

**FACULTY OF ENGINEERING AND TECHNOLOGY**  
**Proposed Revised Structure of TE (Civil)**

**Semester-I**

Subject Code	Subject	Contact hrs/Week			Examination				
		Th.	Pr.	Total	Th.	CT	TW	Pr. / Oral	Total
CED301	Theory of Structure - II	4	-	4	80	20	-	-	100
CED302	Design of Structure - I (Steel)	4	-	4	80	20	-	-	100
CED303	Building Planning and Design	4	-	4	80	20	-	-	100
CED304	Engineering Geology	4	-	4	80	20	-	-	100
CED305	Transportation Engineering I	4	-	4	80	20	-	-	100
CED306	Advanced Surveying	2	-	2	40	10	-	-	50
CED321	Lab I: Building Planning and Design	-	4	4	-	-	50	25	75
CED322	Lab II: Engineering Geology	-	2	2	-	-	25	25	50
CED323	Lab III: Advanced Surveying	-	2	2	-	-	25	-	25
BSH331	Lab IV: Communication Skill- II	-	2	2	-	-		50*	50
<b>TOTAL</b>		<b>22</b>	<b>10</b>	<b>32</b>	<b>440</b>	<b>110</b>	<b>100</b>	<b>100</b>	<b>750</b>

\* Online Exam

**Semester-II**

Subject Code	Subject	Contact Hrs/Week			Examination Scheme				
		Th.	Pr.	Total	Th.	CT	TW	Pr. / Oral	Total
CED351	Design of Structure-II (RCC)	4	-	4	80	20	-	-	100
CED352	Environmental Engineering - I	4	-	4	80	20	-	-	100
CED353	Geotechnical Engineering	4	-	4	80	20	-	-	100
CED354	Water Resource Engineering	4	-	4	80	20	-	-	100
CED355	Transportation Engineering - II	4	-	6	80	20	-	-	100
CED371	Lab V: Structural Design and Drawing-I (Steel)	-	4	4	-	-	50	50	100
CED372	Lab VI: Geotechnical Engineering	-	2	2	-	-	25	25	50
CED373	Lab VII: Transportation Engineering - II	-	2	2	-	-	25	25	50
CED374	Lab VII: Computer Lab- III	0	2	2	-	-	50		50
<b>TOTAL</b>		<b>20</b>	<b>10</b>	<b>30</b>	<b>400</b>	<b>100</b>	<b>150</b>	<b>100</b>	<b>750</b>

Th. = Theory, Pr. = Practical, CT = Class Test, TW = Term Work

## CED301: Theory of Structures- II

### Teaching Schemes

Theory: 04 Hrs / Week

### Examination Schemes

Theory: 80 Marks;

Class Test: 20 Marks

### Unit I: Plastic Analysis of Structures

(04)

Introduction, Material behavior, Theory of Plastic bending and plastic hinge, Plastic Hinge Concept, Shape factor, Ultimate moment of resistance of RCC section, Plastic collapse load. (No numerical to be set)

### Unit II:-Basic Concepts and Analysis of Indeterminate Beams, Frames and Trusses (11)

Concept of indeterminacy–Static and Kinematic Indeterminacy, Degree of Indeterminacy- Rigid Plane Frames and Pin-jointed Plane Trusses.

Analysis of continuous beams, rectangular portal frames and trusses (Indeterminacy up to second degree) by Castigliano's II theorem, lack of fit, temperature changes.

#### Slope deflection method

Nature of equilibrium methods, the slope deflection equation, Interpretation of the slope deflection equation, Analysis of continuous beam, fixed beam, & overhang beams by slope deflection method, Effect of sinking of supports.

### Unit III: Column Analogy Method

(05)

Introduction, Development of the method, Analysis of beams (simple and fixed), Analysis of single bay-single storey frames.

### Unit IV:-Moment Distribution method

(08)

Iterative methods, Physical interpretation of iterative solutions, Basic concept of Moment Distribution Method, Analysis of continuous beam, fixed beam, & overhang beams by Moment Distribution Method, analysis of portal frames (single bay single storey frames), sway and non-sway analysis..

### Unit V: Kani's method

(06)

Analysis of continuous beam, fixed beam, & overhang beams by Kani's Method, analysis of portal frames, sway and non-sway analysis (single bay single storey frames).

### Unit VI: Two Hinged Arch

(06)

Analysis of two hinged parabolic, semicircular and circular arches, yielding of supports of two hinged arches, Rib shortening effects, horizontal thrust due to temperature effects on two hinged arches, Influence lines for two hinged arches.

### **Recommended Books**

1. Fundamentals of Structural Analysis – West & Geschwindner – Wiley India Edition
2. Structural Engineering (An Integrated Treatise) – V.V. Sastry – Dhanpat Rai and Co.
3. Basic Structural Analysis - C.S. Reddy – McGraw Hill
4. Theory of Structures - Timoshenko & Goodier - McGraw Hill
5. Advance Theory of Structures – Sinha & Gayen - Dhanpat Rai and Co.
6. Theory of Structures by S. Ramamrutham and R. Narayan, Dhanpat Rai Publication
7. Theory of Structures, Vol. 1 by Pandit and Gupta
8. Theory of Structures, Vol. 2 by Pandit and Gupta

### **Pattern of Question Paper:**

The units in the syllabus shall be divided in two equal sections. Question paper shall be set having two sections A and B. Section A questions shall be set on first three units (1,2,3) and Section B questions on remaining three units (4,5,6) . Question paper should cover the entire syllabus.

### **For 80 marks Paper:**

1. Minimum ten questions
2. Five questions in each section
3. Three questions from each section are asked to solve.

## **CED302: Design of Structures-I (Steel)**

### **Teaching Scheme**

Theory: 04 Hrs / Week

### **Examination Scheme**

Theory: 80 Marks,

Class Test: 20 Marks

### **Unit-I**

(04)

Types of steel structures, grades of structural steel, various rolled steel sections, relevant IS specifications such as IS: 800-2007, IS: 808-1989, IS: 875 part I to III, SP: 6(1), SP: 6(6), IS: 4000-1992, codes of welded connections, advantages of steel structures, Philosophy of limit state design for strength and serviceability, partial safety factor for load and resistance, various load combinations, classification of cross section such as plastic, compact, semi compact and slender.

### **Unit-II**

(06)

Tension member: Types, Limit state due to yielding, rupture and block shear, Design using single and double angle sections and its connections by bolts and welds.

### **Unit-III**

(10)

Compression member: Behavior of compression members, modes of failure, classification of cross section, Design of strut in trusses and its connections by bolts and welds. Design of axially loaded column using rolled steel section. Design of built up column, lacing and battening, connection of lacing / battening with main components by bolts and welds. Column base under axial load: design of slab base, gusseted base. Column base for axial load and uniaxial bending.

### **Unit-IV**

(07)

Flexural member: Laterally supported and unsupported beams using single rolled steel section with and without flange plate, strength in flexure, check for shear and deflection. Secondary and main beam arrangement for floor of a building, design of beam to beam and beam to column connections using bolt / weld.

### **Unit-V**

(05)

Design of welded plate girder: Design of cross section, curtailment of flange plate, stiffeners and connections.

### **Unit-VI**

(08)

Roof Trusses and Gantry Girder: Assessment of dead load, live load and wind load, design of gantry girder.

## **Recommended Books**

Reference codes: IS 875-Part I to V, IS 800 – 2007.

1. Design of Steel Structures by N. Subramanian, Oxford University Press, New Delhi.
2. Design of steel structure by Limit State Method as per IS: 800-2007 by Bhavikatti S. S., I K International Publishing House, New Delhi.
3. Limit state design of Steel Structure by V. L. Shah and Gore, Structures Publication, Pune.
4. Teaching Resource Material by INSDAG

## **Pattern of Question Paper:**

The units in the syllabus shall be divided in two equal sections. Question paper shall be set having two sections A and B. Section A questions shall be set on first three units (1,2,3) and Section B questions on remaining three units (4,5,6) . Question paper should cover the entire syllabus.

## **For 80 marks Paper:**

1. Minimum ten questions
2. Five questions in each section
3. Three questions from each section are asked to solve.

## **CED 303: Building Planning and Design**

### **Teaching Scheme**

Lectures: 4 Hrs / week

### **Examination Scheme:**

Theory paper: 80 Marks

Class Test: 20 Marks

### **Unit- I:**

(07)

Principles of Architectural Composition: Unit, Contrast, Proportion, Scale, Balance, Rhythm, Character. Functional treatment of building: massing, Principles of Building planning, Climate & its influence on Building planning: Solar radiation, air temperature, wind, humidity, precipitation, climatic zones, climate & comfort, earth & its motion, directions & their characteristics. Orientation of buildings: factors affecting orientation, sun, wind, rain, C.B.R.I. – suggestions for obtaining optimum orientation, orientation criteria for Indian conditions.

### **Unit- II:**

(06)

Building rules & bye laws: objective of building bye-laws, terms commonly used, plot sizes, building frontages, road widths, open spaces, area limitations, height of buildings, plinth height, requirement of different types of rooms, parapet wall, boundary wall, provision for lighting & ventilation, provision for means of access, provision for drainage & sanitation, parking spaces, qualifications for registered architects, Engineers & Licensed supervisor, certificate of commencement, completion & occupancy.

### **Unit-III:**

(07)

a) Different types of buildings, different types of residential buildings, site selection for residential buildings, standard guidelines for building drawings, guidelines for drawing of residential building, drafting materials and their utilization,  
b) Building services: water supply requirement of buildings, sanitary fittings, systems of plumbing, drainage of house, its principles, common terms, drainage plans of buildings, testing of drains, maintenance, pipe sizes and gradients. Septic tanks: domestic & public septic tank, design & commissioning of septic tank.

### **Unit- IV:**

(04)

Design of residential buildings: Planning of living area, sleeping area & service area, minimum standards specified by building bye- laws, requirement of different purpose rooms of a residential building and their grouping.

### **Unit- V:**

(10)

#### **Design of Public buildings:**

A) Educational Building: Site selection, design of Class rooms, Library, Assembly hall, administrative area, staff rooms, sanitary & water fittings requirements.

- B)** Health care buildings: its types, site selection, out- patient dept.(OPD), In- patient dept. (IPD), wards, Operation theatre, Radiology dept., Sanitary & water fitting requirements for IPD & OPD, Pathology dept.
- C)** Hostel Buildings: site selection, Employees hostel, Ladies & working women's hostel, open & closed type hostel, special requirements of ladies hostel, warden's office, residential area, dining area, kitchen, recreation room, store room, sanitary & water fitting requirements.
- D)** Hotel building: site selection, major components of hotel building – entrance foyer, public rooms, bedrooms, kitchen, food store, laundry, building services, sanitary units.
- E)** Office buildings: entrance, corridors, storage, sanitary units, canteen.
- F)** Industrial building: Factory building, godowns & warehouses, site selection, Factory shed, canteen, cloak room, drinking water, entrance, loading & unloading platform, medical aid, office, storage, sanitary block.

#### **Unit VI:**

(06)

Perspective drawing: Necessity, principle of perspective projection, perspective elements, One-point & Two- point perspective. Landscaping: Its necessity, types & materials.

#### **Recommended Books**

1. Building Planning & Drawing – Dr. N. Kumara swamy, A. Kameshwara rao, 6th Edition, Charotar Publications.
2. Building Planning Designing & Scheduling – Gurcharan Singh, Jagdigh singh, Standard Publishers.
3. Planning & Designing of building – Y.S. Sane.
4. Principles of building drawing - M.G. Shah & C.M. Kale
5. Building construction illustrated- Francis D.K. Ching, 4<sup>th</sup> Edition, Wiley India Edition.
6. National Building Code of India: S.P - 7 (2005)

#### **Pattern of Question Paper:**

The units in the syllabus shall be divided in two equal sections. Question paper shall be set having two sections A and B. Section A questions shall be set on first three units (1,2,3) and Section B questions on remaining three units (4,5,6) . Question paper should cover the entire syllabus.

#### **For 80 marks Paper:**

1. Minimum ten questions
2. Five questions in each section
3. Three questions from each section are asked to solve.

## CED304: Engineering Geology

### Teaching Scheme

Theory: 04 Hrs / Week

### Examination Scheme

Theory: 80 Marks,

Class Test: 20 Marks

### Unit I

(04)

**Physical Geology:** Geological action of water, river, valley development, normal cycle of regional erosion, water fall, meanders, and related features, transportation and deposition by river flood plane deposits, deltas, Rejuvenation and related features Earthquake, Interior of the Earth, Volcanism and its types, Types of Mountains.

**Mineralogy:** Minerals, Silicate and non silicate minerals, Rock forming minerals, Physical Properties of minerals, Moh's scale of hardness.

### Unit II

(07)

**Petrology:** Igneous rock and its sub-division- volcanic, hypabyssal and plutonic rocks. Hatch scheme of classification, Texture of rock and its types, study of common rock types, Extrusive rocks Dyke, Batholiths and intrusive igneous type sill, laccolith, lopolith, phacolith, vein.

**Secondary Rock:** Rock weathering, decomposition and disintegration of rock, Classification of secondary rock, Texture of sedimentary rock, stratification and lamination, consolidation by welding and cementation. Characteristics of shallow water deposits, study of common rock types.

**Metamorphic Rock:** Metamorphism. agents of metamorphism, metamorphic minerals and structures, stress minerals and anti-stress minerals. Kind of metamorphism – contact, dynamothermal, cataclastic and plutonic metamorphism. Study of common types of rock.

### Unit III

(09)

**Structural Geology:** Structural elements of rock – dip and strike. Unconformity and overlap. Faults, folds, joints, in rock and their effects on outcrops. Inliers and outliers.

**Stratigraphy:** General principles of stratigraphy, age of the earth and division of geological time. Indian Geology–Physiographic division of India and their characteristics. Geological history of peninsula, study of formation in peninsula and significance for their structural characters in Engineering.

### Unit IV

(07)

**Engineering Geology:** Preliminary geological investigation, use of geological maps and section, bore holes, drilling advantages and limitation of drilling. Engineering significance of geological structures such as stratification dips faults, joints crush zones, fault zones, dykes etc.



Earthquakes losses and geological precaution to be taken while choosing sites of building in seismic zone. Earthquake proof construction of building.

**Ground Water:** Sources of groundwater, Zonal distribution of subsurface water , relation between surface relief and water table . Perched water table. Types of Aquifer. Fluctuations of water table levels, effect of dams and canals condition. Effects of pumping and cone of depression. geological condition that produces artesian pressures. Water Harvesting: Importance, artificial recharge and natural recharge of wells and tube wells.

## **Unit V**

(08)

**Geology of Dam Sites:** Influence of geological condition on the choice of types and design of dams. Preliminary geological work at the dam sites, favorable and unsuitable condition for location of dam. Precautions to be taken to counteract unsuitable condition. Treatment of leaky rock, fault zones, crush zone, dykes, joints unfavorable dips etc.

**Geology of Reservoir Sites:** Dependence of water tightness of physical properties and structures of rock. Geological condition suitable and unsuitable for reservoir site. Condition likely to cause leakage through the reservoir rim.

**Tunneling:** Types, Tunnel Lining, Important geological consideration while choosing alignment of tunnel . Exploration during construction, difficulties during tunneling related with lithology, nature and structure of material to be excavated biological condition likely to be trouble some.

## **Unit VI**

(05)

**Landslides:** Causes, influence dip and slope, safe and unsafe slope, terminal creep. Prevention of landslides. Precaution to be taken while making cut in hill sides.

**Engineering Geology of Deccan Trap:** Engineering significance of variation in size, number and filling of gas cavities . Hydrothermal alteration and weathering. Factors affecting strength and water tightness of basalt. Suitability of basalts for tunneling, factor that create difficulties in tunneling. Suitability of different types of basalts as a construction material, problems of dykes, red boles, volcanic breccias and river alluvium. Precautions to be taken during subsurface exploration in basalts.

## **Recommended Books**

1. Geology of Engineers by Joseph M. Trefethen
2. Geology and Engineering by Robert F. Legget
3. Engineering Geology and Geotechnis byKrynine and judd
4. Principals of physical Geology by Arthus Holmes
5. Engineering Geology by Rish and waston
6. P.W.D Hand book Chapter No.6: (1980) on Engineering Geology.
7. Principles of Engineering Geology by R.B. Gupte.
8. Engineering and General Geology by Parbin singh.
9. Engineering Geology by D. Venkat Reddy
10. A Text book Engineering Geology by K. M. Bangar.
11. Geology of India by Wadia D. N.
12. Engineering Geology by Vasudev Kanithi, Universities Press

## **Pattern of Question Paper:**

The units in the syllabus shall be divided in two equal sections. Question paper shall be set having two sections A and B. Section A questions shall be set on first three units (1,2,3) and Section B questions on remaining three units (4,5,6) . Question paper should cover the entire syllabus.

## **For 80 marks Paper:**

1. Minimum ten questions
2. Five questions in each section
3. Three questions from each section are asked to solve.

## CED305: Transportation Engineering-I

### Teaching Schemes

Theory: 04 Hrs / Week

### Examination Schemes

Theory: 80 Marks;

Class Test: 20 Marks

### Unit I: Introduction

(08)

History of Bridges and development, classification , alignment finalization, investigation, selection of bridge site, flood discharge , water way , calculations afflux, scour, river training works , types of foundation- shallow , piles, cofferdams, caissons.

### Unit II: Approaches and Types of Bridge

(06)

Approaches of Bridges, types of construction, slab culvert, box pipe, cause ways, and submersible bridges, IRC loading, piers, abutments, wing wall and its stability.

### Unit III: Airport Engineering

(06)

Aircraft characteristics related to airport design, general layout of an airport, runway configurations, runway orientations, geometric design of airfields, runways and aprons, air traffic control, airport lighting and marking, air travel demand forecast.

### Unit IV: Signalling and Interlocking

(10)

Layout, Signalling and Interlocking and their principles, objects, construction of tracks and its maintenance, modern trends in railway.

#### Permanent Way and Curves

Permanent way, gauges, sleepers, ballast, function of rails, failures of rails, Rail joints, rail fixtures and fastenings, types of gradient, grade compensation, types of curves.

### Unit V: Crossing, Junctions and Yards

(06)

Points and crossings, junctions, stations and yards, requirements of railway.

### Unit VI: Docks & Harbours

(04)

Elements of Docks and Harbours Engineering, classification, requirements, selection of site. Quay and Bulkhead.

### **Recommended Books**

1. Railway Track by K. F. Antia
2. Principles of Railway Engineering by S. C. Rangawala
3. Railway Engineering by Saxena
4. Bridge Engineering by S. P. Bindra
5. Elements of Bridge Engineering by J. S. Alagia
6. Elements of bridge Engineering by D. Johnos Victer
7. Airport Engineering by G. Venkatappa Rao
8. Highway Engineering by Kadiyali

### **Pattern of Question Paper:**

The units in the syllabus shall be divided in two equal sections. Question paper shall be set having two sections A and B. Section A questions shall be set on first three units (1,2,3) and Section B questions on remaining three units (4,5,6) . Question paper should cover the entire syllabus.

### **For 80 marks Paper:**

1. Minimum ten questions
2. Five questions in each section
3. Three questions from each section are asked to solve.

## CED306: Advanced Surveying

### Teaching Schemes

Theory: 02 Hrs / Week

### Examination Schemes

Theory: 40 Marks;

Class Test: 10 Marks

### UNIT I: Hydrographic Surveying

Introduction, Soundings, Methods of locating soundings, horizontal and vertical control, the nautical sextant, ranges, plotting of soundings, The Three Point problem mechanical, graphical and analytical solutions.

### UNIT II: Photogrammetry :

Application to various fields, General idea of terrestrial photogrammetry, \Aerial photogrammetry, Aerial camera, composition of map and vertical photograph, vertical tilted and oblique photographs, concept of principle point, nadir point , isocenter, horizon point and principle plane, scale of vertical photograph, computation of length and height from the photograph, relief displacement on vertical photograph, flight planning, ground control , radial line method, Binocular vision and Stereoscopic fusion, mirror and lens, Stereoscopes. Parallax equation, measurement of parallax and determining difference of elevations, stereo meter, general idea of stereoscopic plotting instruments, basic principle of remote sensing, photo interpretation, applications to Civil Engineering

### UNIT III: Geographical Information System

GIS definition and terminology, GIS categories, Components of GIS, Geographic data presentation, Mapping process, Coordinate systems, Transformations, Map projection, Geo referencing, Fundamental operations of GIS, Application of GIS.

### UNIT IV: Remote Sensing

RS: Fundamentals of RS, Electromagnetic energy & RS, Sensors, Platforms and RS data acquisition classification, Application of RS.

- Study of Electronic Distance Meter.
- Use of Total Station

### **Recommended Books**

- 1) Surveying and Leveling Vol. I & II - By Prof. T.P. Kanetkar and Prof. S.V. Kulkarni, Pune Vidyarthi Griha Prakashan Pune
2. Surveying Vol. I & II& III - By Dr. B.C. Punmia, Laxmi Publications Pvt. Ltd, New Delhi
3. Surveying and Leveling Vol. II - By Hussain & Nagraj
4. Surveying - By David Clark
5. Surveying - By Norman Thomas
6. Basics of Remote Sensing and GIS By S.Kumar Laxmi Publications
7. Basics of Remote Sensing and GIS By S.Kumar Laxmi Publications
8. Introduction to Remote Sensing By James B. Cambell Taylor and Francis

### **Pattern of Question Paper:**

The units in the syllabus shall be divided in two equal sections. Question paper shall be set having two sections A and B. Section A questions shall be set on first three units (1,2) and Section B questions on remaining three units (3,4) . Question paper should cover the entire syllabus.

### **For 40 marks Paper:**

1. Minimum eight questions
2. Four questions in each section
3. Two questions from each section are asked to solve.

## **CED321: Lab-I Building Planning and Design**

### **Teaching Scheme**

Practical: 4 Hrs / week

### **Examination Scheme**

Term Work: 50 Marks

Pr. / Oral: 25 Marks

### **Practical Examination:**

**I) Students should prepare the following working drawings. Individual projects to be planned. Submission of working drawings by 1:50 or suitable scale.**

#### **a) Residential building:**

- i. Layout plan
- ii. Floor plans ( by hand as well as by computer software)
- iii. Elevation ( by hand as well as by computer software)
- iv. Section through stair ( by hand as well as by computer software)
- v. Foundation plan (on tracing paper)
- vi. Structural plan (on tracing paper)
- vii. Water supply & drainage layout (on tracing paper)

#### **b) Public building:**

- i. Layout plan
- ii. Floor plans (by hand as well as by computer software)
- iii. Elevation (by hand as well as by computer software)
- iv. Section through stair (by hand as well as by computer software)
- v. Foundation plan (on tracing paper)
- vi. Structural plan (on tracing paper)
- vii. Water supply & drainage layout (on tracing paper)

**c) Perspective drawing of above any one building on imperial size sheet.**

**II) Submission of line plans of any four public buildings (not included in I) to be drawn on graph paper using 1:100 or suitable scale.**

## CED322: Lab-II: Engineering Geology

### Teaching Scheme

Practical: 02 Hrs / Week

### Examination Scheme

Term Work: 25 Marks

Pr. / Oral: 25 Marks,

The assessment of the term work shall be done on the following criteria's:

**Continuous assessment:** Performing the experiments in the laboratory.

The term work shall be consists of laboratory work based on the syllabus prescribed below:

Identification of megascopic properties of minerals and rocks.

**Minerals and ores :** Quartz and its varieties, common varieties of amorphous silica, orthoclase ,plagioclase, zeolite, biotite, hornblende, asbestos, actinolite, olivine, serpentine, tourmaline, kaolin, corundum, kyanite, magnetite, limonite, chromites, pyrolusite, bauxite, laterite, calcite, talc, azurite, gypsum, barites, iron pyrites , fluorspar , graphite, native copper.

**Rocks:** Granite, syenite, diorite, gabbro, rhyolites, trachyte, Basalt, obsidian, pumice, pegmatite, graphic granite, dolerite, volcanic breccias, nepheline syenite, mudstone, shale, sandstone, grit, arkose, quartzite ,conglomerate, lime stone, ,coral , schist ,slate, marble, gneisses, augen gneisses, hematite.

**Map and problems:** Geological map reading and construction of section, completion of out crops ,solve the problems with the help of map and section on geological base. Core logging.

**Practical examination:** The practical examination shall consist of an oral test based on the above term work.



## **CED323: Lab-III: Advanced Surveying**

### **Teaching Scheme**

Practical: 02 Hrs / Week

### **Examination Scheme**

Term Work: 25 Marks

**TERM WORK SUBMISSION:** The term work shall consist of performing an exercise based on the assignment/practical work done during the course. The record of the exercises submitted by the candidate on the syllabus. The assessment will be based on

- 1) Performing an exercise
- 2) Record of exercise submitted by the candidate.

### **Practical / Assignment:**

1. Introduction to software's (Open source/Licensed) in Geographical Information System (GIS).
2. Introduction to Total Station :
  - a) Measurement of Horizontal and vertical angle.
  - b) Measurement of area of traverse.
  - c) Block Contouring (Minimum 30 Sq. m).
3. Study of Mirror Stereoscope.
4. Study of Nautical Sextant.

## **BSH331: Lab-IV: Communication Skill-II**

### **Teaching Scheme**

Practical: 02 Hrs / Week

### **Examination Scheme**

Online Exam: 50 Marks

Duration of exam: 1 hour

### **Unit-I**

- Fast calculation techniques, Number system, ratio, proportion, variations averages,
- Simple interest ,compound interest, profit, loss
- Work and time speed and distance
- Set theory and venn diagram, permutation and combination
- Probability, alphanumeric series, logical deduction, reasoning, coding and decoding and blood relation
- Data interpretation

### **Unit-II**

- The key components of non verbal communication i.e. eye contacts, body language, vocal tone and volume.
- Team work and team building, The basics of team intelligence, Diversity awareness, Gender issues
- Group discussion, unstructured group discussions and actual group discussions
- Presentation skills ,self confidence and decision making

### **Unit-III**

- Adapting to corporate life
- Phone etiquettes, Email etiquettes, clothing etiquettes, Dining table etiquettes
- Getting ready for an interviews, corporate dressing, writing reports and proposals, minutes writing,

### **Recommended Books**

1. Gopal Swamy Ramesh, Mahadevan Ramesh ,”The Ace of soft skills” Pearson publication
2. Bansal Harison, ”Spoken English”
3. Orientblackswan, “English for Engineers and Technologist”
4. Jerry Wiessman , “Presenting to Win” Pretince Hall publications
5. Willium sanborn Pfeiffer,T.V.S,Padamaja, “Technical Communication”
6. M.Tyra, “Magical book on Quikermaths” BSC publishing Co. pvt.ltd.

## **CED351: Design of Structures-II (RCC)**

### **Teaching Scheme**

Theory: 04 Hrs / Week

### **Examination Scheme**

Theory: 80 Marks

Class Test: 20 Marks

### **Unit-I**

(06)

Introduction to various design philosophies of reinforced concrete structures (WSM, LSM), Structural elements, loads on structures and structural properties of concrete, Redistribution of moments and its IS code provision

Limit state of serviceability: Significance of deflection, types of deflection and IS Provisions.

Limit state of cracking: Cracking, causes, mechanisms and effects, Classification, types of cracks, bar detailing rules.

### **Unit-II**

(08)

R.C. sections in flexure: Design parameters, maximum values, Analysis and design, singly, doubly reinforced and flanged sections.

### **Unit-III**

(06)

Design of beams for shear, bond and torsion

### **Unit-IV**

(08)

Design of slab: One way, simply supported, cantilever and continuous. Design of staircase: Dog legged and open well, two way slab-simply supported, continuous and restrained

### **Unit-V**

(08)

Design of column: Axially loaded, short and long, uni-axial and biaxial moments. Design of isolated column footing: axial load, uni-axial and biaxial moments.

### **Unit-VI**

(04)

Introduction to earthquake engineering: Equivalent static lateral earthquake force, concepts of base isolation, introduction to ductile detailing as per IS 13920.

### **Reference Books**

Reference codes: IS 875-Part I to V, IS 456 – 2000, IS 1893 – 2002.

5. Limit State Analysis and Design by P. Dayaratnam, Wheeler Publishing Company, New Delhi.
6. Limit State Theory and Design by Dr. V. L. Shan and Dr. S. R. Karve, Pune Vidyarthi Gruh Publication, Pune.
7. Comprehensive Design of R. C. structures by Punmia, Jain and Jain, Standarad Book House, New Delhi.
8. RCC Analysis and Design by Sinha, S. Chand and Co; New Delhi.
9. Reinforced Concrete Design by Varghese, PHI, New Delhi.
10. Reinforced Concrete Design by Pillai Menon, Tata Mc Graw Hill, New Delhi.
11. Design of Concrete Structures by J N Bandyopadhyay, PHI, New Delhi.

**Pattern of Question Paper:**

The units in the syllabus shall be divided in two equal sections. Question paper shall be set having two sections A and B. Section A questions shall be set on first three units (1,2,3) and Section B questions on remaining three units (4,5,6) . Question paper should cover the entire syllabus.

**For 80 marks Paper:**

1. Minimum ten questions
2. Five questions in each section
3. Three questions from each section are asked to solve.

## **CED352: Environmental Engineering-I**

### **Teaching Scheme**

Theory: 04 Hrs / Week

### **Examination Scheme**

Theory: 80 Marks,

Class test: 20 Marks

### **Unit I**

**Air Pollution:** Definition, Statement of problems, Sources of air pollution, Types and classification of air pollutant, general physico-chemical properties of atmosphere, various layers of atmosphere and their importance, atmospheric stability, mixing height, atmospheric diffusion theories, stack height design, Gaussian dispersion model estimation of ground level concentration, effect of air pollution on health man animal and vegetation and materials, photochemical smog, green house effect, acid rain.

### **Unit II**

Air pollution control equipments (scrubber, cyclones electrostatic precipitator, louver type separator), Sources of smoke and smoke measurement by ringelmann's methods.

### **Unit III**

Air pollution legislation and regulation, air quality standards, emission standards, air (prevention and control of pollution, environmental impact assessment.

### **Unit IV**

**Water Supply Engineering:** Introduction to water supply scheme, data collection for water supply scheme, components and layout, design period, factors affecting design period.

Intake structure – river, canal, well, design of rising main, design of pumping station, Water demand, water system losses, factors affecting rate of water demand, population forecasting water quality standards and tests as per Indian standard.

### **Unit V**

Quality parameters of raw water, water treatments – principle of water treatments process introduction to different water treatment flow sheets, Aeration – principle and concept necessity methods removal of taste and odour, Design of aeration fountain, Sedimentation, plain and chemically assisted – sedimentation principal settling velocity, efficiency of an ideal settling basin types of sedimentation tank design of sedimentation tank, sedimentation with coagulation, theory and types of coagulants, mean velocity gradient, design of flocculation chamber, design of clariflocculators.

### **Unit VI**

**Filtration:** Theory of filtration, mechanism of filtration, filter materials, types of filters- rapid, slow sand and pressure filter, design of rapid sand filter, cleaning of filter, operational trouble

**Disinfection:** Theory, factors affecting, disinfectant types, disinfection, chlorination demand, methods of chlorination (break point chlorination), ground water recharge.

### **Recommended Books**

1. Air pollution volume I-IV , Stern , Mc- Graw hill publication .
2. Air Pollution control engineering , Noel De Nevers, ( II Edition) Mc- Graw hill publication International Edition.
3. Water supply engineering, S.K.Garg, Khanna publishers, New Delhi.
4. Water Supply & Sanitary Engineering, G.S.Birde & J.S.Birde, Dhanpat Rai publishing company.
5. Air pollution, Rao H.V.N & Rao M.N , T.M.H Publication.
6. Elements of Environmental Engineering, Duggal K.N S.Chand & company.
7. Environmental Engineering, Peavy & Rawe, Mc Graw Hill publication.

### **Pattern of Question Paper:**

The units in the syllabus shall be divided in two equal sections. Question paper shall be set having two sections A and B. Section A questions shall be set on first three units (1,2,3) and Section B questions on remaining three units (4,5,6) . Question paper should cover the entire syllabus.

### **For 80 marks Paper:**

1. Minimum ten questions
2. Five questions in each section
3. Three questions from each section are asked to solve.

## **CED353: Geotechnical Engineering**

### **Teaching Scheme**

Theory: 04 Hrs / Week

### **Examination Scheme**

Theory: 80 Marks,

Class test: 20 Marks

### **UNIT I :Introduction**

**(06)**

Origin of soil, scope of Geotechnical Engineering, major soil deposits of India, components of soils, soil minerals, Properties of Soil :Mechanical composition of soil, volume and weight relationship, specific gravity, density, relative density, void ratio, porosity, degree of saturation , functional relationship , moisture content, grain size analysis, mechanical and sedimentation analysis, consistency limits soil texture and structure, elementary ideal about swelling, sensitivity and thixotrophy.

### **UNIT II: Classification of soil**

**(04)**

Particle size classification, Highway research board classification, ISI classification, unified classification .Soil moisture and permeability, soil moisture, effect of moisture content on soil, structural water, absorbed water, capillary water , effective and neutral pressure, critical hydraulic gradient, seepage of water through soil , permeability, Darcy's law, Discharge velocity and seepage velocity, factors affecting the permeability. Laboratory methods of permeability concept of flow net and its characteristics, Graphical methods of flow net construction and its application to isotropic soil only.

### **UNIT III : Compaction And Consolidation**

**(10)**

Proctor density and optimum moisture content, factor affecting compaction, field methods of compaction control and mechanical stabilization of soils.

compressibility, relation between pressure and void ratio, laboratory consolidation test. Pre consolidation pressure in clay. Terzaghi's theory of one dimensional consolidation , degree of consolidation, Determination of Coefficient of consolidation, square root of time fitting method and logarithm of time fitting method, coefficient of consolidation.

### **UNIT IV: Stress Distribution in soil**

**(05)**

Boussinesq's equation for point load, vertical pressure under loaded circular area and uniformly loaded rectangular area. Newmark's method for uniformly distributed loads, preparation and use of Newmark's chart.

### **UNIT V: Shear Strength**

**(05)**

Concept of shear strength, principles stresses, Mohr's envelopes for cohesive, non cohesive and composite soils, General principles of drained, consolidated un-drained and drain tests. Direct unconfined tri-axial and vane shear tests. Determination of shear strength by direct, unconfined, tri-axial and vane shear tests. Comparison of these methods. Elastic modulus from triaxial test.

## **UNIT VII: Earth Pressure and Stability of Slope**

**(10)**

Earth pressure at rest active and passive condition elementary idea about Rankin's and Coulomb's earth pressure. Graphical methods for active earth pressure.

Factors contributing to slope failures. Classification of slope failures, Infinite and finite slope. The Swedish Method and its application to dry cohesive soils and composite soils, friction circle method, Taylor's stability number and stability curve.

### **Recommended Books**

1. Soil Engineering in Theory and Practice, Geotechnical Testing and Instrumentation Alam Singh Asia Publishing House (p) Ltd. New Delhi.
2. Punimia B.C. "Soil Mechanics and Foundation Engineering" Laxmi Publications Pvt. Ltd., New Delhi.
3. Soil Mechanics and Foundation Engineering – Murthy V.N.S. (1996) 4<sup>th</sup> Edition, UBS Publishers and Distributors, New Delhi.
4. Purushottam Raj "Geotechnical Engineering" Tata McGraw Hill Publishing Company Limited, New Delhi.
5. Kasmalkar B.J. "Geotechnical Engineering", Pune Vidyarthi Griha Prakashan, Sadashiv Peth, Pune

### **Pattern of Question Paper:**

The units in the syllabus shall be divided in two equal sections. Question paper shall be set having two sections A and B. Section A questions shall be set on first three units (1,2,3) and Section B questions on remaining three units (4,5,6). Question paper should cover the entire syllabus.

### **For 80 marks Paper:**

1. Minimum ten questions
2. Five questions in each section
3. Three questions from each section are asked to solve.



## CED354: Water Resources Engineering –I

### Teaching Scheme

Theory: 04 Hrs / Week

### Examination Scheme

Theory: 80 Marks,

Class Test: 20 Marks

### Unit I: (08)

#### **Introduction of Hydrology:**

Definition, Importance and scope of hydrology, hydrologic cycle, Weather and its precipitation potential.

**Precipitation:** Forms and types of precipitation, Methods of measurement, Rain gauge network Factors affecting precipitation at location, Estimating missing data, Mass rainfall curves, Hyetograph, double mass analysis(Correcting precipitation data) Determination of average precipitation over the catchment.

**Evaporation and Infiltration:** Evaporation process, evaporimeter, evaporation reduction, Measurement of evapo-transpiration by Penmen's equation. Infiltration process, Factors affecting infiltration, Effect of infiltration on runoff and ground water recharge, measurement indices.

### Unit II (06)

**Runoff:** Factors affecting runoff, rainfall-runoff relationships, components of a flood hydrograph, Base Flow separation , Effective rainfall, runoff hydrograph, , Unit hydrograph – theory – assumptions and limitations, unit hydrograph derivation, use of unit hydrograph S-curve hydrograph, synthetic unit hydrograph.

### Unit III (06)

**Stream Gauging:** Selection of site, various methods and instruments of discharge measurements.

**Floods:** Definition, Factors affecting, Estimation of peak flow, Empirical formula, frequency analysis Gumbel's and Log Pearson type III Distribution.

### Unit IV (06)

**Ground water hydrology:** Occurrence and distribution of ground water, Specific yield of aquifer, Movement of ground water, Darcy's law, Permeability, Safe yield of basin.

Hydraulics of well under steady flow conditions in confined and unconfined aquifers, Effect of partial penetration, interference of wells and boundary, recharge of ground water.

### Unit V (08)

**Introduction to Irrigation and Water applications to the crops:** Definition, functions, advantages and necessity, methods of irrigation, surface irrigation, subsurface irrigation, micro irrigation.

Consumptive and non consumptive use of water, factors affecting crop water, requirement , irrigation water standards, wilting point, Delta, duty , factors affecting crop determination of duty, important crops in India, Their seasons, crop rotation, Various methods of applying water to crops and their comparison.

### Unit VI (06)

**Water shed management:** Conservation of land and water necessity of watershed, development small structures and steps involved in watershed management, ridge line treatment, upper treatment, drainage line treatments erosion control.

**Water Logging and Drainage:** Causes and effects of water logging, its remedial measures, Drainage of Irrigation areas.

### **Recommended Books**

1. Irrigation Engineering by S. K. Garg – Khanna Publishers, Delhi.
2. Irrigation, Water Resources and Water power Engineering by Dr P.N. Modi
3. Irrigation and Water power Engineering by Dr Punmia and Dr. Pande – Laxmi Publications, Delhi
4. Engineering Hydrology by Subramany K., -Tata McGraw Hill, New Delhi.
5. Engineering Hydrology by Raghunath H.M. - New Age International Publishers
6. Watershed Management in India by J.V.S. Murthy – Wiley Eastern Publications, Delhi
7. Hydrology and water resources by R.K.Sharma, Dhanpatrai and sons, NewDelhi.
8. Theory and design of irrigation structures by Varshney, Gupta and Gupta vol. I and II and III, Newchand and Brothers.
9. Irrigation Theory and practice by Michael, Vikas Publications House
10. Water management by Jaspal Sing, M. S. Acharya, Arun Sharma, Himanshu Publications.

### **Pattern of Question Paper:**

The units in the syllabus shall be divided in two equal sections. Question paper shall be set having two sections A and B. Section A questions shall be set on first three units (1,2,3) and Section B questions on remaining three units (4,5,6) . Question paper should cover the entire syllabus.

### **For 80 marks Paper:**

1. Minimum ten questions
2. Five questions in each section
3. Three questions from each section are asked to solve.

## CED355: Transportation Engineering-II

### Teaching Schemes

Theory: 04 Hrs / Week

Practical: 02 Hrs /week

### Examination Schemes

Theory: 80 Marks;

Class Test: 20 Marks

### Unit I: Highway Planning and Financing

(04)

Historical developments, classification of roads, planning surveys, preparation of master plan & its phasing, Nagpur plan, Bombay plan, Lucknow plan, (only salient features of these three plans, no numerical is to be asked in examinations), Vision 2021- details of recommendations, highway cost, highway user benefits, highway economic analysis, highway financing, private sector participation, National Highway development Programme, development of rural roads through PMGSY, National highway development authority, Indian road congress.

### Unit II: Highway Alignment and Geometric Design

(10)

Highway Alignment, Engineering Surveys, highway cross- section elements, width of formation, sight distances, design of horizontal and vertical alignment including curves, super elevation, extra widening. Set back distance, gradients, alignment & geometrics of hill roads (IRC recommendations should be followed).

### Unit III: Highway Materials

(06)

soil and its characterization, CBR test , plate bearing test, aggregates, gradation and other tests bituminous materials and different tests on them, bituminous mixes and mix design procedure, cement concrete and their properties.

### Unit IV: Design of Pavement

(06)

**a) Flexible Pavements :** Design factors, different methods of design, CBR method, group index method, Burmister's method, Triaxial method, IRC 37-2001, IRC 37-2012, drainage design for pavements.

**b) Rigid Pavements:** General design considerations, wheel load stresses, Westergad's wheel load stresses formula, slab thickness for pavements, longitudinal and transverse joints, IRC 58-2002.

### Unit V: Pavement Construction and Maintenance:

(06)

Construction of earth roads, stabilized soil roads, water bound Mecadam roads, wet mix Mecadam roads, bituminous macadam, semidence bituminous concrete, asphalt concrete, seal coat mix seal surfacing, liquid spray grout, constructions of cement concrete roads.(All procedures as per specifications for road and bridge works -Ministry of road transport & Highways, Govt. of India, fourth revision.) .Highway Construction Machinery Earth moving

equipments, spreaders, rollers, paver finishers, binder sprayers, hot mix plant, vibromixes, tippers.

**Highway maintenance:** Causes of pavement failures, typical flexible and rigid pavements failure, special repairs in flexible pavements.

**Unit VI: Traffic Engineering:**

(08)

Traffic characteristics, traffic studies & their uses, traffic control devices, intersections & their design.

**Recommended Books**

1. Highway Engineering by S. K. Khanna & Justo
2. Principals of Transportation Engineering by Partha Chakraborty & Animesh Dass
3. Guidelines for the design of flexible pavements, second revision, IRC: 37- 2001
4. Guidelines for the design of rigid pavements, IRC: 58-2002
5. Specifications for road and bridge works, Ministry of Road transportation & Highways- 2001, Govt. of India, New Delhi.
6. Highway Engineering by Kadiyali
7. Principles of transportation and highway engineering by G. Venkatappa Rao
8. Highway Material and Testing by S. K. Khanna, Justo and Veerraghwana.
9. Tentative Guidelines for the design of flexible pavements – IRC: 37-2012
10. Text book of Highway Engineering by R Srinivasa Kumar

**Pattern of Question Paper:**

The units in the syllabus shall be divided in two equal sections. Question paper shall be set having two sections A and B. Section A questions shall be set on first three units (1,2,3) and Section B questions on remaining three units (4,5,6) . Question paper should cover the entire syllabus.

**For 80 marks Paper:**

1. Minimum ten questions
2. Five questions in each section
3. Three questions from each section are asked to solve.

## **CED371: Lab-IV: Structural Design and Drawing-I (Steel)**

### **Teaching Scheme**

Laboratory: 04 Hrs / Week

### **Examination Scheme**

Term Work: 50 Marks

Oral: 50 Marks

Design of an industrial building which should include the following

- A) Design of roof truss (Analysis may be carried out using commercial software), Design of purlins, Design of connections, Design of beams, Design of columns, Design of base.
- B) Design of beam to beam and beam to column connections

**OR**

- B) Design of welded plate girder, design of cross section, curtailment of flange plates, stiffeners and connections.

**Four half Imperial size drawing sheet out of which one drawing sheet shall be drawn by using any drafting software.**

Report of site visit mentioning structural details with relevant sketches of structural connections. (*Desirable*).

**Oral Examination shall be based on the above term work.**

**Note: Maximum number of students in a group not more than three for design.**

## CED372: Lab-V: Geotechnical Engineering

### Teaching Scheme

Laboratory: 02 Hrs / Week

### Examination Scheme

Term Work: 25 Marks

Oral: 25 Marks

### ORAL BASED ON PRACTICAL CONDUCTED AND SYLLABUS

The oral/practical examination shall consist of viva-voice based on the practical work done during the course, the record of experiments submitted by the candidate and the syllabus of the subject. The assessment will be based on performing an experiment and record of experiments submitted by the candidate. Viva-voice/oral will be based on the syllabus.

The term work shall consist of a record of laboratory experiments **any ten** from list below.

1. Determination of water content by oven drying method
2. Determination of specific gravity by pycnometer
3. Determination of field density and dry unit weight by core cutter method
4. Determination of field density by sand replacement method
5. Determination of grain size distribution by sieve analysis
6. Determination of grain size distribution by hydrometer analysis
7. Determination of liquid limit of soil
8. Determination of plastic limit of soil
9. Determination of compaction properties of soil by standard proctor test
10. Determination of shear parameters of soil by direct shear method
11. Unconfined compression test
12. Permeability test variable or constant head

## CED373: Lab-VI: Transportation Engineering-II

### Teaching Scheme

Laboratory: 02 Hrs / Week

### Examination Scheme

Term Work: 25 Marks

Oral: 25 Marks

### Term Work

Term Work shall consist of laboratory journal covering following laboratory tests (minimum 10) as prescribed below

**Test on soil:** CBR test.

**Tests on aggregates:** impact, Los Angeles Abrasion, crushing Value, shape (flakiness, elongation and angularity), soundness, stripping value of aggregate, polished stone value, Specific Gravity and Water absorption

**Tests on Bitumen:** penetration, viscosity, softening point, ductility and elastic recovery, flash & fire point, specific gravity.

**Tests on bituminous mix:** Marshall Stability and Mix Design.

## **CED374: Lab-VII: Computer Lab-III**

### **Teaching Scheme**

Laboratory: 02 Hrs / Week

### **Examination Scheme**

Term Work: 50 Marks

### **TERM WORK:**

The assessment of term work shall be done on the basis of the following:

Continuous Assessment

- Performing the assignment given in Laboratory

#### **A. STAAD Pro V8i:**

This course provides an overall look over STAAD Pro V8i. It demonstrates the steps to be followed to produce the structural analysis & design of two types of buildings; concrete and steel. Also the course concentrate over the different results generated from the program, and how to read them, view them, and finally generate the necessary reports from them. At the completion of this course, the student will be able to:

- ✓ Understand STAAD Pro way of doing the job.
- ✓ Creating geometry using different methods.
- ✓ Use of more advanced techniques in creating geometry.
- ✓ Defining the cross sections of beams, columns & plates.
- ✓ Defining constant, Specifications & supports.
- ✓ Defining the load system.
- ✓ Analyzing your Model using the appropriate Analysis method
- ✓ Reviewing the Analysis Results
- ✓ Performing Steel Design as per Indian Code
- ✓ Performing Concrete Design as per Indian Code

#### **B. The Analysis & design output file of below assignments to be submitted.**

1. Assignment No. 1—Analysis and design of Steel portal frames.
2. Assignment No. 2 – Analysis and design of Reinforced Concrete frames



3. Assignment No. 3 – Analysis of Two- way concrete slab.

**References:** STAAD Pro V8i- Help contents (Available with legal purchase of software).