cleaning and scouring</p>  | 5 | 4 |
| UNIT IX   | <p><b>SEWERAGE SYSTEM</b></p> <p>12.1 Types of system, separate, combined, partially separate, features, comparison between the types, suitability</p> <p>12.2 Shapes of sewer, features, suitability</p> <p>12.3 Sewer materials- suitability, handling &amp; maintenance of stoneware, cast iron, cement concrete, asbestos cement, pre-cast &amp; cast in situ sewer</p> <p>12.4 Laying of sewer-setting out sewer alignment, excavation, and supporting, checking the gradient, preparation of bedding, handling, lowering, laying and jointing, testing of sewer, backfilling, ventilation of sewer, cleaning</p>   | 5 | 5 |
| UNIT X    | <p><b>SEWER APPURTENANCES:</b></p> <p>13.1 Manholes and Lampholes- types, features, location, function, construction</p> <p>13.2 Inlets, Grease &amp; oil trap- features, location, function construction</p> <p>13.3 Storm regulator, inverted syphon-feature, location, function, construction</p> <p>13.4 Sewage Pumping-necessity, ejectors, location, component of pumping station, types of pumps and selection.</p> <p>13.5 Maintenance of sewers</p>   | 4 | 5 |

|              |  |    |    |
|--------------|--|----|----|
| UNIT XI      | <b>SEWAGE CHARACTERISTICS:</b><br>14.1 General importance, strength of sewage, Characteristics of sewage-physical, chemical & biological<br>14.2 Analysis of sewage sampling, tests for- solids, pH, dissolved oxygen, BOD, COD, Nitrogen ( <i>Detailed methods of test to be discussed in laboratory</i> )<br>14.3 Bacteriology of sewage decomposition cycles of sewage- aerobic & anaerobic –C,N,S cycle  | 4  | 5  |
| UNIT XII     | <b>SEWAGE DISPOSAL:</b><br>15.1 Disposal on land-sewage farming, sewage application and dosing, sewage sickness-causes & remedies<br>15.2 Disposal by dilution standards for disposal in different types of waterbodies, self purification of stream<br>15.3 Advantage of two pit laterin, use of sludge   | 3  | 7  |
| UNIT XIII    | <b>SEWAGE TREATMENT</b><br>16.1 Primary treatment -necessity, principles, essential features, functions, operation and maintenance of different units-Screens and racks, Grit chamber, primary sedimentation tank<br>16.2 Secondary treatment–necessity, principles, essential features, functions, operation and maintenance of different units contact bed, trickling filter, activated sludge process, aerated lagoon, oxidation ditch, rotating biological disc<br>16.3 Sludge disposal-sludge digestion necessity, principles, features, Operation, disposal of digested sludge         | 4  | 5  |
| UNIT XIV     | <b>SANITARY PLUMBING FOR BUILDING:</b><br>17.1 Method of connection from water mains to building supply<br>17.2 Plumbing arrangement of single storied & multi-storied Building as per I.S. code of practice<br>17.3Requirements of building drainage, layout of lavatory blocks in residential buildings, layout of building drainage<br>17.4 Sanitary fixtures features, function, and maintenance and fixing of the fixtures- water closets, flushing cisterns, urinals, inspection chambers, traps, anti-syphonage pipe<br>17.5 Inspection, testing and maintenance of sanitary fixtures | 2  | 5  |
|              | <b>Class Test</b>  | 3  |    |
| <b>Total</b> |  | 60 | 75 |

**Text /Reference Books:**

| Name of Authors | Titles of the Book                                 | Edition | Name of the Publisher |
|-----------------|--|---------|-----------------------|
| G.S.Birdie      | Text book on Water Supply and Sanitary Engineering |         |                       |
| N.N Basak       | Environmental Engineering                          |         |                       |
| Hussain         | Public Health Engineering                          |         |                       |

|           |                                     |  |  |
|-----------|-------------------------------------|--|--|
| Rangawala | Water supply & Sanitary Engineering |  |  |
|-----------|-------------------------------------|--|--|

## WATER SUPPLY & SANITARY ENGINEERING (Practical)

### COURSE CONTENT:

The students will perform the following tests/exercises to determine different parameters of given samples of water and waste water.

| UNIT | TOPIC/SUB-TOPIC | Hrs. Total hrs. |
|------|-----------------|-----------------|
|------|-----------------|-----------------|

| SL.NO | NAME OF EXPERIMENT   | HRS |
|-------|--|-----|
| 1     | Determination of Turbidity of a water sample using Turbidimeter/ Nephelometer/ Jackson's Candle Turbidimeter.  | 2   |
| 2     | Determination of PH of a water sample using (a) PH-meter<br>b) colour comparator   | 2   |
| 3     | Determination of conductivity of a water sample using conductivity meter   | 2   |
| 4     | Determination of Acidity/ Alkalinity of a water sample using method of Titration   | 2   |
| 5     | Determination of Iron content of a water sample calorimetric method using Nessler's Tubes  | 2   |
| 6     | Determination of chloride content of a water sample using method of titration  | 2   |
| 7     | Determination of Bacteriological quality of a water sample by Coliform Test  | 2   |
| 8     | Determination of Coagulant (Alum) dose requirement for a turbid water sample by method of Jar Test   | 2   |
| 9     | Determination of Dissolved Oxygen of a water sample, collected from the field, using Winkler's method  | 2   |
| 10    | Determination of total solids, suspended solids and dissolved Solids of a waste water sample by Gravimetric method   | 2   |
| 11    | Determination of Bio-chemical Oxygen Demand (BOD) of a waste water sample  | 2   |
| 12    | Study of different types of pipe joints, valves, water meters  | 2   |
| 13    | Study of plumbing fixtures and fitting for water supply & sanitary arrangement   | 2   |
| 14    | Field visits to study:<br>Water supply and Sewerage System of the Polytechnic Campus, including a building<br>14.2 A water Treatment Plant<br>14.3 Waste water Treatment Plant | 2   |

|  |  |
|--|--|
| <b>Name of the course : DESIGN AND DETAILING-II</b>  |  |
| <b>Course code: CE502</b>  | <b>Semester : Fifth</b>  |
| <b>Teaching Scheme</b>   | <b>Maximum Marks : 125</b>   |
|  | <b>PA and End Examination Scheme</b>                                       |
| Theory : 3 hrs/week  | Class test: 10 Marks   |
| Tutorial: 0 hrs/week   | Assignment / Quiz etc.: 10 Marks<br>Attendance : 5 Marks<br>Sessional : 25 |
| Practical : 2 hrs/week   | End Semester Theory Exam:75 Marks  |
| Credit : 4   | PA Practical : 00 Marks  |
| <b>Rationale:</b> Safety and durability of a structure depend on appropriate design, proper detailing and construction as per detailed drawing and specification. For this reason, 'Design and |  |

Detailing' is an important subject for Civil Engineering Diploma holders. They are most often asked to act as a supervisor in construction projects. In addition to this they may also require to work as a draftsmen responsible for preparing detailed drawing for construction sites. Diploma holders are also called upon to assist designers, suggest modifications for repair and renovation works and also to design simple structural elements. The subject attempts to cover the above aspects of civil engineering profession.

**Aim:** The subject aims to expose the civil engineering diploma students to design of simple structural elements and also to drawing structural details for construction.

| <b>Course Objective :-</b> |   |  |            |              |
|----------------------------|---|--|------------|--------------|
| <b>Module/Unit</b>         | After completion of the course, students will be able to:   |  |            |              |
|                            | Effectively design different types of structural elements made of different construction materials  |  |            |              |
|                            | Apply the basic principles governing the design in a proper manner  |  |            |              |
|                            | Apply the basic requirements envisaged in the relevant Indian Standards in design to ensure safety and serviceability of structures   |  |            |              |
|                            | Analyze and convey to others how success and failure of a major Civil Engineering project can have a severe impact on the human society   |  |            |              |
|                            | Translate theory to practice at the site including good quality detailing and fabrication   |  |            |              |
|                            | Update oneself regularly with latest technological developments in this field as the knowledge in this field is expanding in leaps and bounds   |  |            |              |
| <b>Pre-Requisite :-</b>    |   |  |            |              |
|                            |   |  |            |              |
| <b>Contents (Theory)</b>   |   |  | <b>Hrs</b> | <b>Marks</b> |
| <b>UNIT – I</b>            | <b>1.0 STRUCTURAL DETAILING</b><br>1.1 Draw details of the following steel structures from the given line diagrams:<br>a) A steel roof truss with details of bolted or riveted and welded joints and connections including that of the steel column at base level with foundation (Plate I)<br>b) A two storied steel building frame showing typical details of possible bolted and welded connections including that of column at base with the foundation (Plate II)<br>1.2 Details of an underground RCC water tank (such as Sheet No. 19 of SP 34 or any other) - Plate III.<br>1.3 Combined detailed drawing of a two storied building with load-bearing wall spread footing and R.C. isolated column footing. (Plate IV). |  | 9          | 15           |



|           |   |    |    |
|-----------|---|----|----|
| UNIT II   | <b>2.0 DESIGN OF CONNECTIONS</b><br>2.1 State and sketch types of joints, explain and show failure of joints through sketches.<br>2.2 State the permissible stresses in rivets and bolts; Design joints (excluding joints subjected to moments).<br>2.3 Design determinate framed structure connections, solve problems for riveted and bolted connections.<br>2.4 Welding: State and explain the uses and types of welding.<br>2.5 State the permissible stresses in welding, minimum size of welding.<br>2.6 Design simple welded connections for axial forces. | 7  | 12 |
| UNIT- III | <b>3.0 TENSION MEMBERS</b><br>3.1 State and sketch the common sections of tension members. State the permissible stresses for structural steel.<br>3.2 Explain the net effective sectional area for angles and tees under different conditions, use structural steel section hand book, Design tension members (angle & tubular sections) with detailing, and solve problems as per IS 800-2007.  | 8  | 14 |
| UNIT - IV | <b>4.0 COMPRESSION MEMBERS</b><br>Distinguish between a strut and a column, short and a long column. Explain effective length, state maximum slenderness ratio of different compression members. Explain and perform design of axially loaded compression members (angle & tubular sections), solve problems as per IS 800-2007   | 8  | 14 |
| UNIT - V  | <b>DESIGN OF SIMPLE STEEL BEAMS AS PER IS 800 2007</b><br><b>5.1</b> Design of steel beam bending and shear   | 5  | 10 |
| UNIT-VI   | <b>DESIGN OF FOUNDATIONS FOR SREEL STRUCTURES</b><br><b>6.1</b> Basic Concept of column bases, Slab Base, Gusset Base, and Grillage Footing.  | 5  | 10 |
|           | <b>CLASS TEST</b>   | 3  |    |
|           | <b>Total</b>  | 45 | 75 |

**Text /Reference Books:**

| Name of Authors              | Titles of the Book        | Edition | Name of the Publisher |
|------------------------------|---------------------------|---------|-----------------------|
| V.N. Vazirani & M.M. Ratwani | Design of Steel Structure |         |                       |
| S. Ramamrutham               | Design of Steel Structure |         |                       |

|  |   |  |  |
|--|---|--|--|
| B.N. Duggal  | Design of Steel Structure                 |  |  |
| P.C. Varghese  | Limit State Design of Reinforced Concrete |  |  |
| Code of Practice for design of structural timber in building - IS:883-1970 |   |  |  |
| Design Aids for Reinforced Concrete IS: 456-1978, BIS, SP-16               |   |  |  |
| Handbook on Concrete Reinforcement & detailing, BIS, SP-34                 |   |  |  |

## **DESIGN AND DETAILING II PRACTICAL**

### **UNIT TOPIC/SUB-TOPIC**

**Hrs. Total hrs.**

1.0 Structural Detailing

1.1 Draw details of the following steel structures from the given line diagrams:

a) A steel roof truss with details of bolted or riveted and welded joints and connections including that of the steel column at base level with foundation (Plate I)

b) A two storied steel building frame showing typical details of possible bolted and welded connections including that of column at base with the foundation (Plate II)

1.2 Details of an underground RCC water tank (such as Sheet No. 19 of SP 34 or any other) - Plate III.

1.3 Combined detailed drawing of a two storied building with load-bearing wall spread footing and R.C. isolated column footing. (Plate IV).

**TOTAL:**

|   |   |
|---|---|
| <b>Name of the course : GEOTECHNICAL ENGINEERING- I</b>   |   |
| <b>Course code: CE506</b>   | <b>Semester : FIFTH</b>   |
| <b>Teaching Scheme</b>  | <b>Maximum Marks : 125</b>  |
|   | <b>PA and End Examination Scheme</b>  |
| Theory : 3 hrs/week   | Class test: 10 Marks  |
| Tutorial: 0 hrs/week  | Assignment / Quiz etc.: 10 Marks<br>Attendance : 5 Marks  |
| Practical : 2 hrs/week  | End Semester Theory Exam:75 Marks   |
| Credit : 4  | PA Practical: 25 Marks  |
| <b>Rationale:</b>   |   |
| The knowledge and skills of Geo-Technical Engineering is an important as any other subject of Civil Engineering. Practical works in Geo-Technical Engineering are equally important. The theory together with practices of this subject will help the practicing Civil Engineers in Civil Engineering Construction Works, especially in the design and construction of building foundation. |   |
| <b>Course Objective :-</b>  |   |
| <b>Module/Unit</b>  | After completion of the course, students will be able to:   |
| I.  | Explain fundamentals of soil formation and types of soil  |
| II.   | Explain different term related to index properties and consistency limits of soil   |
| III.  | Classify soil according to grain size distribution and consistency limits of soil as per IS and other specification specification |
| IV.   | Explain structure of different types of soil  |
| V.  | Explain permeability and factors affecting permeability   |
| VI.   | Determine seepage through soil formations   |
| VII.  | Explain compaction characteristics of soil and conduct tests as per IS specification  |
| VIII.   | Develop the basic concept of consolidation in soil  |
| IX.   | Define and explain different parameter related to shear strength of soil and determine them                                       |
| <b>Pre-Requisite :-</b>   |   |
|   | Basic concepts of engineering mechanics, engineering mathematics  |

| UNIT | Contents (Theory) | Hrs | Marks |
|------|-------------------|-----|-------|
|------|-------------------|-----|-------|

|           |   |   |    |
|-----------|---|---|----|
| UNIT - I  | <b>2.0 INTRODUCTION</b><br>1.1 Definition of soil, formation of soil, residual and transported soil, Soil as a three phase system   | 2 | 3  |
| UNIT- II  | <b>2.0 INDEX PROPERTIES</b><br>2.1 Preliminary definition of water content, density, specific gravity, void ratio, degree of saturation, density index, numerical problems<br>2.2 Determination of water content, specific gravity and particle size distribution of coarse and fine grained soil. Numerical problems<br>2.3 Definition of Void ratio, density index, porosity, degree of saturation, air content,<br>2.4 Unit weight of soil mass – bulk unit weight, dry unit weight, unit weight of solids, saturated unit weight, submerged unit weight<br>2.5 Specific gravity of soil solid - determination of specific gravity by pycnometer.<br>2.5 Consistency of soil, stages of consistency, Atterberg's limits of consistency viz. Liquid limit, plastic limit and shrinkage limit, plasticity index, liquidity index, flow index, toughness index, activity number, shrinkage ratio, classification based on these index properties Numerical problems | 8 | 15 |
| UNIT III  | <b>3.0 CLASSIFICATION OF SOIL</b><br>3.1 Identification and description of coarse and fine grained soils<br>3.2 Particle size classification, textural classification, HRB classification, unified soil classification , IS classification<br>3.3 Uniformity coefficient and coefficient of curvature, well graded and uniformly graded soils.  | 6 | 10 |
| UNIT - IV | <b>4.0 SOIL STRUCTURE</b><br>4.1 Particle arrangement in coarse grained, clay and composite soil  | 2 | 4  |
| UNIT V    | <b>5.0 PERMEABILITY</b><br>5.1 Definition of head, gradient<br>5.2 Darcy's law, Validity of Darcy's law<br>5.3 Laboratory and field determination of permeability<br>5.4 Factors effecting permeability   | 4 | 6  |
| UNIT - VI | <b>6.0 SEEPAGE ANALYSIS</b><br>6.1 Definition and concept of seepage flow<br>6.2 Seepage through earthen structures, seepage velocity, seepage pressure, phreatic line, flow lines and equipotential lines, exit gradient, quick sand condition (no derivation)<br>3.6 Flow net, characteristics of flow net, application of flow net (no numerical problems)   | 4 | 5  |
| UNIT VII  | <b>7.0 COMPACTION</b><br>7.1 Definition, purpose of compaction, field situations where compaction is required- maximum dry density, optimum   | 6 | 10 |

|             |   |        |    |
|-------------|---|--------|----|
|             | moisture content, Zero air voids line.<br>7.2 Standard proctor test & Modified proctor test – test procedure as per IS code,<br>7.3 Factors affecting compaction<br>7.4 Light and heavy compaction test as per IS specification<br>7.5 Field compaction methods - rolling, ramming, kneading & vibration and Suitability of various compaction equipment.   |        |    |
| UNIT - VIII | <b>8.0 CONSOLIDATION</b><br>8.1 Principle of consolidation, spring-analogy method, Brief concept of compressibility and consolidation<br>8.2 Terzaghi's one dimensional consolidation theory, its assumption and field of application, standard one dimensional consolidation test by consolidometer<br>8.3 compression index, coefficient of compressibility, coefficient of volume compressibility, coefficient of consolidation and their inter-relation (no deduction, only mathematical expression), swelling index<br>5.4 computation of ultimate settlement – simple numerical problems<br>8.4 difference between consolidation and compaction | 5      | 10 |
| UNIT - IX   | <b>9.0 SHEAR STRENGTH</b><br>9.1 Definition of shear and shear parameters, Concept of shear strength of soil, Shear failure of soil, field situation of shear failure<br>9.2 Components of shearing resistance of soil – cohesion, internal friction<br>9.3 Mohr circle, unconfined compression test, direct shear test, UU test, numerical problems<br>9.3 Introduction to Triaxial tests  | 8      | 12 |
|             | <b>CLASS TESTS</b>  | 3      |    |
|             | <b>Total</b>  | 48 hrs | 75 |

| <b>Texts / Reference</b> |   |               |                                |
|--------------------------|---|---------------|--------------------------------|
| <b>Sl. No.</b>           | <b>Name of Book</b>                       | <b>Author</b> | <b>Publishers</b>              |
| 1.                       | Principles of Geotechnical Engineering    | B. M. Das     | Thomson                        |
| 2.                       | Basic and Applied Soil Mechanics          | Gopal, Ranjan | New Age International (P) Ltd. |
| 3.                       | Soil Mechanics and Foundations, 2ed, w/CD | Budhu         | Wiley India                    |
| 4.                       | Soil Mechanics SI Version                 | Lambe         | Wiley India                    |
| 5.                       | Soil Mechanics & Foundation Engineering   | Raj           | Pearson                        |

|    |   |   |                   |
|----|---|---|-------------------|
| 6. | Soil Mechanics & Foundations            | B. C. Punmia,<br>Ashok Jain & Arun Jain | Laxmi Publication |
| 7. | Basic Soil Mechanics & Foundation       | Alam Singh                              | CBS Publishers    |
| 8. | Soil Mechanics & Foundation Engineering | VNS Murthy                              | CBS Publishers    |

### GEO-TECHNICAL ENGINEERING – I (PRACTICAL)

Marks: **30** (Thirty)

| Sl. No. | Experiment  |
|---------|---|
| 1.      | Determination of water content and specific gravity of a given soil sample.   |
| 2.      | Determination of field density of a soil using core-cutter and sand replacement method.                                 |
| 3.      | Determination of grain size distribution of a cohesionless soil sample by Mechanical Analysis                           |
| 4.      | Determination of grain size distribution of a fine grain soil sample by Hydrometer analysis                             |
| 5.      | Determination of consistency limits of a given soil sample by using Casagrande's liquid limit device, cone penetrometer |
| 6.      | Determination of coefficient of permeability: Constant head and variable head method                                    |
| 7.      | Determination of maximum dry density and optimum moisture content by light and heavy compaction                         |
| 8.      | Conduction of Unconfined compression test, direct shear test  |
| 9.      | Demonstration tests in the laboratory — One dimensional consolidation test and Triaxial test                            |

| Practical :- |  |
|--------------|--|
| Sl. No       | Skills to be developed   |
| 1.           | <b>Intellectual skills:</b> <ol style="list-style-type: none"> <li>1. Application of basic principles to classify soil, determine various parameter related to strength and consolidation and compaction characteristics of soil</li> <li>2. Analyze and solve problems of soil mechanics</li> </ol> |
| 2.           | <b>Motor skills-</b> <ol style="list-style-type: none"> <li>1. Development of understanding for conduction of tests for determination of characteristics of soil</li> </ol>  |

|   |   |
|---|---|
| 3 | <b>Social skills-</b> <ol style="list-style-type: none"> <li>1. Will learn to work with peer as group</li> <li>2. Able to communicate with teachers and peers to clarify doubts.</li> </ol> |
|---|---|

|  |   |
|--|---|
| <b>Name of the course : HIGHWAY &amp; TRANSPORTATION ENGINEERING</b>   |   |
| <b>Course code: CE510</b>  | <b>Semester : FIFTH</b>   |
| <b>Teaching Scheme</b>   | <b>Maximum Marks : 150</b>  |
|  | <b>PA and End Examination Scheme</b>  |
| Theory : 3 hrs/week  | Class test: 10 Marks  |
| Tutorial: 1 hrs/week   | Assignment / Quiz etc.: 10 Marks<br>Attendance : 5 Marks<br>Sessional : 25                                      |
| Practical : 2 hrs/week   | End Semester Theory Exam:75 Marks   |
| Credit : 5   | PA Practical: 25 Marks  |
| <b>Rationale:</b>  |   |
| The subject of highway engineering is very important as it deals with road and airport. It is essential for the students to get a through input into the different components of road constructions, maintenance, drainage and related traffic engineering.  |   |
| <b>Aim:</b>  |   |
| To develop a thorough knowledge & skill in highway development, highway plans and administration, highway economics and financing, traffic engineering, bituminous materials, bituminous surface treatment, carpet coat, road-mix and intermediate type bituminous plant mix surfaces, high type bituminous pavement and their design portland cement concrete pavement and their base courses, verified brick and block pavement, pavement design both flexible and rigid, highway maintenance and airport engineering. |   |
| <b>Course Objective :-</b>   |   |
| <b>Module/Unit</b>   | After the completion of course the students will be able to   |
| 1.   | Classify the different types of roads and their necessity and benefits to the society                           |
| 2.   | Identify the basic requirements, considerations, maintenance and different stages for the construction of Roads |
| 3.   | List out the different technical terms related to geometry of the Roads   |
| 4  | Regulate and plan the traffic control on the road   |
| 5  | Identify the different construction procedure of the highway  |
| 6  | Design the pavement for the road  |

|                          |   |            |              |
|--------------------------|---|------------|--------------|
| 7                        | Maintain the hill road  |            |              |
| 8                        | Define and list out different terms related to airport  |            |              |
| <b>Pre-Requisite :-</b>  |   |            |              |
|                          |   |            |              |
| <b>Contents (Theory)</b> |   | <b>Hrs</b> | <b>Marks</b> |
| UNIT – I                 | <b>1.0 INTRODUCTION</b><br>1.1 Role of Transportation. Modes of Transportation, History of road development.<br>1.2 Classification of roads and pattern. Necessity and benefits of roads.   | 3          | 6            |
| UNIT- II                 | <b>2.0 HIGHWAY ALIGNMENT AND SURVEYS</b><br>2.1 Stages of Engineering survey for highway location- map study, reconnaissance, preliminary survey and final location survey Drawings required for road project- Key map, Index map, Preliminary survey plan and detailed<br>2.2. Alignment- basic requirements, factors affecting alignment, special considerations for aligning hill roads.<br>2.3 Highway project – steps involved in a new project and in a realignment project -2 Investigation for Road Project                     | 11         | 15           |
| UNIT – III               | <b>3.0 GEOMETRIC DESIGN</b><br>3.1 Cross sectional elements-Kerbs, road margin, road formation, right of way, Shoulders<br>3.2 Camber- definition, purpose, types, IRC specifications.<br>3.3 Gradient- definition, types, IRC specification.<br>3.4 Sight distances- definition, types, IRC specification. Horizontal curves, extra widening, transition curves, vertical curves- summit and valley curves.<br>3.5 Super elevation-definition, formula for calculating super elevation, minimum and maximum values of super elevation. | 12         | 14           |
| UNIT – IV                | <b>4.0 TRAFFIC ENGINEERING</b><br>4.1 Traffic characteristic, Traffic surveys- volume study, speed study, capacity, parking study, accident study.<br>4.2 Traffic control devices-Road signs, marking, signals, traffic islands.<br>4.3 Road intersections- Intersection at grade and grade separator intersections,<br>4.4 Design factors of Highway Lighting<br>4.5 Road accidents –causes and its prevention   | 10         | 8            |
| UNIT – V                 | <b>5.0 ROAD CONSTRUCTION METHODS</b><br>5.1 Types of road materials and Tests – soil, aggregates, bitumen, Cement Concrete. Test on soil sub grade- C.B.R. test, Test on Aggregate – Los Angeles abrasion, impact, and shape test. Tests on bitumen- Penetration, Ductility and Softening point test.<br>5.2 Necessity of soil stabilization and various method used  | 12         | 16           |



|              |  |    |    |
|--------------|--|----|----|
|              | (brief)<br>5.3 Construction procedure of Earth road, Gravel road and W.B.M. road.<br>5.4 Construction of bituminous roads - Terms used– bitumen, asphalt, emulsion, cutback, tar, common grades adopted for construction.<br>Types of bituminous surface – prime coat, tack coat, seal coat, Construction<br>5.5 Construction procedure of - Surface dressing, bituminous carpeting, bituminous penetration macadam Bitumen/Tar carpets, premixed macadam<br>5.6 Detailed construction procedure of cement concrete roads, construction joints, joint filler, joint sealer |    |    |
| UNIT - VI    | <b>6.0 HIGHWAY PAVEMENTS</b><br>6.1 Types of Pavements-Flexible and rigid, pavement components and their functions. Pavement design factors.<br>6.2 Design methods for flexible pavement and rigid pavement<br>6.3 Significance and requirements of drainage system. Surface drainage, subsurface drainage<br>6.4 Maintenance operation of roads.  | 7  | 8  |
| UNIT - VII   | <b>7.0 HILL ROADS</b><br>7.1 Introduction, factors considered in alignment. Landslides-causes and prevention.<br>7.2 Methods of formation, hairpin bends, retaining wall, revetment wall.<br>7.3 Surface drainage, cross drainage, subsurface drainage.  | 5  | 8  |
| Class Test   |  |    |    |
| <b>Total</b> |  | 60 | 75 |

| <b>Text /Reference Books:</b>           |                            |         |                       |
|---|----------------------------|---------|-----------------------|
| Name of Authors                         | Titles of the Book         | Edition | Name of the Publisher |
| S. K. Khanna & C.E.G. Justo             | Highway Engineering        |         |                       |
| S. K. Khanna, M. G. Arora & S. S. Jain. | Airport Planning & Design  |         |                       |
| L. R. Kadiyali                          | Transportation Engineering |         |                       |
| S. K. Sharma                            | Highway Engineering        |         |                       |

### **13.0 PRACTICAL: 30 hours**

#### **UNIT TOPIC/SUB-TOPIC**

Hrs.   T  

**total hrs.**

- |      |  |
|------|--|
| 13.1 | Determination of size and shape of road aggregates |
| 13.2 | Determination of crushing value of road aggregates |

|      |   |
|------|---|
| 13.3 | Determination of impact value of road aggregates                      |
| 13.4 | Determination of Los Angeles Abrasion value of coarse road aggregates |
| 13.5 | Determination of C.B.R. value of subgrade soil                        |
| 13.6 | Determination of penetration value of bitumen                         |
| 13.7 | Determination of softening point of bituminous material               |
| 13.8 | Determination of ductility of bitumen                                 |
| 13.9 | Determination of Marshall stability value of bituminous mixture       |

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|--|--|
| <b>Name of the course : THEORY OF STRUCTURES</b>   |  |
| <b>Course code: CE409</b>  | <b>Semester : FIFTH</b>  |
| <b>Teaching Scheme</b>   | <b>Maximum Marks : 100</b>   |
|  | <b>PA and End Examination Scheme</b>                                   |
| Theory : 3 hrs/week  | Class test: 10 Marks   |
| Tutorial: 1 hrs/week   | Assignment / Quiz etc.: 10 Marks<br>Attendance : 5 Marks               |
| Practical : 0 hrs/week   | End Semester Theory Exam:75 Marks                                      |
| Credit : 4   |  |
| <b>Rationale:</b>  |  |
| <p>Theory of structures is a very important subject for diploma holders in Civil Engineering. Many of them are entrusted with the responsibility to supervise constructions, make minor remedial changes in maintenance work, analyze simple structures etc. An adequate knowledge of behaviour of structures is very essential for developing self-confidence among the diplomats for delivering quality service of work. An understanding of 'why' part of structural behaviour and failures enables them to give adequate comparative weightage of heir attention to different components of construction supervision jobs.</p> <p>The course content has been designed with a view to enabling students to solve problems of beams related to permissible stresses in bending and shear, explain and apply the principle of superposition, analyze the determinate trusses, apply the formulae for deflection to solve the problems of propped cantilever, understand and draw qualitatively the deflected shapes of beams and frames to identify the positions of main reinforcements and apply the concept of principal stresses and strains to explain and identify different types of cracks in reinforced concrete beams.</p> <p>While teaching the deformation of indeterminate structures without going into theory and analysis, a teacher of the subject is advised to make use of indigenous flexible elastic model.</p> |  |
| <b>Course Objective :-</b>   |  |
| <b>Module/Unit</b>   | After the completion of course the students will be able to            |
| 1.   | Calculate slope and deflection of simply supported and cantilever beam |
| 2.   | Calculate BM and SF for propped cantilever, fixed and continuous beam  |
| 3.   | Solve problem by moment distribution method                            |

|                                  |  |                                   |            |                       |
|----------------------------------|--|-----------------------------------|------------|-----------------------|
| 4                                | Analyse the different truss problem  |                                   |            |                       |
| <b>Pre-Requisite :-</b>          |  |                                   |            |                       |
|                                  |  |                                   |            |                       |
| <b>Contents (Theory)</b>         |  |                                   | <b>Hrs</b> | <b>Marks</b>          |
| UNIT - I                         | <b>1.0 SLOPE AND DEFLECTION</b><br>1.1 Calculation of slope and deflection in simply supported and cantilever beams with different loads by:<br>a. Macaulay's method<br>b. Strain Energy Method  |                                   | 8          | 8                     |
| UNIT- II                         | <b>2.0 PROPPED CANTILEVER BEAM</b><br>2.1 Concept of propped cantilever beam, S.F.D and B.M.D with point loads and udl<br>2.2 Slope and deflection for point loads and U.D.L   |                                   | 10         | 10                    |
| UNIT - III                       | <b>3.0 FIXED BEAMS</b><br>3.1 Concept.<br>3.2 Drawing of SFD and BMD using fixing moment of fixed beam.  |                                   | 8          | 10                    |
| UNIT - IV                        | <b>4.0 CONTINUOUS BEAMS</b><br>4.1 Concept.<br>4.2 Drawing of SFD and BMD for continuous beams loaded with point load and udl using Claypeyron's theorem of three moments.   |                                   | 8          | 12                    |
| UNIT - V                         | <b>5.0 INTRODUCTION TO MOMENT DISTRIBUTION METHOD</b><br>5.1 Sign convention, carry over factor, stiffness factor, distribution factor.<br>5.2 Numerical problems on indeterminate beams.  |                                   | 6          | 15                    |
| UNIT - VI                        | <b>6.0 APPLICATION OF MOMENT DISTRIBUTION METHOD</b><br>6.1 Single stored single bay symmetrical portal frames, SF and BM diagrams   |                                   | 10         | 10                    |
| UNIT - VII                       | <b>7.0 TRUSS</b><br>7.1 Introduction, Definition, different types of truss.<br>7.2 Advantages and disadvantages.<br>7.3 Analysis of truss- Method of joints, method of section, graphical method.<br>7.4 Difference between frame and truss. |                                   | 10         | 10                    |
| <b>Total</b>                     |  |                                   | <b>60</b>  | <b>75</b>             |
| <b>Text /Reference Books:</b>    |  |                                   |            |                       |
| Name of Authors                  |  | Titles of the Book                | Edition    | Name of the Publisher |
| R. S. Khurmi & J. K. Gui         |  | Theory of Structure               |            |                       |
| V. Rajaraman                     |  | Theory of Structure               |            |                       |
| R. S. Khurmi                     |  | Strength of Materials             |            |                       |
| S. P. Timoshenko and D. H. Young |  | Elements of Strength of Materials |            |                       |

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|--|--|---|--------------|
| <b>Name of the course : PROFESSIONAL PRACTICES- IV</b>   |  |   |              |
| <b>Course code: CE515</b>  |  | <b>Semester : Fifth</b>                                 |              |
| <b>Teaching Scheme</b>   |  | <b>Maximum Marks : 50</b>                               |              |
|  |  | <b>PA and End Examination Scheme</b>                    |              |
| Theory :   | 0 hrs/week   | Class test: 0 Marks                                     |              |
| Tutorial:  | 0 hrs/week   | Assignment / Quiz etc.: 0 Marks<br>Attendance : 0 Marks |              |
| Practical :  | 2 hrs/week   | End Semester Theory Exam:00 Marks                       |              |
| Credit :   | 1  | PA Practical : 50 Marks                                 |              |
| <b>Rationale:</b>  |  |   |              |
| <p>The diploma-holders in Civil Engineering, many a times , are involved with project work at site as a supervisor for managing the construction of the project. Major works involved in that case rule and regulation at site ,safety related to equipments and human life, construction related procedure and some measurement and analysis of data also their other related components.They are also expected some industrial visits for gathering knowledge about the different stages of the construction and management process at the site.</p> |  |   |              |
| <b>Course Objective :-</b>   |  |   |              |
| <b>Module/ Unit</b>  | After completion of the course, students will be able to:                          |   |              |
| 1.   | Describe different process of construction management and their interrelated terms |   |              |
| 2.   | Handle the construction related machine/ equipment.                                |   |              |
| 3.   | Aware cause and effect of accident and safety measure in construction works        |   |              |
| 4  | Describe different rules and regulation related construction works                 |   |              |
| 5  | Explain the quality control of construction works                                  |   |              |
| 6  |  |   |              |
| <b>Pre-Requisite :-</b>  |  |   |              |
|  |  |   |              |
|  |  |   |              |
| <b>Contents (Theory)</b>   |  | <b>Hrs</b>  | <b>Marks</b> |

|            |   |   | in % |
|------------|---|---|------|
| UNIT- I    | <b>1.0 INTRODUCTION</b><br>1.1 Aims & objectives of construction management<br>1.2 Functions of construction management<br>1.3 The construction team components-owner, engineer, architect, contractor-their functions and interrelationship and jurisdiction<br>1.4 Resources for construction management, men, machines, materials, money<br>1.5 Collecting an estimate from P.W.D.   | 3 | 5    |
| UNIT - II  | <b>2.0 CONSTRUCTIONAL PLANNING:</b><br>2.1 Importance of constructional planning<br>2.2 Developing work break down structure for construction works<br>2.3 Construction planning stages- Pretender stage, Post- tender stage<br>2.4 Construction scheduling by bar charts preparation of bar charts for simple construction works<br>2.5 Preparation of schedules for labour, materials, machinery, finance for small works<br>2.6 Limitations of bar charts<br>2.7 Construction scheduling by network techniques. Definitions of terms- PERT and CPM techniques, advantages and disadvantages of two techniques, network analysis, estimation of time and critical path, application of PERT & CPM techniques in simple construction works | 8 | 15   |
| UNIT - III | <b>3.0 SITE MANAGEMENT</b><br>3.1 Factors influencing selection, design and layout of temporary facilities and services at construction site<br>3.2 Principles of storing materials at site<br>3.3 Location of equipment Organizing labour at site  | 3 | 5    |
| UNIT - IV  | <b>4.0 SAFETY IN CONSTRUCTION WORKS:</b><br>4.1 Importance of safety<br>4.2 Causes and effects of accidents in construction works<br>4.3 Safety measures in work sites for-excavation, scaffolding, formwork, fabrication and erection, demolition<br>4.4 Development of safety consciousness<br>4.5 Safety legislation-workmen's compensation act, contract labour act   | 5 | 14   |
| UNIT - V   | <b>5.0 DISPUTES:</b><br>5.1 Nature of disputes between contractor and owner<br>5.2 Causes of disputes and claims<br>6.3 Arbitration-procedure, criterion for arbitrator, conditions for arbitration.  | 3 | 5    |
| UNIT -VI   | <b>6.0 QUALITY CONTROL:</b><br>6.1 Principles of inspection - enforcement of specifications - stages of inspection and quality control for earth work, masonry, RCC, sanitary and water supply services   | 3 | 6    |

|                               |   |           |                       |
|-------------------------------|---|-----------|-----------------------|
|                               | 6.2 Quality standards -during construction, after construction<br>6.3 Methods of testing-during construction, after construction,<br>Destructive & non-destructive methods                    |           |                       |
|                               | <b>Guest lecture on construction management</b>   | 2         |                       |
| <b>Total</b>                  |   | 32<br>hrs | 50                    |
| <b>Practical :-</b>           |   |           |                       |
| <b>S.No</b>                   | <b>Skills to be developed</b>   |           |                       |
| 1.                            | <b>Intellectual skills-</b><br>1. Interact with industry people-executive and working level<br>2. Implementation of work schedule<br>3. Exchange of ideas.<br>4. Adopting safety precautions. |           |                       |
| 2.                            | <b>Motor skills-</b><br>1. Development of managerial and quality control skill.   |           |                       |
| 3                             | <b>Social skills-</b><br>1. Development of ethics.<br>2. Will learn to work with peer as group.<br>3. Able to keep safe and amicable working environment                                      |           |                       |
| <b>Text /Reference Books:</b> |   |           |                       |
|                               |   |           |                       |
| Name of Authors               | Titles of the Book  | Edition   | Name of the Publisher |
|                               | Construction management and<br>planning   |           |                       |
|                               |   |           |                       |
|                               |   |           |                       |
|                               |   |           |                       |
|                               |   |           |                       |

## **TERM – VI**



## ENGINEERING ECONOMICS AND ACCOUNTANCY

L        T        P  
3        0        0

Curri. Ref. No.: G303

**Total Contact hrs.:**

**Total marks: 100**

**Theory:**

Theory: 45

End Term Exam: 75

Tutorial: 0

P.A.: 25

Practical: 0

**Credit: 3**

### RATIONALE

The knowledge of Engineering Economics and Accountancy is needed by personnel dealing with the cost of products of any kind related to quality and standards of production including its financial control. Engineers / Technicians, in general, need to know the cost of the final products for marketing purposes. The knowledge of Economics as well as Accountancy is required by all people dealing in any business or enterprise.

This particular subjects deals in basic concepts of economics, production of commodities, different types of industries, market forms, objective of economic planning, concept of value of money, causes of unemployment, industrial policy, business transaction and accountancy, maintenance of cash and balances, receipt and expenditures and final accounts.

### DETAIL COURSE CONTENT

#### THEORY:

| UNIT TOPIC / SUB-TOPIC  | Lecture Hrs. |
|---|--------------|
| <b>1.0 INTRODUCTION</b>   | <b>1</b>     |
| 1.1 Introduction to Economics and its Utility of study                              |              |
| 1.2 Importance of the study of Economics  |              |
| <b>2.0 BASIC CONCEPTS OF ECONOMICS</b>  | <b>3</b>     |
| 2.1 Definition of Utility, Consumption, Want, Value, Price, Goods, National Income. |              |
| 2.2 Classification of goods, characteristics and classification of wealth.          |              |
| 2.3 Basic Laws of demand and supply.  |              |
| 2.4 Concept and Measurement of Elasticity of demand                                 |              |
| <b>3.0 PRODUCTION</b>   | <b>3</b>     |

|            |  |          |
|------------|--|----------|
| 3.1        | Meaning and factors of production.   |          |
| 3.2        | Land, Labour, Capital and Organisation   |          |
| 3.3        | Formation of Capital, Break even chart-its uses.                                     |          |
| <b>4.0</b> | <b>SCALE OF INDUSTRIES</b>   | <b>2</b> |
| 4.1        | Definition, advantages and disadvantages of small, medium and large scale production |          |
| 4.2        | Internal and External Economies  |          |
| <b>5.0</b> | <b>MARKET FORMS</b>  | <b>3</b> |
| 5.1        | Definition and types of Markets in respect of present trends.                        |          |
| 5.2        | Features of Perfect, Imperfect and monopoly markets.                                 |          |
| 5.3        | Price determination under perfect competition and monopoly                           |          |
| <b>6.0</b> | <b>ECONOMIC PLANNING</b>   | <b>3</b> |
| 6.1        | Features of Under-developed and Developing Countries.                                |          |
| 6.2        | Meaning, objectives and needs of planning.   |          |
| 6.3        | Introduction to industrial development in India during the five year plans.          |          |
| <b>7.0</b> | <b>MONEY</b>   | <b>3</b> |
| 7.1        | Meaning and functions of Money   |          |
| 7.2        | Introduction to the concept of the value of money                                    |          |
| 7.3        | Meaning of Inflation, Deflation, Stagnation.   |          |
| <b>8.0</b> | <b>UNEMPLOYMENT</b>  | <b>2</b> |
| 8.1        | Meaning, types and causes of Unemployment  |          |
| 8.2        | Unemployment problems in India   |          |
| <b>9.0</b> | <b>INDUSTRIAL POLICY</b>   | <b>3</b> |

|             |   |          |
|-------------|---|----------|
| 9.1         | Current Industrial Policy   |          |
| 9.2         | Industrial licensing Policy, De-licensing   |          |
| 9.3         | Monopolistic and Restricted Trade practices (MRTP)<br>Foreign Exchange Regulation Act (FERA).                           |          |
| <b>10.0</b> | <b>BUSINESS TRANSACTIONS AND ACCOUNTANCY</b>  | <b>5</b> |
| 10.1        | Transactions and classifications, need and objectives of proper records including double entry system.                  |          |
| 10.2        | Classification of Accounts and its description<br>(in respect of real accounts, personal accounts and nominal accounts) |          |
| 10.3        | Debit and credit concept; golden rules of debit and credit.   |          |
| 10.4        | Objectives and principles of double entry book-keeping.   |          |
| <b>11.0</b> | <b>BOOKS OF ACCOUNTS</b>  | <b>2</b> |
| 11.1        | Journal and Ledger, their sub-divisions; posting from journals to ledger.   |          |
| 11.2        | Balancing of Accounts   |          |
| <b>12.0</b> | <b>CASH BOOK</b>  | <b>2</b> |
| 12.1        | Objective of Cash Book (in respect of all kinds of Cash transactions)   |          |
| 12.2        | Single column, double column and triple column cash book  |          |
| 12.3        | Imprest system of Petty Cash Book.  |          |
| <b>13.0</b> | <b>TRIAL BALANCE</b>  | <b>2</b> |
| 13.1        | Objective, Preparation, errors and rectification (in respect of balance of accounts for the total period).              |          |

|             |  |          |
|-------------|--|----------|
| <b>14.0</b> | <b>FINAL ACCOUNTS</b>  | <b>5</b> |
| 14.1        | Steps of preparing accounts; Trading Account; Profit and Loss Account          |          |
| 14.2        | Revenue and Depreciation adjustment  |          |
| 14.2        | Introduction to balance sheet  |          |
| <b>15.0</b> | <b>CAPITAL AND REVENUE EXPENDITURE DISTRIBUTION</b>                            | <b>3</b> |
| 15.1        | Receipts and payments  |          |
| 15.2        | Income and Expenditure differences   |          |
| <b>16.0</b> | <b>MEANING AND PURPOSE OF COSTING</b>  | <b>2</b> |
| 16.1        | Elements of Cost-Analysis and classification of expenditure for cost accounts. |          |
| 16.2        | Cost Control – Prime cost, Overhead cost, and Indirect materials and tools.    |          |
| <b>17.0</b> | <b>ELECTRONICS COMMERCE – MEANING – SCOPE</b>                                  | <b>1</b> |
| 17.1        | Accounting Software – Tally latest version                                     |          |

**SUGGESTED LEARNING RESOURCES:**

**Reference Books :**

1. Agrawal, A.N., Indian Economy, New Delhi ; wish Prahashan, 2005
2. Wali, B.M., and A.B. Kalkundrikar – Managerial Economics, New Delhi : R.Chand and Co., 1983

## ENTREPRENEURSHIP DEVELOPMENT

L        T        P  
3        0        0

Curri. Ref. No.: G304

**Total Contact hrs.:**

Theory: 45

Tutorial :0

Practical: 0

Credit: 3

**Total marks: 100**

**Theory:**

End Term Exam: 75

P.A.: 25

### RATIONALE

The course intends to provide the fundamental aspects of entrepreneurship as a means for self employment and culminating in economic development of the country. It deals with basic issues like entrepreneurial characteristics and quality, governmental policy support and overall scenario along with opportunities and the facilities available for entrepreneurship development.

### DETAIL COURSE CONTENT

#### THEORY:

| UNIT TOPIC / SUB-TOPIC   | Lecture Hrs. |
|--|--------------|
| <b>1.0 INTRODUCTION</b>  | <b>10</b>    |
| 1.1 Definition and functions of Entrepreneur, entrepreneurship quality, entrepreneurial spirit, need for entrepreneurship. |              |
| 1.2 Individual and social aspects of business – achievement motivation theory  |              |
| 1.3 Social responsibilities of Entrepreneurs   |              |
| <b>2.0 FORMS OF BUSINESS ORGANISATION</b>  | <b>4</b>     |
| 2.1 Types of company   |              |
| 2.2 Merits and demerits of different types   |              |
| 2.2 Registration of small scale industries   |              |
| 2.4 Conglomeration.  |              |
| <b>3.0 SMALL SCALE AND ANCILLARY INDUSTRIES</b>  | <b>8</b>     |
| 3.1 Definition – scope with special reference to self employment.  |              |
| 3.2 Procedure to start small scale and Ancillary industries  |              |
| 3.3 Pattern on which the Scheme/Project may be prepared  |              |
| 3.4 Sources of finance - Bank, govt., and other financial institutions.  |              |
| 3.5 Selection of site for factory  |              |

|             |  |          |
|-------------|--|----------|
| 3.6         | Factors of selection   |          |
| 3.7         | N.O.C. from different authorities, e.g., Pollution Control Board, Factories Directorate etc.   |          |
| 3.8         | Trade License.   |          |
| <b>4.0</b>  | <b>SYSTEM OF DISTRIBUTION</b>  | <b>1</b> |
| 4.1         | Wholesale Trade  |          |
| 4.2         | Retail trade   |          |
| <b>5.0</b>  | <b>SALES ORGANISATION</b>  | <b>3</b> |
| 5.1         | Market survey, marketing trends, knowledge of competitors, product selection & its basis .   |          |
| 5.2         | Sales promotion  |          |
| 5.3         | Advertisement  |          |
| 5.4         | Public relations and selling skills  |          |
| <b>6.0</b>  | <b>PRICING THE PRODUCT</b>   | <b>1</b> |
| 6.1         | Basic guidelines   |          |
| <b>7.0</b>  | <b>INTRODUCTION TO IMPORT AND EXPORT</b>   | <b>6</b> |
| 7.1         | Procedures for export  |          |
| 7.2         | Procedures for import  |          |
| 7.3         | Technical collaboration – international trade  |          |
| 7.4         | Business insurance   |          |
| 7.5         | Rail and road transport  |          |
| 7.6         | Forwarding formalities, FOR, FOB, CIF, etc.  |          |
| <b>8.0</b>  | <b>BUSINESS ENQUIRIES</b>  | <b>4</b> |
| 8.1         | Enquiries: From SISI, DIC, SFC Dept. of Industrial Development Banks.  |          |
| 8.2         | Offers and Quotations  |          |
| 8.3         | Orders   |          |
| <b>9.0</b>  | <b>PROJECT REPORT</b>  | <b>6</b> |
| 9.1         | Project Report on feasibility studies for small scale industries, proposal for finances from bank and other financial institutions for establishing new industries and its extension, obtaining License enlistment as suppliers, different vetting organizations for Techno Economic feasibility report.<br>Breakeven analysis, Breakeven point. |          |
| <b>10.0</b> | <b>ENVIRONMENT LEGISLATION</b>   | <b>2</b> |
| 10.1        | Air Pollution Act  |          |

- 10.2 Water Pollution Act
- 10.3 Smoke Nuisance Control Act
- 10.4 ISO: 14000, OSHA

## **SUGGESTED LEARNING RESOURCES:**

### **Reference Books:**

1. Entrepreneurship Development  
Prepared by CTSC Manila Publishers by Tata Mc Graw Hill Publishing Co. Ltd.
2. Small Enterprise Management Published by ISTE, Mysore
3. Motivation Published by ISTE, Mysore
4. S.S.M. in Environmental Engineering Published by ISTE, Mysore
5. Entrepreneurship New Venture Creations, Holt, Prentice Hall, India.
6. Essence of TQM by John Bank
7. Rathore, B.S. and J.S. Saini(ed), A Handbook of Entrepreneurship – Panchkula : Aapga, 1997
8. Jose Pauletal, Entrepreneurship Development, Mumbai : Himalaya Publishing House, 1996
9. Khanka, S.S., Entrepreneurship Development, New Delhi : S. Chand and Co., 2001
10. Nagarazan, R.S. and A.A. Arivalagar, TQM New Delhi : New Age International Publishers, 2005
11. Bhatia, R.C., Marketing Communication and Advertising, New Delhi : Galgotia Publishing Co., 2003
12. Sinha, J.C., and V.N. Mugali : A Textbook of Commerce, New Delhi : R. Chand and Co., 1994

## PRINCIPLES OF MANAGEMENT

L        T        P  
3        0        0

Curri. Ref. No. G305

**Total Contact hrs.:**

**Total marks: 100**

**Theory:**

Theory: 45

End Term Exam: 75

Tutorial :0

P.A.: 25

Practical : 0

**Credit: 3**

### RATIONALE

Management is the integrated component of all areas of technological courses as recognized across the world. Technicians or supervisors coming out of the system hence need to study the basics components of the management relevant to them. Principles of management will enable them to apply basic knowledge of management in their field of work. Keeping with this in mind necessary content details of the course on Principles of Management has been developed. With the assumption that, it will develop some management foundation to the diploma students.

### DETAIL COURSE CONTENT

#### THEORY:

| UNIT TOPIC / SUB-TOPIC                 | Lecture Hrs. |
|--|--------------|
| <b>FRAMEWORK OF MANAGEMENT</b>         | <b>8</b>     |
| 1.1 Nature of management               |              |
| 1.2 Development of management thoughts |              |
| 1.3 Management and process skills      |              |
| <b>2.0 PLANNING</b>                    | <b>9</b>     |
| 2.1 Fundamentals of planning           |              |
| 2.2 Planning premises and forecasting  |              |
| 2.3 Decision making                    |              |
| 2.4 Mission and objective              |              |



|  |           |
|--|-----------|
| <b>3.0 ORGANIZING</b>                              | <b>10</b> |
| 3.1 Fundamentals of organizing                     |           |
| 3.2 Design of organization structure               |           |
| 3.3 Forms of organization structure                |           |
| 3.4 Power and authority                            |           |
| 3.5 Authority relationship                         |           |
| <br>   |           |
| <b>4.0 STAFFING</b>                                | <b>8</b>  |
| 4.1 Fundamentals of staffing                       |           |
| 4.2 HR planning                                    |           |
| 4.3 Recruitment and selection                      |           |
| 4.4 Training and development                       |           |
| 4.5 Performance appraisal                          |           |
| <br>   |           |
| <b>5.0 DIRECTING</b>                               | <b>6</b>  |
| 5.1 Fundamentals of directing                      |           |
| 5.2 Operational control techniques                 |           |
| 5.3 Overall control technique                      |           |
| <br>   |           |
| <b>6.0 TOTAL QUALITY MANAGEMENT</b>                | <b>4</b>  |
| 6.1 Concepts and definitions                       |           |
| 6.2 Sages of quality gurus and their contributions |           |
| 6.3 Basic tools of TQM                             |           |

## **SUGGESTED LEARNING RESOURCES:**

Reference books:

1. Principles of management, by: T.Ramasamy (Himalya publishing house)
2. Management by: S. P. Robins
3. Management principles by: Anil Bhat and Arya Kumar
4. Principles and practice of management by LM Prasad
5. Principles of management by LM Prasad
6. Essentials of Management / Joseph L. Massie / Prentice-Hall of India

## **ORGANIZATIONAL BEHAVIOUR**

L            T            P  
3            0            0

**Curri. Ref. No.:G306**

**Total Contact hrs.:**

**Total marks: 100**

**Theory:**

Theory: 45

End Term Exam: 75

Tutorial :0

P.A.: 25

Practical: 0

**Credit: 3**

## **RATIONALE**

Knowledge in behavioural principles in an organization is an important requirement because concepts such as work motivation, behavioural patterns of individuals as also those of group of individuals etc are intimately related to it. Organizational Behavioural principles, its scopes, applicability etc. are therefore important to know by the students irrespective of the

branch of specialization. Based of the above facts following content details of the subject on Organizational Behaviour has been suggested.

## **DETAIL COURSE CONTENT**

### **THEORY:**

| <b>UNIT TOPIC / SUB-TOPIC</b>  | <b>Lecture Hrs.</b> |
|--|---------------------|
| <b>1.0 ORGANIZATION:</b>   | <b>8</b>            |
| Concept and Definition   |                     |
| Structures (line, staff, functional divisional, matrix)                |                     |
| <b>2.0 MOTIVATION :</b>  | <b>10</b>           |
| Principles of Motivation   |                     |
| Aspects of Motivation  |                     |
| Job motivation   |                     |
| Theories of motivation (Maslow, Herzberg, Theory of X&Y of Mc. Gregar) |                     |
| <b>3.0 DEVELOPING GOOD WORK HABITS:</b>                                | <b>10</b>           |
| Principles of habit formation  |                     |
| Attitude and values  |                     |
| Personality-   |                     |
| - Concepts   |                     |
| - Theories   |                     |
| - Personality and Behaviour  |                     |
| <b>4.0 ORGANIZATIONAL CULTURE:</b>                                     | <b>8</b>            |
| Concepts and its importance  |                     |
| Determinants of organizational culture                                 |                     |
| Rules & regulations  |                     |
| <b>5.0 TEAM BUILDING:</b>  | <b>9</b>            |

Concepts  
Team and Group

Formation of Team building

### **SUGGESTED LEARNING RESOURCES:**

#### **Reference Books:**

1. Organisational Behaviour — An introductory Text – Huezyski A. & Bucheman C. (Prentice Hall of India)
2. Image of Organisation — Morgan G. (Sage)
3. Understanding Management — Linstoand S. (Sage)
4. Organizational Behaviour — Robbins (Prentice Hall of India)
5. Understanding and Managing – Organizational Behavior — George & Jones
6. Organisational Behaviour, L.M. PRASAD, New Delhi, Sultan Chand & Sons
7. Essentials of Management — Koontz (Tata McGraw Hill)

## ENVIRONMENTAL EDUCATION

L        T        P  
3        0        0

Curri. Ref. No. G307

**Total Contact hrs.:**

**Total marks: 100**

**Theory:**

Theory: 45

End Term Exam: 75

Tutorial : 0

P.A.: 25

Practical : 0

**Credit: 3**

### RATIONALE

Management of Environmental Degradation as also its control using innovative technologies is of prime importance in the times we are living in. Since the days of the famed Rio Summit (1992) awareness about degradation of environment we live in and its management through participation of one and all has literally blossomed into a full fledged movement of universal importance. Technically qualified people, such as the Diploma Engineers, should not only be aware about new technologies to combat environmental degradation at their disposal but also various aspects of environment, ecology, bio-diversity, management, and legislation so that they can perform their jobs with a wider perspective and informed citizens. This course can be taken by all diploma students irrespective of their specializations.

### DETAILED COURSE CONTENT

#### THEORY:

| UNIT TOPIC / SUB-TOPIC                       | Lecture Hrs. |
|--|--------------|
| <b>1.0 INTRODUCTION</b>                      | <b>2</b>     |
| 1.1 Introduction                             |              |
| 1.2 Environment and its components           |              |
| 1.3 Environment in India                     |              |
| 1.4 Public Awareness                         |              |
| <b>2.0 ECOLOGICAL ASPECTS OF ENVIRONMENT</b> | <b>8</b>     |
| 2.1 Ecology                                  |              |
| • Eco-system                                 |              |
| • Factors affecting Eco-system               |              |
| 2.2 Bio-geochemical cycles                   |              |
| • Hydrological cycle                         |              |
| • Carbon cycle                               |              |
| • Oxygen cycle                               |              |
| • Nitrogen cycle                             |              |
| • Phosphorous cycle                          |              |
| • Sulphur cycle                              |              |
| 2.3 Bio-diversity                            |              |

2.4 Bio-diversity Index

**3.0 NATURAL RESOURCES 5**

3.1 Definition of Natural Resources

3.2 Types of Natural Resources

3.3 Quality of life

3.4 Population & Environment

3.5 Water Resources

- Sources of Water

3.6 Water Demand

3.7 Forest as Natural Resource

- Forest and Environment
- Deforestation
- Afforestation
- Forest Conservation, its methods

3.8 Land

- Uses and abuses of waste and wet land

**4.0 GLOBAL ENVIRONMENTAL ISSUES 9**

4.1 Introduction

4.2 Major Global Environmental Problems

4.3 Acid Rain

- Effects of Acid Rain

4.4 Depletion of Ozone Layer

- Effects of Ozone Layer Depletion

4.5 Measures against Global Warming

4.6 Green House Effect

**5.0 ENVIRONMENTAL POLLUTION 9**

5.1 Introduction

5.2 Water Pollution

- Characteristics of domestic waste water
- Principles of water treatment
- Water treatment plant (for few industries only- unit operations & unit processes - names only)

5.3 Air Pollution

- Types of air pollutants
- Sources of Air Pollution
- Effects of Air Pollutants

5.4 Noise Pollution

- Places of noise pollution
- Effect of noise pollution

**6.0 CLEAN TECHNOLOGY 6**

- 6.1 Introduction to Clean Technologies
- 6.2 Types of Energy Sources
  - Conventional Energy sources
  - Non-conventional sources of Energy
- 6.3 Types of Pesticides
- 6.4 Integrated Pest Management

**7.0 ENVIRONMENTAL LEGISLATION 3**

- 7.1 Introduction to Environmental Legislation
- 7.2 Introduction to Environmental Laws

**8.0 ENVIRONMENTAL IMPACT ASSESSMENT 3**

- 8.1 Introduction to Environmental Impact Assessment
- 8.2 Environmental Management (elements of ISO 14001)
- 8.3 Environmental ethics

**SUGGESTED IMPLEMENTATION STRATEGIES:**

The teachers are expected to teach the students as per the prescribed subject content. This subject does not have any practical but will have only demonstration and field visit as stated. The students will have to prepare report of the site visit.

**SUGGESTED LEARNING RESOURCES:**

(a) Reference Books:

| S. No. | Title   | Author, Publisher, Edition & Year   |
|--------|---|---|
| 1.     | Environmental Engineering   | Pandya & Carny,<br>Tata McGraw Hill, New Delhi  |
| 2.     | Introduction to Environmental Engineering and Science   | Gilbert M. Masters<br>Tata McGraw Hill, New Delhi   |
| 3.     | Waste Water Engineering – Treatment, Disposal & Reuse   | Metcalf & Eddy<br>Tata McGraw Hill, New Delhi   |
| 4.     | Environmental Engineering   | Peavy, TMH International<br>New York  |
| 5.     | Study / training materials, references, reports etc. developed by Central Pollution Control Board, New Delhi as also State Pollution Control Boards | Central Pollution Control Board<br>Postal Address: Parivesh Bhawan, CBD-cum-Office Complex East Arjun Nagar, DELHI - 110 032, INDIA<br>Tel.: 91-11-22307233<br>Fax: 91-11-22304948<br>e-mail: ccb.cpcb@nic.in |
| 6.     | Environmental Science   | Aluwalia & Malhotra, Ane Books Pvt. Ltd,<br>New Delhi   |
| 7.     | Text Book of Environment & Ecology  | Sing, Sing & Malaviya, Acme Learning, New Delhi   |
| 8.     | Environmental Science & Ethics  | Sing, Malaviya & Sing, Acme Learning, New   |

| S. No. | Title                   | Author, Publisher, Edition & Year                   |
|--------|-------------------------|---|
|        |                         | Delhi   |
| 9.     | Environmental Chemistry | Samir K. Banerji, Prentice Hall of India, New Delhi |

(b) Others:

1. Text book mentioned in the references
2. Lab Manuals
3. OHP Transparencies
4. Video film on Environment

#### **SUGGESTED LIST OF DEMONSTRATIONS/FIELD VISIT**

- pH value of water sample.
- Hardness of water
- Calcium hardness
- Total Hardness
- Residual Chlorine to a given sample of water
- Turbidity
- B.O.D.
- C.O.D.

**Visits: Following visits shall be arranged by the teachers during the semester:**

- Water Treatment Plant
- Sewage Treatment Plant
- Maintenance work of water supply mains and sewage system



|  |   |  |              |
|--|---|--|--------------|
| <b>Name of the course : IRRIGATION ENGINEERING</b>   |   |  |              |
| <b>Course code: CE511</b>  |   | <b>Semester : Sixth</b>                                  |              |
| <b>Teaching Scheme</b>   |   | <b>Maximum Marks : 100</b>                               |              |
|  |   | <b>PA and End Examination Scheme</b>                     |              |
| Theory :   | 3 hrs/week  | Class test: 10 Marks                                     |              |
| Tutorial:  | 0 hrs/week  | Assignment / Quiz etc.: 10 Marks<br>Attendance : 5 Marks |              |
| Practical :  | 0 hrs/week  | End Semester Theory Exam:75 Marks                        |              |
| Credit :   | 3   | PA Practical : 00 Marks                                  |              |
| <b>Rationale:</b>  |   |  |              |
| <p>Many diploma holders in civil engineering supervise the construction or perform the maintenance of canals, head-works, river training works, cross drainage works, regulatory and other works. Some of diploma holders are also engaged for preventing water logging and irrigation by tube-wells. For a state which does not have a major Irrigation System the subject can be offered as an elective one so that an willing student can plan his carrier in Irrigation Engineering.</p> |   |  |              |
| <b>Course Objective :-</b>   |   |  |              |
| <b>Module/Unit</b>   | After completion of the course, students will be able to:   |  |              |
| 1.   | Identify the scope and necessity of irrigation  |  |              |
| 2.   | Describe the different term related to irrigation   |  |              |
| 3.   | Describe the methods of irrigation  |  |              |
| 4  | Compute the rain fall and runoff  |  |              |
| 5  | Demonstrate the cause and effect and measurement of flood   |  |              |
| 6  | Identify the different types of head works  |  |              |
| <b>Pre-Requisite :-</b>  |   |  |              |
|  |   |  |              |
| <b>Contents (Theory)</b>   |   | <b>Hrs</b>   | <b>Marks</b> |
| UNIT- I  | <b>1.0 INTRODUCTION:</b><br>1.1 Definition of irrigation<br>1.2 Types, sources and necessity of irrigation<br>1.3 History of development of irrigation in India, including National Water Policy  | 1  | 5            |
| UNIT - III   | <b>2.0 RAIN FALL AND RUN OFF</b><br>2.1 Definition of rainfall and run-off. Catchment area, relationship, Dicken's and Ryve's formulae<br>2.2 Concepts of Hydrograph and hyetograph, Computation of average rainfall by different methods<br>2.3 Computation of run-off and factors affecting run-off | 4  | 10           |

|             |  |    |    |
|-------------|--|----|----|
|             | 2.4 Scope of rain water harvesting.<br>2.5 Types of rain gauges - Automatic and non-automatic  |    |    |
| UNIT - III  | <b>3.0 WATER REQUIREMENT OF CROPS</b><br>3.1 Definition of crop season<br>3.2 Duty, Delta and Base Period, their relationship<br>3.3 Types of soil, soil fertility, crop rotation, season and names of Kharif and Rabi crops<br>3.4 Definition- Gross command area, culturable command area, Intensity of Irrigation, Irrigable area<br>3.5 Water requirement of different crops in Sikkim and their classification according to season  | 5  | 15 |
| UNIT - IV   | <b>4.0 GROUND WATER AND WELLS:</b><br>4.1 Ground water resources<br>4.2 Types of wells - shallow and deep well, aquifer types, ground water flow, construction of open wells and tube-wells<br>4.3 Yield of an open tube-well and problems<br>4.4 Methods of lifting water - Manual and mechanical Devices (names)   | 3  | 6  |
| UNIT - V    | <b>5.0 CANAL IRRIGATION:</b><br>5.1 Classification of canals according to their alignment<br>5.2 Different parts of irrigation canals and their functions<br>5.3 Sketches of different canal cross-sections<br>5.5 Design of irrigation canals - Chezy's formula, Mannings formula, Kennedy's and Lacey's silt theories and equations, comparison of above two silt theories, critical velocity ratio<br>5.6 Various types of canal lining - Advantages and disadvantages                      | 10 | 6  |
| UNIT - VI   | <b>6.0 DIVERSION HEAD WORKS</b><br>6.1 Definition, necessity & objectives<br>6.2 Layout of a diversion head works and function of each parts<br>6.3 Difference between weir and barrage  | 2  | 5  |
| UNIT - VII  | <b>7.0 REGULATORY AND CROSS DRAINAGE WORKS:</b><br>7.1 Functions of regulatory works<br>7.2 Cross and head regulators<br>7.3 Definition- Canal falls, canal escapes, Energy dissipaters<br>7.4 Functions of the following types: aqueduct, siphon, super-passage, level crossing, inlet and outlet<br>7.5 Constructional detail of the above   | 4  | 5  |
| UNIT - VIII | <b>8.0 FLOOD CONTROL:</b><br>8.1 Definition, cause and effects of flood<br>8.2 Flood control measures- Structural and non- structural<br>8.3 Flood forecasting- network and various methods<br>8.4 Dam: Classification: Earthen, masonry and concrete dams<br>8.5 Earthen dams - types, necessity, advantages of earthen dams, materials used in construction, drainage problem, causes of failure and protection against failures<br>8.6 Masonry and concrete dams: Forces acting on the dam, | 10 | 12 |

|   |  |         |   |
|---|--|---------|---|
|   | stresses developed at the base, solution of numerical problems<br>8.7 Labeled cross section of gravity dam and Spillways<br>8.8 Dam, Different types of Dams available in India.<br>8.9 River training works- Objectives, different types, guide bank, spurs, groynes, pitching, revetment, rip-rap.   |         |   |
| UNIT - IX                               | <b>9.0 WATER LOGGING AND DRAINAGE:</b><br>9.1 Definition, causes and ill effects of water lodging.s<br>9.2 Preventive measures and remedies<br>9.2 Land drainage- methods of drainage, surface and sub-surface drains and their layout   | 1       | 5                                       |
| UNIT - X                                | <b>10.0 TUBE WELL IRRIGATION:</b><br>10.1 Introduction, advantages & disadvantages of tube well irrigation over canal irrigation<br>10.2 Tube-wells, explanation of terms water table, radius of influence, depression head, cone of depression, confined and unconfined aquifers<br>10.3 Types of tube-wells and their choice-cavity, strainer and slotted type<br>10.4 Method of construction-- boring, installation of well assembly, development of well, pump selection, installation and maintenance<br>10.5 Piped Water Irrigation, Design of Pipelines and losses. | 2       | 6                                       |
|   | <b>Class test</b>  | 3       |   |
| <b>Total</b>                            |  | 45 hrs  | 75                                      |
| <b>Text /Reference Books:</b>           |  |         |   |
| Name of Authors                         | Titles of the Book   | Edition | Name of the Publisher                   |
| Basak, N.N                              | Irrigation Engineering   |         | Tata Mc-Graw Hill                       |
| Garg, Santosh Kumar                     | Irrigation Engineering and Hydraulics  |         | Khanna Publishers, Delhi                |
| Purnima, BC and Pande<br>Brij Bansi Lal | Irrigation and Water Power Engineering   |         | Standard Publishers Distributors, Delhi |
| G.L Asawa                               | Irrigation Engineering   |         | Willey eastern limited                  |

|  |   |  |            |              |
|--|---|--|------------|--------------|
| <b>Name of the course : GEO-TECHNICAL ENGINEERING – II</b>   |   |  |            |              |
| <b>Course code: CE507</b>  |   | <b>Semester : Sixth</b>                                  |            |              |
| <b>Teaching Scheme</b>   |   | <b>Maximum Marks : 100</b>                               |            |              |
|  |   | <b>PA and End Examination Scheme</b>                     |            |              |
| Theory :   | 3 hrs/week  | Class test: 10 Marks                                     |            |              |
| Tutorial:  | 1 hrs/week  | Assignment / Quiz etc.: 10 Marks<br>Attendance : 5 Marks |            |              |
| Practical :  | 0 hrs/week  | End Semester Theory Exam:75 Marks                        |            |              |
| Credit :   | 4   | PA Practical : 00 Marks                                  |            |              |
| <b>Rationale:</b>  |   |  |            |              |
| <p>The knowledge and skills of Geo-Technical Engineering is very important subject of Civil Engineering. Practical works in Geo-Technical Engineering are equally important.</p> <p>The theory together with practices of this subject will definitely help the Practicing Civil Engineers in Civil Engineering Construction Works, specially in the design and construction of building foundation.</p> |   |  |            |              |
| <b>Course Objective :-</b> Geo-technical Engineering II aims at imparting basic knowledge on Earth Pressure Theories, slope stability, soil exploration, bearing capacity and settlement analysis of shallow foundations, deep foundations and introduction to soil improvement and stabilization techniques.  |   |  |            |              |
| <b>Module/Unit</b>   | After completion of the course, students will be able to:   |  |            |              |
| 1.   | Determine earth pressure on retaining walls and analysis stability of retaining walls   |  |            |              |
| 2.   | Determine bearing capacity of different types of shallow foundations  |  |            |              |
| 3.   | Determine settlement of shallow foundations   |  |            |              |
| 4.   | Define different types of slopes and slope protection measures  |  |            |              |
| 4  | Explain the importance of soil exploration and different types of soil exploration techniques   |  |            |              |
| 5  | <ul style="list-style-type: none"> <li>• Classify deep foundation and their applications</li> <li>• Determine pile capacity as per IS code recommendations under vertical load</li> </ul>   |  |            |              |
| 6  | Explain the application of different types of soil improvement and stabilisation techniques   |  |            |              |
| <b>Pre-Requisite :-</b>  |   |  |            |              |
|  |   |  |            |              |
| <b>Contents (Theory)</b>   |   |  | <b>Hrs</b> | <b>Marks</b> |
| UNIT- I  | <b>1.0 EARTH PRESSURE THEORIES</b><br>1.1 Rankine & Coloumb’s Earth Pressure theories<br>1.2 Determination of Earth Pressure on retaining wall by applying Rankine’s Theory, simple problems<br>1.3 Stability of retaining walls: Fundamental consideration (no derivation) |  | 6          | 5            |

|            |  |    |    |
|------------|--|----|----|
| UNIT - II  | <p><b>2.0 SOIL EXPLORATION &amp; SITE INVESTIGATION</b></p> <p>2.1 Necessity of site investigation &amp; sub-soil exploration.</p> <p>2.2 Types of exploration – general, detailed.<br/>Method of site exploration open excavation &amp; boring</p> <p>2.3 Undisturbed and disturbed samples, sampling and samplers</p> <p>2.4 Standard penetration test, plate load test (demonstration of tests)</p> <p>2.5 Format for soil report of a residential project</p>  | 5  | 12 |
| UNIT - III | <p><b>3.0 BEARING CAPACITY ANALYSIS</b></p> <p>3.1 Concept of bearing capacity, ultimate bearing capacity, net ultimate bearing capacity, factor of safety, safe bearing capacity and allowable bearing pressure</p> <p>3.2 Bearing capacity analysis of isolated shallow foundation by Terzaghi's and IS code method (IS 6403-1981)</p> <p>3.3 Effect of water table on bearing capacity</p> <p>3.4 Determination of bearing capacity for different foundation (isolated and strip foundation only on homogeneous soil deposits) as per IS code method</p> <p>3.5 Field methods for determination of bearing capacity – Plate load test and standard penetration test.<br/>Test procedures as Per IS:1888&amp; IS:2131</p> <p>3.6 Typical values of bearing capacity from building code IS:1904</p> |    | 12 |
| UNIT - IV  | <p><b>4.0 SETTLEMENT ANALYSIS OF SHALLOW FOUNDATIONS</b></p> <p>4.1 Types and definition</p> <p>4.2</p> <p>4.3 Settlement computation: Immediate and consolidation settlement</p> <p>4.4 Estimation of settlements for cohesionless soils</p> <p>4.4.1 Schmertmann's method</p> <p>4.4.2 Semi-empirical method of settlement analysis –</p> <p>a. plate load test</p> <p>b. static cone penetration test</p> <p>c. Settlement from SPT (numerical problems)</p> <p>4.5 Estimation of settlement for cohesive soils</p> <p>4.5.1 Thin clay layer sandwiched between thick sand layers – numerical problems</p> <p>4.5.2 Clay layer resting on cohesionless soil or rock – numerical problems</p>  | 12 | 18 |
| UNIT - V   | <p><b>5.0 STABILITY OF SLOPES</b></p> <p>5.1 Introduction, definition and types of slope</p> <p>5.2 Slope protection measures</p>  | 4  | 6  |

|                                      |  |         |                            |
|--------------------------------------|--|---------|----------------------------|
| UNIT - VI                            | <p><b>6.0 DEEP FOUNDATION</b></p> <p>6.1 Definition, classification and suitability: Pile foundation, Pier, Well foundation</p> <p>6.2 Determination of pile capacity by IS code method (IS-2911) under vertical load only</p> <p>6.3 Components of well foundation, Forces acting on well foundation.</p> <p>6.4 Construction of well foundations - Sinking of wells - Tilting and shifting of wells - Rectification of tilts and shifts</p>  | 7       | 12                         |
| UNIT - VII                           | <p><b>7.0 INTRODUCTION TO GROUND IMPROVEMENT &amp; SOIL STABILIZATION TECHNIQUES</b></p> <p>7.1 Need for ground improvement and classification of ground improvement techniques</p> <p>7.2 Different methods: Pre loading, sand drains, stone columns, vibro flotation, grouting, earth reinforcement, drop hammer, dynamic consolidation, vibro compaction and stabilization by using admixtures (applicability and fundamental considerations only), in-situ ground treatment for slopes.</p> <p>7.3 Applications, functions and types of geotextiles and geo-synthetics</p> <p>7.4 Concept of soil stabilization, necessity of soil stabilization</p> <p>7.5 Different methods of soil stabilization – Mechanical soil stabilization, lime stabilization, cement stabilization, bitumen stabilization &amp; fly-ash stabilization</p> | 8       | 10                         |
|                                      | <b>CLASS TESTS</b>   | 3       |                            |
| <b>Total</b>                         |  | 45 hrs  | 75                         |
| <b>Text /Reference Books:</b>        |  |         |                            |
| Name of Authors                      | Titles of the Book   | Edition | Name of the Publisher      |
| B. M. Das                            | Principles of Foundation Engineering   |         | Thomson                    |
| P.P Raj                              | Soil Mechanics & Foundation Engineering  |         | Pearson                    |
| B. C. Punmia, Ashok Jain & Arun Jain | Soil Mechanics & Foundations   |         | Laxmi Publication          |
| VNS Murthy                           | Soil Mechanics & Foundation Engineering  |         | CBS Publishers             |
|                                      | Relevant IS Codes: IS 6403, IS 8009, IS 1892, IS 2911  |         | Bureau of Indian Standards |

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|--|--|--------------------------------------|--------------|
| <b>Name of the course : PROJECT</b>  |  |                                      |              |
| <b>Course code: CE517</b>  |  | <b>Semester : Sixth</b>              |              |
| <b>Teaching Scheme</b>   |  | <b>Maximum Marks : 100</b>           |              |
|  |  | <b>PA and End Examination Scheme</b> |              |
| Theory :   | 0 hrs/week   | Class test: 0 Marks                  |              |
| Tutorial:  | 0 hrs/week   | Sessional: 50 Marks                  |              |
| Practical :  | 10 hrs/week  | Viva voice: 50 Marks                 |              |
| Credit :   | 5  |                                      |              |
| <p>Rationale: The diploma-holders in Civil Engineering, many a times , are involved with project work in design and drawing offices. The major works involve making survey, drawing plan and sections, collection of data , organization and analysis of data, estimation and elementary design of structures or their components. They are also expected to have some knowledge of actual practice in construction work. The course “ Project and Industrial visits” should therefore be very important to the diploma students of Civil Engineering to make them professionally sound and valuable</p> |  |                                      |              |
| <b>Course Objective :-</b>   |  |                                      |              |
| <b>Module/Unit</b>   | After completion of the course, students will be able to:  |                                      |              |
| 1.   | Apply knowledge gained in different subjects through solving real life problems in Civil Engineering Apply the ideas of the state of art of construction practices through industrial visits |                                      |              |
| 2.   | Apply the ideas of the state of art of construction practices through industrial visits  |                                      |              |
| 3.   | Develop self-confidence for working in Civil Engineering projects  |                                      |              |
| 4  | Prepare necessary drawings, estimates and project reports  |                                      |              |
| <b>Pre-Requisite :-</b>  |  |                                      |              |
|  | Students should have entire knowledge of civil engineering.  |                                      |              |
| <b>Contents</b>  |  | <b>Hrs</b>                           | <b>Marks</b> |
| UNIT- I  | Selection of groups  | 3                                    |              |
| UNIT - II  | Development of project topics and conduct reconnaissance survey  | 10                                   |              |
| UNIT - III   | Collection of data, required survey work, Preparation of synopsis and selection of project   | 15                                   |              |
| UNIT - IV  | Management and construction procedure,   | 20                                   |              |
| UNIT – V   | Scheduling of planning, Preparation of designing and drawing in detail   | 25                                   |              |
| UNIT - VI  | Estimation of the project  | 20                                   |              |

|                     |   |     |     |
|---------------------|---|-----|-----|
| UNIT - VII          | Execution of the project  | 30  |     |
| UNIT - VIII         | Documentation and final presentation  | 27  |     |
| Total               |   | 150 | 100 |
| <b>Practical :-</b> |   |     |     |
| S.No                | Skills to be developed  |     |     |
| 1                   | Intellectual skills-<br>1) Decide and collect data for projects.<br>2) Read and interpret the drawing, data.<br>3) Design the components.<br>4) Apply the principles rules regulations and byelaws. |     |     |
| 2                   | Motor skills-<br>1) Plan for different phases of a task.<br>2) Prepare drawings for project.<br>3) Use of computer for drawing, networking.<br>4) Work in a group for a given task.                 |     |     |
| 3                   | Social skills-<br>1. Development of ethics.<br>2. Will learn to work with peer as group.<br>3. Able to keep safe and amicable working environment   |     |     |

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|---|-------------------------|
| <b>Name of the course : PROFESSIONAL PRACTICES- V</b> |                         |
| <b>Course code: CE516</b>                             | <b>Semester : Sixth</b> |



|  |   |                                      |
|--|---|--------------------------------------|
| <b>Teaching Scheme</b>   |   | <b>Maximum Marks : 50</b>            |
|  |   | <b>PA and End Examination Scheme</b> |
| Theory :   | 0 hrs/week  | Class test: 0 Marks                  |
| Tutorial:  | 0 hrs/week  |                                      |
| Practical :  | 4 hrs/week  | End Semester Theory Exam:00 Marks    |
| Credit :   | 2   | PA Practical : 50 Marks              |
| <b>Rationale:</b>  |   |                                      |
| This course is designed to provide the students with the knowledge and skills of undertaking supervision work in Civil engineering construction and management. It will also enable them to carry out survey work by using Total Station |   |                                      |
| Course Objective :-  |   |                                      |
| <b>Module/Unit</b>   | After completion of the course, students will be able to  |                                      |
| 1.0  | Explain the organization of an engineering department   |                                      |
| 2.   | Classify work into different categories and execute them  |                                      |
| 3.   | Explain the various stages of accounting procedure during execution of works using standard measurement books and master roll |                                      |
| 4  | Handle Total Station and carryout survey work using Total Station   |                                      |
| <b>Pre-Requisite :- Professional Practice IV &amp; Surveying</b>   |   |                                      |

|          | <b>Contents (Theory)</b>   | Hrs | Marks |
|----------|--|-----|-------|
| UNIT I   | <b>1.0 Organization of engineering department</b><br>1.1 Permanent establishment<br>1.2 Duties and responsibilities of subordinate engineers   |     |       |
| UNIT II  | <b>2.0 Works</b><br>2.1 Classification of work-original, major, minor, petty, repair work, annual repair, special repair, quadrantal repair<br>2.2 Method of execution of works through the contractors, departmentally, contract and agreement, work order.   |     |       |
| UNIT III | <b>3.0 Account of works</b><br>3.1 Explanation of various terms<br>Administrative approval, technical sanction, contingency budget, tender, preparation of notice inviting tender, receiving of quotations, earnest money, security deposit, advance payment, on account payment, intermediate payment, final payment, running bill, final, regular and temporary establishment, cash, major & subhead of account, temporary advance, issue rate, storage, supervision charges, suspense account, debit, credit, book transfer, sub-voucher and related accounts vouchers<br>3.2 Measurement book use & maintenance, procedure of making entries of measurement of work and supply of materials, labour employed, standard measurement books and common irregularity<br>3.3 Muster Roll: Its preparation & use for pay and |     |       |

|         |  |    |           |
|---------|--|----|-----------|
|         | wages  |    |           |
| UNIT IV | <b>4.0 TOTAL STATION AND ITS APPLICATION</b><br>4.1 Use of total station-<br>4.2 Control survey, topographic survey, Land, Boundary or cadastral survey, Route survey.<br>4.3 Detail Survey and Profile Levelling; Calculation of Area and Volume<br>4.4 Engineering Surveys: Setting out of Curves – Horizontal: Simple, Compound, Reverse and Transition, Vertical | 30 |           |
| UNIT V  | <b>5.0 AERIAL SURVEY AND REMOTE SENSING &amp; GIS</b><br>5.1 Aerial Survey Introductions, definition, Aerial photograph<br>5.2 Remote Sensing – Introduction, Electro-Magnetic Energy, Remote sensing system-Passive system , Active system, Applications – mineral, land use / Land cover, Natural Hazards and Environmental engineering system.                    |    |           |
|         | <b>TOTAL:</b>  | 60 | <b>50</b> |

**Practical :-**

| S.No | Skills to be developed   |
|------|--|
| 1.   | <b>Intellectual skills-</b> Labour management and capacity to execute work   |
| 2.   | <b>Motor skills-</b><br>1. Handling Total Station for conducting Survey  |
| 3    | <b>Social skills-</b><br>1. Will learn to work with peer as group<br>2. Able to communicate with teachers and peers to clarify doubts. |

**TEXT / REFERENCE**

| Name of Authors             | Titles of the Book  | Name of the Publisher            |
|-----------------------------|---|----------------------------------|
| Gopi                        | Advanced Surveying: Total Station, GIS and Remote Sensing | Pearson Education India          |
| A. M. Chandra               | Higher Surveying  | New Age International            |
| Gahlot P.S. and Dhir, B.M.; | Construction Planning and Management                      | Wiley Eastern Limited, New Delhi |
| Harpal Singh                | Construction Management and Accounts                      | Tata Mc.Graw Hill, New Delhi     |
| Srinath L.S                 | PERT & CPM Principles and Applications                    | East West Press, New Delhi       |
| S.C. Dixit                  | Text Book of PWD Account                                  |                                  |

**ELECTIVE SUBJECTS**

|  |  |  |                   |
|--|--|--|-------------------|
| <b>Name of the course : EARTHQUAKE RESISTANT DESIGN&amp; CONSTRUCTION</b>  |  |  |                   |
| <b>Course code: CE601</b>  |  | <b>Semester : Sixth</b>                                  |                   |
| <b>Teaching Scheme</b>   |  | <b>Maximum Marks : 100</b>                               |                   |
|  |  | <b>PA and End Examination Scheme</b>                     |                   |
| Theory :   | 3 hrs/week   | Class test: 10 Marks                                     |                   |
| Tutorial:  | 1 hrs/week   | Assignment / Quiz etc.: 10 Marks<br>Attendance : 5 Marks |                   |
| Practical :  | 0 hrs/week   | End Semester Theory Exam:75 Marks                        |                   |
| Credit :   | 4  | PA Practical : 00 Marks                                  |                   |
| <b>Rationale:</b>  |  |  |                   |
| The subject Earthquake Resistant Design and Construction is very important in the present day's context. This is particularly relevant for earthquake prone areas like Northeastern part of India. So it is felt that a course to cover these aspects of Civil Engineering should be mandatory in the diploma curriculum also. |  |  |                   |
|  |  |  |                   |
| <b>Module/Unit</b>   | After completion of the course, students will be able to:  |  |                   |
| 1.   | Demonstrate the cause and effect of earthquake   |  |                   |
| 2.   | Demonstrate the different configuration of structure   |  |                   |
| 3.   | Design and detail the earthquake resistant of structure as per Indian standard   |  |                   |
| 4  | Use the concrete band, ties and reinforcement in masonry structure   |  |                   |
| 5  | Demonstrate the use of timber in earthquake resistant design   |  |                   |
| 6  |  |  |                   |
| <b>Pre-Requisite :-</b>  |  |  |                   |
|  |  |  |                   |
| <b>Contents (Theory)</b>   |  | <b>Hrs</b>   | <b>Marks in %</b> |
| UNIT- I  | <b>1.0 INTRODUCTION</b><br>1.1 Introduction to earthquakes, causes of earthquakes<br>1.2 Brief history of major earthquakes in the past  | 5  | 5                 |
| UNIT- II   | <b>2.0 STRUCTURAL CONFIGURATION</b><br>2.1 Advantages of regular, simple and symmetrical configurations over irregular ones<br>2.2 Use of separation joints (IS:4326)  | 6  | 10                |
| UNIT - III   | <b>3.0 USE OF CONCRETE BANDS, TIES AND REINFORCEMENTS IN MASONRY CONSTRUCTION (IS:4326- 2013)</b><br>3.1 Masonry construction with rectangular masonry units- Wall, mortar, masonry bond and seismic strengthening arrangement | 5  | 10                |

|                               |  |         |  |
|-------------------------------|--|---------|--|
|                               |  |         |  |
| UNIT - IV                     | <b>1.0 USE OF TIMBER IN EARTHQUAKE RESISTANT DESIGN (IS:4326)</b><br>1.1 Connection of column with foundation<br>1.2 Types of framing-<br>Stud wall construction, Brick nogged timber frame construction<br>4.3 General discussions with jointing  | 4       | 6                                      |
| UNIT - V                      | <b>5.0 INTRODUCTION TO IS: 1893 – 2002 (PART 1)</b><br>5.1 Magnitude and Intensity of earthquakes<br>5.2 Seismic zoning<br>5.3 Definition of terms related to earthquake engineering<br>ordinary and special moment resistant frames, shear wall, separation sections, centre of mass, centre of rigidity, ductility, storey drift.<br>5.4 General principles of earthquake resistant design, MCE, DBE | 10      | 17                                     |
| UNIT - VI                     | <b>6.0 DETAILED DISCUSSIONS ON DUCTILE DETAILING OF RC STRUCTURES AS PER IS: 13920-2016</b><br>6.1 General specifications of beam- Detailing of longitudinal and transverse reinforcement (no design or derivation), Location of splices<br>6.2 General specifications of columns- Detailing of longitudinal and transverse reinforcements including special confining reinforcement                   | 12      | 22                                     |
|                               | Class Test   | 3       |  |
| <b>Total</b>                  |  | 60 hrs  | 75                                     |
| <b>Text /Reference Books:</b> |  |         |  |
|                               |  |         |  |
| Name of Authors               | Titles of the Book   | Edition | Name of the Publisher                  |
| Jai Krishna & Jain            | Elements of Earthquake Engineering   |         | South Asian Publishers Private Limited |
| Agarwal & Shrikhande          | Earthquake Resistant Design of Structures  |         | PHI                                    |
| S.K. Duggal                   | Earthquake Resistant Design of Structures  |         | Oxford University Press                |

|                 |   |  |                      |
|-----------------|---|--|----------------------|
| Prasad          | Fundamentals of Soil Dynamics and Earthquake Engineering  |  | PHI Learning         |
| Kramer          | Geotechnical Earthquake Engineering                       |  | Pearson              |
| C. V. R. Murthy | Earthquake tips   |  | Publication of Nicee |
|                 | Publications of nicee                                     |  | IIT Kanpur           |
|                 | Relevant IS Codes: 1893, 4326, 13920                      |  |                      |
|                 | Website: <a href="http://www.nicee.org">www.nicee.org</a> |  |                      |

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|--|--|
| <b>Name of the course : ENVIRONMENTAL ENGINEERING</b>  |  |
| <b>Course code: CE602</b>  | <b>Semester : Sixth</b>  |
| <b>Teaching Scheme</b>   | <b>Maximum Marks : 100</b>   |
|  | <b>PA and End Examination Scheme</b>   |
| Theory : 3 hrs/week  | Class test: 10 Marks   |
| Tutorial: 1 hrs/week   | Assignment / Quiz etc.: 10 Marks<br>Attendance : 5 Marks                                     |
| Practical : 0 hrs/week   | End Semester Theory Exam:75 Marks  |
| Credit : 4   | PA Practical : 00 Marks  |
| <b>Rationale:</b>  |  |
| <p>The construction activities taken up by the technical personnel, civil engineering technicians in particular, are responsible for the environmental degradation. The civil engineers are also responsible for adopting the remedial measures. As such, a civil engineering diploma holder should have adequate knowledge about the types of pollution caused by various construction activities for adopting preventive and remedial measures. They should be also be aware of the various environmental laws for effective control of environmental pollution.</p> |  |
| <b>Module/Unit</b>   | After completion of the course, students will be able to:                                    |
| 1.   | explain the different aspects of environmental engineering                                   |
| 2.   | relate the various components of ecosystem   |
| 3.   | identify the sources and effects of environmental pollution                                  |
| 4  | analyze the polluted water, air and soil by using appropriate sampling method                |
| 5  | describe the role of various agencies in environmental pollution and the environmental laws. |
| <b>Pre-Requisite :-</b>  |  |
|  |  |

| <b>Contents (Theory)</b> |  | <b>Hrs</b> | <b>Marks</b> |
|--------------------------|--|------------|--------------|
| UNIT- I                  | <b>1.0 INTRODUCTION</b><br>1.1 Definition of environment and components of Environment and related terms<br>1.2 Aims & objectives of environmental engineering<br>1.3 Impact of population growth, industrialization & urbanization and energy growth on environment<br>1.4 Current issues of environmental concern like-Global warming, Acid rain, Ozone depletion-features, causes and impacts on living being   | 7          | 8            |
| UNIT - II                | <b>2.0 ECOLOGY:</b><br>2.1 Concepts of ecosystem and its component<br>2.2 Energy flow through an ecosystem<br>2.3 Biochemical cycles-C,N,P<br>2.4 Interrelationships between communities in an ecosystem<br>Sustainable development  | 8          | 10           |
| UNIT - III               | <b>3.0 ENVIRONMENTAL POLLUTION:</b><br>3.1 Definition of terms, parameters of pollution, types of pollution<br>3.2 Water Pollution- Types of pollutants & their characteristics, Sources of pollutants, effects of water pollution, standards for industrial effluents, remedial measures for control<br>3.3 Air Pollution- Types of pollutants & their characteristics<br>Sources of pollutants, effects of pollutants on human, plants & vegetation, structures etc, permissible limits as per Indian and International standard, remedial measures for control<br>3.4 Noise Pollution-definition and measure of noise, types, Sources of pollution, effects of noise pollution, prevention & control measures<br>3.5 Land Pollution- Causes, Effects of Pesticides & fertilizers used in agricultural practice, impacts of blasting & open cast mining, degradation due to deforestation and due to natural disaster like land subsidence, case studies on mining; blasting and deforestation, soil pollution management-land conservation and land reclamation | 15         | 17           |
| UNIT - IV                | <b>4.0 POLLUTION SURVEY:</b><br>4.1 Planning survey, sampling, locations, criterion, equipment, and techniques for water & air pollution survey<br>4.2 Analysis of water and air pollutants-principles & methods   | 10         | 10           |

|                               |   |           |                       |
|-------------------------------|---|-----------|-----------------------|
| UNIT - V                      | <b>5.0 SOLID WASTE MANAGEMENT:</b><br>5.1 Definition of related terms and purpose<br>5.2 Sources of solid wastes, characteristics of wastes-urban & rural communities, sampling methods<br>5.3 Storage & collection- storage methods, frequency of collection, methods of collection, comparison<br>5.4 Disposal of solid wastes- principles, description of process, planning, operation, maintenance & suitability of different methods of disposal- sanitary land fill, composting, incineration, recycle of the waste | 10        | 15                    |
| UNIT - VI                     | <b>6.0 ENVIRONMENTAL MANAGEMENT:</b><br>6.1 Environmental legislation- salient features of different environmental protection acts in India<br>6.2 Roles of pollution control boards, local bodies and citizens in environmental pollution management<br>6.3 Environmental impact assessment- requirements and definition of related terms, method of assessment<br>Environmental ethics  | 10        | 15                    |
|                               | CLASS TEST  | 3         |                       |
| <b>Total</b>                  |   | 60<br>hrs | 75                    |
| <b>Text /Reference Books:</b> |   |           |                       |
|                               |   |           |                       |
| Name of Authors               | Titles of the Book  | Edition   | Name of the Publisher |
| N.N Basak                     | Environmental Engineering   |           |                       |
| A.K.Chatterjee                | Environmental Engineering   |           |                       |
| Peavy, et.al.                 | A Text Book of Environmental Engineering  |           |                       |
| Chanlett                      | Environmental Protection  |           |                       |
| Odum                          | Fundamentals of Ecology   |           |                       |
| APHA                          | Standard Methods for Examination of Water and Waste Water   |           |                       |



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|--|--|--|--------------|
| <b>Name of the course : ADVANCED TRANSPORTATION ENGINEERING</b>  |  |  |              |
| <b>Course code: CE605</b>  |  | <b>Semester : Sixth</b>                                  |              |
| <b>Teaching Scheme</b>   |  | <b>Maximum Marks : 100</b>                               |              |
|  |  | <b>PA and End Examination Scheme</b>                     |              |
| Theory :   | 3 hrs/week   | Class test: 10 Marks                                     |              |
| Tutorial:  | 1 hrs/week   | Assignment / Quiz etc.: 10 Marks<br>Attendance : 5 Marks |              |
| Practical :  | 0 hrs/week   | End Semester Theory Exam:75 Marks                        |              |
| Credit :   | 4  | PA Practical : 00 Marks                                  |              |
| <b>Rationale:</b>  |  |  |              |
| <p>Many diploma holders in civil engineering supervise the construction or perform the maintenance of canals, head-works, river training works, cross drainage works, regulatory and other works. Some of diploma holders are also engaged for preventing water logging and irrigation by tube-wells. For a state which does not have a major Irrigation System the subject can be offered as an elective one so that an willing student can plan his carrier in Irrigation Engineering.</p> |  |  |              |
| <b>Course Objective :-</b>   |  |  |              |
| <b>Module/Unit</b>   | After completion of the course, students will be able to:                    |  |              |
| 1.   | Identify the different types of railways and their elements and functions    |  |              |
| 2.   | Identify the different types gauges, connections and maintenance of railways |  |              |
| 3.   | Supervise the construction of tunnel   |  |              |
| 4  | Maintain the tunnel for use of safety purposes                               |  |              |
| 5  | Identify the different type bridge and their function                        |  |              |
| 6  | Identify the culverts and their uses   |  |              |
| <b>Pre-Requisite :-</b>  |  |  |              |
|  |  |  |              |
|  |  |  |              |
| <b>Contents (Theory)</b>   |  | <b>Hrs</b>   | <b>Marks</b> |

|           |   |    |    |
|-----------|---|----|----|
| UNIT- I   | <p><b>RAILWAYS</b></p> <p>1.1 Introduction:</p> <p>1.2 Railway terminology</p> <p>1.3 Advantages of railways</p> <p>1.4 Classification of Indian Railways</p> <p>1.5 Permanent way</p> <p>    1.5.1 Definition and components of a permanent way</p> <p>    1.5.2 Concept of gauge, different gauges prevalent in India, suitability of these gauges under different conditions</p> <p>1.6 Track materials</p> <p>    1.6.1 Rails</p> <p>    1.6.2 Functions and requirement of rails</p> <p>    1.6.3 Types of rail sections, length of rail</p> <p>    1.6.4 Rail joints – types, requirement of an ideal joint</p> <p>    1.6.7 Purpose of welding of rails &amp; its advantages</p> <p>    1.6.7 Creep – definition, cause &amp; prevention</p> <p>1.7 Sleepers</p> <p>    1.7.1 Definition, functions &amp; requirements of sleepers</p> <p>    1.7.2 Classification of sleepers</p> <p>    1.7.3 Advantages &amp; disadvantages of different types of sleepers</p> <p>1.8 Ballast</p> <p>    1.8.1 Functions &amp; requirements of ballast</p> <p>    1.8.2 Materials for ballast</p> <p>1.9 Fixtures &amp; fastening</p> <p>    1.9.1 Connection of rails to rail-fishplate, fish bolts</p> <p>    1.9.2 Connection of rails to sleepers</p> <p>2.0 Geometric for Broad gauge</p> <p>    2.0.1 Typical cross-sections of single &amp; double broad gauge railway track in cutting and embankment</p> <p>    2.0.2 Permanent &amp; temporary land width</p> <p>    2.0.3 Gradients for drainage</p> <p>    2.0.4 Super-elevation – necessity &amp; limiting values</p> <p>2.1 Points and Crossings</p> <p>    2.1.1 Definition, necessity of points &amp; crossings</p> <p>    2.1.2 Types of points &amp; crossings with tie diagrams</p> <p>2.2 Signaling systems</p> | 20 | 30 |
| UNIT - II | <p><b>TUNNELS</b></p> <p>a. Introduction:</p> <p>b. Definition of tunnels</p> <p>c. Necessity of tunnels</p> <p>d. Functions of tunnels</p> <p>e. Advantages &amp; disadvantages of tunnels</p> <p>2.0 Tunnel surveying</p> <p>    2.1 Factors affecting alignment &amp; grade of a tunnel</p> <p>    2.2 Method of location of centre line of tunnel on the Ground</p>   | 10 | 20 |

|            |   |    |    |
|------------|---|----|----|
|            | <p>2.3 Method of transferring the centre line of tunnel to inside of tunnel</p> <p>3.0 Size &amp; Shape of Tunnel</p> <p>3.1 Factors affecting the size of tunnels</p> <p>3.2 Typical sectional views of tunnels for (a) a National Highway (b) a single &amp; double broad gauge railway Track</p> <p>4.0 Construction of tunnels</p> <p>4.1 Methods of tunneling in rocks</p> <p>4.2 Operations involved in tunneling in rocks</p> <p>4.3 Methods of tunneling in soft soil</p> <p>4.4 Safety precautions to be adopted in tunneling</p> <p>4.5 Maintenance of tunnels</p> <p>4.6 Drilling equipment- drills and drills carrying equipment, Types of explosives used in tunneling. Maintenance of tunnels</p> <p>5.0 Ventilation of tunnels</p> <p>5.1 Necessity of ventilation</p> <p>5.2 Shafts - purpose, classification, location</p> <p>5.3 Methods of dust control</p> <p>6.0 Tunnel Lining</p> <p>6.1 Necessity of lining</p> <p>6.2 Functions of lining</p> <p>6.3 Types of lining</p> <p>6.4 Operations involved in lining of tunnels</p> <p>7.0 Drainage of tunnels</p> <p>7.1 Necessity of drainage</p> <p>7.2 Methods of drainage</p> |    |    |
| UNIT - III | <p><b>BRIDGES</b></p> <p>1.0 Introduction:</p> <p>1.1 Definitions</p> <p>1.2 Components of a bridge</p> <p>1.3 Classification of bridges</p> <p>1.4 Requirements of an ideal bridge</p> <p>2.0 Bridge Site investigation, hydrology &amp; planning</p> <p>2.1 Selection of bridge site</p> <p>2.2 Bridge alignments</p> <p>2.3 Determination of flood discharge</p> <p>2.4 Waterway &amp; economic span</p> <p>2.5 Afflux, clearance &amp; free board</p> <p>2.6 Collection of bridge design data &amp; sub surface investigation</p> <p>3.0 Bridge foundation</p> <p>3.1 Scan depth, minimum depth of foundation</p> <p>3.2 Types of bridge, foundations - spread foundation pile</p>  | 15 | 25 |

|                               |  |                |                              |
|-------------------------------|--|----------------|------------------------------|
|                               | <p>foundation - pile driving, well foundation - sinking of wells, caisson foundation</p> <p>3.3 Cofferdams</p> <p>4.0 Bridge substructure and approaches</p> <p>4.1 Piers &amp; types - forces acting &amp; design principles</p> <p>4.2 Abutments, types - forces acting &amp; design principles</p> <p>4.3 Wing walls, types and their stability</p> <p>4.4 Approaches</p> <p>5.1 Permanent bridges</p> <p>5.1 Masonry bridges</p> <p>5.2 Steel bridges – classification, brief description with sketches - plated girder bridges, truss bridges, steel bridges, rigid frame steel bridges, cable stayed bridges, continuous steel bridges, suspension bridges</p> <p>5.3 Concrete bridges - classification, brief description with sketches - slab &amp; girder bridges, balanced cantilever bridges, continuous bridges, arch bridges, rigid frame bridges, pre-stressed concrete bridges.</p> <p>5.4 IRC bridge loading</p> <p>6.0 Culverts &amp; causeways</p> <p>6.1 Types of culverts - brief description</p> <p>6.2 Types of causeways - brief description</p> <p>6.3 Bridge details</p> <p>6.4 Joints in bridges - description with sketches</p> <p>7.0 Railings</p> |                |                              |
|                               | <b>Class test</b>  | 3              |                              |
| <b>Total</b>                  |  | 45 hrs         | 75                           |
| <b>Text /Reference Books:</b> |  |                |                              |
| <b>Author's Name</b>          | <b>Titles of the Book</b>  | <b>Edition</b> | <b>Name of the Publisher</b> |
| N.L. Arora,<br>S.P.Luthara    | Transportation Engineering   |                | I.P.H. New Delhi             |
| N.L. Arora,<br>S.P.Luthara    | Transportation Engineering   |                | I.P.H. New Delhi             |
| S.C. Saxena                   | A Text Book of Railway Engineering   |                | Dhanpatrai & sons            |
| S.P. Bindra                   | Principles and Practice of Bridge Engineering  |                | Dhanpat rai & sons           |
| S.C. Saxena                   | Tunnel Engineering   |                | Dhanpatrai & sons            |

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|--|---|-------------------|
| <b>Name of the course : LOW COST CONSTRUCTION TECHNOLOGY</b>   |   |                   |
| <b>Course code: CE606</b>  | <b>Semester : Sixth</b>   |                   |
| <b>Teaching Scheme</b>   | <b>Maximum Marks : 100</b>  |                   |
|  | <b>PA and End Examination Scheme</b>  |                   |
| Theory : 3 hrs/week  | Class test: 15 Marks  |                   |
| Tutorial: 1 hrs/week   | Assignment / Quiz etc.: 10 Marks<br>Attendance : 5 Marks  |                   |
| Practical : 0 hrs/week   | End Semester Theory Exam:75 Marks   |                   |
| Credit : 4   | PA Practical : 00 Marks   |                   |
| <b>Rationale:</b>  |   |                   |
| <p>It is essential that the students should have knowledge of various components of some advance aspects of construction technology in details. Nowadays the construction activities is undergoing lots of changes /developments due to internal and globalised market demands of quality and faster completion of project works using modern techniques, use of modern and waste materials, and through mechanized construction. Today we require high capacity machines with better output and greater efficiency to make construction process less stressful. Therefore, the diploma student should learn the subject advanced construction technology thoroughly which is very important for them.</p> |   |                   |
| <b>Course Objective :-</b>   |   |                   |
| <b>Module/Unit</b>   | After completion of the course, students will be able to:   |                   |
| 1.   | Report the important operations of construction activities such as new techniques , machines and equipment are used                                       |                   |
| 2.   | Describe important aspects , operations and safety points pertaining to: Deep Excavations' Pile foundations , Cofferdams, Caissons, Drilling and Blasting |                   |
| 3.   | Describe equipment and tackles used , problems encountered and their solutions in erection of steel structures  |                   |
| 4  | Discuss purpose, types, materials, design issues, and erection of temporary structures for construction activities.                                       |                   |
| <b>Pre-Requisite :-</b>  |   |                   |
|  |   |                   |
|  |   |                   |
| <b>Contents (Theory)</b>   | <b>Hrs</b>  | <b>Marks in %</b> |

|            |  |    |    |
|------------|--|----|----|
| UNIT- I    | <b>1.0 EXCAVATION AND RELATED EQUIPMENT</b><br>1.1 Shallow and deep excavation.<br>1.2 Dewatering situations, necessity and method of dewatering.<br>1.3 Excavations machinery: power shovel, drag line, clam shell, scoop, trenching equipment.<br>1.4 Earth moving vehicles and machinery: tractors, bulldozers, graders, scrapers, rippers, pump, pile driving, drilling equipment, grouting and gunning equipment. | 5  | 6  |
| UNIT - III | <b>2.0 ERECTION OF STEEL STRUCTURES</b><br>2.1 Formwork: requirement, tolerances, footing forms, column forms, wall forms, beam and slab forms, other types of forms, removal of forms.<br>2.2 Roof truss: Erection problems building/ industrial component, equipment and tackles used for erecting these.<br>2.3 plate girder launching a portion of bridge girder, large span lattice girder                        | 10 | 15 |
| UNIT - III | <b>3.0 DRILLING AND BLASTING</b><br>3.1 Drilling: types, drilling requirement.<br>3.2 Selecting the drilling pattern for blasting.<br>3.3 Effect of air pressure on drilling operation.<br>3.4 Mud slurry in drilling.<br>3.5 Factors affecting the selection of drilling method and equipment blasting.<br>3.6 Explosives for blasting  | 5  | 14 |
| UNIT - III | <b>4.0 COFFER DAMS AND CAISSONS</b><br>4.1 Cofferdams: types, requirements, selection criteria, leakage points and leakage prevention in coffer dams.<br>4.2 caissons: materials used, sinking loading of caissons.  | 2  | 10 |
| UNIT - IV  | <b>PILE FOUNDATION</b><br>5.1 Pile foundation, types<br>5.2 sheet piles<br>5.3 Selection of type of piles<br>5.4 Pile driving methods<br>5.5 Settlement and failure of piles<br>5.6 Under reamed piles including method construction   | 7  | 10 |
| UNIT - V   | <b>6.0 VENTILATION</b><br>6.1 Purpose of ventilation<br>6.2 Essential factors necessitating ventilation<br>6.3 methods of ventilation<br>6.4 Natural ventilation<br>6.5 mechanical ventilation<br>6.6 Air-Conditioning   | 5  | 4  |
| UNIT- VII  | <b>7.0 ACOUSTICS, SOUND INSULATION AND NOISE CONTROL</b><br>7.1 Sound insulating materials<br>7.2 optimum time of reverberation  | 7  | 4  |

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|                               |   |         |                       |
| UNIT-VIII                     | <b>8.0 PREFABRICATED CONSTRUCTION</b><br>8.1 Materials of construction<br>8.2 Modular co-ordination, architectural treatment and finishes<br>8.3 Components of prefabricated construction<br>8.4 Types of prefabricated components<br>8.5 Types of prefabricated systems<br>8.6 precast walls<br>8.7 Precast floors<br>8.8 Joints, joining techniques | 16      | 12                    |
|                               | Class Test  | 3       |                       |
| <b>Total</b>                  |   | 60 hrs  | 75                    |
| <b>Text /Reference Books:</b> |   |         |                       |
|                               |   |         |                       |
| Name of Authors               | Titles of the Book  | Edition | Name of the Publisher |
| B. C. Punmia                  | Building construction   |         |                       |
| S. K Sharma                   | A text book of building construction  |         | S.Chand               |
| Tony Brjan, Wiley             | Construction Technology   |         |                       |
| Dr. Jha & S.K. Sinha          | Building construction   |         |                       |





