## G.PULLA REDDY ENGINEERING COLLEGE (Autonomous) KURNOOL – 518 007

# SCHEME OF CIVIL ENGINEERING FROM III TO VIII SEMESTERS



Scheme - 2013

# Scheme and Syllabus for Four Year B.Tech. Degree Course in Civil Engineering

G. Pulla Reddy Engineering College (Autonomous): Kurnool

Accredited by NBA of AICTE and NAAC of UGC An ISO 9001:2008 Certified Institution Affiliated to JNTUA, Anantapuramu

### FOUR YEAR B. Tech. DEGREE COURSE

#### Scheme of Instruction and Examination

(Effective from 2013–14)

	III Semester (CE)		Se	cheme : 2013						
S.	Subject	Code	edits	Scheme of Instruction periods/week			Duration of end	Scheme of Examination Maximum Marks		
			C	L	D/T	Р	(Hours)	End Exam	Internal Assessment	Total
Ι	Theory									
1	Strength of Materials -I	CE201	3	3	1	-	3	70	30	100
2	Surveying	CE202	3	3	-	-	3	70	30	100
3	Fluid Mechanics	CE203	3	3	1	-	3	70	30	100
4	Building Materials and Building Construction	CE204	3	3	_	_	3	70	30	100
5	Hydrology	CE205	3	3	-	-	3	70	30	100
6	Building Planning and Drawing	CE206	3	2	2	-	3	70	30	100
7	Quantitative Aptitude	ML201	2	1	1	-	-	-	100	100
II	Practical									
8	Surveying Lab	CE207	2	—	_	3	3	70	30	100
9	Strength of Materials Lab	CE208	2	—	_	2	3	70	30	100
	Total		24	18	5	5		560	340	900

### FOUR YEAR B. Tech. DEGREE COURSE

Scheme of Instruction and Examination

	IV Semester (CE)			,			Sc	cheme : 2013		
S.	Subject	Code	edits	Scheme of Instruction periods/week			Duration of end	Scheme of Examination Maximum Marks		
INO			Cr	L	D/T	Р	(Hours)	End Exam	Internal Assessment	Total
Ι	Theory									
1	Strength of Materials-II	CE209	3	3	1	—	3	70	30	100
2	Managerial Economics and Principles of Accountancy	HU202	3	3	-	_	3	70	30	100
3	Advanced Surveying	CE210	3	3	1	_	3	70	30	100
4	Hydraulics	CE211	3	3	1	—	3	70	30	100
5	Concrete Technology	CE212	3	3	_	—	3	70	30	100
6	Business English and Technical Writing	ML203	2	1	2	_	-	-	100	100
II	Practical									
7	Advanced Surveying Lab	CE213	2	—	_	3	3	70	30	100
8	Computer Aided Drafting Lab	CE214	2	_	_	2	3	70	30	100
9	Fluid Mechanics Lab	CE215	2	_	_	2	3	70	30	100
	Total		23	16	5	7		560	340	900

### FOUR YEAR B. Tech. DEGREE COURSE

Scheme of Instruction and Examination

(Effective from 2013–14)

V Semester (CE)									Scheme : 2013		
S.	Subject	Code	edits	Scheme of Instruction periods/week			Duration of end	Scheme of Examination Maximum Marks			
INU			C	L	D/T	Р	(Hours)	End Exam	Internal Assessment	Total	
Ι	Theory										
1	Analysis of Structures	CE301	3	3	1	_	3	70	30	100	
2	Environmental Engineering-I	CE302	3	3	1	_	3	70	30	100	
3	Hydraulic Machinery	CE303	3	3	1	_	3	70	30	100	
4	Transportation Engineering–I	CE304	3	3	1	-	3	70	30	100	
5	Reinforced Concrete Design and Drawing	CE305	4	3	1	_	3	70	30	100	
6	Engineering Geology	CE306	3	3	_	_	3	70	30	100	
7	Soft Skills	ML202	2	1	2	-	_	_	100	100	
II	Practical										
8	Hydraulics and Hydraulic Machinery Lab	CE307	2	-	_	2	3	70	30	100	
9	Concrete Technology Lab	CE308	2	_	_	2	3	70	30	100	
	Total		25	19	7	4		560	340	900	

### FOUR YEAR B. Tech. DEGREE COURSE Scheme of Instruction and Examination

	VI Semester (CE)		S	cheme : 2013						
S.	Subject	Code	edits	Scheme of Instruction periods/week			Duration of end	Scheme of Examination Maximum Marks		
INU			Cr	L	D/T	Р	(Hours)	End Exam	Internal Assessment	Total
Ι	Theory									
1	Steel Structures Design and Drawing	CE309	4	3	1	_	3	70	30	100
2	Water Resources Engineering-I	CE310	3	3	1	-	3	70	30	100
3	Geotechnical Engineering-I	CE311	3	3	1	_	3	70	30	100
4	Transportation Engineering-II	CE312	3	3	1	-	3	70	30	100
5	Environmental Engineering-II	CE313	3	3	1	-	3	70	30	100
6	Interdisciplinary Elective		3	3	-	-	-	70	30	100
II	Practical									
7	Transportation Engineering Lab	CE314	2	-	-	2	3	70	30	100
8	Environmental Engineering Lab	CE315	2	_	_	2	3	70	30	100
9	Engineering Geology Lab	CE316	2	_	_	2	3	70	30	100
	Total		25	18	5	6		630	270	900

### FOUR YEAR B. Tech. DEGREE COURSE

Scheme of Instruction and Examination

(Effective from 2013–14)

	VII Semester (CE)					,		Sche	me : 2013	
S.	Subject	Code	edits	Scheme of Instruction periods/week			Duration of end	Scheme of Examination Maximum Marks		
INO			C	L	D/T	Р	(Hours)	End Exam	Internal Assessment	Total
Ι	Theory									
1	Construction Planning & Management	CE401	3	3	1	-	3	70	30	100
2	Water Resources Engineering-II	CE402	3	3	1	-	3	70	30	100
3	Geotechnical Engineering –II	CE403	3	3	1	_	3	70	30	100
4	Estimation, Costing and Valuation	CE404	3	2	2	_	3	70	30	100
5	Professional Elective–I		3	3	-	-	3	70	30	100
6	Global Elective		2	2	-	-	-	_	100	100
II	Practical									
7	STAAD Lab	CE405	2	-	-	2	3	70	30	100
8	Geotechnical Engineering Lab	CE406	2	_	_	2	3	70	30	100
9	Project Work Preliminary	CE407	2	_	_	3	_	50	50	100
	Total		23	16	5	7		540	360	900

### FOUR YEAR B. Tech. DEGREE COURSE Scheme of Instruction and Examination

	VIII Semester (CE)								Scheme : 2013			
S.	Subject	Code	Credits	Scheme of Instruction periods/week			Duration of end	Scheme of Examination Maximum Marks				
NO				L	D/T	Р	Exam (Hours)	End Exam	Internal Assessment	Total		
Ι	Theory											
1	Advanced Structural Design	CE408	3	3	1	-	3	70	30	100		
2	Water Resources Engineering – III	CE409	3	2	2	-	3	70	30	100		
3	Professional Elective–II		3	3	-	-	3	70	30	100		
4	Professional Elective–III		3	3	-	-	3	70	30	100		
II	Practical											
5	Geographical Information Systems Lab	CE410	2	-	-	2	3	70	30	100		
6	Project Work	CE411	6	_	-	6	_	50	50	100		
	Total		20	11	3	8		400	200	600		

### **DETAILED SYLLABUS**

### FOUR YEAR B. Tech. DEGREE COURSE

Scheme of Instruction and Examination

	III Semester (CE)		Scheme : 2013							
S.	Subject	Code	redits	Scheme of Instruction periods/week			Duration of end	Scheme of Examination Maximum Marks		
110			C	L	D/T	Р	(Hours)	End Exam	Internal Assessment	Total
Ι	Theory									
1	Strength of Materials -I	CE201	3	3	1	—	3	70	30	100
2	Surveying	CE202	3	3	-	-	3	70	30	100
3	Fluid Mechanics	CE203	3	3	1	-	3	70	30	100
4	Building Materials and Building Construction	CE204	3	3	_	_	3	70	30	100
5	Hydrology	CE205	3	3	-	-	3	70	30	100
6	Building Planning and Drawing	CE206	3	2	2	—	3	70	30	100
7	Quantitative Aptitude	ML201	2	1	1	_	-	_	100	100
II	Practical									
8	Surveying Lab	CE207	2	-	-	3	3	70	30	100
9	Strength of Materials Lab	CE208	2	-	—	2	3	70	30	100
	Total		24	18	5	5		560	340	900

### **CE201: STRENGTH OF MATERIALS-I (SM1)**

(For B. Tech. CE - III Semester)

### Scheme: 2013 Internal Assessment: 30 End Exam Marks : 70 End Exam Duration: 3 hrs

L	T/D	Р	С
3	1	-	3

### **Course Objectives:**

- 1) To learn the concepts of stresses in compound sections and shear force and bending moment in different types of beams.
- 2) To learn the flexural and shear stress distribution in beams.
- 3) To study the different methods of finding deflections of beams.
- 4) To learn about the direct and bending stresses in members subjected to eccentric loading.
- 5) To analyze the columns with different end conditions.
- 6) To understand the theory of torsion and concept of strain energy.

Course Outcomes: On completion of this course, the student will be able to

- 1) Determine shear force and bending moment for determinate beams under transverse loading.
- 2) Determine the bending and shear stress variation for determinate beams.
- 3) Determine slopes and deflection of determinate beams using Double integration method, Macaulay's method and Moment area method.
- 4) Analyse the compression members under axial, uni-axial, Bi-axial loads and thermal stresses and strains in composite sections.
- 5) Analyse the long column under axial load and eccentric loads.
- 6) Analyse the effect of torsion on circular shafts.
- 7) Understand the concepts of strain energy.

### Unit – I

**Shear Force and Bending Moments:** Types of supports – Types of beams – Shear force and bending moment diagrams for cantilever, simply supported and over hanging beams with point loads, uniformly distributed load, uniformly varying loads and couples – Relationship between shear force and bending moment and rate of loading at a section of a beam.

### Unit – II

**Flexural Stresses:** Theory of simple bending - Assumptions – Equation for simple bending – Bending stresses in beams – Efficiency of various cross sections of beams.

**Shear Stress:** Derivation of formula – Shear stress distribution in various beam sections like rectangular, triangular, circular, I and T sections.

### Unit – III

**Deflection of Determinate Beams :** Slope, deflection and radius of curvature and their relationship – Strength and stiffness of beams – Finding slope and deflections using Double integration method, Macaulay's method - Moment Area method.

### Unit – IV

**Stresses and Strains in Composite Sections:** Analysis of bars of composite section, Thermal Stresses in simple and composite bars.

**Direct and Bending Stresses:** Combined direct and bending stresses – Eccentric loading – Limit of eccentricity and core of section, wind pressure on walls and chimney shafts.

### Unit – V

**Columns and Struts:** Introduction, slenderness ratio – Euler's formulae for long columns with different end conditions – Limitations of Euler's theory - Rankine's theory – Derivation of Rankine Formula – Long Columns under eccentric loading – Secant formula and Perry's formula. **Unit – VI** 

**Torsion of Circular Shafts:** Theory of pure Torsion – Derivation of Torsion equation  $\frac{T}{J} = \frac{q}{r} = \frac{N\theta}{l}$ .

Assumptions made in pure torsion – Torsional theory applied to circular shafts – Power transmission by shafts.

**Strain Energy:** Strain energy in tension, compression, bending and torsion – Strain energy due to impact loading.

### **Text Books:**

- 1. B.C Punmia, Ashok Kumar Jain & Arun Kumar Jain [2009], *Mechanics of Materials*, Laxmi Publications.
- 2. R.K. Rajput [2012], Strength of materials, S.Chand & Co., New Delhi.
- 3. R.K. Bansal [2010], Strength of materials, Laxmi Publications, New Delhi.

### **Reference Books:**

- 1. F.L. Singer and A.Y. Pytel [1987], *Strength of materials*, Harper & Row Publications.
- 2. Bhavikatti [2009], Strength of materials, S.Chand & Co., New Delhi.
- 3. Timoshenko & Young [1968], *Elements of Strength of materials*, Eastern Wiley Publications.
- 4. D.S. Prakash Rao [2009], Strength of Materials, University Press Publications, Hyderabad.

### Note:

**Internal Assessment:** The question paper for sessional examination shall have one compulsory question carrying 6 marks and five other conventional (descriptive or analytical type) questions carrying 8 marks each. The compulsory question consists of objective type questions like the multiple choice, fill in the blanks etc. Apart from the compulsory question, the student has to answer any 3 from the remaining 5 conventional questions.

### CE202: SURVEYING (SUR) (For B. Tech. CE - III Semester)

Scheme: 2013 Internal Assessment: 30 End Exam Marks : 70 End Exam Duration: 3 hrs

L	T/D	Р	С
3	•	I	3

### **Course Objectives:**

- 1) To acquire the basic knowledge of the principles, procedures, and types of surveying.
- 2) To learn the operation of surveying instruments and their application in civil engineering.
- 3) To be able to determine the areas, volumes of different quantities.
- 4) To be able to prepare contour maps.
- 5) To have knowledge of measurement of horizontal and vertical angles using Theodolite and to be able to calculate heights and distances.

### Course Outcomes: The student will be able to

- 1) Understand the objectives and principles of surveying, using conventional instruments involved in surveying.
- 2) Apply Bowditch's method to adjust a compass traverse.
- 3) Understand fly leveling, reciprocal leveling, profile leveling and cross sectioning.
- 4) Understand direct & Indirect methods of contouring and calculate areas of irregular boundaries and capacity of reservoir.
- 5) Understand computation of theodolite traverse and determine the reduced levels of objects when base of object is accessible & inaccessible

### Unit – I

Introduction: Definition, objectives, principles and classification of surveying – Plan and map.

**Chain Surveying:** Principles of chain survey – Methods of measuring distance – Direct and indirect ranging – Metric chains – Chaining on plane and sloping ground – Instruments for setting out right angles – Basic problems in chaining – Chaining past obstacles – Cross–staff survey – Plotting of chain survey – Errors.

### Unit – II

**Compass Surveying:** Bearing – Types – Designation of bearings – W.C.B and R.B – Fore and back bearings – Construction, working of prismatic and surveyor compass – Measurement of bearings of lines –Open and closed traverse, calculation of included angles – Plotting of a traverse – Distribution of closing error by Bowditch's method –Magnetic declination, dip, local attraction – Errors.

**Plane table surveying:** Accessories, working operations, different methods, advantages and disadvantages, Two point and Three point problems;

### Unit – III

**Levelling :** Definitions and terms used in levelling – Types of levels – Types of staves – Temporary adjustments – Booking of staff readings – Different methods of levelling – Calculation of reduced levels by height of instrument and rise & fall methods – Fly levelling and reciprocal levelling – Longitudinal & cross sectioning – Plotting of profiles. Errors – Levelling difficulties – Correction for curvature and refraction.

### Unit – IV

**Contouring:** Definition of contour – Contour interval – Characteristics of contours – Direct and Indirect methods of contouring – Applications of contour maps.

Areas & Volumes: Determination of area by chain survey – Computation of areas by mid ordinate rule, trapezoidal rule, average ordinate rule and Simpson's rule– Volume by trapezoidal and prismoidal rule – Volume of reservoir by using contours.

### Unit – V

**Theodolite Traversing:** Parts of transit Theodolite –Terms used – Temporary adjustments – Measurement of horizontal angles, vertical angles, deflection angles, bearings and other uses of Theodolite – Errors in Theodolite work.

Traverse survey by included angles & bearings –Checks in traverse plotting – Traverse computations – Coordinate system – Balancing the traverse – Degree of accuracy in traversing – Omitted measurements.

### Unit – VI

**Trigonometric Levelling:** Heights and distances problems for accessible and inaccessible stations (For same and different planes).

Minor instruments: Box sextant, Planimeter, Pentagraph, Clinometers.

### Text books:

- 1. B.C. Punmia, A.K. Jain and A.K. Jain [2005], *Surveying vol. I & II*, Laxmi Publications (P) Ltd, New Delhi.
- 2. R. Agor [2009], A text book of surveying & Levelling, Khanna Publishers, New Delhi.
- 3. R. Subramanyam [2012], Surveying and Levelling, Oxford University Press, New Delhi.

### **Reference books:**

- 1. S.K.Duggal [2004], Surveying vol-1, Tata McGraw Hill Pub.Comp. Ltd.,
- 2. N.N. Basak [1994], Surveying and Levelling, Tata McGraw Hill Publishers, New Delhi
- 3. S.K. Roy [2004], Fundamentals of surveying, Prentice Hall of India (P) Ltd., New Delhi.

### Note:

**Internal Assessment:** The question paper for sessional examination shall have one compulsory question carrying 6 marks and five other conventional (descriptive or analytical type) questions carrying 8 marks each. The compulsory question consists of objective type questions like the multiple choice, fill in the blanks etc. Apart from the compulsory question, the student has to answer any 3 from the remaining 5 conventional questions.

### CE203: FLUID MECHANICS (FM) (For B. Tech. CE - III Semester)

Scheme: 2013 Internal Assessment: 30 End Exam Marks : 70 End Exam Duration: 3 hrs

L	T/D	Р	С
3	1	-	3

**Course Objectives:** Student shall learn the various topics on fluid statics, fluid kinematics, fluid dynamics, pipe flow, types of flow and flow measurement.

### Course Outcomes: The student will be able to

- 1) Understand types of fluids and their properties.
- 2) Apply the concept of hydrostatic law and Pascal's law.
- 3) Determine the stability of floating and submerged bodies.
- 4) Solve problems related to static and dynamic conditions of fluid.
- 5) Determine discharge through pipes, tanks and channels using Venturimeter / Orificemeter, orifice/mouthpiece and notches.
- 6) Understand the laminar and turbulent flows, major and minor losses in pipes.

### Unit – I

**Fluid Properties**: Definition of a fluid – Density – Specific weight – Specific volume – Specific gravity – Compressibility –Vapour pressure – Surface tension and capillarity –Viscosity.

### Unit – II

**Fluid Statics:** Pascal's law – Pressure variation in a static fluid – Atmospheric, gauge and absolute pressures – Measurement of pressure – Piezometer – U–tube and inverted U–tube manometers – Bourdon's pressure gauge – Hydrostatic forces on plane and curved surfaces

### Unit – III

**Buoyancy and Floatation:** Buoyancy – Buoyant force and centre of buoyancy – Metacentre and metacentric height – Stability of submerged and floating bodies – Determination of metacentric height

**Liquids in Relative Equilibrium:** Fluid mass subjected to uniform linear acceleration – Liquid containers subjected to constant horizontal and vertical accelerations and constant rotation.

### Unit – IV

**Fluid Kinematics:** Types of flow – Streamline – Streak line – Path line – Stream tube – Control volume and control surface – General control volume equation – Continuity equation in one and three dimensional forms – Stream function and velocity potential function – Flow net – Acceleration of a fluid particle – Local and convective accelerations – Tangential and normal accelerations.

### Unit – V

**Fluid Dynamics:** Euler's equation of motion along a streamline – Bernoulli's energy equation – Energy correction factor – Impulse–momentum equation – Momentum correction factor – Force on a bend – Energy gradient line – Hydraulic gradient line – Analysis of free liquid jets – Forced vortex and free vortex .

**Flow Measurement:** Velocity measurement by Pitot tube and Pitot static tube – Discharge measurement by Venturimeter and orifice meter – Flow through Orifices and mouthpieces – Notches and weirs

### Unit – VI

**Pipe Flow:** Reynolds' experiment – Regimes of flow, laminar flow, turbulent flow, transitional flow – Reynolds' number – Laminar flow through circular pipes – Hagen Poiseuille equation – Laminar flow through parallel plates.

**Turbulent Flow:** Minor losses in pipe flow – Pipes in series – Pipes in parallel – Siphon – Pipe networks –Velocity distribution for turbulent flow in pipes – Rough and smooth pipes – Darcy– Weisbach equation – Variation of friction Factor – Moody's chart.

### **Text Books:**

- 1. P.N. Modi & S.M. Seth [2015], *Hydraulics and Fluid Mechanics including Hydraulic Machines*, Standard Book House, New Delhi.
- 2. R.K.Bansal [2011], A text book of Fluid Mechanics and Hydraulic machinery, Laxmi Publications (P) Ltd.

### **Reference Books:**

- 1. Streeter & Wylie [1979], *Fluid Mechanics*, McGraw Hills Publications.
- 2. C.M. White [2011], Fluid Mechanics, McGraw Hills Publications.
- 3. Bernard Massey [1998], *Mechanics of Fluids*, Taylor & Francis.

### Note:

**Internal Assessment:** The question paper for sessional examination shall have one compulsory question carrying 6 marks and five other conventional (descriptive or analytical type) questions carrying 8 marks each. The compulsory question consists of objective type questions like the multiple choice, fill in the blanks etc. Apart from the compulsory question, the student has to answer any 3 from the remaining 5 conventional questions.

### CE204: BUILDING MATERIALS AND BUILDING CONSTRUCTION (BMBC) (For B. Tech. CE - III Semester)

### Scheme: 2013 Internal Assessment: 30 End Exam Marks : 70 End Exam Duration: 3 hrs

L	T/D	Р	С
3	-	-	3

**Course Objectives:** The objectives include acquiring the knowledge of :

- 1) Various materials used in construction
- 2) Manufacturing of lime, cement, bricks, tiles
- 3) Properties, uses and preservation of building materials
- 4) Damp proofing and surface finishes
- 5) Different types of foundations
- 6) Building services-ventilation, lighting, fire protection
- 7) Testing of building materials to assess their suitability for different construction works

### **Course Outcomes:** The student will be able to

- 1) Understand the usage of building materials in construction.
- 2) Understand the manufacturing processes of lime, bricks, cement and tiles.
- 3) Understand the structure, preservation and defects in timber.
- 4) Understand the types of shallow and deep foundations and the types of masonry walls.
- 5) Understand the types of floors, roofs and foundations.
- 6) Understand the usage of surface finishes, concept of Green building and fire safety requirements in buildings.

### Unit – I

**Introduction:** Importance – Objectives of study of building materials – Classification of construction materials – Properties of materials.

**Stones:** Properties of building stones – Relation to their structural requirements – Classification of stones – Dressing of stones – Natural bed – Testing of stones.

**Bricks:** Composition of good brick earth – Methods of manufacturing of bricks – Comparison between clamp burning and kiln burning – Qualities of a good brick – Testing of bricks.

Tiles: Characteristics of a good tile – Manufacturing methods – Types of tiles – Testing of tiles.

### Unit – II

**Lime:** Technical terms – Constituents of lime stone – Classification of lime – Manufacturing of lime. **Cement:** Functions of ingredients of cement – Manufacturing of Portland cement – Properties of cement – Types of cements – Testing of cements.

### Unit – III

**Wood:** Structure – Properties – Seasoning of timber – Classification of various types of wood used in buildings – Defects in timber – Galvanized iron, fiber–reinforced plastics, steel, aluminum.

**Miscellaneous Materials:** Properties and uses of iron, steel, aluminum, glass, plastic, rubber, gypsum.

### Unit – IV

Foundations: Shallow foundations – Spread, combined, strap and mat footings.

**Masonry:** Types of masonry, English and Flemish bonds, rubble and ashlar masonry– Cavity and partition walls.

### Unit – V

**Floors:** Materials used – Different types of floors – Concrete, mosaic, terrazzo, tiled floors. **Roofs:** Pitched, flat and curved roofs – Lean–to–roof, couple roofs, trussed roofs – King and queen post trusses– RCC roofs. **Stairs:** Terminology – Types of stairs

### Unit – VI

**Surface Finishes:** Plastering - Pointing – White washing and distempering - Damp proofing – Painting – Constituents of paint – Types of paints – Processing and defects of painting. **Miscellaneous Topics:** Form work and scaffolding.

### **Building Services:**

Ventilation: Necessity – Functional requirements – Natural and mechanical ventilation. Lighting: Day and artificial lighting – Types of lighting in working places Fire Protection: Causes – Fire load – General fire safety requirements – Fire resistant construction. Green Building: Outlines of Green Building Concept

### **Text Books:**

- 1. S.C.Rangwala, K.S. Rangwala and P.S. Rangwala [2012], *Engineering materials*, Charotar Publishers, Anand.
- 2. Dr. B.C. Punmia [2008], Building construction, Laxmi Publications (P) Ltd., New Delhi.

### **Reference Books:**

- 1. S.K. Duggal [2012], *Building materials*, New Age international (P) Ltd., New Delhi.
- 2. N.L. Arora and B.L. Gupta [2014], *Building construction*, Satya prakshan publications, New Delhi.
- 3. S.V. Deodhar [2005], Building science and planning, Khanna Publishers, New Delhi.
- 4. Bureau of Indian Standards, National Building Code of India 2005, New Delhi.
- 5. V.K. Jain [2009], *Automation Systems in smart and Green Buildings*, Khanna Publications, New Delhi.

### Note:

**Internal Assessment:** The question paper for sessional examination shall have one compulsory question carrying 6 marks and five other conventional (descriptive or analytical type) questions carrying 8 marks each. The compulsory question consists of objective type questions like the multiple choice, fill in the blanks etc. Apart from the compulsory question, the student has to answer any 3 from the remaining 5 conventional questions.

### CE205: HYDROLOGY (HGY)

(For B. Tech. CE - III Semester)

Scheme: 2013 Internal Assessment: 30 End Exam Marks : 70 End Exam Duration: 3 hrs

L	T/D	Р	С
3	-	-	3

**Course Objectives:** The student shall learn about hydrological cycle, analysis of rainfall data, stream flow and runoff, hydrograph, flood routing and flood control methods.

### Course Outcomes: The student will be able to

- 1) Understand the concept of hydrological systems.
- 2) Understand the meteorology parameters and weather seasons.
- 3) Measure precipitation, evaporation using rain gauges and evaporation pans.
- 4) Analyze rainfall and runoff pattern and establish relation between them.
- 5) Apply the concept of hydrograph, S-hydrograph, Unit hydrograph and Instantaneous Unit hydrograph to estimate the runoff.
- 6) Apply suitable methods for estimate and control the floods.

### Unit – I

**Introduction:** Scope and definition of hydrology – Hydrologic cycle – Practical applications and historical development.

**Hydrometeorology:** Formation of precipitation – Types and forms of precipitation – Weather – Seasons in India – Meteorological observations.

### Unit – II

**Precipitation:** Measurement – Recording and non recording type of rain gauges – Errors in measurement – Analysis and interpretation of rain fall data – Mass curve of rain fall – Hyetograph – Intensity – Duration analysis – Average depth of precipitation – Depth–Area–Duration analysis, Double mass curve – Missing records – Network of rain gauges.

### Unit – III

**Abstractions from Precipitation:** Evaporation and evapotranspiration: Process – Factors affecting – Estimation and measurement – Reducing evaporation – Transpiration – Evapotranspiration. **Infiltration:** Definition – Factors affecting – Infiltration equations and indices – Measurement.

### Unit-IV

**Streamflow:** Discharge measurement – Area velocity method – Moving boat method – Stage – discharge relations.

Runoff: Components – Factors affecting – Rain fall – Runoff relationships – Flow mass curve.

### Unit – V

**Hydrograph Analysis:** Features of hydrograph – Separation of base flow – Unit hydrograph (UH theory – Derivation – UH from complex storms – UH for various durations) – S–Curve hydrograph – Use and application of unit hydrograph

**Synthetic and Instantaneous Unit Hydrographs:** Synthetic Unit Hydrograph – Dimensionless Unit Hydrograph – Convolution integral – Derivation of IUH from S–Curve – Relationship between IUH and DUH – Derivation of IUH by other methods.

### Unit – VI

**Flood Routing:** Introduction – Reservoir routing – Modified puls' method – Channel routing **Design Flood:** Introduction – Methods – Envelope curves – Empirical formulae – Rational method – Unit hydrograph application – Frequency analysis – Regional flood frequency analysis.

**Flood Control:** Introduction – Classification of methods for flood control – Flood control reservoirs – Levees and flood walls – Channel improvement – Land management and flood control – Economics of flood control.

### **Text Books:**

- 1. P. Jaya Rami Reddy, A Text book of Hydrology (3rd Edition, 2011), Laxmi Publications, New Delhi.
- 2. K.Subramanya [2013], *Engineering Hydrology*, Tata Mc Graw Hill Publishing Co. Ltd, New Delhi.

### **Reference Books:**

- 1. Linsley, Kohler and Phaulus [1982], *Hydrology for Engineers*, Tata Mc Graw Hill Publishing Co. Ltd, New Delhi.
- 2. Vijay Singh [1991], Engineering Hydrology, John Wiley & Sons, Ltd.

### Note:

**Internal Assessment:** The question paper for sessional examination shall have one compulsory question carrying 6 marks and five other conventional (descriptive or analytical type) questions carrying 8 marks each. The compulsory question consists of objective type questions like the multiple choice, fill in the blanks etc. Apart from the compulsory question, the student has to answer any 3 from the remaining 5 conventional questions.

### CE206: BUILDING PLANNING AND DRAWING (BPD) (For B. Tech. CE - III Semester)

Scheme: 2013 Internal Assessment: 30 End Exam Marks : 70 End Exam Duration: 3 hrs

L	T/D	Р	С
2	2	I	3

Course Objectives: The objectives include

- 1) Learning the functional and engineering planning of types of buildings and civil engineering systems.
- 2) Having exposure to building planning and drawing terminology
- 3) Acquiring expertise in drawing plan and sectional views for residential and public buildings and knowledge of building bye-laws and regulations.

Course Outcomes: Student will be able to

- 1) Understand principles of planning for Residential and Public building.
- 2) Apply Building Bye-Laws and Regulations with respect to classification of buildings based on occupancy.
- 3) Plan Residential and Public Buildings as per the requirements.
- 4) Draw the conventional signs, doors, windows & ventilators.
- 5) Draw the plan, elevation, section of single storey and Multi-storey buildings for the given requirements.

### Unit – I

**Principles of Building Planning:** Introduction – Selection of site – Aspect, prospect, furniture requirements, roominess, grouping, circulation, privacy, sanitation, elegance, economy, flexibility and practical considerations.

### Unit – II

**Building Bye–laws and Regulations:** Introduction – Objectives of building bye–laws – Principles underlying building bye laws – Terminology – Floor area ratio (FAR), Floor space index (FSI) – Classification of buildings – Open space requirements – Built up area limitations – Height of the buildings – Wall thickness – Lighting and ventilation requirements.

**Planning of Residential Buildings:** Introduction – Minimum standards for various parts of the buildings – Requirements of different rooms and their grouping – Verandah – Drawing room – Bed room – Kitchen – Dining room – Store room – Bath room – Water closet – Staircase – Garrage.

### Unit – III

**Planning of Public Buildings:** Introduction – Educational buildings – Hospitals and dispensaries – Office buildings – Banks – Industrial buildings – Hotels and motels – Buildings for recreation.

### Unit – IV

### Drawing Exercises:

- 1 a) Conventional signs used in building drawing
  - b) Doors, windows and ventilator
- 2 Single storied residential building with RCC Roof (Copying Exercise)
- 3 Drawing plan, elevation and section of a single storied residential building for the given line sketch and specifications
- 4 Multi–storied residential building with RCC roof
- 5 Drawing plan, elevation and section of an industrial building for the given line sketch and specifications

6 Planning and drawing of plan, elevation and section of a single storied residential building with RCC roof for the given site and accommodation details

#Subject to the availability of classes, there shall be 10 (Ten) drawing classes of two periods each. **Text Books:** 

- 1. Dr.N.Kumara Swamy & A.Kameswara Rao [2012], *Building Planning & Drawing*, Charotar Publishers, Anand.
- 2. Gurucharan Singh and Jagdish Singh [2009], *Building Planning Designing and scheduling*, Standard publishers Distributors.
- 3. Bureau of Indian Standards [2005], National Building Code of India, New Delhi.

### **Reference Books:**

- 1. S.C. Rangwala [2009], Civil Engineering Drawing, Charotar Publishing House.
- 2. Y.S. Sane [1964], Planning and Designing of Buildings, Third Edition, Allies Book Stall.
- 3. M. Chakraborty [2013], Civil Engineering Drawing, Tenth Edition, Bhakti Vedanta Book Trust.

### Note:

**Internal Assessment:** Out of the total sessional marks of 30 allotted for this subject, 20 marks are to be awarded based on the performance in the two sessional examinations. 10 marks are to be awarded based on the day to day work of submission of drawing sheets.

Each Sessional examination carries 20marks. The question paper shall consist of total four questions out of which the first three questions are from the syllabus of Units I, II & III. Student shall answer any two questions with 5 marks for each question. Fourth question is compulsory, consisting of drawing from the syllabus of Unit IV, with internal choice, for 10 marks.

**End Exa :** The question paper shall consist of **Part** – **A** and **Part** – **B**. Part - B is compulsory. Part – A consists of three questions (from the syllabus of the Units I, II & III). Student shall answer any two questions. Each question carries 15 marks. Part – B consists of compulsory question with internal choice (From the syllabus of Unit IV) for 40 marks.

### ML201: QUANTITATIVE APTITUDE (QA)

### (Common for all branches of B.Tech - III Semester)

Scheme: 2013 Internal Assessment: 100

L	T/D	Р	С
1	1	-	2

### **Numerical Ability:**

Number Systems, HCF and LCM, Decimal Fractions, Square Roots and Cube Roots, Linear and Quadratic Equations

Averages, Mixtures & Allegations, Ages, Ratios, Proportions and Variations, Percentages, Profit and Loss

Time, Speed and Distance, Time and Work

Permutations and Combinations, Probability, Clocks and Calendars

### Introduction to concepts of Reasoning:

Cubes, Series and sequences, Odd man out, Coding and decoding

### **General Mental Ability:**

Puzzles and Teasers

### **References Books:**

- 1. Arun Sharma, How to Prepare for Quantitative Aptitude, TMH Publishers, New Delhi.
- 2. R.S. Aggarwal, *Quantitative Aptitude*, S.Chand Publishers, New Delhi.
- 3. Sharon Weiner-Green, Ira K. Wolf, Barron's GRE, Galgotia Publications, New Delhi.
- 4. Ethnus, Aptimithra, McGraw Hill Publishers
- 5. R.S Aggarwal, Verbal and Non-Verbal Reasoning, S.Chand Publishers, New Delhi.
- 6. Shakuntala Devi, *Puzzles to Puzzle You*, Orient Paper Backs Publishers, New Delhi.
- 7. Shakuntala Devi, More Puzzles, Orient Paper Backs Publishers, New Delhi.
- 8. Ravi Narula , Brain Teasers, Jaico Publishing House, New Delhi.
- 9. George J Summers, Puzzles and Teasers, Jaico Publishing House, Mumbai.

### DISTRIBUTION AND WEIGHTAGE OF MARKS

There shall be four objective type (Paper / PC based) tests, carrying 25 marks each, during the semester. The sum of the marks scored in all these four tests shall be the final score.

### CE207: SURVEYING LAB (SURP) (For B. Tech. CE - III Semester)

Scheme: 2013 Internal Assessment: 30 End Exam Marks : 70 End Exam Duration: 3 hrs

L	T/D	Р	С
-	-	3	2

#### **Course Objectives:**

- 1) Student shall learn the conduct of standard practices using instruments like chain, compass, dumpy level, theodolite in the field and to plot from field data.
- 2) Student shall learn the conduct of leveling and grid contouring by different methods.

#### **Course Outcomes:** The student shall be able to

- 1) Measure area of given land using chain, tape and cross staff.
- 2) Plot the details of given area.
- 3) Transfer the bench mark to project site.
- 4) Prepare contour map of given area.
- 5) Measure horizontal and vertical angles using Theodolite.

### List of Experiments:

#### I. Chain Surveying:

- 1. To find the area of the given plot using chain, tape & cross-staff.
- 2. To find the distance between inaccessible points.

### **II.** Compass Surveying:

- 3. Traversing using prismatic compass.
- 4. To find the distance between inaccessible points.

### **III. Levelling:**

- 5. Fly levelling, reduction of levels by rise and fall method.
- 6. Differential levelling, reduction of levels by height of collimation method.
- 7. Profile levelling: L.S. and C.S.
- 8. Preparation of contour map by using grid contouring.

### **IV. Theodolite Surveying:**

- 9. Measurement of horizontal angle by repetition method
- 10. a) Measurement of horizontal angle by reiteration method
  - b) Measurement of vertical angle

### V. Plotting:

- 11. Conventional signs and symbols used in surveying.
- 12. Plotting of closed traverse and adjusting closing error by Bowditch method.
- 13. Plotting of L.S. & C.S.

### CE208: STRENGTH OF MATERIALS LAB (SMP) (For B. Tech. CE - III Semester)

### Scheme: 2013 Internal Assessment: 30 End Exam Marks : 70 End Exam Duration: 3 hrs

L	T/D	Р	С
-	-	2	2

Course Objectives: The student shall have the knowledge of

- 1) The stress strain characteristics of mild steel bar.
- 2) The methods of determining modulus of elasticity, modulus of rigidity of spring and shaft materials.
- 3) The concepts of hardness, compressive strength, shear strength, impact strength and tensile strength of different materials.
- 4) Measurement of the deflection in simply supported and over hanging beams.

**Course Outcomes:** The student shall be able

- 1) Determine the mechanical properties of steel ,brass, aluminum and other engineering materials.
- 2) Measure deflections in simply supported and overhanging beams.
- 3) Determine hardness, compressive strength, shear strength and impact strength of materials.
- 4) Develop skills to observe, analyse and interpret the experimental data and practical relevance applicable to industry.

### List of Experiments:

- 1. To study the stress-strain characteristics of mild steel bar using universal testing machine.
- 2. To find the compressive strength of wooden specimen and direct shear strength of circular steel bar using compression testing machine.
- 3. To find the modulus of elasticity of given material by measuring deflection in beams
  - a) Simply supported beam.
  - b) Over hanging beam.
- 4. To find the modulus of elasticity of rolled steel joist by measuring deflection using universal testing machine.
- 5. To find the modulus of rigidity of given material using torsion testing machine.
- 6. To find the modulus of rigidity of given material using spring testing machine.
- 7. To find tensile, compressive and shear strengths of given materials using tensometer.
- 8. To find hardness of given metal specimen using Brinnell's Hardness Testing Machine and Rockwell Hardness Testing Machine.
- 9. To find impact strength (Izod and Charpy) using impact testing machine.
- 10. To find modulus of elasticity by conducting flexural test on carriage spring.

#### FOUR YEAR B. Tech. DEGREE COURSE Scheme of Instruction and Examination (Effective from 2013–14)

I	V Semester (CE)								Scheme : 201	3
S.	Subject	Code	edits	Scheme of Instruction periods/week		Duration of end	Scheme of Examination Maximum Marks			
INO			Cr	L	D/T	Р	(Hours)	End Exam	Internal Assessment	Total
Ι	Theory									
1	Strength of Materials-II	CE209	3	3	1	-	3	70	30	100
2	Managerial Economics and Principles of Accountancy	HU202	3	3	_	_	3	70	30	100
3	Advanced Surveying	CE210	3	3	1	-	3	70	30	100
4	Hydraulics	CE211	3	3	1	-	3	70	30	100
5	Concrete Technology	CE212	3	3	-	-	3	70	30	100
6	Business English and Technical Writing	ML203	2	1	2	_	_	-	100	100
II	Practical									
7	Advanced Surveying Lab	CE213	2	-	-	3	3	70	30	100
8	Computer Aided Drafting Lab	CE214	2	_	_	2	3	70	30	100
9	Fluid Mechanics Lab	CE215	2	_	—	2	3	70	30	100
	Total		23	16	5	7		560	340	900

### **CE209: STRENGTH OF MATERIALS-II (SM2)**

(For B. Tech. CE – IV Semester)

Scheme: 2013 Internal Assessment: 30 End Exam Marks : 70 End Exam Duration: 3 hrs

L	T/D	Р	С
3	1	-	3

### **Course Objectives:**

- 1) To have basic knowledge of the stresses in springs, principal stresses, principal planes.
- 2) To have basic knowledge of the stresses in thin cylindrical and spherical shells, thick cylindrical shells.
- 3) To understand different failure theories.
- 4) To learn and analyze propped cantilever and fixed beams
- 5) To learn and analyze continuous beams.
- 6) To understand unsymmetrical bending of beams.

### **Course Outcomes:** On completion of this course, the student will be able to

- 1) Analysis of closed and open coiled helical springs, carriage spring under axial load and axial twist.
- 2) Analyse thin cylindrical and spherical shells subjected to pressure.
- 3) Understand the concepts of theories of failure.
- 4) Design of thick cylinders and shells using theories of failure.
- 5) Analyse indeterminate beams subjected to transverse loads.
- 6) Analyse structural elements subjected to unsymmetrical bending.
- 7) Analysis of two dimensional stress at a point.
- 8) Understand the concepts of shear flow and shear centre.

### Unit – I

**Springs:** Introduction – Types of Springs - Closed and open coiled helical springs under axial loads and axial twist – Carriage springs.

### Unit – II

Thin Cylinders: Thin cylindrical and thin spherical shells – Wire wound thin pipes.

**Thick Cylinders:** Thick cylinders – Lame's equation – Design of thick cylindrical shells – Compound cylinders – Shrink fit allowance – Initial difference of radii at the junction.

### Unit – III

**Analysis of Plane Stress at a Point:** Analysis of two dimensional stress at a point – Principal planes – Principal stresses and strains – Mohr's circle of stress.

**Elastic Theories of Failure:** Introduction – Maximum principal stress theory – Maximum principal strain theory – Maximum shear stress theory – Maximum strain energy theory – Maximum distortion energy theory – Application to shafts and thick cylinders.

### Unit – IV

### Indeterminate Structures: Introduction

**Propped Cantilever:** Analysis of propped cantilever beams for bending moments, shear forces, slopes and deflections.

**Fixed Beams:** Analysis of fixed beams for bending moments, shear forces, slopes and deflections with and without sinking of supports for point loads, uniformly distributed loads and uniformly varying loads.

### Unit – V

**Continuous Beams:** Clapeyron's theorem of three moments – Derivation of theorem – Application to continuous beams – Effect of sinking of supports – Shear force and bending moment diagrams.

### Unit –VI

**Unsymmetrical Bending of Beams:** Centroidal principal axes of bending – Moment of inertia about the principal axes – Resolution of bending moment into two components along principal axes – Determination of stresses.

Shear Center: Shear Flow and Shear Center for Thin walled Channel, I - Sections

### Text books:

- 1. B.C Punmia, Ashok Kumar Jain & Arun Kumar Jain [2009], *SMTS –2, Theory of structures*, Laxmi Publications.
- 2. R.K. Rajput [2012], Strength of materials, S.Chand & Co., New Delhi.
- 3. R.K. Bansal [2010], Strength of materials, Laxmi Publications, New Delhi.

### **Reference Books:**

- 1. F.L. Singer and A.Y. Pytel [1987], *Strength of materials*, Harper & Row Publications.
- 2. Bhavikatti [2009], Strength of materials, S.Chand & Co., New Delhi.
- 3. Timoshenko & Young [1968], *Elements of Strength of materials*, Eastern Wiley Publications.

### Note:

**Internal Assessment:** The question paper for sessional examination shall have one compulsory question carrying 6 marks and five other conventional (descriptive or analytical type) questions carrying 8 marks each. The compulsory question consists of objective type questions like the multiple choice, fill in the blanks etc. Apart from the compulsory question, the student has to answer any 3 from the remaining 5 conventional questions.

### HU202: MANEGERIAL ECONOMICS AND PRINCIPLES OF ACCOUNTANCY (MEPA)

### (Common to B.Tech IV Semester CE & EEE)

Scheme: 2013 Internal Assessment: 30 End Exam Marks : 70 End Exam Duration: 3 hrs

L	T/D	Р	С
3	-	-	3

### **Course Objectives:**

- To enable the students to understand Principles of Managerial Economics
- To enable the students to know Accounting Practices for effective decision making
- To promote entrepreneurial abilities among the budding engineers

Course Outcomes: On completion of this course, the student will be able to

- 1) Understand the nature and scope of managerial economics and the role of managers in firms.
- 2) Understand the demand conditions and various factors influencing demand elasticity.
- 3) Understand various elements of demand forecasting and its techniques.
- 4) Understand the concept of production and cost analysis and the concept of equilibrium price and output in different market situations.
- 5) Understand different forms of business organizations and the significance of capital and factors determining the requirement of working and fixed capital and their sources.
- 6) Understand the principles and problems of accountancy.

#### Unit - I

### Introduction to Managerial Economics & Demand Analysis:

**Managerial Economics**: Definition of Managerial Economics, Characteristics and Scope, Managerial Economics and its Relation with other subjects and its Uses, Role and Responsibilities of Managerial Economist

**Demand Analysis:** Meaning, Types of Demand, Demand Determinants, Law of Demand – Its assumptions and exceptions, Law of Diminishing Marginal Utility

### Unit - II

### **Elasticity of Demand and Demand Forecasting:**

**Elasticity of Demand:** Definition, Types of Elasticity of Demand, Practical Significance of price elasticity of demand, Measurement of Price Elasticity of Demand

**Demand forecasting** – Importance, Factors, Purposes of Demand Forecasting, Methods of Demand Forecasting.

### Unit – III

### Theory of production & cost analysis and Market Structures:

**Production Analysis:** Meaning of production function, Isoquants & Isocosts, The law of diminishing Marginal Returns, Law of Returns to Scale, Internal and External Economies of scale.

**Cost Analysis:** Cost concepts, Cost output relationship for Short Run and Long Run, Break Even Analysis – Its Importance, Limitations and Managerial uses.

**Market Structures:** Types and Features of different Competitive situation – Perfect Competition – Monopoly – Monopolistic and Oligopolistic Competition, Price output determination in case of perfect competition and Monopoly.

### Unit - IV

Types of Business Organizations & Capital and its Significance:

**Types of Business Organizations:** Features and Evaluation of Sole Proprietorship, Partnership, Joint Stock Company.

**Capital and its Significance:** Types of Capital – Estimation of fixed and working capital requirements – Methods and sources of raising fixed and working capital

Unit – V

**Introduction to Financial Accountancy:** 

**Principles of Accountancy:** Introduction to Accountancy, Double Entry System of Book Keeping-Meaning – Scope – Advantages, Journal Entries, Ledger, Preparation of Trial Balance.

### Unit – VI

### **Final Accounts:**

**Preparation of Final Accounts:** Trading Account, Profit & Loss Account, Balance Sheet with adjustments, Final Accounts problems.

### **Text Books:**

- 1) Varshiney and Maheswari, Managerial Economics, Sultan Chand & Co, New Delhi
- 2) Y.K Bhushan, Business Organization & Management, S Chand & Co., New Delhi.
- 3) S.P Jain and K.L Narang, *Financial Accounting* B.com First Year Andhra Pradesh Universities, Kalyani Publishers, New Delhi.

### **Reference Books:**

- 1) Shukla & Grewal, Advanced Accountancy, S.Chand& Co., New Delhi
- 2) M.C. Shukla, Business Organization and Management, S.Chand& Co., New Delhi.

### Note:

**Internal Assessment:** The question paper for sessional examination shall have one compulsory question carrying 6 marks and five other conventional (descriptive or analytical type) questions carrying 8 marks each. The compulsory question consists of objective type questions like the multiple choice, fill in the blanks etc. Apart from the compulsory question, the student has to answer any 3 from the remaining 5 conventional questions.

### **CE210: ADVANCED SURVEYING (ASUR)**

(For B. Tech. CE – IV Semester)

### Scheme: 2013 Internal Assessment: 30 End Exam Marks : 70 End Exam Duration: 3 hrs

L	T/D	Р	С
3	1	•	3

### **Course Objectives:**

- 1) To have the basic knowledge of tachometric surveying.
- 2) To understand the various elements of horizontal and vertical curves used in the geometric design of highways, Railways etc.
- 3) To learn the various applications of surveying in setting out of curves, buildings, culverts and bridges
- 4) To get introduced to triangulation surveying.
- 5) To get introduced to advanced surveying techniques such as remote sensing, GPS, Total Station, Photogrammetry, Hydrographic Surveying etc.

Course Outcomes: On completion of this course, the student will be able to

- 1) Calculate the distance and elevation of given points using Tacheometric and EDM methods.
- 2) Calculate the data required for setting out horizontal and vertical curves by linear and angular methods.
- 3) Prepare Plans for setting out the foundation plan of building, culvert, and bridge.
- 4) Understand the advanced methods of surveying the land by Triangulation and water bodies by Hydrographic surveying.
- 5) Understand the applications of advanced surveying techniques by Photogrammetry, Remote Sensing, Global Positioning System and modern plotting technique Geographical Information System.

### Unit – I

**Tacheometry:** Principle of stadia method – Determination of constants – Determination of distances and elevations for horizontal and inclined line of sight for staff vertical and inclined positions – Tangential tachometry – Errors in stadia surveying.

### Unit – II

**Electronic Distance Measurements (EDM) and Total station:** Measurement principle of EDM instrument – EDM instrument characteristics – Accuracy in EDM – Field procedure of EDM – Total station – Introduction – Advantages – Types of total stations – Applications of total station.

### Unit – III

**Curves:** Types of curves – Definitions & Notations of curve – Elements of simple circular curve – Setting out the simple circular curves by using linear and angular methods.

Elements of compound curve – Transition curve – Types – Methods for determination of length – Characteristics and elements of transition curve – Vertical curve – Types and length of vertical curve.

Setting Out Works: Setting out of foundation trench of a building, culverts and bridges.

### Unit – IV

**Triangulation Surveying:** Horizontal and vertical control – methods of triangulation –network-Signals. Base line – choice of instruments and accessories – corrections – Intervisibility of height and distances – Axis signal corrections. Global Positioning System (GPS): Introduction, working principle, GPS receivers – Types, applications of GPS.

### Unit – V

**Hydrographic Surveying:** Purpose of hydrographic surveying – Soundings, sounding equipment, methods of locating sounding, plotting of soundings by range lines, two angles from a boat.

**Photogrammetry:** Principles of photogrammetry – Types of photographs – Branches of photogrammetry – Scale of photographs – Technical terms used in aerial photography – Photo interpretation.

### Unit – VI

### **Concepts of Remote Sensing and Geographic Information Systems:**

**Remote Sensing:** Concept of remote sensing – Principles of remote sensing–Components of remote sensing – Elements in remote sensing – Platforms for remote sensing – Types of remote sensing – Remote sensing systems – The principle steps used to analyze remotely sensed data – Data reception, transmission and processing.

**Geographic Information Systems (GIS):** Definition – Objectives of GIS – Components of GIS – GIS architecture – Data – Raster and vector data processing methods – Data input – Data storage and retrieval – Data manipulation and analysis – Data output – Applications of GIS in Civil Engineering.

### Text books:

- 1. B.C. Punmia, Ashok kumar Jain and Arun kumar Jain [2005], *Surveying Vol. II & III*, Laxmi Publications(P) Ltd., New Delhi.
- 2. R. Agor [2009], A text book of Advanced Surveying, Khanna Publishers, New Delhi.
- 3. Satheesh Gopi, R. Sathi Kumar & N. Madhu [2007], *Advanced Surveying*, Pearson Education, Dorling Kindersley (India) Pvt. Ltd, New Delhi.
- 4. Satheesh Gopi [2005], *Global Positioning System Principles and Applications*, Tata McGraw Hill Pub.Comp. Ltd.,
- 5. R. Agor [2002], A Text book of Surveying and leveling, Khanna Publishers.

### **Reference books:**

- 1. M. Anji Reddy [2000], A text book of Remote Sensing and Geographical Information Systems, B.S.Publications, Hyderabad.
- 2. S.K. Duggal [2004], Surveying Vol. 2, Tata McGraw Hill Pub.Comp. Ltd.,

### Note:

**Internal Assessment:** The question paper for sessional examination shall have one compulsory question carrying 6 marks and five other conventional (descriptive or analytical type) questions carrying 8 marks each. The compulsory question consists of objective type questions like the multiple choice, fill in the blanks etc. Apart from the compulsory question, the student has to answer any 3 from the remaining 5 conventional questions.

### **CE211: HYDRAULICS (HYD)**

(For B. Tech. CE – IV Semester)

Scheme: 2013 Internal Assessment: 30 End Exam Marks : 70 End Exam Duration: 3 hrs

L	T/D	Р	С
3	1	-	3

**Course Objectives:** Student shall learn various topics like open channel flow, boundary layer theory, dimensional analysis and drag and lift and their practical applications.

**Course Outcomes:** On completion of this course, the student will be able to

- 1) Understand the characteristics of pressure drag, friction drag and concepts of boundary layer.
- 2) Determine an equation for a phenomenon using dimensional analysis.
- 3) Determine the dimensions of most economical sections for open channel.
- 4) Understand the flow characteristics of open channel with respect to types of flows.
- 5) Understand channel transitions in open channel by applying momentum principle.
- 6) Analyze the characteristics of surface profiles and hydraulic jump in open channel.

### Unit – I

**Forces on Submerged Bodies:** Drag and lift over a submerged body – Pressure drag – Friction drag – Total drag at small and large Reynolds' number over cylinder and sphere – Circulation and Magnus effect.

**Boundary Layer Theory:** Boundary layer – Definition – Growth over a flat plate – Boundary layer thickness – Nominal, displacement, momentum and energy thickness – Laminar sub layer – Separation of boundary layer

### Unit –II

**Dimensional Analysis and Similitude:** Units and dimensions – Dimensional homogeneity – Rayleigh's method – Buckingham  $\pi$  theorem – Superfluous and omitted variables – Geometric, kinematic and dynamic similarities – Dimensionless numbers – Model and prototype relations – Distorted models.

### Unit – III

**Basics of Flow in Open Channels:** Introduction – Differences between pipe flow and open channel flow – Types of flow in channels – Geometrical properties of channel section – Velocity distribution in channel section

### Unit – IV

**Uniform Flow in Open Channels:** Chezy's and Manning's formulae – Most economical section of channels – Rectangular, trapezoidal, triangular and circular shapes – Constant velocity open channel section – Computation of uniform flow.

### Unit – V

**Critical Flow:** Specific energy – Critical depth – Momentum in open channel flow – Specific force – Critical flow and its computation – Froude number – Application of specific energy and discharge diagrams to channel transitions – Metering flumes – Determination of mean velocity of flow in channel – Practical channel sections.

### Unit – VI

**Non** – **Uniform Flow in Open Channels (GVF):** Gradually varied flow – Dynamic equation – Classification of channel bottom slopes – Classification and characteristics of surface profiles – Integration of varied flow equation

**Non – Uniform Flow in Open Channels (RVF):** Rapidly varied flow – Hydraulic jump – Specific force – Types of hydraulic jump – Jump in rectangular channels – Loss of energy in hydraulic jump – Applications of hydraulic jump- Surges.

### **Text Books:**

- 1 P.N. Modi & S.M. Seth [2015], *Hydraulics and Fluid Mechanics including Hydraulic Machines*, Standard Book House, New Delhi.
- 2. K.Subramanya [2009], Flow in open channels, Tata McGraw Hill Publishing Co. Ltd, New Delhi.
- 3. Dr. R.K. Bansal [2011], A Text book of Fluid Mechanic and Hydraulic Machinery, Laxmi Publications (P) Ltd.

### **Reference Books:**

1. Ven Te Chow [2009], *Open channel Hydraulics*, Tata McGraw Hill Publishing Co. Ltd, New Delhi.

### Note:

**Internal Assessment:** The question paper for sessional examination shall have one compulsory question carrying 6 marks and five other conventional (descriptive or analytical type) questions carrying 8 marks each. The compulsory question consists of objective type questions like the multiple choice, fill in the blanks etc. Apart from the compulsory question, the student has to answer any 3 from the remaining 5 conventional questions.

#### CE 212: CONCRETE TECHNOLOGY (CT) (For B. Tach. CF., IV Somester)

(For B. Tech. CE – IV Semester)

Scheme: 2013 Internal Assessment: 30 End Exam Marks : 70 End Exam Duration: 3 hrs

L	T/D	Р	С
3	-	-	3

**Course Objectives:** Student shall learn about the various ingredients of concrete, admixtures, workability and strength of concrete, effect of shrinkage and creep, methods of curing, design of concrete mix by IS method, special concretes and their importance.

Course Outcomes: On completion of this course, the student will be able to

- 1) Determine the properties of concrete Ingredients.
- 2) Understand the properties of concrete both in fresh and hardened state.
- 3) Understand the long term durability characteristics of concrete.
- 4) Compute the mix design of concrete using Indian Standard methods.
- 5) Understand the usage of special concretes according to the existing situations.

### Unit – I

**Cement & Admixtures** : Portland cement – Chemical composition – Hydration – Setting and fineness of cement – Structure of hydrated cement – Mechanical strength of cement gel – Water held in hydrated cement paste – Heat of hydration – Influence of compound composition and properties of cement – Tests on cements – Types of cements.

Admixtures: Types of admixtures – plasticizers – Super plasticizers – mineral admixtures.

### Unit – II

**Aggregates:** Classification of aggregates – Particle shape & texture – Bond, strength & other mechanical properties of aggregate – Specific gravity, bulk density, porosity, absorption & moisture content of aggregate – Bulking of sand – Deleterious substances in aggregate – Soundness of aggregate – Alkali aggregate reaction – Thermal properties – Sieve analysis – Fineness modulus – Grading curves – Grading of fine & coarse aggregates – Gap graded aggregates – Maximum size of aggregate.

### Unit – III

**Fresh & Hardened Concrete:** Workability – Factors affecting workability – Measurement of workability – Slump test, Compaction factor test, flow test, Vee–Bee test and ball penetration test – Effect of time and temperature on workability – Segregation and Bleeding.

Water/Cement ratio – Abrams' law – Gel space ratio – Effective water in the mix – Strength in tension and compression – Factors affecting strength of concrete – Effect of age and temperature on strength of concrete – Relationship between compressive and tensile strengths – Curing of concrete – Methods – Quality of mixing water – Tests on hardened concrete.

### Unit – IV

**Elasticity, Creep & Shrinkage:** Modulus of elasticity – Dynamic modulus of elasticity – Poisson's ratio – Creep of concrete – Factors influencing creep – Relation between creep & time – Nature of creep – Effects of creep – Shrinkage – Types of shrinkage.

Durability of concrete – Types and causes of cracks.

### Unit – V

**Mix Design:** Statistical quality control of concrete – various methods of mix designs - Proportioning of concrete mix by IS Method – Relation between mean and maximum strengths – Maximum size of aggregate – Grading and type of aggregate – Aggregate/Cement ratio – Mix proportions and weights per batch.

### Unit – VI

**Special Concretes:** Ready mix concrete – Pumped concrete – Pre–Packed concrete – bacterial concrete – Light weight aggregate concrete – Cellular concrete – Fiber reinforced concrete – Fly ash concrete – High density concrete – High performance concrete – Self compacting concretes.

### **Text Books:**

- 1. A.M.Neville [2011], *Properties of Concrete*, Pearson Education.
- 2. A.M.Neville [2008], Concrete Technology, Pearson Education, New Delhi.
- 3. M.S.Shetty [2006], *Concrete Technology*, S.Chand Company Ltd.

### **Reference Books:**

- 1. P.D. Kulkarni, R.K.Ghosh and Y.R.Phaul [2009], *Text Book of Concrete Technology*, New Age International.
- 2. M.L.Gambhir [2013], Concrete Technology, Tata McGraw Hill Publishers,

### Note:

**Internal Assessment:** The question paper for sessional examination shall have one compulsory question carrying 6 marks and five other conventional (descriptive or analytical type) questions carrying 8 marks each. The compulsory question consists of objective type questions like the multiple choice, fill in the blanks etc. Apart from the compulsory question, the student has to answer any 3 from the remaining 5 conventional questions.

### ML203: BUSINESS ENGLISH AND TECHNICAL WRITING (BETW)

(Common to B.Tech IV Semester CIVIL, EEE & ME and V Semester ECE & CSE Branches)

Scheme: 2013 Internal Assessment: 100

L	T/D	Р	С
1	2	-	2

The purpose of this course is to help the students enhance their proficiency in oral and written communication in English to enable them to use English effectively at the corporate workplaces with global presence.

### **Course Objectives:**

The course aims at enabling the students to use English effectively for the purpose of:

- Using correct grammar and vocabulary
- Practice all aspects of English Language Skills required for a global professional
- Using English effectively in interpersonal and professional contexts
- Practice gathering ideas and information and organizing them coherently
- Practice writing technical papers, journal articles, project reports, and proposals
- Practice writing business letters, block letters, memos and emails

Course Outcomes: On completion of this course, the student will be able to

- 1) Use grammatically acceptable English.
- 2) Demonstrate all aspects of language skills for a successful professional career.
- 3) Use English effectively in interpersonal and professional contexts.
- 4) Write technical content effectively.
- 5) Handle business correspondence effectively.

### **Course Work**

To achieve the objectives, the following course content is prescribed for the Business English and Technical Writing Laboratory Sessions.

### Contents

- Revision of grammar and vocabulary:
  - articles, prepositions, tenses, concord
  - voices, reported speech, sentence types
  - synonyms, antonyms, one word substitutes, idioms, collocations
  - word making, affixes, commonly used foreign words, words often confused
  - jumbled sentences and jumbled paragraphs
  - common errors in English pertaining to both grammar and vocabulary (TOEFL type)
- Reading Comprehension practice tests
- Listening Comprehension practice tests
- Speaking skills with focus on correct pronunciation
- Writing Cover Letters for Job Applications/ Resume Preparation/ Statement of Purpose for Internships, Apprenticeships, Admissions in Universities, etc.
- Writing Technical Reports/ Proposals/Formats of Research Articles, Journal Papers, Project Reports
- Email writing
- Writing Business Letters/ Formats of Letters, Block Letters/Memos

### References

- 1. Raj N Bakshi, English Grammar Practice, Orient Longman.
- 2. Sangeeta Sharma & Binod Mishra, *Communication Skills for Engineers and Scientists*, PHI Learning Private Limited.
- 3. Marilyn Anderson, Pramod K.Naya and Madhucchanda Sen, *Critical Reasoning, Acedemic Writing and Presentation Skills*, Pearson Publishers.
- 4. M. Ashraf Rizvi, *Effective Technical Communication*, Tata McGraw-Hill Publishing Company Ltd., 2005.
- 5. Raymond V. Lesikar, Marie E. Flatley, *Basic Business Communication: Skills for Empowering the Internet Generation*, 11th Edition, Tata McGraw-Hill. 2006.
- 6. Dr A. Ramakrishna Rao, Dr G.Natanam & Prof S.A.Sankaranarayanan, *English Language Communication : A Reader cum Lab Manual*, Anuradha Publications, Chennai, 2006.
- 7. Dr. Shalini Verma, Body Language- Your Success Mantra, S.Chand, 2006.
- 8. Andrea J. Rutherford, *Basic Communication Skills for Technology*, 2nd Edition, Pearson Education, 2007.

### **DISTRIBUTION AND WEIGHTAGE OF MARKS**

### **Business English and Technical Writing Examination**

For Business English and Technical Writing subject, there shall be continuous PC based evaluation during the semester for 80 marks and viva voce to be conducted by an external examiner for 20 marks.

### **CE213: ADVANCED SURVEYING LAB [ASUR(P)]**

(For B. Tech. CE – IV Semester)

### Scheme: 2013 Internal Assessment: 30 End Exam Marks : 70 End Exam Duration: 3 hrs

L	T/D	Р	С
-	-	3	2

### **Course Objectives:**

- 1) Students shall have the knowledge of various standard practices involved in trigonometric leveling and tachometric surveying.
- 2) Students shall be able to acquire the expertise needed for setting out of circular curves and marking of foundation trench of a building/culvert.
- 3) Students shall learn about total station, its use and applications.

### Course Outcomes: The students will be able to conduct various field experiments

- 1) Establish the elevations and distances of accessible & inaccessible points.
- 2) Calculates and establishes the gradient between given two points by Tacheometric method & with Total Station.
- 3) Set-out the Horizontal curves by offsets from long chord method and Rankine's method.
- 4) Set-out the foundation plan of Building.
- 5) Collect the co-ordinate data using Total Station, calculate the area and establish station points.

### List of Experiments:

### I. Trigonometrical Leveling (Heights & Distances problems):

- 1. a) Base of the object is accessible
  - b) Base of the object inaccessible and instrument stations and the elevated object are in the same vertical plane.
- 2. Base of the object inaccessible and instrument stations and the elevated object are not in the same vertical plane

### **II.** Tacheometric Surveying:

- 3. a) Determination of the gradient of the line.
  - b) Determination of the horizontal distances and vertical heights by using tangential tacheometry.

### **III. Setting Out Works:**

- 4. Setting out the simple circular curve by using offsets from the long chord method.
- 5. Setting out the simple circular curve by using Rankine's method.
- 6. Setting out the foundation trench of a building/ culvert.

### **IV. Exercises Using Electronic Total station:**

- 7. a) Determination of remote height /elevation.
  - b) Missing line measurement.
- 8. a) Determination of gradient of a line joining two inaccessible points.
  - b) Determination of area of a given traverse.
- 9. Data collection using Total Station.
- 10. a) Demonstration of digital level.
  - b) Demonstration of hand held GPS.
- 11. Demonstration of E-Survey CAD

### **CE214: COMPUTER AIDED DRAFTING LAB [CAD(P)]**

(For B. Tech. CE – IV Semester)

Scheme: 2013 Internal Assessment: 30 End Exam Marks : 70 End Exam Duration: 3 hrs

L	T/D	Р	С
-	-	2	2

**Course Objectives:** The student shall learn various Auto CAD 2D commands, drawings of various types of buildings.

Course Outcomes: The student shall able to

- 1) Draw a line diagram of Office, Hospital and Library Buildings.
- 2) Calculate area of plot and volume of Earth work.
- 3) Draw reinforcement details of Beam, Column and Footing.
- 4) Draw the plan, section & elevation of Load Bearing and Multistoried buildings.
- 5) Prepare site plan for residential building as per building bylaws.

### List of Experiments / Exercises:

- 1. Introduction to various CAD commands with simple examples
- 2. Line diagram of office building
- 3. Line diagram of health Center
- 4. Line diagram of library
- 5. Doors and Windows
- 6. a) Calculation of area of closed traverse.
  - b) Quantity of earth work in excavation and cutting of a road in two level section.
- 7. Plan, section and elevation of residential building
- 8. Plan, section and elevation of public building
- 9. Plan, section and elevation of multistoried building
- 10. Preparation of Site plan of a Residential building

### CE215: FLUID MECHANICS LAB [FM(P)] (For B. Tech. CE – IV Semester)

Scheme: 2013 Internal Assessment: 30 End Exam Marks : 70 End Exam Duration: 3 hrs

L	T/D	Р	С
-	•	2	2

**Course Objectives:** The objective of this course is to equip the students with basic skills necessary to conduct experiments and understand various experimental methods to measure rate of flow in pipes, channels and tanks, head loss in pipes and verification of the energy equation.

Course Outcomes: At the end of the course, the students will be able to

- 1) Measure the rate of flow in pipes using Venturimeter/Orificemeter.
- 2) Measure the rate of flow through tanks using Orifice/Mouthpiece.
- 3) Measure the rate of flow in channels using Rectangular/Triangular Notch.
- 4) Calculate the loss of head due to friction in a given pipe.
- 5) Calculate the loss of head due to Bend/Elbow in pipe line.

### List of Experiments:

- 1. Determination of coefficient of discharge, velocity and contraction for a small orifice by 'Constant head method'.
- 2. Determination of coefficient of discharge of an external mouthpiece by 'Constant head method'.
- 3. Calibration of a rectangular notch.
- 4. Calibration of a triangular notch.
- 5. Losses in pipe lines due to bends and elbows (Minor losses).
- 6. Determination of friction factor for a given pipe.
- 7. Calibration of Venturimeter.
- 8. Calibration of Orificemeter.
- 9. Determination of loss coefficient for sudden contraction and sudden expansion (Minor losses).
- 10. Verification of Bernoulli's equation.
# FOUR YEAR B. Tech. DEGREE COURSE Scheme of Instruction and Examination (Effective from 2013–14)

	V Semester (CE)						Se	cheme : 2013		
S.	Subject	Code	edits	Scheme of Instruction periods/week			Duration of end	Scheme of Examination Maximum Marks		
INO			Cr	L	D/T	Р	Exam (Hours)	End Exam	Internal Assessment	Total
Ι	Theory									
1	Analysis of Structures	CE301	3	3	1	-	3	70	30	100
2	Environmental Engineering-I	CE302	3	3	1	-	3	70	30	100
3	Hydraulic Machinery	CE303	3	3	1	-	3	70	30	100
4	Transportation Engineering–I	CE304	3	3	1	-	3	70	30	100
5	Reinforced Concrete Design and Drawing	CE305	4	3	1	_	3	70	30	100
6	Engineering Geology	CE306	3	3	_	_	3	70	30	100
7	Soft Skills	ML202	2	1	2	_	_	_	100	100
II	Practical									
8	Hydraulics and Hydraulic Machinery Lab	CE307	2	_	_	2	3	70	30	100
9	Concrete Technology Lab	CE308	2	_	_	2	3	70	30	100
	Total		25	19	7	4		560	340	900

# CE301: ANALYSIS OF STRUCTURES (AS)

(For B. Tech. CE - V Semester)

Scheme: 2013 Internal Assessment: 30 End Exam Marks : 70 End Exam Duration: 3 hrs

L	T/D	Р	С
3	1	-	3

#### **Course Objectives:**

- 1) To have basic knowledge of maximum shear force and bending moment due to moving loads in simply supported beam.
- 2) To have basic knowledge of I.L. for reaction, bending moment and shear force in simply supported beams.
- 3) To understand application of Castigliano's theorems 1&2 for beams and trusses.
- 4) To learn and analyze continuous beams and frames by slope deflection method.
- 5) To learn and analyze continuous beams and frames by moment distribution method.
- 6) To learn and analyze continuous beams and frames by Kani's method.

**Course Outcomes:** On completion of this course, the student will be able to

- 1) Analyse the effects of moving loads on simply supported beams.
- 2) Analyse the effects of moving loads on simply supported beams, trusses and continuous beams by I.L diagrams.
- 3) Analyse determinate, indeterminate beams, trusses by strain energy theorems.
- 4) Analyse continuous beams and portal frames by slope deflection method.
- 5) Analyse continuous beams and portal frames by Moment distribution method .
- 6) Analyse continuous beams and portal frames by Kanis method

#### Unit – I

**Moving Loads:** Maximum shear force and bending moment for loads on simply supported beams – Curves for maximum bending moment and shear force for single point load, two point loads, UDL longer than span and several point loads.

#### Unit – II

**Influence Lines:** Influence lines for reaction, bending moment and shear force in simply supported beams – Influence line diagram for the forces in members of simple trusses – Muller-Breslau's principle – Application of Muller-Breslau's principle to indeterminate beams.

#### Unit – III

**Strain Energy Theorems:** Castigliano's theorem – Analysis of determinate beams, pin joined trusses and frames – Analysis of statically indeterminate beams and trusses up to two degree of indeterminacy by Castigliano's theorem of minimum strain energy – Betti's law and Maxwell's reciprocal theorem.

#### Unit – IV

**Slope Deflection Method:** Slope deflection equation – Application to continuous beams upto three spans (with and without sinking of supports) – Analysis of single bay and single storey portal frames with and without sway.

#### Unit –V

**Moment Distribution Method:** Stiffness and carry over factors – Distribution factors – Analysis of continuous beams upto three spans (with and without sinking of supports) – Effect of yielding of supports – Analysis of single bay and single storey portal frames with and without sway.

#### Unit –VI

**Kani's Method:** Kani's method of analysis applied to continuous beams upto three spans with and without settlement of supports – Analysis of single bay single storey portal frames with and without side sway.

#### **Text Books:**

- 1. B.C. Punmia, A.K Jain & A.K.Jain [2014], SMTS-2, Theory of Structures, Laxmi Publications.
- 2. C.S.Reddy [2011], Basic Structural Analysis, Tata McGraw Hill.
- 3. C.K.Wang, Indeterminate Structural Analysis, Standard Publication House.

#### **Reference Books:**

- 1. Timoshenko & Young [1965], Theory of Structures, Tata McGraw Hill.
- 2. Wilbur and Norri's [1977], Elementary Structural Analysis, Tata McGraw Hill.
- 3. Vazirani & Ratwani [2013], Analysis of Structures-Vol.II, Khanna Publishers.
- 4. Ramamrutham [2012], *Theory of Structures*, Dhapat Rai Publications.

#### Note:

**Internal Assessment:** The question paper for sessional examination shall have one compulsory question carrying 6 marks and five other conventional (descriptive or analytical type) questions carrying 8 marks each. The compulsory question consists of objective type questions like the multiple choice, fill in the blanks etc. Apart from the compulsory question, the student has to answer any 3 from the remaining 5 conventional questions.

# **CE302: ENVIRONMENTAL ENGINEERING-I (EE1)**

(For B. Tech. CE - V Semester)

Scheme: 2013 Internal Assessment: 30 End Exam Marks : 70 End Exam Duration: 3 hrs

L	T/D	Р	С
3	1	•	3

**Course Objectives:** Student shall learn about forecast of population, water requirement, water born diseases, purification of water and water distribution system.

Course Outcomes: On completion of this course, the student will be able to

- 1) Understand the need for protected water supply system for public.
- 2) Estimate the water demand considering future projection of population.
- 3) Evaluate the various sources of water in terms of quantity and quality.
- 4) Analysis and design the unit operation of domestic water treatment units.
- 5) Understand the components of water distribution system including pipe network.
- 6) Understand Plumbing Fixtures and Plumbing Systems for house drainage.

#### Unit– I

Introduction: Need for protected water supply – Objectives of water supply systems

**Quantity:** Design period – Population forecast – Rate of consumption for various purposes – Fluctuations in demand – Factors governing the rate of demand – Fire demand.

#### Unit–II

**Quality:** Impurities in water – Sampling – Routine water analysis for physical, chemical and bacteriological characteristics and their significance – Standards for drinking water – Water borne diseases and their control.

#### Unit-III

**Sources of Water Supply:** Classification, choice of source – Suitability of sources with reference to quantity and quality.

**Collection and Conveyance:** Infiltration galleries and wells – Intake structures – Lake, canal, river and reservoir intake – Types of conduits – Hydraulic design of pressure pipes – Materials for pipes – Pipe joints – Laying and testing of pipes.

#### Unit-IV

**Treatment of Water:** Layout and general outline of water treatment units – Principles and design of plain sedimentation and coagulation tanks – Dosage and feeding of coagulants –Working and design of slow sand filters, rapid sand filters and pressure filters – Different methods disinfections – Chlorination practices – Chlorine demand – Breakpoint chlorination – Aeration – Softening – Defluoridation – Iron and manganese removal.

#### Unit–V

**Distribution System:** Water supply systems – Pumping, gravity and dual systems – Layouts of distribution system – Dead end, grid iron, ring and radial systems – Analysis of water distribution system using Hardy – Cross method – Mass curve application to calculate the storage capacity of the distribution reservoir – Appurtenances in the distribution system – Different types of valves and fire hydrants.

#### Unit–VI

**House Fittings:** House drainage – Components and requirements – Sanitary fittings – Water closets – Flushing tanks – Wash basins – Sinks – Traps – Plumbing systems.

#### **Text Books:**

- 1. Santosh Kumar Garg [1992], Environmental Engineering Vol.1, Khanna Publications.
- 2. S.K.Hussain [1994], Water supply and sanitary Engineering, Oxford & IBH.

#### **Reference Books:**

- 1. E.W. Steel [1985], Water supply and Sewerage, Tata McGraw Hill.
- 2. Sawyer and McCarthy [2003], Chemistry for Environmental engineering, Tata McGraw Hill.
- 3. CPHEEO, Ministry of Urban development, [1996], "Manual on water supply and Treatment", New Delhi.
- 4. Mark J. Hammer & Mark J. Hammer Jr [1986], *Water and Waste Water Technology*, John Wiley Publications.

#### Note:

**Internal Assessment:** The question paper for sessional examination shall have one compulsory question carrying 6 marks and five other conventional (descriptive or analytical type) questions carrying 8 marks each. The compulsory question consists of objective type questions like the multiple choice, fill in the blanks etc. Apart from the compulsory question, the student has to answer any 3 from the remaining 5 conventional questions.

# **CE303: HYDRAULIC MACHINERY (HM)**

(For B. Tech. CE - V Semester)

Scheme: 2013 Internal Assessment: 30 End Exam Marks : 70 End Exam Duration: 3 hrs

L	T/D	Р	С
3	1	-	3

**Course Objectives:** To Study the basic concepts of various hydraulic machines like hydraulic turbines and pumps. To study the performance of hydraulic machines under different working conditions. To study the working principles of miscellaneous hydraulic machines used in civil engineering practice.

**Course Outcomes:** On completion of this course, the student will be able to

- 1) Determine the forces exerted by the jet of fluid on vanes.
- 2) Determine work done and efficiency of turbines and pumps.
- 3) Understand the working principles of pumps and turbines.
- 4) Evaluate the performance of pumps and turbines.
- 5) Understand the concept of unit quantities and specific quantities for pumps and turbines
- 6) Understand the working principle of crane, lift and hydraulic ram.

#### Unit – I

**Basics of Fluid Machinery:** Impact of free jets – Force exerted by fluid jet on stationary and moving plates – Flat, inclined and curved vanes – Velocity triangles at inlet and outlet of the vane – Angular momentum equation – Evaluation of torque exerted on a wheel with curved vanes.

#### Unit – II

**Hydraulic Turbines :** Elements of hydroelectric power plants – Heads and efficiencies of turbines – Classification of turbines – Pelton wheel – Main components and working principle, Expressions for work done and efficiency, Working proportions and design – Radial flow reaction turbines – Modern Francis turbine – Work done and efficiency, Working proportions and design – Draft tube theory – Kaplan turbine – Working proportions.

#### Unit – III

**Performance of Turbines:** Performance under unit head – Unit quantities – Performance under specific conditions – Specific speed – Expressions for specific speed – Performance characteristic curves – Model testing of turbines – Cavitation in turbines – Selection of turbines – Governing of turbines – Runaway speed.

#### Unit – IV

**Centrifugal Pumps:** Advantages of centrifugal pumps over reciprocating pumps – Classification and types of pumps – Components and working of a centrifugal pump – Work done by the impeller–Heads and efficiencies – Net positive suction head (NPSH).

Priming – Priming devices – Minimum starting speed – Multistage pumps – Pumps in series and parallel – Submersible pumps – Limiting suction head – Cavitation – Expression for specific speed – Model testing – Performance characteristics.

#### Unit – V

**Reciprocating Pumps:** Main components – Working of a Reciprocating Pump – Types of reciprocating pumps – Work done by single acting and double acting pumps – Coefficient of discharge, slip, percentage slip – Negative slip – Acceleration head – Indicator diagrams – Air vessels – Operating characteristics.

#### Unit – VI

**Miscellaneous Hydraulic Machines:** Principle of working of hydraulic accumulator – Intensifier – Crane – Lift – Hydraulic ram – Fluid coupling and torque converter and air lift pump.

#### **Text Books:**

- 1. P.N. Modi & S.M. Seth [2005], *Hydraulics and Fluid Mechanics including Hydraulic Machines*, Standard Book House, New Delhi.
- 2. R.K. Bansal [2008], A text book of Fluid Mechanics and Hydraulic machinery, Laxmi Publications (P) Ltd.

#### **Reference Books:**

- 1. Jagadish Lal [1988], *Fluid Mechanics and Hydraulics with computer Applications*, Metropolitan Book Company Pvt. Ltd.
- 2. Nachleba, Hydraulic Turbines, Tata McGraw Hill Publishing Co. Ltd, New Delhi.

#### Note:

**Internal Assessment:** The question paper for sessional examination shall have one compulsory question carrying 6 marks and five other conventional (descriptive or analytical type) questions carrying 8 marks each. The compulsory question consists of objective type questions like the multiple choice, fill in the blanks etc. Apart from the compulsory question, the student has to answer any 3 from the remaining 5 conventional questions.

## CE304: TRANSPORTATION ENGINEERING-I (TE1) (For B. Tech. CE - V Semester)

Scheme: 2013 Internal Assessment: 30 End Exam Marks : 70 End Exam Duration: 3 hrs

L	T/D	Р	С
3	1	-	3

**Course Objectives :** The Objective of the subject to provide basic knowledge of highway development in India, highway alignment, geometric design of highways with an introduction to traffic engineering and management, construction of flexible and rigid pavements.

Course Outcomes: On completion of this course, the student will be able to

- 1) Understand the importance of Transportation, Engineering surveys for highway project and Highway Alignment
- 2) Design Geometric features of highways, Intersections and identification of conflicts as per codal provisions.
- 3) Understand the Basic Traffic parameters and traffic studies and statistical analysis of Speed and accident studies.
- 4) Understand the use of Traffic control devices, parking facilities and design the traffic signal system at intersections using codal provisions.
- 5) Design the flexible and rigid pavements as per Indian Roads Congress code books and MORTH specifications.

#### Unit –I

**Highway Development and Planning:** Importance of transportation – History of Planned Highway Development in India- Twenty Year Road development plans - Classification of roads – Road patterns

**Highway Alignment:** Highway alignment – Basic requirements – Controlling factors – Engineering surveys for highway location –Points considered in a new highway project

#### Unit – II

**Geometric Design of Streets and Highways:** Introduction – Parameters controlling geometric design – Cross sectional elements – Sight distances: Stopping sight distance, Overtaking sight distance – Definitions and derivation of equations for computing sight distances – Horizontal alignment – Super elevation – Design of super elevation – Extra-widening on curves - Transition curve – Objectives of providing transition curves – Methods of computing the length of transition curve – Vertical alignment – Intersections – Rotary intersection – Grade separated intersections (interchanges).

#### Unit –III

**Traffic Engineering:** Introduction – Basic parameters of traffic - Speed, flow and density – Definitions and their inter-relationship- – Traffic studies – Traffic volume counts: Objectives, methods and presentation of volume data - Speed studies: Objectives, types of speeds, Presentation of speed data, Statistical and graphical methods – Parking parameters and parking studies – Accident studies.

#### Unit –IV

**Traffic Control and Management:** Introduction – Traffic control devices – Signs; Classification of road signs and their design specifications- Road markings – Different types of road markings – Channelization: Objectives of channelization – Traffic signal design by Webster method – Onstreet and Off-street parking systems.

#### Unit –V

**Flexible Pavement Design:** Pavement types – Components and their functions – Design factors – Flexible pavement design – IRC method based on CBR only.

#### Unit –VI

**Rigid Pavement Design:** Calculation of stresses – Design of joints, dowel bars, tie bars – Design of thickness of rigid pavement by IRC method.

#### **Text Books:**

- 1. C.E.G.Justo and S.K. Khanna, *Highway Engineering*, Nemchand & Bros, Roorkee
- 2. G.V. Rao, Principles of Transportation and Highway Engineering, Tata McGrew Hill
- 3. L.R.kadiyali [2011], Traffic Engineering and Transportation Planning, Khanna Purblishers

#### **Reference Books:**

- 1. Jotin Khisty [2003], Introduction to Transportation Engineering, Prentice Hall Publications.
- 2. L.R. Kadiyali [2011], Principles of Highway Engineering, Khanna Publications.
- 3. S.K. Sharma [2012], *Principles, Practice and design of Highway Engineering*, Prentice Hall Publications, New Delhi.

#### Note:

**Internal Assessment:** The question paper for sessional examination shall have one compulsory question carrying 6 marks and five other conventional (descriptive or analytical type) questions carrying 8 marks each. The compulsory question consists of objective type questions like the multiple choice, fill in the blanks etc. Apart from the compulsory question, the student has to answer any 3 from the remaining 5 conventional questions.

# CE305: REINFORCED CONCRETE DESIGN AND DRAWING (RCDD)

(For B. Tech. CE - V Semester)

Scheme: 2013 Internal Assessment: 30 End Exam Marks : 70 End Exam Duration: 3 hrs

L	T/D	Р	С
3	1	-	4

**Course Objectives:** Student shall learn about IS 456-2000 code, concepts of Limit State Method (LSM), analysis and design of R.C.C singly, doubly & flanged beams, design of one way, two-way & continuous slabs, design of columns and footings.

Course Outcomes: On completion of this course, the student will be able to

- 1) Understand the concepts of limit state method for reinforced concrete elements.
- 2) Design simply supported , cantilever and continuous beams with detailing.
- 3) Apply limit state of serviceability criteria to flexural members.
- 4) Design of one -way ,Two -way and continuous slabs.
- 5) Design of axially and eccentrically loaded columns.
- 6) Design of isolated footings.

#### Unit – I

**Introduction to Limit State Design:** Concepts of limit state design – Recommendation in IS 456 – 2000 – Basic concepts – Assumptions in limit state design – Characteristic values – Partial safety factors – Stress block – Reinforcement and its significance characteristics – Types of reinforcement – Permissible stresses – Stress–strain curves for cold worked deformed bars and mild steel bars. Limit state of collapse – Ultimate flexural strength – Analysis of singly reinforced rectangular beam – Concept of under reinforced, over reinforced and balanced section.

#### Unit – II

Analysis of Beams: Analysis of doubly reinforced and flanged beams.

**Shear, Torsion and Bond:** Limit state design of section for shear and torsion – Concept of bond, anchorage and development length, I.S. code provisions.

#### Unit – III

**Design of Beams:** Design of simply supported (rectangular and flanged), cantilever and continuous beams.

**Limit State of Serviceability:** Limit state design of serviceability for deflection, cracking and codal provisions.

#### Unit –IV

Design of Slabs: Design of one way, two way and continuous slabs.

#### Unit – V

**Design of Columns:** Design of columns – Axially loaded & eccentrically loaded columns – Uniaxial moment – Biaxial moment.

#### Unit – VI

**Design of Footings**: Types of footings – Design of isolated square and rectangular footings.

#### Note: Following plates should be prepared by the students

1. Reinforcement detailing of Rectangular and Flanged beams

2. Reinforcement detailing of one way and two way slabs

3. Reinforcement detailing of continuous beams and continuous slabs

4. Reinforcement detailing of columns and footings

#### **Text Books:**

- 1. N. Krishna Raju and R. N. Pranesh [2009], *Reinforced Concrete Design IS:456–2000 Principles and Practice*, New Age International (P). Limited.
- 2. Neelam Sharma, Reinforced Cement Concrete Design, S.K. Kataria & Sons, New Delhi.

#### **Reference books:**

- 1. Dr. B.C. Punmia, Ashok Kumar Jain and Arun Kumar Jain [2007], *Limit state design of Reinforced Concrete (As per IS 456:2000)*, Laxmi Publications (P) Ltd.
- 2. Ashok Kumar Jain [1983], *Reinforced Concrete Limit State Design*, New Chand & Bros.
- 3. M.L. Gambhir [2006], *Fundamentals of Reinforced concrete design*, Printice Hall of India Private Ltd., New Delhi.
- 4. N. Subramayanan, Design of Reinforced Concrete Structures, Oxford Publications.

#### Codes:

IS 456-2000, IS 875, SP 16, SP 24.

#### Note:

**Internal Assessment:** The Sessional examination paper should consist of Part A and Part B. Part A consists of *Two* questions in Design and Drawing out of which one question is to be answered. Part B should consist of *Three* questions on design out of which *Two* are to be answered. Weightage for Part – A is 40% and Part- B is 60%.

**End Exam:** The end examination paper should consist of Part A and Part B. Part A consists of *Two* questions in Design and Drawing out of which one question is to be answered. Part B should consist of *Five* questions on design out of which three are to be answered. Weightage for Part – A is 40% and Part- B is 60%.

# **CE306: ENGINEERING GEOLOGY (EG)**

(For B. Tech. CE - V Semester)

Scheme: 2013 Internal Assessment: 30 End Exam Marks : 70 End Exam Duration: 3 hrs

L	T/D	Р	С
3	-	-	3

Course Objectives: To impart knowledge on

- (i) Branches of geology and their importance in civil engineering works
- (ii) Weathering, geological classification of soils and soil erosion and conservation.
- (iii) Identification and study of minerals, rocks-rock as a construction material.
- (iv) Geological structures and their role in civil engineering project
- (v) Earthquakes, landslides causes and preventive measures
- (vi) Geological and geophysical surveys for site selection
- (vii) Role of engineering geology in dams, reservoirs and tunnels.

Course Outcomes: On completion of this course, the student will be able to

- 1) Understand the branches of geology.
- 2) Determine characteristics of rocks and minerals.
- 3) Understand the significance of geological structures in civil engineering works..
- 4) Understand the phenomenon of earthquakes and landslides.
- 5) Apply geological studies in site selection for dams, reservoirs and tunnels.

#### Unit – I

**Introduction:** Branches of geology – Scope and importance of geology from Civil Engineering point of view – Brief study of case histories of failure of some civil engineering constructions due to geological drawbacks.

**Physical Geology:** Weathering of rocks – Susceptibility of rocks to weathering – Significance of weathering

**Soils:** Genesis, profile – Geological classification –Soil erosion and conservation.

Geological Agents: Wind, river, ocean and their Civil Engineering significance.

#### Unit – II

**Mineralogy:** Definition – Physical properties for identification of minerals – Study of common rock forming minerals.

**Petrology:** Civil Engineering importance – Geological classification of rocks –Rock cycle.

**Igneous – Sedimentary – Metamorphic Rocks:** Formation, classification, structures, textures of the above rock groups – Study of common rock types of each group.

#### Unit – III

**Structural Geology:** Strike, dip, outcrop – Study of folds, faults, joints, unconformities and their importance in Civil Engineering works.

**Ground Water Geology:** Origin, occurrence, advantages, types and zones – Ground water exploration – Potentiality of various rocks – Geological action and Engineering significance of ground water.

#### Unit – IV

#### **Geological Hazards:**

Earth Quakes: Terminology, Causes, Classification, Earthquake waves, Seismograph, Locating Epicenter, Determination of depth of focus, Intensity, Magnitude, Prediction, Effects, Seismic belts,

Shield areas – Seismic zones of India – Civil Engineering considerations in seismic areas – Safety measures for buildings and dams – Reservoir induced seismicity. **Landslides:** Causes, effects, preventive measures

#### Unit – V

**Engineering Geology:** Geological – Geophysical (Electrical & Seismic surveys only) – Interpretation of geological maps – Core logging etc for site selection to Civil Engineering projects – Site improvement methods

#### Unit – VI

**Civil Engineering Projects:** Geology of dams – Reservoirs – Tunnels

#### **Text Books:**

- 1. N.Chenna Kesavulu [2014], *Text book of Engineering Geology*, MacMillan India Ltd, Hyderabad.
- 2. D.Venkat Reddy [2010], *Engineering Geology for Civil Engineers*, Oxford & IBH Publishing Co. Pvt. Ltd, NewDelhi

#### **Reference Books:**

- 1. Dr. Anil Kumar Mishra [2014], Engineering Geology, S. Chand & Company Ltd., New Delhi.
- 2. S.K.Garg [2015], A Text book of Geology, Khanna Publishers, New Delhi.
- 3. B.S.Sathyanarayana Swamy[2009], Structural Geology, Dhanpat Rai & Sons, New Delhi.

#### Note:

**Internal Assessment:** The question paper for sessional examination shall have one compulsory question carrying 6 marks and five other conventional (descriptive or analytical type) questions carrying 8 marks each. The compulsory question consists of objective type questions like the multiple choice, fill in the blanks etc. Apart from the compulsory question, the student has to answer any 3 from the remaining 5 conventional questions.

#### ML202: SOFT SKILLS (SS) (Common to B.Tech IV Semester ECE & CSE and V Semester CE, EEE & ME Branches)

Scheme : 2013 Internal Assessment : 100

L	T/D	Р	С
1	2	0	2

#### **Course Objectives:**

- Acquire competence to use grammar with an understanding of its basic rules
- Be able to speak and write appropriately applying these rules
- Communicate effectively and enhance their interpersonal relationship building skills with renewed self confidence
- Work together in teams and accomplish objectives in a cordial atmosphere
- Face interviews, GDs and give presentations
- Understand and develop the etiquette necessary to present oneself in a professional setting

Course Outcomes: On completion of this course, the student will be able to

- 1) demonstrate the competence to use grammar with an understanding of its basic rules.
- 2) communicate effectively and enhance their interpersonal relationship building skills with renewed self confidence.
- 3) work together in teams and accomplish objectives in a cordial atmosphere.
- 4) face interviews, GDs and give presentations.
- 5) understand and develop the etiquette necessary to present themselves in a professional setting

Course Work.

• To achieve the objectives, the following course content is prescribed.

#### Contents

- Revision and reinforcement of language skills grammar vocabulary
- Communication Skills Barriers to Communication Strategies to overcome the barriers
- Non Verbal Communication Body Language Proxemics Kinesics
- Emotional Quotient self analysis of emotional responses
- Group Discussions understanding the objective and skills tested in a GD types of GDs roles in a GD dos and don'ts in a GD
- Team Work importance of team work team vs group attributes of a successful team working with groups dealing with people group decision making
- Goal Setting importance of goal setting difference between goals and dreams importance of writing goals SMART goals short term goals long term goals
- Time Management scheduling how to delegate effectively plugging time leaks learning to say "No"
- Presentation Skills Oral Presentations PPTs Prepared Speeches Extempore
- General Awareness & Current affairs
- Business Etiquette telephone and email etiquette dining etiquette dos and don'ts in a formal setting

#### References

- 1. Stephen R. Covey, "The Seven Habits of Highly Effective People", Pocket Books Publishers, London
- 2. Infosys Campus Connect Portal -//http::campusconnect.infosys.com//
- 3. Shiv Khera, "You Can Win", MacMillan India Publishers, New Delhi
- 4. Stephen R. Covey, A. Roger Merrill and Rebecca R. Merril, "First Things First", Pocket Books Publishers, London
- 5. Gloria J.Galanes, Katherine Adams, John K Brillhart, "Effective Group Discussion: Theory and Practice".
- 6. Priyadarshani Patnaik, "Group Discussion and Interview Skills with VCD", Foundation Books.
- 7. Sangeeta Sharma & Binod Mishra, "Communication Skills for Engineers and Scientists", PHI Learning Private Limited.
- 8. Dr. Shalini Verma, "Body Language- Your Success Mantra", S.Chand, 2006.
- 9. Andrea J. Rutherford, "Basic Communication Skills for Technology", 2nd Edition, Pearson Education, 2007.
- 10. Krishna Mohan and Meera Bajerji, "Developing Communication Skills", MacMillan India Ltd.

## DISTRIBUTION AND WEIGHTAGE OF MARKS

For the Soft Skills subject there shall be continuous tests for 50 marks and viva-voce for 50 marks.

# CE 307: HYDRAULICS & HYDRAULIC MACHINERY LAB [HHM(P)]

(For B. Tech. CE - V Semester)

Scheme: 2013 Internal Assessment: 30 End Exam Marks : 70 End Exam Duration: 3 hrs

L	T/D	Р	С
-	-	2	2

**Course Objectives:** To study and gain practical knowledge and required skills to understand and conduct experiments on various hydraulic machines like pumps and turbines. To study the performance and behavior of the hydraulic machines. To study the uniform flow in open channel along with hydraulic jump.

Course Outcomes: On completion of this course, the student will be able to

- 1) Determine the force exerted by jet of water on fixed vane.
- 2) Determine the open channel roughness.
- 3) Determine the performance of hydraulic turbines.
- 4) Determine the efficiency of Centrifugal/Reciprocating pump.
- 5) Establish the characteristic curves of pumps.
- 6) Determine the specific speed of the pumps.

#### List of Experiments:

- 1. Impact of jet on vanes.
- 2. Performance test on single stage centrifugal pump.
- 3. Performance test on multi stage centrifugal pump.
- 4. Performance test on submersible pump.
- 5. Performance test on centrifugal pump. (Variable speed).
- 6. Performance test on reciprocating pump.
- 7. Open channel roughness.
- 8. Performance and specific speed test on Pelton wheel.
- 9. Performance and specific speed test on Francis turbine.

#### **Demonstration:**

- 10. Performance and specific speed test on Kaplan turbine.
- 11. Study of hydraulic jump

# CE308: CONCRETE TECHNOLOGY LAB [CT(P)]

(For B. Tech. CE - V Semester)

Scheme: 2013 Internal Assessment: 30 End Exam Marks : 70 End Exam Duration: 3 hrs

L	T/D	Р	С
I	•	2	2

**Course Objectives:** The student shall learn the conduct of various tests on cement, aggregates (fine & course), fresh and hardened concrete.

Course Outcomes: On completion of this course, the student will be able to

- 1) Determine the properties of cement as per IS specifications.
- 2) Determine the properties of aggregates as per IS specifications.
- 3) Determine the properties of fresh concrete as per IS specifications.
- 4) Determine the properties of hardened concrete as per IS specifications
- 5) Determine the strength of concrete using Rebound hammer method.

#### List of Experiments:

- a) Fineness of cement by dry-sieving method & Blair's air permeability apparatus
  b) Specific gravity of cement
- 2. a) Standard consistency of cement paste
  - b) Soundness of cement (By Lechatelier method)
- 3. Initial and final setting of cement
- 4. Compressive strength of cement
- 5. a) Grain size distribution of fine aggregate
  - b) Specific gravity of fine aggregate
- 6. a) Grain size distribution of coarse aggregate
  - b) Specific gravity of coarse aggregate
- 7. Bulking of sand
- 8. a) Workability of fresh concrete by slump cone method
  - b) Workability of fresh concrete by compaction factor method
- 9. a) Compressive strength of concrete
  - b) Split tensile strength of concrete
  - c) Modulus of rupture of concrete
- 10. Demonstration of rebound test hammer and concrete core cutter.

# FOUR YEAR B. Tech. DEGREE COURSE Scheme of Instruction and Examination (Effective from 2013–14)

	VI Semester (CE)							S	Scheme : 2013	3
S.	Subject	Code	Credits	Scheme of Instruction periods/week		Duration of end	Scher M	ne of Examina aximum Mark	tion s	
				L	D/T	Р	Exam (Hours)	End Exam	Internal Assessment	Total
Ι	Theory									
1	Steel Structures Design and Drawing	CE309	4	3	1	_	3	70	30	100
2	Water Resources Engineering-I	CE310	3	3	1	-	3	70	30	100
3	Geotechnical Engineering-I	CE311	3	3	1	-	3	70	30	100
4	Transportation Engineering-II	CE312	3	3	1	-	3	70	30	100
5	Environmental Engineering-II	CE313	3	3	1	-	3	70	30	100
6	Interdisciplinary Elective		3	3	-	-	-	70	30	100
II	Practical									
7	Transportation Engineering Lab	CE314	2	-	-	2	3	70	30	100
8	Environmental Engineering Lab	CE315	2	_	-	2	3	70	30	100
9	Engineering Geology Lab	CE316	2	_	_	2	3	70	30	100
	Total		25	18	5	6		630	270	900

# CE309: STEEL STRUCTURES DESIGN AND DRAWING (SSDD) (For B. Tech. CE – VI Semester)

Scheme: 2013 Internal Assessment: 30 End Exam Marks : 70 End Exam Duration: 3 hrs

L	T/D	Р	С
3	1	I	4

**Course Objectives :** The student shall learn to use IS 800-2007 code, design of welded & bolted connections, design of beams, tension & compression members, design of slab and gusseted bases for columns.

Course Outcomes: On completion of this course, the student will be able to

- 1) Understand the concepts of plastic analysis and limit state design.
  - 2) Design of welded and bolted connections.
  - 3) Design of tension members.
  - 4) Design of compression members.
  - 5) Design of laterally supported and unsupported beams.
  - 6) Design of slab and gusset bases for columns.

#### Unit – I

#### **Introduction to Limit State Method**

Introduction to Plastic Analysis-Idealised Stress-Strain curve for steel, Plastic Hinge, Plastic Moment, Plastic Section Modulus, Shape factor, Equal Area Axis, Collapse mechanisms and Theorems of Plastic Analysis, Load and Resistance factor design-Classification of Sections namely Plastic, Compact, Semi-Compact and Slender as per IS:800-2007, Selection of stresses as per I.S.Code. Application of plastic analysis to continuous beams and portal frames.

#### Unit – II

**Welded Joints:** Introduction – Advantages and disadvantages of welding – Strength of welds – Welded connections with butt and fillet welds.

**Bolted Connections:** Introduction – Behaviour of bolted joints – Design strength of ordinary black bolts – Design strength of high strength friction grip bolts – Simple connections – Lap and butt joints.

#### Unit – III

**Tension Members:** Types of sections – Net effective section for angles and tees in tension – Design of Tension member-Lug angles.

#### Unit – IV

**Compression Members:** Simple and built up compression members – Assumptions regarding end conditions – Design of built up columns with battens and laces – Concept of column splicing.

#### Unit – V

**Beams:** Allowable stresses – Design requirements as per IS Code – Design of beams with restrained and unrestrained compression flanges – Built up sections.

#### Unit –VI

Design of Slab and Gusseted bases for Columns

**Note**: The students should prepare the following plates: Plate 1 Detailing of simple beams and compound beams Plate 2 Detailing of Column including lacing Plate 3 Detailing of Column including battens Plate 4 Detailing of Column bases – Slab base Plate 5 Detailing of Column bases – Gusseted base

#### Codes:

IS 800 – 2007, Steel Tables.

#### Text books:

- 1. S.K.Duggal [2014], Limit State design of Steel structures, Tata, McGraw Hill, New Delhi.
- 2. N. Subramanian [2009], Design of steel structures, Oxford university press
- 3. Prof. Dr.V.L.Shah, Prof. Veena Gore [2012], *Limit State Design of Steel Structures (IS:* 800-2007), *Structures Publications*,
- 4. N. Krishna Raju [2009], Structural Design and Drawing, University press, Hyderabad.

#### **Reference books:**

- 1. S.S.Bhavikatti, Design of Steel Structures, New age International, New Delhi.
- 2. Dr. Ramachandra & Virendra Gehlot, *Limit state Design of steel structures Vol.1*, Scientific Publishers (India), Jodhpur

#### Note:

**Internal Assessment:** The Sessional examination paper should consist of Part A and Part B. Part A consists of *Two* questions in Design and Drawing out of which one question is to be answered. Part B should consist of *Three* questions on design out of which *Two* are to be answered. Weightage for Part – A is 40% and Part- B is 60%.

**End Exam:** The end examination paper should consist of Part A and Part B. Part A consists of *Two* questions in Design and Drawing out of which one question is to be answered. Part B should consist of *Five* questions on design out of which three are to be answered. Weightage for Part – A is 40% and Part- B is 60%.

## CE310: WATER RESOURCES ENGINEERING–I (WRE1) (For B. Tech. CE - VI Semester)

Scheme: 2013 Internal Assessment: 30 End Exam Marks : 70 End Exam Duration: 3 hrs

L	T/D	Р	С
3	1	-	3

**Course Objectives:** To study the water requirements of various crops and concepts of duty and delta of water for crops. To study the availability of Ground water and its distribution. To study the various storage and diversion head works along with the silt theories used in design of canals. To study the practical problems like water logging and canal lining.

Course Outcomes: On completion of this course, the student will be able to

- 1) Select suitable method of irrigation to be adopted in the field.
- 2) Estimate the water requirements of crops in terms of duty and delta.
- 3) Understand the occurrence and distribution of ground water.
- 4) Design the impervious floor for weir and suggest remedies for failure of weir.
- 5) Design of canal sections using silt theories.
- 6) Select suitable type of canal lining and suggest remedial measures for water logging.

#### Unit – I

**Introduction:** Definition of irrigation – Necessity – Scope – Benefits – Ill-effects – Types – History of development in India.

**Methods of Irrigation:** Methods of applying water to crops – Flooding – Contour laterals – Strip method – Basin flooding – Sprinkler irrigation – Subsurface irrigation – Contour farming.

#### Unit – II

**Soil–Water-Plant Relationship:** Introduction – Composition of soil, soil texture and soil structure – water holding capacity of soil – Classification of soil water – Availability of soil water – Soil moisture tension – Soil moisture constants – Essential elements for plant growth – Maintaining soil fertility.

#### Unit – III

**Water Requirements of Crops:** Functions of irrigation water – Depth and frequency of irrigation – Duty – Delta – definitions – Factors affecting duty – Methods of improving duty – Duty delta relationship – Consumptive use of water – Irrigation efficiencies – Crop rotation – Principal crops – Assessment of irrigation water.

#### Unit – IV

**Groundwater:** Occurrence of groundwater – Aquifer, aquiclude, aquifuge and aquitard – Types of aquifers – Specific yield, retention – Velocity of ground water – Movement of ground water – Darcy's law – Permeability, transmissibility, storage coefficient – Thiem's equilibrium formula – Dupuit's formula.

**Well Irrigation:** Hydraulics of wells – Pumping test and recovery test – Well losses – Types of wells – Selection of suitable site for tube well – Yield of wells – Advantages and disadvantages of well irrigation.

#### Unit – V

**Diversion Headworks:** Introduction – Components – Weir – Causes of failures of weirs – Remedies – Design of impervious floor – Bligh's creep theory – Lane's weighted creep theory Khosla's theory – Method of independent variables – Location of head works.

#### Unit – VI

**Canal Irrigation and Silt Theories:** Canals – Classification – Alignment of canals - Kennedy's theory – Method of channel design – Silt supporting capacity – Drawbacks – Lacey's regime theory – Channel design – Comparison of Lacey's and Kennedy's theory – Defects in Lacey's theory – Longitudinal section of canal – Balancing depth .

**Water Logging and Canal Lining:** Water logging – Effects – Causes – Remedial measures – Losses in canals – Lining of irrigation channels – Types of lining– Economics of canal lining – Advantages of canal lining.

#### **Text Books:**

- 1. Dr. B.C. Punmia & B.B. Lal [2012], *Irrigation and Water power Engineering*, Laxmi Publications (P) Ltd
- 2. Dr. P.N. Modi [2014], Irrigation and water Resources Engineering, Standard Book House

#### **Reference Books:**

1. K.B. Khushalani & M. Khushalani [1984], Irrigation Practice and Design, Oxford & IBH.

#### Note:

**Internal Assessment:** The question paper for sessional examination shall have one compulsory question carrying 6 marks and five other conventional (descriptive or analytical type) questions carrying 8 marks each. The compulsory question consists of objective type questions like the multiple choice, fill in the blanks etc. Apart from the compulsory question, the student has to answer any 3 from the remaining 5 conventional questions.

# **CE311: GEOTECHNICAL ENGINEERING-I (GTE1)**

(For B. Tech. CE - VI Semester)

Scheme: 2013 Internal Assessment: 30 End Exam Marks : 70 End Exam Duration: 3 hrs

L	T/D	Р	С
3	1	-	3

**Course Objectives:** To make the student to understand the soil and index properties of soil like sieve analysis and consistency limits. Student shall learn about the permeability, stress distribution and compaction properties of soil.

**Course Outcomes:** On completion of this course, the student will be able to

- 1) Understand the importance of functional relationships related to soil.
- 2) Determine the index properties of soils for its classification.
- 3) Determine the permeability and seepage of soils for fluid flow characteristics analysis.
- 4) Understand the importance and modification of soil properties by compaction.
- 5) Estimate the vertical stresses in soils due to self weight, point and distributed loads required for settlement calculation.
- 6) Prepare the soil investigation report after conducting the soil investigation.

#### Unit – I

**Basic Definitions and Functional Relations:** Introduction - Soil as a 3-phase system – Basic definitions – Volumetric relationships – Water content – Volume-mass relationships – Volume-weight relationships – Specific gravity – Functional relations in terms of volume and weight.

## Unit – II

**Physical Properties of Soils:** Determination of specific gravity, water content, in–situ density – Relative Density - Grain size analysis by sieve and hydrometer – Gradation characteristics of soils – Consistency limits – Determination of liquid limit, plastic limit and shrinkage limit – Different Indices – Use of consistency limits.

## Unit – III

**Soil Classification:** Particle size classification – AASHTO classification system – Unified soil classification system – Indian Standard classification system – Plasticity chart – Field identification tests.

**Soil Investigation:** Planning and execution of soil exploration – Reconnaissance – Depth of exploration – Methods of soil exploration – Soil samples – Soil investigation report.

## Unit – IV

**Geostatic Stresses:** Total, neutral and effective stress in soil deposits – Soil deposits subject to capillary action.

**Stresses Due to Applied Loads:** Boussinesq's theory – Vertical stress due to concentrated load, line load, strip load, below uniformly loaded circular and rectangular areas – Isobar diagram – Newmark's influence chart – Westergaard's theory – Comparison of Boussinesq's and Westergaard's theories – Approximate methods – Contact pressure beneath foundations.

#### Unit – V

**Permeability:** Darcy's law – Factors affecting permeability – Laboratory methods for determination of permeability – Permeability of stratified soil deposits.

Seepage: Seepage pressure – Quick sand condition – Characteristics and uses of flow net.

#### Unit – VI

**Compaction:** Theory of compaction – Optimum moisture content – Standard Proctor test – Modified Proctor test – Compaction of sands – Factors affecting compaction – Effect of compaction on soil properties – Field compaction control.

#### **Text Books:**

- 1. K.R. Arora [2008], *Soil Mechanics and Foundation Engineering*, Standard Publishers Distributors.
- 2. Gopal Ranjan and A.S.R.Rao [2000], *Basic and Applied Soil Mechanics*, New Age International Publishers.

#### **Reference Books:**

- 1. P.Purushothama Raj [2013], Soil Mechanics and Foundation Engineering, Pearson Publishers.
- 2. C. Venkataramaiah [2009], Geotechnical Engineering, New Age International.
- 3. B.C. Punmia, A.K.Jain [2005], Soil Mechancis and Foundations, Lakshmi Publications.
- 4. A.V. Narasimha Rao and C. Venkataramaiah [2000], *Numerical Problems, Examples and Objective Questions in Geotechnical Engineering*, University Press.

#### Note:

**Internal Assessment:** The question paper for sessional examination shall have one compulsory question carrying 6 marks and five other conventional (descriptive or analytical type) questions carrying 8 marks each. The compulsory question consists of objective type questions like the multiple choice, fill in the blanks etc. Apart from the compulsory question, the student has to answer any 3 from the remaining 5 conventional questions.

## CE312: TRANSPORTATION ENGINEERING–II (TE2) (For B. Tech. CE - VI Semester)

Scheme: 2013 Internal Assessment: 30 End Exam Marks : 70 End Exam Duration: 3 hrs

L	T/D	Р	С
3	1	I	3

**Course Objectives:** The objective of the course is to provide the students to know the various types of pavement failures and their maintenance strategies. To provide a sound knowledge of railway track, rails, sleepers and ballast along with track alignment and geometric design of the railway track.

**Course Outcomes:** On completion of this course, the student will be able to

- 1) Understand the properties of pavement materials and determine the parameters of mix design by using Marshall Stability method.
- 2) Apply the remedial measures for pavement failures and evaluate the thickness of overlay by Benkelman's beam method.
- 3) Design the surface and subsurface drainage systems and apply the measures for erosion control and seepage flow.
- 4) Understand the components of railway track, failures in rails and concept of coning of wheels.
- 5) Design the geometric features of railway track for horizontal and vertical alignment.

#### Unit –I

**Highway Materials:** Aggregates and bitumen – Desirable properties – Tests – Aggregate bitumen mixes – Mix design by Marshall Stability method.

**Highway Construction:** Construction of water bound macadam roads – Construction of bituminous pavements, concrete pavements, joints in cement concrete pavements.

#### Unit –II

**Highway Maintenance:** Introduction – Pavement failures – Failures in flexible and rigid pavements – Maintenance of highways – WBM roads, Flexible pavements (including special repairs), and CC Pavements – Overlay design by Benkelman beam method.

#### Unit –III

**Highway Drainage:** Importance of highway drainage – Surface drainage – Sub Surface drainage – Drainage of slopes and erosion control – Road construction in water logged areas.

#### Unit – IV

**Railway Track:** Requirements of an ideal permanent way – Gauges in India – Selection of gauge. **Rails:** Functions and requirements – Corrugated or roaring rails – Hogged rails – Kinks in rails – Buckling of rails – Wear on rails – Coning of wheels.

#### Unit – V

**Sleepers and Ballast:** Functions and requirements, types of sleepers – Spacing of sleepers – Sleeper density – Ballast – Functions and requirements, types – Subgrade – Functions of sub grade or formation – Sub grade materials and its improvement.

#### Unit – VI

**Track Alignment:** Basic requirements – Factors controlling alignment – Gradients – Types of gradient – Grade compensation on curves.

**Geometric Design of the Track:** Speed of the train – Speed on curves – Radius or degree of curvature – Super elevation or cant – Types of transition curve – Length of transition curve – Widening of gauge on curves – Shift of the curve.

#### **Text Books:**

- 1. L.R. Kadiyali [2011], Traffic Engineering and Transport Planning, Khanna Publishers, Delhi
- 2. C. Saxena and S.P. Arora [2015], Railway Engineering, Dhanpat Raj Publications.
- 3. Justo and S.K. Khanna [2014], Highway Engineering, Nemchand & Bros, Roorkee

#### **Reference Books:**

- 1. Jotin Khisty [2003], Introduction to Transportation Engineering, Prentice Hall Publications.
- 2. S.K. Sharma [2012], *Principles, Practice and design of Highway Engineering*, Prentice Hall Publications, New Delhi.

#### Note:

**Internal Assessment:** The question paper for sessional examination shall have one compulsory question carrying 6 marks and five other conventional (descriptive or analytical type) questions carrying 8 marks each. The compulsory question consists of objective type questions like the multiple choice, fill in the blanks etc. Apart from the compulsory question, the student has to answer any 3 from the remaining 5 conventional questions.

## CE313: ENVIRONMENTAL ENGINEERING-II (EE2) (For B. Tech. CE - VI Semester)

Scheme: 2013 Internal Assessment: 30 End Exam Marks : 70 End Exam Duration: 3 hrs

L	T/D	Р	С
3	1	-	3

**Course Objectives:** This course enable the students to recognize the source of waste water, their characterization, treatment sewage and disposal system of liquid and solid waste without harmful to public.

**Course Outcomes:** On completion of this course, the student will be able to

- 1) Understand the adoption of sanitation systems.
- 2) Estimate the quantity of sanitary sewage.
- 3) Understand the essential features of sewers and sewer appurtenances.
- 4) Understand the physical, chemical and biological properties of waste water.
- 5) Analyze and design unit operations for waste water treatment.
- 6) Understand the sources, types and composition of solid waste with methods of handling, and disposal of solid waste.

#### Unit–I

**Introduction:** Aim and objectives of sanitation – Conservancy and water carriage systems – Classification of sewerage systems – Separate, combined and partially combined systems.

**Estimation of Sewage:** Estimation of quantity of sewage – Fluctuations in quantity of sewage – Storm water quantity estimation by rational method – Time of concentration and its significance in the design of storm sewer.

#### Unit–II

**Design of Sewerage System:** Preliminary survey and preparation of plans for a sewerage scheme – Selection of site for out fall – Design of sewers – Hydraulics of partially flowing sewer – Self cleaning velocity, shield expression for self cleaning velocity, permissible velocities and gradients –Shapes and materials of sewers – Sewer appurtenances, pumps and pumping stations – Testing and maintenance of sewers.

#### Unit–III

**Characteristics of Domestic Waste Water:** Cycles of decomposition – Sampling and analysis of domestic waste water for Physical and chemical Characteristics – B.O.D equation and population equivalent.

**Disposal of Domestic Waste Water:** Dilution – Self purification of water bodies – Dissolved oxygen sag curve and its significance – On land disposal, sewage farming, choice of method of disposal – Sewage sickness.

#### Unit-IV

**Primary Treatment:** Layout and general outline of various units in a domestic waste water treatment plant – Principle, working and design of screens, grit chambers, sedimentation tanks.

Unit-V

**Biological Treatment:** Principle, working and design of trickling filters (standard and high rate), activated sludge process, oxidation ditch, oxidation ponds, aerated lagoons – Working and design of Septic tank – Sludge digestion tank.

## Unit–VI

**Urban Solid Waste Management:** Types, sources, quantity and composition of urban solid waste – Collection, transportation, recovery & reuse – Disposal methods such as composting, incineration, sanitary land fill.

#### **Industrial Effluents – RRR Concept Text Books**:

1. S.K.Hussain [1994], Water supply and sanitary Engineering, Oxford & IBH.

2. Santosh Kumar Garg [2002], Environmental Engineering Vol.2, Khanna Publishers.

#### **Reference Books** :

- 1. Metcalf and Eddy [2003], Waste Water treatment, Disposal and Reuse, Tata McGraw Hill.
- 2. Sawyer and Mc Carthy [ 2003 ], Chemistry for Environmental Engineering, Tata McGraw Hill.
- 3. *CPHEEO*, Ministry of Urban development, [1999], "Manual on Sewerage and Sewage Treatment", New Delhi.
- 4. H.W.Peavy, D.G. Rowe and George Tchobanoglaus [1985], *Environmental Engineering*, Tata McGraw Hill.
- 5. Mark J. Hammer & Mark J. Hammer Jr. [2004], *Water and Waste Water Technology*, Prentice Hall India (P) Ltd, New Delhi.

#### Note:

**Internal Assessment:** The question paper for sessional examination shall have one compulsory question carrying 6 marks and five other conventional (descriptive or analytical type) questions carrying 8 marks each. The compulsory question consists of objective type questions like the multiple choice, fill in the blanks etc. Apart from the compulsory question, the student has to answer any 3 from the remaining 5 conventional questions.

# CE314: TRANSPORTATION ENGINEERING LAB [TE(P)] (For B. Tech. CE - VI Semester)

Scheme: 2013 Internal Assessment: 30 End Exam Marks : 70 End Exam Duration: 3 hrs

L	T/D	Р	С
-	-	2	2

**Course Objectives:** The objective of this lab is to provide the students the knowledge of testing of highway materials like bitumen and aggregates with hands on experience. The tests on aggregates include the determination of aggregate crushing strength, Impact value of aggregates, water absorption value of aggregate, flakiness and elongation Index. The tests on bitumen include penetration test, stripping value of aggregate, ductility value of bitumen, viscosity test on bitumen, softening point of the bitumen and Flash, fire point of bitumen. The tests on bituminous mixes like Marshall Stability and separation of bitumen from aggregate by bitumen extraction test.

Course Outcomes: On completion of this course, the student will be able to

- 1) Determine the strength and toughness properties of aggregate.
- 2) Understand the significance of shape of aggregate by Flakiness and Elongation indices.
- 3) Determine the grade ,Viscosity and ductile properties of Bitumen under specified test temperature.
- 4) Determine the water absorption value of aggregate and stripping value of Bitumen.
- 5) Measure the flash and fire point and softening point of Bitumen.

#### List of Experiments:

#### **Tests on Aggregates:**

- 1. Determination of strength of the aggregate by crushing test using compression testing machine
- 2. a) Determination of toughness value of aggregate by impact test
  - b) Determination of water absorption value of aggregate by using water absorption test
- 3. Determination of flakiness index and elongation index by shape test using thickness gauge and length gauge

#### **Tests on Bitumen:**

- 4. a) Determination of grade of bitumen by penetration test using penetrometerb) Determination of stripping value of aggregate by using stripping value test
- 5. Determination of ductile value of bitumen using ductility testing machine
- 6. Determination of viscous value of bitumen by viscosity test using viscometer
- 7. Determination of softening value of the bitumen using ring and ball test
- 8. Determination of flash point and fire point by using Penskey Martin's testing machine

#### **Demonstration:**

- 9. Determination of Marshall Stability value and flow value of prepared sample by using Marshall Stability testing machine
- 10. Determination of separation of bitumen from aggregate by using bitumen extraction test

## CE315: ENVIRONMENTAL ENGINEERING LAB [EE(P)] (For B. Tech. CE - VI Semester)

Scheme: 2013 Internal Assessment: 30 End Exam Marks : 70 End Exam Duration: 3 hrs

L	T/D	Р	С
-	-	2	2

**Course Objectives:** Students shall learn the conduct of experiments on physical and chemical characteristics of water and waste water.

Course Outcomes: On completion of this course, the student will be able to

- 1) Understand the water and wastewater sampling and sample preservations.
- 2) Determine the characteristics of water sample.
- 3) Determine the characteristics of sewage sample.
- 4) Statistically analyze and interpret laboratorial results.
- 5) Report the results of laboratory experiments at a professional standard.

#### List of Experiments:

To determine the characteristics of the following parameters of given water / waste water sample

- 1. a) Acidity
  - b) Alkalinity
- 2. a) Total hardness
  - b) Temporary & Permanent hardness
  - c) Calcium & Non calcium hardness
- 3. Chlorides
- 4. Sulphates
- 5. Dissolved oxygen
- 6. a) Total solids
  - b) Dissolved & Suspended solids
  - c) Volatile & Non-Volatile solids
  - d) Settleable solids
- 7. a) Turbidity
  - b) Conductivity
  - c) pH
- 8. Optimum dose of coagulant
- 9. a) Chlorine demand and break point chlorination.
  - b) Residual chlorine by orthotolidine method.
- 10. Fluorides

#### **Demonstration:**

- 11. Bio chemical Oxygen Demand (BOD) of waste water
- 12. Chemical Oxygen Demand (COD) of waste water

# **CE316: ENGINEERING GEOLOGY LAB**

(For B. Tech. CE - VI Semester)

Scheme: 2013 Internal Assessment: 30 End Exam Marks : 70 End Exam Duration: 3 hrs

L	T/D	Р	С
-	-	2	2

**Course Objectives:** To impart working knowledge of minerals, rocks and geological maps for civil engineering projects.

Course Outcomes: On completion of this course, the student will be able to

- 1) Identify mineral based on physical characteristics.
- 2) Identify rocks and understand the properties of each rock type.
- 3) Interpret geological maps and their suitability to civil engineering works.
- 4) Understand problems on structural geology.
- 5) Understand suitability of sites based on study of geological maps.

#### List of Experiments:

- 1. Megascopic identification of minerals.
- 2. Megascopic identification of common igneous rocks.
- 3. Megascopic identification of common sedimentary rocks.
- 4. Megascopic identification of common metamorphic rocks.
- 5. Structural geology problems.
- 6. Study and interpretation of geological maps.

#### Scheme of Instruction and Examination (Effective from 2013–14)

	VII Semester (CE)						Sch	eme : 2013		
S.	Subject	Code	Credits	Scheme of Instruction periods/week		Duration of end	Scheme of Examination Maximum Marks		ation KS	
INO	-			L	D/T	Р	Exam (Hours)	End Exam	Internal Assessment	Total
Ι	Theory									
1	Construction Planning & Management	CE401	3	3	1	Ι	3	70	30	100
2	Water Resources Engineering-II	CE402	3	3	1	-	3	70	30	100
3	Geotechnical Engineering-II	CE403	3	3	1	-	3	70	30	100
4	Estimation, Costing and Valuation	CE404	3	2	2	-	3	70	30	100
5	Professional Elective-I		3	3	I		3	70	30	100
6	Global Elective		2	2	-	-	_	-	100	100
Π	Practical									
7	STAAD Lab	CE405	2		1	2	3	70	30	100
8	Geotechnical Engineering Lab	CE406	2	-	-	2	3	70	30	100
9	Project Work Preliminary	CE407	2		_	3	_	50	50	100
	Total		23	16	5	7		540	360	900

# CE401: CONSTRUCTION PLANNING & MANAGEMENT (CPM) (For B. Tech. CE - VII Semester)

#### Scheme: 2013 Internal Assessment: 30 End Exam Marks : 70 End Exam Duration: 3 hrs

L	T/D	Р	С
3	1	-	3

Course Objectives: To impart knowledge on

- (i) Objectives, need, functions, types, resources and stages of construction management.
- (ii) PERT-CPM network formulation and analysis
- (iii) Organization of PWD, classification of methods and works
- (iv) Types- documentation- procedures of contracts, tenders and arbitration.
- (v) Causes- classification- accident report- safety measures
- (vi) Principles-inspection-technical service for QC and QA

Course Outcomes: On completion of this course, the student will be able to

- 1) Understand the methods of planning, scheduling and principles of construction management.
- 2) Formulate, solve CPM&PERT networks.
- 3) Understand the concepts of quality control and safety management.
- 4) Understand the procedure of documentation of tenders, contracts & time-cost analysis
- 5) Understand the structure of PWD organization& resource allocation.

#### Unit – I

**Introduction to Construction Management:** Significance – Objectives and functions of construction management – Types – Resources – Stages – Team of construction unit.

**Construction Planning and Scheduling:** Objectives of planning – Stages of planning – Scheduling – Advantages and classification of schedules – Methods of planning and scheduling – Bar charts – Milestone charts.

#### Unit – II

**Network Techniques in Construction management:** Elements of network – Network techniques – Breakdown structures – Representation and specifying of activities and events – Rules for Network – Numbering of network – Development of network – Types of networks.

Program Evaluation and Review Technique (PERT): Introduction, time estimates, slack,

critical path – Network analysis and computation problems.

#### Unit – III

**Critical Path Method (CPM):** Introduction – Difference between CPM and PERT – Time estimates – Float – Critical path – Network analysis and computation problems.

**Cost–Time Analysis in Net Work Planning:** Importance of time – Project cost analysis in network planning – Updating – Resources allocation

#### Unit – IV

**Organisation and System of Accounts of P.W.D.:** Principles of organization – Types of organization – Organisation for construction firm – Organisation of Engineering department – Classification of work – Methods of carrying of works – Measurement book – Stores – Tools and plants.

#### Unit – V

**Contracts:** Definition – Essentials – Types – Documents – Conditions of contracts – Rights of a contractor – Remedies for termination of contract – Departmental procedure for execution of Civil Engineering works.

**Arbitration:** Definition – Arbitrator – Arbitration agreement – Qualification of arbitrator – Different kinds of arbitration – Procedure of settlement of dispute – Advantages of arbitration. **Tenders:** Type of tenders – Principles of tendering – Notice inviting tender.

#### Unit – VI

**Construction Safety Management:** Importance of safety – Causes – Classification – Measurement – cost of accidents – Accident report – General safety programmes – Safety measures for different construction works.

**Inspection and Quality Control:** Inspection of construction work – Principles of inspection – Technical service for inspection – Importance of quality – Elements of quality – Organisation for quality control – Quality assurance techniques.

#### **Text Books:**

- 1. Dr. B.C. Punmia & K.K. Kandelwal [2014], *Project Planning & Control with PERT & CPM*, Laxmi Publications (P) Ltd, New Delhi.
- 2. J.L. Sharma [2010], Construction Management and Accounts, Satya Prakasan (P), New Delhi.

#### **Reference Books:**

- 1. Dr. U.K. Shrivastava [2010], Construction planning and Management, Galgotia (P), New Delhi.
- 2. S. Seetha Raman [2009], Construction Engineering and Management, Umesh (P), New Delhi.
- 3. Chitkara [2008], *Construction project management Planning, Scheduling and Control*, Tata McGraw Hill (P), Noida (UP).

#### Note:

**Internal Assessment:** The question paper for sessional examination shall have one compulsory question carrying 6 marks and five other conventional (descriptive or analytical type) questions carrying 8 marks each. The compulsory question consists of objective type questions like the multiple choice, fill in the blanks etc. Apart from the compulsory question, the student has to answer any 3 from the remaining 5 conventional questions.

# CE402: WATER RESOURCES ENGINEERING-II (WRE2) (For B. Tech. CE - VII Semester)

Scheme: 2013 Internal Assessment: 30 End Exam Marks : 70 End Exam Duration: 3 hrs

L	T/D	Р	С
3	1	-	3

**Course Objectives:** To study the various aspects of planning and operation of various types of reservoirs. To gain knowledge about the important hydraulic structures like various types of dams and spillways. To study about various canal structures and regulation works used in civil engineering practice.

**Course Outcomes:** On completion of this course, the student will be able to

- 1) Understand the functional requirements and financial analysis of a multipurpose project.
- 2) Estimate the storage capacity and useful life of reservoir.
- 3) Check the stability of gravity dam.
- 4) Suggest suitable seepage control measures for earth dam.
- 5) Understand the process of energy dissipation below spillways
- 6) Suggest suitable type of cross drainage work for existing field conditions.

#### Unit – I

**Planning for Water Resources Development:** Purpose – Classification of water resources development projects – Functional requirements in multipurpose projects – Financial analysis of a project – Augmentation of water supplies – Impact of climate changes on water resources.

#### Unit – II

**Reservoir Planning:** Introduction – Investigations for reservoir planning – Selection of site – Zones of storage – Storage capacity and yield – Sedimentation of reservoirs – Control of sedimentation – Single purpose flood control reservoirs – Multipurpose reservoirs – Determination of yield – Fixation of storage capacity – Relation between capacity and yield – Density currents – Trap efficiency – Capacity – Inflow ratio.

**Dams – General:** Classification – Factors governing selection of type of dam – Selection of site for a dam – Types of Arch dams – Forces on an arch dam – Buttress dam – Types of buttress dams.

#### Unit – III

**Gravity Dams:** Forces acting – Modes of failure – Stability requirements – Principal and shear stresses – Stability analysis – Elementary and practical profiles – Limiting height – Galleries – Keys, joints and water seals – Control of cracking in concrete dams.

#### Unit – IV

**Earth and Rockfill Dams:** Types of earth dams – Causes of failures – Criteria for safe design – Earth dam section – Downstream drainage system – Seepage analysis – Stability analysis – Stability of D/S slope during steady seepage – Sudden drawdown condition – Stability during construction – Stability against shear – Slope protection – Seepage control measures – Rockfill dams – Compaction.

#### Unit – V

**Spillways:** Introduction – Straight drop spillway – Ogee spillway – Side channel spillway – Chute spillway – Syphon spillway – Shaft spillway – Dynamic force on spillway – Energy dissipation below spillways – Indian standards on criteria for design of hydraulic jump type stilling basins – Horizontal and sloping aprons – Crest gates – Outlet works.

#### Unit – VI

**Cross Drainage Works:** Types – Selection of suitable type – Classification – Features of design of cross drainage works – Aqueducts – Syphon aqueduct.

**Canal Regulation Works:** Canal Outlets: Types of outlets – Definitions – Canal Fall – Necessity and location – Classification – Sarda type fall design – Head regulator and cross regulator.

#### **Text Books:**

- 1. Dr. B.C. Punmia & B.B. Lal [2012], *Irrigation and Water power Engineering*, Laxmi Publications (P) Ltd.
- 2. Dr. P.N. Modi [2014], Irrigation and water Resources Engineering, Standard Book House

#### **Reference Books:**

- 1. K.B. Khushalani & M.Khushalani [1984], Irrigation Practice and Design, Oxford & IBH .
- 2. S.K. Garg [2008], Irrigation and Hydraulic structures, Khanna Publishers

#### Note:

**Internal Assessment:** The question paper for sessional examination shall have one compulsory question carrying 6 marks and five other conventional (descriptive or analytical type) questions carrying 8 marks each. The compulsory question consists of objective type questions like the multiple choice, fill in the blanks etc. Apart from the compulsory question, the student has to answer any 3 from the remaining 5 conventional questions.
# CE403: GEOTECHNICAL ENGINEERING-II (GTE2)

(For B. Tech. CE - VII Semester)

## Scheme: 2013 Internal Assessment: 30 End Exam Marks : 70 End Exam Duration: 3 hrs

L	T/D	Р	С
3	1	-	3

## **Course Objectives:**

- (i) To enable the student to understand the consolidation, shear strength properties.
- (ii) To enable the student to understand the soil investigation, earth pressure, slope stability, bearing capacity and pile foundation

Course Outcomes: At the end of the course, the student will be able to

- 1. Compute the consolidation characteristics and settlement of soils.
- 2. Determine the shear strength of different soils.
- 3. Calculate the lateral earth pressure on retaining structures required for its safe design.
- 4. Analyse the stability of soil slopes.
- 5. Assess the bearing capacity of soil required for the design of shallow foundation.
- 6. Understand the types of pile foundations and estimate the load carrying capacity if single and group of piles.

## Unit – I

**Consolidation:** Mechanism of consolidation – Pressure–void ratio curve – Consolidation settlement – Terzaghi's theory of one–dimensional consolidation – Laboratory consolidation test – Coefficient of consolidation – Time fitting methods – Initial and primary compression – Secondary consolidation – Normally and over–consolidated soils – Determination of pre–consolidation pressure.

## Unit – II

**Shear Strength:** Mohr–Coulomb failure criterion – Shear parameters – Direct shear test – Triaxial compression test – Types of shear tests based on drainage conditions – Unconfined compression test – Shear strength characteristics of cohesive and cohesionless soils – Pore pressure parameters.

## Unit – III

**Lateral Earth Pressure:** Active and passive earth pressure – Earth pressure at rest – Rankine's theory – Active and Passive earth pressure for cohesionless and cohesive soils – Coulomb's theory – Rebhann's and Culmann's graphical method.

## Unit – IV

**Stability of Slopes:** Types of slope failures – Stability analysis of infinite slopes – Swedish circle method – Bishop's simplified method of slices – Friction circle method – Taylor's stability number.

## Unit – V

**Bearing Capacity of Soils:** Definition of bearing capacity – Terzaghi's, Meyerhof's and Skempton's theories of bearing capacity – Bearing capacity of square, circular and rectangular footings – Effect of water table on bearing capacity – I.S. code recommendations for bearing capacity – Safe bearing pressure based on N value - Plate load test.

## Unit – VI

**Pile Foundations:** Classification of piles – Pile driving methods – Load carrying capacity of single pile – Dynamic formulae – Static formulae – Load test on pile - Pile groups – Load carrying capacity of pile groups – Settlement of pile groups - Negative skin friction – Under reamed piles.

## **Text Books:**

- 1. K.R. Arora [2008], Soil Mechanics and Foundation Engineering, Standard Publishers.
- 2. P. Purushotham Raj [2013], *Soil Mechanics and Foundation Engineering*, Pearson Publishers. **Reference Books:**
- 1. Joseph E. Bowles [1997], Foundation analysis and design, McGraw Hill
- 2. V.N.S. Murthy [2007], A Text book of soil mechanics and foundation engineering, CBS Publishers & Distributors.
- 3. C. Venkatramaiah [2009], *Geotechnical Engineering*, New Age International Publishers.
- 4. Gopal Ranjan and A.S.R.Rao [2000], *Basic and Applied Soil Mechanics*, New Age International Publishers.

## Note:

**Internal Assessment:** The question paper for sessional examination shall have one compulsory question carrying 6 marks and five other conventional (descriptive or analytical type) questions carrying 8 marks each. The compulsory question consists of objective type questions like the multiple choice, fill in the blanks etc. Apart from the compulsory question, the student has to answer any 3 from the remaining 5 conventional questions.

## CE404: ESTIMATION, COSTING AND VALUATION (ECV) (For B. Tech. CE - VII Semester)

Scheme: 2013 Internal Assessment: 30 End Exam Marks : 70 End Exam Duration: 3 hrs

L	T/D	Р	С
2	2	-	3

## **Course Objectives:**

- (i) This is a core technology subject. After completion of this course student shall able to learn core facts, concepts, principles, procedures in Estimation and Costing.
- (ii) It is used to study the various methods of approximate estimate and detailed estimate.
- (iii) Learn how to take measurements and deductions of brickwork, pillars, RCC, plastering, painting.
- (iv) It is used to study specifications and rate analysis.

Course Outcomes: On completion of this course, the student will be able to

- 1) Discuss the concept of detailed estimation and its measurements.
- 2) Determine various quantities of items required for construction of buildings, culverts and irrigation projects.
- 3) Prepare the specifications and estimations for civil engineering works.
- 4) Analyse and draw the bar bending details for two way slabs, beams and lintels.
- 5) Determine value of a property.

## Unit – I

Introduction – Purpose of estimation – Rules and methods of measurement of works – Units of measurements for various items of works. Types of estimates – Preliminary estimate – Plinth area estimate – Cube rate estimate – Detailed estimate – Revised estimate – Supplementary and revised estimate – Annual repair or maintenance estimate – Contingencies – L.S.Item.

## Unit – II

Earth work Computations: Earth work computations in banking and cutting for roads and canals.

## Unit – III

**Specification Writing for the following items of works**: Earth work excavation in foundation of a building – Plain cement concrete– R.C.C. – Brick masonry – Stone masonry – Plastering with C.M – White washing – Colour washing – Painting to steel and iron work – First class building – Second class building.

**Reinforcement Estimation:** Reinforcement – Bar bending and bar requirement schedule – Example problems on beams, lintel cum sunshade and one way slab.

## Unit – IV

Analysis of Rates: Definition – Purpose of rates – Factors affecting rate analysis – Standard schedule of rates.

**Preparation of Rates for the Following Items of Work for Building:** Cement mortar (1:4) – Cement concrete (1:4:8) – Reinforced cement concrete: Lintels – Slabs – Beams – Columns in  $1:1\frac{1}{2}:3$  – Brick work using first class bricks in CM(1:6) – Stone masonry: C.R.S in CM (1:6) – Flooring – Plastering – Painting – White washing and colour washing – Painting for iron and wood work .

## Unit – V

**Valuation:** Definition and purpose of valuation – Different kinds of Properties for which valuation is required – Different methods of valuation – Cost of land – Factors affecting the value of plot – Factors affecting the value of building – Rent Fixation – Mortgage – Depreciation – Valuation of residential building.

## Unit – VI

**Preparation of Detailed Estimates for Items of Construction:** Simple residential buildings – R.C.C. Slab culvert and box culvert – Septic tank and soak pit.

## **Text Books:**

- 1. B.N. Dutta [2012], *Text book of Estimating and Costing in Civil Engineering*, UBS Publishers, New Delhi..
- 2. M. Chakraborthy, *Estimating*, *Costing*, *Specifications and valuation in Civil Engineering*, Khanna Publications.
- 3. V.V.Vazirani and S.P.Chandola, *Estimating & Costing in Civil Engineering*, Khanna publishers, New Delhi.

## **Reference Books:**

- 1. Agarwal, Kumar, Chaudary, *Civil Estimating, Costing, and Valuation in Civil Engineering*, Dhanpat Rai Publications.
- 2. G.S.Biridie, *Estimation and costing*, Dhanpat Rai Publications.
- 3. Mahajan, Text book of Estimating and costing, UBS Publications.
- 4. A.P. Dept, Standard Specifications and Standard schedule of rates Public Work Department .
- 5. Rangwala, Estimation and costing, UBS Publications.

## Note:

**Internal Assessment:** The question paper shall consist of *FOUR* questions. First *THREE* questions shall be from the syllabus of unit I to V with 25% of the marks for each question. The student shall answer any *TWO* questions. *FOURTH* question is a compulsory question with 50% of the marks from the syllabus of unit VI.

**End Exam:** The question paper shall consist of *SIX* questions. First *FIVE* questions shall be from the syllabus of the units I to V with *ONE* question from each unit with 15 marks for each question. The student shall answer any *THREE* questions. *SIXTH* question is a compulsory question for 25 marks from the syllabus of unit VI.

# CE 405: STRUCTURAL ANALYSIS AND DESIGN LAB [STAAD(P)]

(For B. Tech. CE - VII Semester)

Scheme: 2013 Internal Assessment: 30 End Exam Marks : 70 End Exam Duration: 3 hrs

L	T/D	Р	С
-	-	2	2

**Course Objectives:** The student shall learn various commands used in STAAD Pro and their applications.

Course Outcomes: On completion of this course, the student will be able to

- 1) Analyse the structures for various loading conditions as per Indian codes.
- 2) Analyse and design 1-D and 2-D structures for various loading conditions.
- 3) Analyse and design space structures for various loading conditions.
- 4) Analyse and design of bridges.
- 5) Analyse and design of industrial structures.

## List of Experiments:

- 1. Introduction to STAAD Pro and basic commands of STAAD Pro. (2 classes)
- 2. Analysis of simply supported and fixed beams subjected to member forces
- 3. Analysis and design of continuous beam subjected to member forces
- 4. Analysis of plane truss subjected to different types of forces
- 5. Analysis and design of plane frame subjected to member and joint loads
- 6. Analysis and design of space frame subjected to gravity forces
- 7. Analysis and design of space frame subjected to wind forces
- 8. Analysis of beam subjected to moving loads
- 9. Analysis of gantry girder subjected to moving loads
- 10. Analysis and design of an industrial structure
- 11. Analysis and design of a retaining wall

## CE406: GEOTECHNICAL ENGINEERING LAB [GTE(P)] (For B. Tech. CE - VII Semester)

Scheme: 2013 Internal Assessment: 30 End Exam Marks : 70 End Exam Duration: 3 hrs

L	T/D	Р	С
I	•	2	2

**Course Objectives:** To enable the student to learn about the determination of index properties like specific gravity, sieve analysis, consistency limits and Engineering properties like shear strength, compaction, CBR and consolidation of soil.

Course Outcomes: On completion of this course, the student will be able to

- 1. Determine the index properties of soils.
- 2. Classify the soil for engineering applications.
- 3. Determine the permeability and shear parameters of the soils.
- 4. Estimate the compaction characteristics and CBR of soils.
- 5. Report the results of laboratory experiments at professional standard.
- 6. Analyse the data for real time applications.

## List of Experiments:

- 1. (a) Grain size distribution by sieve analysis
  - (b) Specific gravity by density bottle
- 2. Liquid limit and plastic limit
- 3. (a) Shrinkage limit
- (b) Free swell index
- 4. Permeability by constant head method
- 5. Permeability by falling head method
- 6. Field density by core cutter method and sand replacement method
- 7. Shear parameters by direct shear test
- 8. Unconfined compressive strength
- 9. OMC and MDD using I.S. light compaction
- 10. C.B.R. value

## **Demonstration:**

- 11. Grain size distribution by hydrometer analysis
- 12. Shear parameters by tri-axial compression test
- 13. Consolidation properties by consolidation test

#### FOUR YEAR B. Tech. DEGREE COURSE Scheme of Instruction and Examination (Effective from 2013–14)

	VIII Semester (CE)							Sch	eme : 2013	
S.	Subject	Code	Credits	Scheme of Instruction periods/week		Duration of end	Scheme of Examination Maximum Marks			
NO				L	D/T	Р	Exam (Hours)	End Exam	Internal Assessment	Total
Ι	Theory									
1	Advanced Structural Design	CE408	3	3	1	I	3	70	30	100
2	Water Resources Engineering –III	CE409	3	2	2	I	3	70	30	100
3	Professional Elective-II		3	3	—	I	3	70	30	100
4	Professional Elective-III		3	3	—	I	3	70	30	100
II	Practical									
5	Geographical Information Systems Lab	CE410	2	_	-	2	3	70	30	100
6	Project Work	CE411	6	_	_	6	_	50	50	100
	Total		20	11	3	8		400	200	600

## CE408: ADVANCED STRUCTURAL DESIGN (ASD) (For B. Tech. CE - VIII Semester)

Scheme: 2013 Internal Assessment: 30 End Exam Marks : 70 End Exam Duration: 3 hrs

L	T/D	Р	С
3	1	•	3

**Course Objectives:** The student shall learn about the design of R.C.C retaining walls, water tanks, grid floor, flat slab, stair case, combined footing, bridges and bearings.

Course Outcomes: After completion of this course, the student shall able to

- 1) Design of dog legged and open well type stair cases by limit state method
- 2) Design of combined footing by limit state method
- 3) Design of cantilever and counter fort retaining walls by limit state method
- 4) Design of circular water tanks by working stress method
- 5) Understand IRC loading, impact factors and design of deck slab bridge, bridge bearings.

## Unit – I

Stair Cases: Types of stair cases, design of dog legged and open well types by limit state method.

## Unit – II

Combined Footing: Design of rectangular combined footing by limit state method.

## Unit – III

Retaining Walls: Design of cantilever and counterfort retaining walls by limit state method.

## Unit – IV

## **Concept of Working Stress Method.**

**R.C. Circular Water Tanks:** Design of circular water tank resting on ground with rigid and flexible bases usingconcept of working stress method.

## Unit – V

## **R.C Rectangular Water Tanks:**

Design of rectangular water tank resting on ground using I.S. Code (working stress method).

## Unit – VI

**R.C. Bridges:** I.R.C. loading and impact factor – Deck slab bridges by effective width method for Class AA Tracked vehicle using concept of working stress method.

**Bridge bearings:** Types of bearings – Design of R.C. bearings and neoprene bearings using concept of working stress method.

## **Text Books:**

- 1. N. Krishna Raju [2003], *Reinforced Concrete Design IS:456–2000 Principles and Practice*, New Age International (P) Limited.
- 2. Ashok K.Jain , *Reinforced Concrete Limit State Design*, Nem Chand & Bros.
- 3. Dr. B.C. Punmia, Ashok Kumar Jain and Arun Kumar Jain [2015], *Limit state design of Reinforced Concrete (As per IS 456:2000)*, Laxmi Publications (P) Ltd.

## **Reference books:**

- 1. N.Krishnaraju, *Design of Bridges*, Oxford IBH.
- 2. H.J.Shah [2014], *R.C.Structures*, Charoter Publications.
- 3. I.C.Syal and Goel [2003], *Reinforced Concrete Structures*, S. Chand & Co.

- 4. S.S.Bhavikatti [2008], Advanced R.C.C. Design-RCC Vol. II, New Age International.
- 5. N.Krishnaraju [2014], Advanced RCC, CBS Publications, New Delhi.
- 6. M.L. Gambhir [2013], Design of RCC structures, PHI Publishers, New Delhi.

## Note:

**Internal Assessment:** The question paper for sessional examination shall have one compulsory question carrying 6 marks and five other conventional (descriptive or analytical type) questions carrying 8 marks each. The compulsory question consists of objective type questions like the multiple choice, fill in the blanks etc. Apart from the compulsory question, the student has to answer any 3 from the remaining 5 conventional questions.

## CE409: WATER RESOURCES ENGINEERING–III (WRE3) (For B. Tech. CE - VIII Semester)

Scheme: 2013 Internal Assessment: 30 End Exam Marks : 70 End Exam Duration: 3 hrs

L	T/D	Р	С
2	2	-	3

**Course Objectives:** To study about the various design aspects and features of drawings of irrigation structures like weir, sluice and drop commonly used and the various cross drainage works, which form an important component of irrigation engineering.

Course Outcomes: After completion of this course, the student shall able to

- 1) Design the components of tank sluice and surplus work of a tank
- 2) Design canal drop and canal regulator cum road bridge
- 3) Draw the features of surplus weir and sluice of a tank
- 4) Design abutments, wing walls and return walls of irrigation structures
- 5) Check the stability of side wall of a sluice barrel and pier of a canal regulator
- 6) Draw the features of canal drop, canal regulator cum road bridge and under tunnel.

## Unit – I

## **Design of**

**Surplus Weir:** Introduction – Estimation of flood discharge – Selection of type of work – Length of surplus Weir – Crest width – Base width – Abutments – Wings – Returns – Aprons.

**Tank Sluice with Tower Head:** Ventway design – Sluice barrel – R.C. Slab – Earth pressure – Stability analysis – Tower head design – Cistern.

**Canal drop (Notch type):** Trapezoidal notch – Length of drop wall between abutments – Profile of drop wall – Notch pier – Protective works.

**Canal regulator cum Road Bridge:** Ventway design – Drowning ratio method – Roadway – Piers – Shutters – Abutments – Wing Walls – Return walls – Solid apron for regulator – Revetments – Energy dissipation.

**Under Tunnel:** Design of barrel roof – Abutment pressure under Pier – Fixing maximum flood levels – Tail channel – Afflux over drop wall – Loss of head calculation – Depth of foundations of returns – Wing walls and returns - Uplift – Creep lost in percolation.

## Unit – II

## **Design and Drawing of**

- 1) Surplus weir
- 2) Tank sluice with tower head
- 3) Canal drop (Notch type)
- 4) Canal regulator cum road bridge
- 5) Under tunnel

## **Text Books:**

1. C.Satyanarayana Murthy [2009], *Water Resources Engineering Principles and practice*, New Age International Publishers, New Delhi.

## Note:

## **Internal Assessment:**

1. The Question paper shall consist of *TWO* questions related to Design and drawing. The student shall answer *ONE* question.

## End Exam:

- 1. The question paper shall consist of *TWO* units with *TWO* questions in each unit. The student shall answer any *ONE* question from each unit.
- 2. First unit shall have questions related to theory and design aspects only for 25 marks from the Unit I of the syllabus. Second unit shall have design and drawing question from Unit- II of the syllabus for 45 marks.

## CE410: GEOGRAPHICAL INFORMATION SYSTEMS LAB [GIS(P)] (For B. Tech. CE - VIII Semester)

Scheme: 2013 Internal Assessment: 30 End Exam Marks : 70 End Exam Duration: 3 hrs

L	T/D	Р	С
-	-	2	2

**Course Objectives:** After completion of the course the student acquires the basic knowledge of various components of GIS and be able to use the software.

## **Course Outcomes:** The student shall be able to:

- 1. Understand the spatial and non spatial data, raster and vector data
- 2. Digitize point, polyline and polygon features
- 3. Manage the attribute data
- 4. Build a model and perform spatial analysis using clip, buffer, overlay and selection tools
- 5. Prepare high quality maps

## List of Experiments:

## GEOMEDIA

- 1. Introduction to GeoMedia
- 2. Building Queries
- 3. Using Buffer zones for Querying
- 4. Geocoding and Spatial Analysis

## **ARC VIEW**

- 5. Basics of Arc View
- 6. Attribute data analysis and classification (Entering Data in Tables, Linking & Joining tables) using ArcView
- 7. Making choropleth map, adding symbols & labels in Arc View
- 8. Querying in Arc View
- 9. Buffering and Overlay in Arc View

## DEMONSTRATION

10. ERADAS IMAGINE AND ENVI softwares

## LIST OF PROFESSIONAL ELECTIVES

## **PROFESSIONAL ELECTIVE – I**

- 1. CE 412 GROUND WATER HYDROLOGY (GWH)
- 2. CE 413 ADVANCED STRUCTURAL ANALYSIS (ASA)
- 3. CE 414 ENVIRONMENTAL IMPACT ASSESSMENT AND MANAGEMENT(EIA)
- 4. CE 415 DISASTER MITIGATION & MANAGEMENT (DMM)

## PROFESSIONAL ELECTIVE – II

- 1. CE 416 HYDRO POWER ENGINEERING (HPE)
- 2. CE 417 PRESTRESSED CONCRETE (PSC)
- 3. CE 418 SOIL DYNAMICS AND MACHINE FOUNDATIONS (SDMF)
- 4. CE 419 INFTRASTRUCTURE ENGINEERING (IE)

## PROFESSIONAL ELECTIVE – III

- 1. CE 420 WATER RESOURCES SYSTEMS ENGINEERING (WRSE)
- 2. CE 421 EARTHQUAKE RESISTANT DESIGN (ERD)
- 3. CE 422 ADVANCED FOUNDATION ENGINEERING (AFE)
- 4. CE 423 TRANSPORTATION PLANNING AND DESIGN (TPD)
- 5. CE 424 ADVANCED DESIGN OF STEEL STRUCTURES (ADSS)

## **PROFESSIONAL ELECTIVE – I**

- 1. CE 412 GROUND WATER HYDROLOGY (GWH)
- 2. CE 413 ADVANCED STRUCTURAL ANALYSIS (ASA)
- 3. CE 414 ENVIRONMENTAL IMPACT ASSESSMENTAND MANGEMENT (EIA)
- 4. CE 415 DISASTER MITIGATION & MANAGEMENT (DMM)

## CE – 412 : GROUND WATER HYDROLOGY (GWH) (Professional Elective – I for B. Tech. CE – VII Semester)

Scheme: 2013 Internal Assessment: 30 End Exam Marks : 70 End Exam Duration: 3 hrs

L	T/D	Р	С
3	-	-	3

**Course Objectives:** To study about the basics of Ground water occurrence, distribution and movement. To study the various aspects of ground water flow and its potential. To study exploitation, utilization and management for various uses along with practical problems like saline water intrusion and artificial recharge.

**Course Outcomes:** On completion of this course, the student will be able to

- 1) Acquire knowledge about the occurrence, distribution and movement of groundwater
- 2) Understand the basic aquifer parameters and ground water resources for different hydro geological boundary conditions
- 3) Interpret groundwater field data using the concepts of well hydraulics
- 4) Conduct surface and sub surface investigations of groundwater using latest technology and methods available
- 5) Adopt suitable recharge method of groundwater
- 6) Understand the practical problems like sea water intrusion and suggest the suitable method for control of it

## Unit – I

**Occurrence of Ground water:** Scope of the subject – Utilization of ground water in hydrologic cycle – Origin of Ground water – Rock properties affecting groundwater – Geological formation of aquifers – Types of aquifers – Vertical distribution of subsurface water – Porosity – Specific yield – Specific retention – Storage coefficient – Compressibility of aquifers. Ground water potential in India

## Unit – II

**Movement of Ground Water:** Darcy's law – Derivation – Validity of Darcy's law – Velocity – Permeability – Hydraulic conductivity – Transmissibility – Equation of conservation of mass – Homogeneous and isotropic aquifers – Laplace equation – Hydrodynamic equation – Analysis of an isotropic aquifers.

## Unit – III

Well Hydraulics (Steady & Unsteady Flows): Drawdown curve, radius of influence – Steady state flow (Equilibrium condition) in to a well – Steady radial flow in to an unconfined aquifer – Dupuit's equation – Steady radial flow in to a confined aquifer – Theim's Equation-Unsteady radial flow in a confined aquifer – Determination of formation constants – Theis, Cooper – Jacob and Chow's method of analysis – Recovery test – Unsteady radial flow in leaky aquifers – Well flow near aquifer boundaries – Image wells – Characteristic well losses and well efficiency – Partially penetrating wells.

## Unit –IV

**Water Wells:** Dug, bored, driven and jetted wells – Methods of drilling deep wells – Well casings and screens – Gravel packs – Well development methods – Open wells – Yield determination – Protection of wells – Infiltration galleries and collector wells.

## Unit –V

**Groundwater Recharge & Management :** Concept of recharge– Methods – Recharge for reuse – Induced recharge – Recharge for energy purposes Water management – Concepts of basin management – Hydrological equilibrium equation – Basin yield – Evaluation of perennial yield – Conjunctive use – Basin management by conjunctive use – Problems and remedial measures.

## Unit – VI

**Saline Water Intrusion:** Occurrence of Saline Water intrusion– Relation between fresh and saline waters – Ghyben–Herzberg equation – Shape and structure of fresh–salt water interface – Upcoming of saline water – Control of saline water intrusion – Examples of seawater intrusion.

## **Text Books:**

- 1. D.K. Todd [2007], Groundwater Hydrology, John Wiley & Sons, Singapore.
- 2. H.M. Raghunath [2009], Groundwater, Wiley Eastern Ltd.

## **Reference Books:**

1. H. Bouwer, *Groundwater Hydrology* 

## Note:

**Internal Assessment:** The question paper for sessional examination shall have one compulsory question carrying 6 marks and five other conventional (descriptive or analytical type) questions carrying 8 marks each. The compulsory question consists of objective type questions like the multiple choice, fill in the blanks etc. Apart from the compulsory question, the student has to answer any 3 from the remaining 5 conventional questions.

## CE – 413 : ADVANCED STRUCTURAL ANALYSIS (ASA) (Professional Elective – I for B. Tech. CE – VII Semester)

## Scheme: 2013 Internal Assessment: 30 End Exam Marks : 70 End Exam Duration: 3 hrs

L	T/D	Р	С
3	-	I	3

## **Course Objectives:**

- (i) To have basic knowledge of three and two hinged arches under static and moving loads
- (ii) To have basic knowledge of cables and suspension bridges.
- (iii)To learn and analyze of frames by approximate methods.
- (iv)To have basic knowledge of plastic analysis and analyze continuous beams and portal frames.
- (v) To learn and analyze continuous beams by flexibility method.
- (vi)To learn and analyze continuous beams by stiffness methods.

Course Outcomes: On completion of this course, the student will be able to

- 1) Analyse the arches with different end conditions
- 2) Analyse the suspension bridges with different end conditions
- 3) Analyse the frames by approximate method of analysis
- 4) Analyse the indeterminate structures using plastic analysis
- 5) Analyse the one dimensional elements using matrix methods

## Unit – I

**Three & Two Hinged Arches:** Linear arches – Eddy's theorem – Analysis of three & two hinged parabolic arches for static and moving loads – Influence lines for horizontal thrust, bending moment and radial shear.

## Unit – II

**Cables and Suspension Bridges:** Stress in suspended cables with the supports at same level and different levels – Simple suspension bridges with three hinged stiffening girders – Influence lines for horizontal tension, bending moment and shear force.

## Unit – III

**Approximate Methods of Analysis of Frames:** Substitute frame method for vertical loads – Portal and cantilever methods for horizontal loads – Assumptions and limitations

## Unit – IV

**Plastic Analysis:** Basic concepts – Elastic and plastic stress – Strain relationships – Plastic bending – Moment curvature relations – Plastic hinges – Collapse mechanisms – Fundamental theorems of plastic analysis – Plastic analysis of propped and fixed beams, continuous beams and single bay, single storey portal frame – Methods of combined mechanism.

## Unit –V

**Introduction to Matrix Methods of Structural Analysis:** Static and kinematic indeterminacy of structures – Equilibrium and compatibility conditions

**Flexibility Method:** Flexibility methods – Applications to continuous beams (degree of static indeterminacy not exceeding three)

## Unit –VI

**Stiffness Method:** Introduction – Application to continuous beams (degree of kinematic indeterminacy not exceeding three)

## **Text Books:**

- 1. B.C.Punmia, A.K. Jain, A.K. Jain [2014], SMTS 2, Theory of Structures, Laxmi Publications.
- 2. C.K. Wang, Indeterminate Structural Analysis, Standard Publishers.
- 3. C.S. Reddy [2011], Basic Structural Analysis Tata McGraw Hill.

## **Reference Books:**

- 1. Ramachandra [2011], *Design of steel structures Vol.2*, Standard Book House.
- 2. Vazirani & Ratwani, Design of steel structures, Khanna Publications
- 3. Pandit & Gupta [2008], Structural Analysis- A Matrix Approach, Tata McGraw Hill.

## Note:

**Internal Assessment:** The question paper for sessional examination shall have one compulsory question carrying 6 marks and five other conventional (descriptive or analytical type) questions carrying 8 marks each. The compulsory question consists of objective type questions like the multiple choice, fill in the blanks etc. Apart from the compulsory question, the student has to answer any 3 from the remaining 5 conventional questions.

# CE – 414 : ENVIRONMENTAL IMPACT ASSESSMENT AND MANAGEMENT (EIA)

(Professional Elective – I for B. Tech. CE – VII Semester)

Scheme: 2013 Internal Assessment: 30 End Exam Marks : 70 End Exam Duration: 3 hrs

L	T/D	Р	С
3	-	-	3

**Course Objectives:** Students shall learn about and ensure that the conditions of project approval are implemented satisfactorily, verify that impacts are within predicted or permitted limits, take action to manage unanticipated impacts or other unforeseen changes and ensure that environmental benefits are maximized through good practice.

## **Course Outcomes:**

- 1. Understand the environmental attributes to be considered for the EIA study
- 2. Identify the methodology to prepare rapid EIA
- 3. Proficient in components and methods for prediction and assessment of impacts of air, water, land etc.
- 4. Proficient in Environmental Audit and Acts
- 5. Proficient in preparing EIA report for Projects like Irrigation and power generation

## Unit – I

## **Introduction to EIA:**

Concepts of E.I.A – Define sustainable development and the significance of environmental ethics for Civil Engineers – Initial environmental Examination, Elements of EIA, - factors affecting E-I-A Impact evaluation and analysis, preparation of Environmental Base map, Classification of environmental parameters.

## Unit – II

## **EIA Methodologies:**

Introduction, Criteria for the selection of EIA Methodology, EIA methods, Ad-hoc methods, matrix methods, Network method Environmental Media Quality Index method, overlay methods, cost/benefit Analysis.

## Unit – III

## Prediction and assessment of impact on ground water and surface water environment:

Impact of Developmental Activities and Land use, Introduction and Methodology for the assessment of ground water, Delineation of study area, Identification of actives - E I A in surface water, methodology for the assessment of Impacts on surface water environment

## Unit – IV

## Environmental assessment of soil, air pollution impacts and Deforestation

Procurement of relevant soil quality, Impact prediction, Assessment of Impact significance, Identification and Incorporation of mitigation measures. E I A for Air and Biological environment: Methodology for the assessment of Impacts on Air pollution sources. Generalized approach for assessment of Air Pollution Impacts. Assessment of Impact of development Activities on Vegetation and wildlife, environmental Impact of Deforestation – Causes and effects of deforestation.

## Unit – V

**Environmental Audit and Acts (Protection and Prevention) :** Environmental Audit and Environmental legislation objectives of Environmental Audit, Types of environmental Audit, Audit

protocol, stages of Environmental Audit, onsite activities, evaluation of Audit data and preparation of Audit report.

The Environmental pollution Act, The water Act, The Air (Prevention & Control of pollution Act.), Mota Act, Wild life Act.

## Unit – VI

**Case studies:** Social and environmental impact of large dams – Watershed management schemes – Mining, oil refinery, national highways and port projects – Computer applications in EIA.

## **Text Books:**

- 1. Y. Anjaneyulu, Environmental Impact Assessment Methodologies, B.S. Publication, Hyderabad.
- 2. L.Canter, Environmental Impact Analysis, McGraw Hill Book Co.

## **Reference Books:**

- Public Involvement and Dispute Resolution Volume–1. Institute for Water resources, U.S. Army corps of Engineers, Alexandria, VA–22315USA, IWR Research report 82–R1, 1998.Copies available from the national Technical Information Services, 5285 Port Royal Road, Spring Field, VA–22161, USA.
- 2. R.E.Munn, Environmental Impact Assessment, John Wiley & sons.

## Note:

**Internal Assessment:** The question paper for sessional examination shall have one compulsory question carrying 6 marks and five other conventional (descriptive or analytical type) questions carrying 8 marks each. The compulsory question consists of objective type questions like the multiple choice, fill in the blanks etc. Apart from the compulsory question, the student has to answer any 3 from the remaining 5 conventional questions.

## CE – 415 : DISASTER MITIGATION & MANAGEMENT (DMM) (Professional Elective – I for B. Tech. CE – VII Semester)

Scheme: 2013 Internal Assessment: 30 End Exam Marks : 70 End Exam Duration: 3 hrs

L	T/D	Р	С
3	-	-	3

**Course Objectives:** To enable the student to learn about the disasters like earthquakes, floods and cyclones, landslides and droughts and the methods employed to manage and mitigate the losses.

## Course Outcomes: The student shall understand the

- (i) Analyze the effects of natural and manmade disasters
- (ii) Plan mitigation and management strategies for disasters
- (iii) Assess the impact of disasters on environment
- (iv) Apply environment and ground water pollution management and solid waste management skills

## Unit – I

**Introduction:** Types of disasters– Impact of disasters on environment – Infrastructure and development – Disaster: A Global View-Disaster profile of India-Disaster management cycle-Guidelines for hazard assessment and vulnerability analysis.

## Unit – II

## Natural Disasters-I

**Earthquakes:** Causes - Distribution of earthquakes - effects of earthquakes - Earthquake Hazards in India - Volcanic Eruptions - Causes effects of volcanic eruptions - Environmental impacts –

Action plan for earthquake disaster preparedness – Elements at risk – Recovery and rehabilitation after.

**Tsunamis**: Causes of a Tsunamis - General Characteristics- Predictability - Distribution pattern of Tsunamis in India - Possible risk reduction measures.

## Unit – III

## Natural Disasters-II

**Floods:** Causes and effects of floods - Flood hazards in India – Warning system - Flood mitigation and management.

**Cyclones:** Causes of a cyclones - General Characteristics - Stages of cyclone formation - Indian Cyclones - Distributional Pattern - Distributional Pattern possible risk reduction.

## Unit – IV Natural Disasters-III

**Droughts:** causes of drought - Types of droughts - Drought Indices - Impacts of droughts - Drought hazards in India - Drought mitigation strategies.

**Landslides:** Definition –causes of landslides - Type of Landslides - Distributional Pattern - Adverse Effects - Possible risk reduction measures

## Unit – V

**Man Made Disasters** – **I** Fire: Forest fire assessment, monitoring and management. Urban area fire: building construction and structural fire protection, electric hazard shock and protection; Aircraft fire: action required for rescue and fire fighting in aircraft and airports; forest fire, explosives, fire hazard and protection in special risk areas, coal fire.

## Unit – VI Man Made Disasters – II

Industrial Disasters: Manmade hazards, toxic chemicals, noise pollution, environment and ground water pollution and management, solid waste management.

## **Text Books:**

- 1. V. K. Sharma, Disaster Management, National Centre for Disaster Management, IIPE, Delhi,
- 2. A Status Report Publication of the Govt. of India, Ministry of Home Affairs, National Disaster Management Division, *Disaster Management in India*.
- 3. A. S. Arya, Anup Karanth, and Ankush Agarwal, *Hazards, Disasters and Your Community; A Primer for Parliamentarians*, GOI–UNDP Disaster Risk Management Programme.

## **Reference Books:**

- 1. Carter, W. Nick, 1991: Disaster Management, Asian Development Bank, Manila.
- 2. Sahni, Pardeep et.al. (eds.) 2002, Disaster Mitigation Experiences and Reflections, Prentice Hall of India, New Delhi.
- 3. William, P. L.; and J. L. Burson, 1985, Industrial Toxicology, Safety and Health Applications in the work place, Van Nostrand Reinhold, New York.
- 4. web site: www.empowerpoor.org, *Drought in India: Challenges and Initiatives; Poorest Areas in Civil Society (PACS) Programme*. [2001–2008]
- 5. website: <u>www.odihpn.org</u>:, *Disaster Preparedness Programme in India. A Cost Benefit Analysis*, Commissioned and Published by the Humanitarian Practice Network 'at ODI HPN.

## Note:

**Internal Assessment:** The question paper for sessional examination shall have one compulsory question carrying 6 marks and five other conventional (descriptive or analytical type) questions carrying 8 marks each. The compulsory question consists of objective type questions like the multiple choice, fill in the blanks etc. Apart from the compulsory question, the student has to answer any 3 from the remaining 5 conventional questions.

## **PROFESSIONAL ELECTIVE – II**

- 1. CE 416 HYDRO POWER ENGINEERING (HPE)
- 2. CE 417 PRESTRESSED CONCRETE (PSC)
- 3. CE 418 SOIL DYNAMICS AND MACHINE FOUNDATIONS (SDMF)
- 4. CE 419 INFTRASTRUCTURE ENGINEERING (IE)

## CE – 416: HYDRO POWER ENGINEERING (HPE) (Professional Elective – II for B. Tech. CE - VIII Semester)

Scheme: 2013 Internal Assessment: 30 End Exam Marks : 70 End Exam Duration: 3 hrs

L	T/D	Р	С
3	-	-	3

**Course Objectives:** To study the various aspects of generation of hydro electric power. To study the various aspects related to different types of power plants and power houses. To study the importance of tidal power.

Course Outcomes: After successful completion of course, the student will be able to

- 1. Understand the basic concepts of hydropower generation
- 2. To estimate the available hydropower of a power project
- 3. Determine the efficiency of pumped storage plant
- 4. Select suitable type of hydro power systems
- 5. Analyze the different types of loads on power plants
- 6. Design penstock and design of components of tidal power plants

## Unit – I

**Introduction:** Different sources of energy – Hydro power – Its advantages and disadvantages – Role of hydel power in the power system – Development of water power in India with particular reference to south India – Estimation of water power potential.

**River Basin Development:** Selection of site – Assessment of power potential.

## Unit – II

**Basic Concepts of Power plants**: Loads – Load curves – Load factor – Capacity factor – Diversity factor – Utilization factor – Load duration curve – Efficiencies – Firm and secondary power – Prediction of load.

## Unit – III

**Storage and Pondage:** Definitions – Mass curve – Flow and power duration curves – Hydrograph analysis – Storage and pondage – Pondage factor.

## Unit – IV

**Classification of Power Plants:** Classification on the basis of head and plant capacity – Runoff river plants and their general arrangement – Storage plants – Diversion canal plants – Underground power plants – Principles of layout – Some typical layouts of Indian projects – Pumped storage plants – Basic features – Advantages – Types – Two unit, three unit and four unit installations – Merits and demerits – Reversible pump turbines – Efficiency of pumped storage plants.

## Unit – V

**Water Conducting Systems:** Intakes – Power canals – Tunnels - penstocks – Economical diameter – Anchorages – Expansion joints – Other accessories – Water hammer – Rigid and elastic column theories – Surge tanks.

## Unit –VI

**Power Houses & Turbines:** Types – Layouts – Relative merits and design principles for surface power stations and underground power stations- Types of turbines – Selection of sizes and number of units setting of turbines – Cavitation in turbines – Governing of turbines.

**Tidal Power:** Basic principles – Location of tidal power plants – Components.

## **Text Books:**

- 1. M.M. Dandekar and K.N. Sharma [2010], A Text Book of Water Power Engineering, Vikas Publications.
- 2. R.K.Sharma and T.K.Sharma [2003], A Text book of Water Power Engineering including Dams, Engg. Hydro & Fluid Power Engg., S. Chand Company Ltd., New Delhi–110 055

## **Reference Books:**

1. Deshmukh M.M. [2010], Water Power Engineering.

## Note:

**Internal Assessment:** The question paper for sessional examination shall have one compulsory question carrying 6 marks and five other conventional (descriptive or analytical type) questions carrying 8 marks each. The compulsory question consists of objective type questions like the multiple choice, fill in the blanks etc. Apart from the compulsory question, the student has to answer any 3 from the remaining 5 conventional questions.

## CE – 417: PRESTRESSED CONCRETE (PSC) (Professional Elective – II for B. Tech. CE - VIII Semester)

Scheme: 2013 Internal Assessment: 30 End Exam Marks : 70 End Exam Duration: 3 hrs

L	T/D	Р	С
3	•	•	3

**Course Objectives**: Student shall learn about concept of pre-stressed concrete, methods and systems of prestressing, losses of prestress, analysis and design of sections for flexure & shear, deflections of prestressed concrete members.

**Course Outcomes:** After successful completion of course, the student will be able to

- 1. Understand the principles of prestressing
- 2. Analyse the prestressed concrete beams with straight, concentric and eccentric tendons.
- 3. Determine the short term and long term losses in prestressed concrete members.
- 4. Design of prestressed concrete members for flexure and shear.
- 5. Determine the short term and long term deflections in prestressed concrete beams.

## Unit – I

**Introduction:** Historical development – General principles of prestressing – Pre tensioning and post tensioning – Advantages and limitations of prestressed concrete – Materials – High strength concrete and high tensile steel and their characteristics

## Unit – II

**Methods and Systems of Prestressing:** Pre tensioning and post tensioning methods – Systems of prestressing – Hoyer system, Magnel system, Freyssinet system and Gifford – Udall system.

## Unit – III

**Losses of Prestress:** Losses of prestress in pre tensioned and post tensioned members due to various causes like elastic shortening of concrete, shrinkage of concrete, creep of concrete, relaxation of stress in steel, slip in anchorage and frictional losses.

## Unit – IV

**Analysis of Sections for Flexure:** Elastic analysis of concrete beams prestressed with straight, concentric, eccentric, bent and parabolic tendons – Kern lines – Cable profile.

## Unit – V

**Design of Sections for Flexure:** Design criteria as per I.S. Code – Design of simple rectangular and I–sections for flexure.

**Design of Sections for Shear:** Shear and principal stresses – Design for shear.

## Unit – VI

**Deflections of Prestressed Concrete Beams:** Importance of control of deflections – Short term deflections of uncracked members – Prediction of long term deflections.

## **Text Books:**

- 1. N. Krishna Raju, *Prestressed Concrete*, Fifth Edition, Tata McGraw–Hill Publishing Company Limited.
- 2. Praveen Nagarajan [2013], Prestressed Concrete, Pearson Education, Inc, New Delhi.

## **Reference Books:**

1. E. G. Nawy, Prestressed Concrete: A fundamental approach, Prentice Hall.

## **Reference Codes:**

IS 1343-2012, Code of Practice for Prestressed Concrete, BIS, New Delhi. IS 456-2000, Code of Practice for plain and reinforced concrete BIS, New Delhi.

## Note:

**Internal Assessment:** The question paper for sessional examination shall have one compulsory question carrying 6 marks and five other conventional (descriptive or analytical type) questions carrying 8 marks each. The compulsory question consists of objective type questions like the multiple choice, fill in the blanks etc. Apart from the compulsory question, the student has to answer any 3 from the remaining 5 conventional questions.

# CE – 418: SOIL DYNAMICS AND MACHINE FOUNDATIONS (SDMF)

(Professional Elective – II for B. Tech. CE - VIII Semester)

Scheme: 2013 Internal Assessment: 30 End Exam Marks : 70 End Exam Duration: 3 hrs

L	T/D	Р	С
3	-	-	3

**Course Objectives:** The objective of this subject is to impart the knowledge of vibration analysis, principles of dynamics applied to soil, various aspects of machine foundations design and control of vibrations using different material.

## Course Outcomes: Student shall be able to

- (i) Understand various concepts and terms related to dynamic analysis of soil
- (ii) Analyze the behavior of soil under static and dynamic loads
- (iii) Recognize the importance of due consideration given to design under dynamic loads
- (iv) Design the foundation which can tolerate dynamic loads (i.e. machine foundations)
- (v) Select the suitable technique and material to control the propagation of vibrations
- (vi) Understand the mechanism, measurement and effect of liquefaction of soils

## Unit – I

**Machine Foundations:** Types of machine foundations – General requirements of machine foundations – Dimensional criteria – Design data – Dynamic loads induced in simple crank mechanisms – Permissible amplitudes – Permissible bearing pressures.

## Unit–II

**Theory of Vibrations:** Basic definitions – Free and forced vibrations with and without damping – Constant force and rotating mass type excitation – Resonance and its effect – Magnification factor – Phase angle between forces and displacements for steady state vibrations – Logarithmic decrement – Transmissibility – Natural frequency of foundation-soil system – Barkan's and I.S. methods of determining natural frequency.

## Unit-III

**Wave Propagation and Dynamic Soil Properties:** Wave propagation in elastic half-space – Elastic waves and their characteristics – Elastic properties of soil for dynamics purpose and their experimental determination.

## Unit-IV

**Design of Machine Foundations:** Analysis and design of block foundations for reciprocating engines and impact machines as per I.S. code.

## Unit – V

**Vibration Isolation:** Active and passive types of isolation – Screening of vibrations by use of open trenches – Passive screening by use of pile barriers – Isolation in existing machine foundations.

## Unit –VI

**Liquefaction of Soils:** Definition – Mechanism of liquefaction – Effect of liquefaction – Laboratory studies – Field testing – Factors affecting liquefaction.

## Text books:

1. Swami Saran [2006], Soil Dynamics and Machine Foundations, Galgotia Publications Pvt. Ltd.

- 2. P. Srinivasulu and C.V. Vidyanathan [1976], *Handbook of machine foundations*, M/s.Tata McGraw Hill Publications.
- 3. S. Prakash [1981], Soil Dynamics, McGraw Hill Co.

## **Reference books:**

- 1. D.D. Barkan [1962], Dynamics of Bases and Foundations, McGraw Hill Co.
- 2. F.E. Richart [1970], Vibrations of soils and Foundations, Prentice Hall Inc.
- 3. N.S.V. Kameswara Rao [1998], *Vibration Analysis and Foundation Dynamics*, Wheeler Publication Ltd.

## Note:

**Internal Assessment:** The question paper for sessional examination shall have one compulsory question carrying 6 marks and five other conventional (descriptive or analytical type) questions carrying 8 marks each. The compulsory question consists of objective type questions like the multiple choice, fill in the blanks etc. Apart from the compulsory question, the student has to answer any 3 from the remaining 5 conventional questions.

## CE – 419: INFRASTRUCTURE ENGINEERING (IE) (Professional Elective – II for B. Tech. CE - VIII Semester)

## Scheme: 2013 Internal Assessment: 30 End Exam Marks : 70 End Exam Duration: 3 hrs

L	T/D	Р	С
3	-	-	3

**Course Objectives:** This subject covers the planning for Social infrastructure, Infrastructure development including the different types of Financing mechanisms of urban infrastructure with Public Private Partnership like BOT, BOLT and BOOT etc., Maintenance of Infrastructure, Infrastructure developments, regional development along with the sound knowledge of the concepts in Airport Engineering , Docks & Harbour Engineering

## Course Outcomes: Student shall be able to

- (i) Identify the basic amenities requirements to develop various projects
- (ii) Apply financing the mechanism in public private partnership
- (iii) Plan and design the runways
- (iv) Plan and design the ports, docks and harbor
- (v) Understand the importance and safety of various infrastructure projects

## Unit – I

**Planning for Social Infrastructure:** Basic need – Approach, health, education, religion, recreation – Cultural planning standards – Spatial standards – Hierarchy of provision – Different types of units and scales.

## Unit – II

**Infrastructure Development:** Critical issues in public and private development – Ownership management and maintenance – Provisions in infrastructure development enabling act of A.P.UIDSSMT and infrastructure. - Telecommunication – Cable T.V. – Wireless communications – Digital communications – Internet and intranet – Regional poverty and basic needs – Regional infrastructure network systems.

## Unit – III

**Financing Urban Infrastructure:** Financing mechanisms in addition to tax and grant financing – User charges – Public private partnerships like BOT, BOLT, BOOT etc., – Impact fee – Municipal bonds – Subsidies and social aspects in the planning.

## Unit – IV

**Maintenance of Infrastructure:** Operation and maintenance of infrastructure with special reference to the urban poor – Capacity building of organizations for infrastructure development and services – Review of multinational and bilateral activities and programs such as DFID and FIRE programs in India – Overview of World Bank programs in India.

## Unit – V

**Regional Development:** Physical (roads, irrigation system, water supply, sanitation, drainage, watershed management, fire services, telecommunication, energy, electricity, solid waste disposal etc.), social (Health and education) & economics (banking, marketing and public distribution systems), environmental – Social and economic impacts of infrastructure network system – Role of district planning committee.

## Unit – VI

**Airport Engineering:** Factors affecting selection of site for airport – Aircraft characteristics – Geometric design of runway – Computation of runway length – Correction for runway length – Orientation of runway – Wind rose diagram – Runway lighting system.

**Docks and Harbour Engineering:** Water transportation – Harbours and types of harbours – Site selection – Ports – Classification of ports – Docks – Types – Shapes of docks – Dock entrances, repair of docks – Break water – Types of break waters – Fender systems – Aprons – Transit sheds and ware houses – Dredging.

## **Text Books:**

- 1. Veerendra Kumar & Sathish Chandra [1999], *Air Transportation planning and Design*, Gal Gotia publications
- 2. S.P.Bindra [1992], Docks and Harbour Engineering, Dhanapat Rai & Sons publications
- 3. R.Srinivasan [2013], Harbour Dock and Tunnel Engineering, Charotar Publishing house.

## **Reference Books:**

- 1. Reports and research studies by Human Settlement Management Institute (HSMI)
- 2. Reader volumes by Institute of Town Planners, India (ITPI)

## Note:

**Internal Assessment:** The question paper for sessional examination shall have one compulsory question carrying 6 marks and five other conventional (descriptive or analytical type) questions carrying 8 marks each. The compulsory question consists of objective type questions like the multiple choice, fill in the blanks etc. Apart from the compulsory question, the student has to answer any 3 from the remaining 5 conventional questions.

## **PROFESSIONAL ELECTIVE – III**

- 1. CE 420 WATER RESOURCES SYSTEMS ENGINEERING (WRSE)
- 2. CE 421 EARTHQUAKE RESISTANT DESIGN (ERD)
- 3. CE 422 ADVANCED FOUNDATION ENGINEERING (AFE)
- 4. CE 423 TRANSPORTATION PLANNING AND DESIGN (TPD)
- 5. CE 424 ADVANCED DESIGN OF STEEL STRUCTURES (ADSS)

## CE – 420: WATER RESOURCES SYSTEMS ENGINEERING (WRSE)

(Professional Elective – III for B. Tech. CE - VIII Semester)

Scheme: 2013 Internal Assessment: 30 End Exam Marks : 70 End Exam Duration: 3 hrs

L	T/D	Ρ	С
3	-	•	3

**Course Objectives:** To study the various aspects of systems analysis and approach to planning and management of water resources. To study the various simulation techniques and their engineering applications in the field of water Resources.

Course Outcomes: After successful completion of course, the student will be able to

- 1. Understand fundamentals of linear programming
- 2. Apply the dynamic programming for resource allocation
- 3. Apply the simulation techniques in water resources
- 4. Plan the reservoir system to allocate water resources
- 5. Estimate the consumptive use of water resources
- 6. To apply the advanced optimization techniques to cover the socio-technical aspects in the field of water resources

## Unit – I

**Introduction & Basic Concepts:** Concepts of systems analysis – Definition – Systems approach to water resources planning and management – Role of optimization models – Objective function and constraints – Types of optimization techniques.

## Unit – II

**Linear Programming:** Formulation of linear programming models – Graphical method – Simplex method – Application of linear programming in water resources- Revised simplex method – Duality in linear programming – Sensitivity and post optimality analysis.

## Unit – III

**Dynamic Programming:** Belman's principles of optimality – Forward and backward recursive dynamic programming – Case of dimensionality – Application of dynamic programming for resource allocation.

## Unit – IV

**Non–Linear Optimization Techniques:** Classical method of optimization – Kun–Tecker – Gradient based research techniques for simple unconstrained optimization.

## Unit – V

Simulation: Application of simulation techniques in water resources - Case studies

## Unit – VI

**Water Resources Management & Economics:** Planning of reservoir system – Optimal operation of single reservoir system – Allocation of water resources – Optimal cropping pattern – Conjunctive use of surface and sub–surface water resources. Principles of Economics analysis – Benefit cost analysis – Socio economic intuitional and pricing of water resources.

## **Text Books:**

- 1. Vedula & Mujumdar [2007], *Water Resources System Modelling Techniques & Analysis*, Tata McGraw Hill Company Ltd.
- 2. James & Lee [2005], *Water Resources Economics* Oxford Publishers.

3. S.S. Rao [2008], Engineering Optimization Theory and Practice.

## **Reference Books:**

- 1. P.R.Bhave [2003], Optimal design of water distribution networks, Narosa Publishing house.
- 2. P. Shankar Iyer, Operation research, TMH Publications, New Delhi.
- 3. N. Ramanathan, Operations research, TMH Publications, New Delhi.
- 4. Hall and Dracup, Water Resources Systems Engineering, McGraw Hill.
- 5. Arthur Mass et.al [1962], Design of Water Resources System, Harvard University Press.

## Note:

**Internal Assessment:** The question paper for sessional examination shall have one compulsory question carrying 6 marks and five other conventional (descriptive or analytical type) questions carrying 8 marks each. The compulsory question consists of objective type questions like the multiple choice, fill in the blanks etc. Apart from the compulsory question, the student has to answer any 3 from the remaining 5 conventional questions.

## CE – 421: EARTHQUAKE RESISTANT DESIGN (ERD) (Professional Elective – III for B. Tech. CE - VIII Semester)

Scheme: 2013 Internal Assessment: 30 End Exam Marks : 70 End Exam Duration: 3 hrs

L	T/D	Р	С
3	•	I	3

**Course Objectives:** Student shall learn about introduction to structural dynamics-single and multi degree of freedom systems, Earthquake response analysis of single and multi-storied buildings, Earthquake engineering, codal design & detailing provisions, aseismic planning and shear walls.

Course Outcomes: On completion of this course the student will be able to :

- (i) Classify the Earthquake size based on magnitude and intensity
- (ii) Plan the buildings suitable for Earthquake resistant
- (iii) Analyse the structures of SDOF and MDOF systems
- (iv) Design the structures using Seismic coefficient and response spectrum methods as per IS code
- (v) Prepare ductile detailing of RC building components

## Unit – I

**Introduction to Structural Dynamics:** Theory of vibrations – Lumped mass and continuous mass systems.

**Single Degree of Freedom (SDOF) Systems** – Formulation of equations of motion– Undamped and damped free vibration – Damping – Response of harmonic excitation – Concept of response spectrum.

## Unit – II

**Multi–Degree of Freedom (MDOF) Systems:** Formulation of equations of motion – Free vibration – Determination of natural frequencies of vibration and mode shapes – Orthogonal properties of normal modes – Mode superposition method of obtaining response.

## Unit – III

**Earthquake Engineering:** Engineering seismology – Earthquake phenomenon – Causes and effects of earthquakes – Faults – Structure of earth – Plate tectonics – Elastic rebound theory – Earthquake terminology – Source, focus, epicenter etc – Earthquake size – Magnitude and intensity of earthquakes – Classification of earthquakes – Seismic waves – Seismic zones – Seismic zoning map of India – Seismograms and accelegrams.

## Unit – IV

Aseismic Planning: Plan configurations – Torsion irregularities – Re–entrant corners – Non parallel systems – Diaphragm discontinuity – Vertical discontinuities in load path – Irregularity in strength and stiffness – Mass irregularities – Vertical geometric irregularity – Proximity of adjacent buildings.

## Unit – V

**Earthquake Analysis:** Introduction – Rigid base excitation – Formulation of equations of motion for SDOF and MDOF Systems – Earthquake response analysis of single and multi–storyed buildings – Use of response spectra.

## Unit – VI

**Codal Design Provisions:** Review of the latest Indian seismic code IS:1893–2002 (part–I) provisions for buildings – Earthquake design philosophy – Assumptions – Design by seismic

coefficient and response spectrum methods – Displacements and drift requirements – Provisions for torsion.

**Codal Detailing Provisions:** Review of the latest Indian Seismic codes IS:4326 and IS:13920 provisions for ductile detailing of R.C. buildings – Beam, column and joints.

## **Text Books:**

- 1. Clough & Penzien, Dynamics of Structures, McGraw Hill International Edition
- 2. Agarwal Pankaj & Manish Shrikhande, *Earthquake Resistant Design of Structures*, Printice Hall of India, New Delhi
- 3. S.K.Duggal, *Earth quake resistant design of structures*, Oxford University Press, New Delhi.

## **Reference Books:**

- 1. A.K. Chopra, Dynamics of Structures, Pearson Education, Indian Branch, Delhi.
- 2. Mario Paaz, Structural Dynamics (Theory and Computation), CBS Publish
- 3. C.V.R.Murthy, Earthquake Tips, I.I.T, Kanpur.
- 4. R.Ayothiraman & Hemanth Hazarika, I.K., *Earthquake Hazardous Mitigation*, International Publishing House Private Limited, New Delhi.

## Codes:

**IS codes:** IS: 1893, IS: 4326 and IS: 13920.

## Note:

**Internal Assessment:** The question paper for sessional examination shall have one compulsory question carrying 6 marks and five other conventional (descriptive or analytical type) questions carrying 8 marks each. The compulsory question consists of objective type questions like the multiple choice, fill in the blanks etc. Apart from the compulsory question, the student has to answer any 3 from the remaining 5 conventional questions.
# CE – 422: ADVANCED FOUNDATION ENGINEERING (AFE) (Professional Elective – III for B. Tech. CE - VIII Semester)

## Scheme: 2013 Internal Assessment: 30 End Exam Marks : 70 End Exam Duration: 3 hrs

L	T/D	Р	С
3	-	-	3

# **Course Objectives:**

(i) To understand the various tests to obtain soil profile required for design of foundation and estimation of settlements

(ii) To get knowledge about the various methods of improving the properties of problematic soil such as expansive soil

(iii) To expose the student to the knowledge of deep foundations

**Course Outcomes:** After successful completion of course work, student will be able to

- Understand the soil exploration methods and prepare the soil profile required for preliminary design of foundation.
- 2. Understand the design aspects of foundation for safety
- 3. Analyze the different types of foundations and their adoption to site condition
- 4. Identify the expansive soil and suggest the methods to control its adverse effects on structures
- 5. Select the effective and economical ground improvement technique for strengthening of soil
- 6. Gain the knowledge about design of deep foundation, such as well foundations and caissons

# Unit – I

**Soil Exploration Field Tests:** Soil samplers – Design features of soil samplers – Rock core sampling – Recovery ratio & RQD – Standard penetration test – Static & dynamic cone penetration tests – Pressuremeter test – Geophysical exploration.

# Unit – II

**Foundation Design Considerations:** Types of foundations – Choice of foundation – Depth and spacing of footing – Foundations in sands and clays.

**Settlement Analysis:** Components of settlements – Allowable settlements – Allowable bearing pressure – Raft foundation – Bearing capacity and settlement of mat foundation.

# Unit – III

**Foundations in Expansive Soils:** Cause of swelling in expansive soil – Differential free swell – Swelling pressure – Effects of swelling on buildings and canals – Foundation techniques in expansive soils.

# Unit – IV

**Ground Improvement Techniques:** Dewatering – Densification methods in granular soils and cohesive soils – Preloading with sand drains – Stone columns – Grouting.

## Unit – V

**Geosynthetics:** Geotextiles – Types, functions and applications – Geogrids and geomembranes – Functions and applications.

**Reinforced Earth:** Principles – Components of reinforced earth.

#### Unit – VI

**Caissons and Well foundations :** Types of caissons – Construction of open & pneumatic caissons – Comparison of caisson types – Design aspects of caissons - Shapes of wells – Components of a well foundation – Forces acting on well foundation – Sinking of wells – Rectification of tilt and shift of well foundation.

#### **Text Books:**

- 1. K.R. Arora [2008], Soil Mechanics and Foundation Engineering, Standard Publishers.
- 2. Gopal Ranjan and A.S.R.Rao [2000], *Basic and Applied Soil Mechanics*, New Age International Publishers.
- 3 P. Purushotham Raj [2013], Soil Mechanics and Foundation Engineering, Pearson Publishers.

#### **Reference Books:**

- 1. Joseph E. Bowles [1997], Foundation analysis and design, McGraw Hill.
- 2. V.N.S. Murthy [2007], Advanced Foundation Engineering, CBS Publishers & Distributors.
- 3. C. Venkatramaiah [2009], Geotechnical Engineering, New Age International.
- 4. A.V. Narasimha Rao and C. Venkatramaiah [2000], *Numerical Problems, Examples and Objective Questions in Geotechnical Engineering*, University Press.

#### Note:

**Internal Assessment:** The question paper for sessional examination shall have one compulsory question carrying 6 marks and five other conventional (descriptive or analytical type) questions carrying 8 marks each. The compulsory question consists of objective type questions like the multiple choice, fill in the blanks etc. Apart from the compulsory question, the student has to answer any 3 from the remaining 5 conventional questions.

# CE – 423: TRANSPORTATION PLANNING AND DESIGN (TPD) (Professional Elective – III for B. Tech. CE - VIII Semester)

Scheme: 2013 Internal Assessment: 30 End Exam Marks : 70 End Exam Duration: 3 hrs

L	T/D	Р	С
3	-	-	3

**Course Objectives:** The objective of the course is to provide the knowledge of travel demand assessment for transportation planning with an introduction to the process models, data collection methods, inventory, trip generation models, trip distribution models, a sound knowledge of traffic assignment, mode split with transportation and environment.

Course Outcomes: At the end of the course the student can able to

- (i) Understand the travel characteristics, estimation of travel demand
- (ii) Differentiate the various models in transportation planning process
- (iii) Analyse the trip generation, distribution, assignment, mode split methods and its evaluation
- (iv) Carry out the surveys for data collection and draw the desire lines diagram
- (v) Solve the economic evaluation of transportation projects and can suggest the remedial measures for environment pollution

# Unit – I

**Concept of Travel Demand:** Travel Characteristics – Origin, destination, route mode, purpose – Travel demand as a function of independent variables – Assumptions in Demand Estimation – Relation between land use and Travel – Four step process of transportation planning.

# Unit – II

**Transportation Planning Process:** General concept of Trip – Trip generation – Trip distribution – Traffic assignment and mode – Split – Aggregate and disaggregate models – Direct demand models – Sequential and recursive models.

# Unit – III

**Data Collection and Inventories:** Definition of study area – Zoning Principles – Types and sources of data – Home interview surveys – Road side interview surveys – Goods taxi, IPT surveys – Sampling techniques – Expansion factors and accuracy check – Desire line diagram and use.

# Unit – IV

**Trip Generation Models:** Factors governing trip generation and attraction – Multiple linear regression models – Category analysis.

**Trip Distribution Models:** Methods of trip distribution – Growth factor models – Uniform growth factor method – Average growth factor method – Fraton method – Furnes method – Limitations of growth factor models – Concept of gravity model.

# Unit – V

**Traffic Assignment and Mode Split:** Purpose of assignment – General principles – Assignment techniques – All – or – nothing assignment – Multiple route assignment – Capacity restraint method – Minimum path trees – Diversion curves – Factors affecting mode split – Probit, logit and descriminant analysis.

# Unit – VI

**Transportation and Environment:** Detrimental effect of traffic on environment – Noise pollution – Air pollution – Vibrations – Visual intrusion – Effects and remedial measures.

**Economic Evaluation of Transportation Plans:** Costs and benefits of transportation projects – Vehicle operating cost – Time saving accident costs – Methods of economic evaluation – Benefit cost ratio method – Net present value method – Internal rate of return method.

## **Text Books:**

1. L.R. Kadiali, Traffic Engineering and Transportation Planning

2. Papa Costas. C.S, *Fundamentals of Transportation Engineering*, Prentice Hall Publications. **Reference Books:** 

- 1. Bruton M.J, Introduction to Transportation Planning
- 2. Khistory C.J, Transportation Engineering-An Introduction, Prentice Hall Publications.
- 3. G. Venkatappa Rao, Transportation and Highway Engineering, Tata McGraw Hill.

#### Note:

**Internal Assessment:** The question paper for sessional examination shall have one compulsory question carrying 6 marks and five other conventional (descriptive or analytical type) questions carrying 8 marks each. The compulsory question consists of objective type questions like the multiple choice, fill in the blanks etc. Apart from the compulsory question, the student has to answer any 3 from the remaining 5 conventional questions.

# CE – 424: ADVANCED DESIGN OF STEEL STRUCTURES (ADSS) (Professional Elective – III for B. Tech. CE - VIII Semester)

Scheme: 2013 Internal Assessment: 30 End Exam Marks : 70 End Exam Duration: 3 hrs

L	T/D	Р	С
4	0	0	3

**Course Objectives:** The student shall learn about the design of beam-column connections, design of plate girder, design of gantry girder, design of trusses and design of pre-engineered building.

Course Outcomes: After successful completion of course, the student will able to

- (i) Analyse and design a beam column.
- (ii) Analyse and design bolted and welded connections
- (iii) Analyse and design a plate girder
- (iv) Analyse and design a gantry girder
- (v) Anlayse and design roof trusses and Tubular trusses

# Unit – I

**DESIGN OF BEAM-COLUMN:** Introduction-General behavior of beam-columns-Codal provision for local capacity check and overall buckling check-Design of beam-column.

#### Unit – II

# **BEAM TO COLUMN CONNECTIONS:**

Design of Eccentric connections-Eccentric load causing twisting moments- Eccentric load causing bending moments (Bolted and Welded connections).

# Unit – III

**DESIGN OF WELDED PLATE GIRDER:** Introduction to plate girder-Elements of plate girder-IS 800-2007 codal provisions-Preliminary design considerations-Concept of tension field action-Design of end panels-Design of plate girder using IS 800-2007-Design of vertical stiffeners-Design of longitudinal stiffeners-Design of torsional stiffeners- Introduction to steel plate shear wall.

# Unit – IV

# **DESIGN OF GANTRY GIRDER:**

Introduction-Loading consideration and maximum load effect-Selection of gantry girder-Design of gantry girder for primary loads only.

#### Unit – V

#### **ROOF TRUSSES:**

Types of trusses-Loads on roof trusses-Design of Simple roof trusses involving design of purlin members and joints-Design of tubular trusses.

#### Unit – VI

# **PRE-ENGINEERED BUILDING:**

Introduction- Connection details- Design of typical gable frame of industrial shed using IS 800-2007.

Codes: IS 800-2007, IS-875, Steel Tables.

# **Text Books:**

- 1. N. Subramanyam, "Design of steel structures", 1<sup>st</sup> Edition, Oxford University press, 2008.
- 2. M.R.Sheyekar "Limit state design in Structural Steel" ist Edition, PHI Publications, 2010.
- 3. S.K.Duggal "limit state design of steel structures", 1<sup>st</sup> edition, TMH publication 2011.

#### **Reference books:**

1. Edmin H.Gaylord, J.Charles.N.Gaylord & James E.Stallmeyer, "Design of steel structures", 3<sup>rd</sup> edition, Mc Graw-Hill International 1992.

#### Note:

**Internal Assessment:** The question paper for sessional examination shall have one compulsory question carrying 6 marks and five other conventional (descriptive or analytical type) questions carrying 8 marks each. The compulsory question consists of objective type questions like the multiple choice, fill in the blanks etc. Apart from the compulsory question, the student has to answer any 3 from the remaining 5 conventional questions.

# List of Interdisciplinary Electives

- 1 IDE301 Optimization Techniques
- 2 IDE302 Remote Sensing and GIS
- 3 IDE303 New and Renewable Energy Systems
- 4 IDE304 Artificial Intelligence and Expert Systems
- 5 IDE305 Nanotechnology
- 6 IDE306 Introduction to Information Systems
- 7 IDE307 Mechatronics
- 8 IDE308 Control and Automation
- 9 IDE309 Web Development Programme
- 10 IDE310 Environmental and Water Resources Engineering

# **IDE 301: OPTIMIZATION TECHNIQUES (OT)** (Interdisciplinary Elective for B. Tech. – VI Semester)

Scheme: 2013 Internal Assessment: 30 End Exam Marks : 70 End Exam Duration: 3 hrs

L	T/D	Р	С
3	0	0	3

## **Course Objectives:**

- (i) To understand the different types of decision making environment and introduce widely used mathematical models.
- (ii) To enable the students to construct mathematical models of real world physical systems for quantitative analysis of managerial problems in industry;
- (iii)To enable the students to understand the systematic approach to allocate scarce resources more effectively.

#### Course outcomes: Students will be able to

- (i) Develop mathematical models from the verbal description of the real system.
- (ii) Understand the importance of mathematical modeling in solving practical problems in industry.
- (iii)Suggest proper deployment of scarce resources and provide optimum solution.

#### Unit- I

**Introduction**: Definition, Nature and Significance of Operations Research , Models in Operations Research, Application Areas of Operations Research in Management. Linear Programming: Model Formulation, Graphical solution of L.P.P, Slack, Surplus and Artificial variables, Simplex method, Big M method, Degeneracy in L.P.P, Dual linear programming problem, Solution of the Primal problem from the solution of the Dual Problem.

#### Unit – II

**Transportation Problems:** Balanced and unbalanced Transportation problems, Initial basic feasible solution using N-W corner rule, least cost entry method and Vogel's approximation method, Optimal Solution, Degeneracy in Transportation Problem. Assignment Problems: The Assignment Algorithm (Hungarian Assignment method), Balanced and Unbalanced Assignment Problems, Travelling Salesman Problem as an Assignment Problem

# Unit- III

**Game Theory:** Definitions and Terminology, Two Person Zero Sum Games, Pure Strategy Games (with Saddle Point), Principal of Dominance, Solution for Mixed Strategy Games (Game without Saddle Point),

**Queuing Theory:** Introduction, single channel - poission arrivals - exponential service times with infinite population, Multi channel - poisson arrivals - Exponential service times with infinite population.

# Unit – IV

**Project Management:** Phases of project management, guidelines for network construction, critical path, forward and backward pass, floats and their significance, crashing for optimum duration.

Sequencing Models: Introduction, General assumptions, processing n jobs through 2 machines, processing 'n' jobs through m machines, Processing 2 jobs through m machines.

# Unit - V

**Dynamic Programming:** General Concept of Dynamic Programming, Problems related to general allocation and capital investment decisions.

# Unit – VI

**Inventory Control:** Definition, Costs associated with inventory, Basic EOQ model, Inventory control systems – P System, Q System, ABC analysis, VED analysis

Simulation: Introduction, Advantages of Simulation, Generation of Random numbers, Simulation Languages, Monte Carlo Simulation, Application of Simulation to queuing theory, inventory control.

#### **Text Books:**

- 1. Hamdy, A. Taha, Operations Research-An Introduction, Prentice Hall of India Pvt. Ltd.,
- 2. S.D. Sharma, Operations Research, Kedarnath, Ramnath & Co., Meerut,
- 3. R. Paneer Selvam, Operations Research, PHI Learning Pvt. Ltd., New Delhi.

#### **Reference Books:**

- 1. Hillier / Libernam, Introduction to Operations Research, Tata McGraw Hill Edition
- 2. J.K. Sharma, *Operations Research*-Problems and Solutions, Macmillan India Ltd.
- 3. Billy E Gillett, *Introduction to Operations Research A Computer Oriented Algorithmic Approach*, Tata McGraw Hill Edition.

#### NOTE:

**Internal Assessment:** The question paper for sessional examination shall have one compulsory question carrying 6 marks and five other conventional (descriptive or analytical type) questions carrying 8 marks each. The compulsory question consists of objective type questions like the multiple choice, fill in the blanks etc. Apart from the compulsory question, the student has to answer any 3 from the remaining 5 conventional questions.

# IDE 302: Remote Sensing And Geographic Information System (RS&GIS)

# (Interdisciplinary Elective for B. Tech – VI Semester)

Scheme : 2013				
Internal Assessment : 30	L	T/D	Р	С
End Exam Marks : 70	3	0	0	3
End Exam Duration : 3 hrs	5	U	U	5

## **Course Objectives:**

- (i) To know the basics, importance, analysis and applications of RS and GIS
- (ii) To study the various types of operating systems of RS and GIS

Course Outcomes: At the end of the course the students shall be able to

- 1. Understand the concept of electromagnetic radiation and its interaction with earth's surface
- 2. Understand air borne and space borne platforms, space imaging satellites of different countries.
- 3. Understand mineralogical, water resource applications of remote sensing
- 4. Understand the concept of GIS and organization of GIS data structures.
- 5. Understand primary and secondary methods of capturing spatial and attribute data

# UNIT – I

# **Introduction to Remote Sensing:**

**Concept and Scope of Remote Sensing:** Definitions, Process and Characteristics of Remote Sensing System, Advantages and limitations.

**Concept of Electromagnetic Radiation (EMR):** Wavelength-frequency-energy relationship of EMR, EMR Spectrum and its properties, EMR wavelength regions and their applications, Spectral signatures.

**Energy Interaction in the atmosphere and with Earth Surface Features:** Scattering, absorption, transmission, atmospheric windows Spectral Reflectance Curve, Concept of signatures.

# UNIT – II

# **Platforms and Sensors:**

**Introduction:** Sensor materials, Sensor System - Framing and Scanning System, Whiskbroom scanners, Push-broom scanners.

**Types and Characteristics of Sensor:** Imaging and non-imaging sensors, Active and passive sensors, Resolution of Sensors - Spectral, Spatial, Radiometric & Temporal, Scale, Mapping unit, Multi-band concepts and False Colour Composites.

**Remote Sensor Platforms and Satellite Orbits:** Ground, Airborne and Space borne Platforms, Orbital Characteristics – Coverage, Passes, Pointing Accuracy, Geostationary, Sun synchronous, shuttle orbit.

**Space Imaging Satellites:** Early history of space imaging; Multispectral and Hyperspectral sensors, Radar, Lidar; Specification of some popular satellites – IRS, Landsat and SPOT series; High resolution satellites – IKONOS, Cartosat, Quickbird, OrbView, GeoEye, Pléiades, WorldView; Other latest earth resource satellites.

# UNIT – III

# **Remote Sensing Applications:**

Scope of Remote Sensing Applications - Potentials and Limitations. Applications in land use and land cover analysis.

Resource evaluation - Soils, forest and agriculture.

Water Resource Applications- Mapping, monitoring of surface water bodies, tanks, lakes/reservoirs. Environmental applications.

# $\mathbf{UNIT} - \mathbf{IV}$

#### **Geographic Information System:**

**Basic Concepts**: Definition of GIS, Components of GIS, Variables - points, lines, polygon, Functionality of GIS, Areas of GIS application, Advantage and Limitation of GIS

#### $\mathbf{UNIT} - \mathbf{V}$

**GIS Data:** Spatial and Attribute Data, Information Organization and Data Structures – Raster and Vector data structures, Data file and database

**Creating GIS Database**: GIS Software's, file organization and formats, Geo-database, Database model, Rectification, Digitization and Map Composition

#### $\mathbf{UNIT} - \mathbf{VI}$

**GIS Data Input & Editing:** Nature and Source of data, Method of spatial and Attribute data capture - Primary and Secondary, digitization and scanning method, Techniques and procedure for digitizing, Errors of Digitization and rectification, Re-projection, Transformation and Generalization, Edge matching and Rubber sheeting, Proximity, buffering and overlay, Network analysis, Topology.

#### **Text Books:**

- 1. M. Anji Reddy; *Text Book of Remote Sensing and Geographic Information System*, BS Publication.
- 2. Lo C.P. & Yeung A.K.W., (2004). *Concepts and Techniques of GIS*, Prentice-Hall of India, New Delhi.

#### **Reference Books:**

- 1. B.Bhatta; Remote sensing and Geographic Information System, Oxford Publications.
- 2. Siddiqui, M.A.; 2006, *Introduction to Geographical Information System*, Sharda Pustak Bhavan, Allahabad.
- 3. Curran, Paul J; 1985, Principles of Remote Sensing, Longman, London.
- 4. NRSA, IRS, Data User Handbook, Hyderabad

# NOTE:

**Internal Assessment:** The question paper for sessional examination shall have one compulsory question carrying 6 marks and five other conventional (descriptive or analytical type) questions carrying 8 marks each. The compulsory question consists of objective type questions like the multiple choice, fill in the blanks etc. Apart from the compulsory question, the student has to answer any 3 from the remaining 5 conventional questions.

#### IDE 303: NEW AND RENEWABLE ENERGY SYSTEMS (NRES) (Interdisciplinary Elective for B. Tech. – VI Semester)

Scheme: 2013 Internal Assessment: 30 End Exam Marks : 70 End Exam Duration: 3 hrs

L	T/D	Р	С
3	0	0	3

#### **Course objective:**

Familiarize the students with the concept and importance of renewable energy sources.

#### Course outcomes: The student will be able

- (i) To analyze the various renewable energy sources like wind, solar, biomass, Ocean energy, Fuel cells and MHD systems
- (ii) To exposure on biomass gasification and combustion, Theory of flat plate collectors,
- (iii) Photo voltaic, thermal applications and limitations of solar energy are also provided.

#### Unit - I

**Introduction and Energy Conservation:** Classification of energy sources-Importance of renewable energy sources and energy chain-Principles of energy conservation –Energy conservation opportunities

**Fundamentals of Solar Energy:** Extra terrestrial and terrestrial radiation- Solar constant and solar radiation geometry-Solar time and day length-Estimation of monthly average daily total radiation on horizontal surface and tilted surface-Measurements of radiation data.

#### Unit - II

**Solar Collecting Devices :** Flat plate collector- Losses associated with collector-Method of determination of top loss, side loss and bottom loss coefficient -Performance parameters affecting the collector performance-Efficiency of flat plate collector-selective surfaces- Air collectors-Classification of concentrating collector-Tracking of CPC collector

**Solar Thermal Systems:** Methods of storing solar energy-Solar water heating-Solar refrigeration system – Solar thermal power generation-Solar distillation-Solar space heating.

#### Unit - III

**Solar Voltaic Systems & Emerging Technology:** Basic principle of PV cell-Arrangements of PV cell-classification of PV cell-Principle of magneto hydro dynamics-thermo electric and thermionic conversion, Introduction to Fuel cell.

# Unit - IV

**Wind Energy:** Origin of wind-Application of wind power –Betz limit-Components of Horizontal axis wind turbine-Types of blades- Classification of vertical axis turbine.

#### Unit - V

**Biomass Energy:** Photosynthesis process- Biomass conversion technologies- Biogas production - Types of digester- Factors affecting the digester performance

**Geothermal Energy:** Types of geothermal energy resources-Energy conversion through geothermal energy resources-Environmental consideration.

#### Unit - VI

**Ocean Thermal Energy Conversion**: Principle of OTEC- Anderson and Claude cycles **Tidal energy:** Introduction- tidal energy conversion methods, **Wave energy:** Introduction, conversion methods

## Text Book:

1. B.H.Khan, Non-conventional Energy Sources, TMH Publishers, New Delhi. 2003

#### **Reference Books**:

- 1. G.D Rai, Non-conventional Energy Sources, Khanna Publishers, New Delhi. 1989
- 2. S.Rao and Paulekar, Energy Technology, Khanna Publishers, New Delhi. 2000
- 3. W.R.Murphy& G.Mckay, *Energy Management*, Butterworth & Co. Publishers, New Delhi 2001
- 4. B.Sreenivasa Reddy & K.Hemachandra Reddy , *Thermal data hand book*, IK International Publishers, Bangaloore 2007

# NOTE:

**Internal Assessment:** The question paper for sessional examination shall have one compulsory question carrying 6 marks and five other conventional (descriptive or analytical type) questions carrying 8 marks each. The compulsory question consists of objective type questions like the multiple choice, fill in the blanks etc. Apart from the compulsory question, the student has to answer any 3 from the remaining 5 conventional questions.

#### IDE 304: ARTIFICIAL INTELLIGENCE AND EXPERT SYSTEMS(AIES) (Interdisciplinary Elective for B. Tech. – VI Semester)

#### Scheme: 2013 Internal Assessment: 30 End Exam Marks : 70 End Exam Duration: 3 hrs

L	T/D	Ρ	С
3	0	0	3

#### **Course Objectives:**

- (i) To Gain a historical perspective of AI and its foundations.
- (ii) To Become familiar with basic principles of AI toward problem solving, inference, perception, knowledge representation, and learning.
- (iii)To Investigate applications of AI techniques in intelligent agents, expert systems, artificial neural networks and other machine learning models.
- (iv)To Explore the current scope, potential, limitations, and implications of intelligent systems.

#### Course Outcomes: Student will be able to:

- (i) Demonstrate fundamental understanding of the history of artificial intelligence (AI) and its foundations.
- (ii) Apply basic principles of AI in solutions that require problem solving, inference, perception, knowledge representation, and learning.
- (iii)Demonstrate awareness and a fundamental understanding of various applications of AI techniques in intelligent agents, expert systems and other machine learning models.
- (iv)Gain on working of an expert system.

#### Unit: I

**Introduction:** What Is AI?, The Foundations of Artificial Intelligence, The History of Artificial Intelligence.

# Unit: II

**Intelligent Agents:** Agents and Environments, Good Behavior: The Concept of Rationality, The Nature of Environments, The Structure of Agents.

#### Unit: III

**Solving Problems by Searching:** Problem-Solving Agents, Example Problems, Searching for Solutions, Uninformed Search Strategies.

#### Unit: IV

Informed (Heuristic) Search Strategies- Greedy best-first search, A\* search, Memory-bounded heuristic search, Learning to search better. Heuristic Functions.

#### Unit: V

**Beyond Classical Search:** Local Search Algorithms and Optimization Problems, Local Search in Continuous Spaces, Searching with Partial Observations.

#### Unit: VI

**Introduction to Expert System**: What are Expert Systems, Features of Expert system, Features of good expert system, Role of human in Expert system, Expert system organization, Difference between expert system and conventional program, Basic activities of expert system and the areas in which they solve problems, Prospector system features, working.

#### **Text Books:**

- 1. Stuart Russell and Peter Norvig, "Artifcial Intelligence: A Modern Approach" Third Edition, 2010. Pearson Education.
- 2. Donald A.Water man, "A Guide to expert systems", Addison Wesley publishing company.

#### **Reference Books:**

- 1. Judea Pearl, "Probabilistic Reasoning in Intelligent Systems", Morgan Kaufmann, 1988.
- 2. Tom Mitchell, "Machine Learning", McGraw Hill, 1997.

## NOTE:

**Internal Assessment:** The question paper for sessional examination shall have one compulsory question carrying 6 marks and five other conventional (descriptive or analytical type) questions carrying 8 marks each. The compulsory question consists of objective type questions like the multiple choice, fill in the blanks etc. Apart from the compulsory question, the student has to answer any 3 from the remaining 5 conventional questions.

# IDE 305: NANO TECHNOLOGY (Interdisciplinary Elective for B. Tech. – VI Semester)

Scheme: 2013 Internal Assessment: 30 End Exam Marks : 70 End Exam Duration: 3 hrs

L	T/D	Р	С
3	0	0	3

#### **Course Objectives:**

- (i) Main objective the course is to provide insight about introduction to Nano technology.
- (ii) To familiarize the carbon nano tubes and sensors.

#### **Course Outcomes:**

- (i) Students will acquire the knowledge about the basics of Nano technology and materials
- (ii) Students get in touch with some applications and designs on nano carbons and spntronics.

#### Unit I

Basics of nanoelectronics – capabilities of nanoelectronics – physical fundamentals of nanoelectronics – basics of information theory – the tools for micro and nano fabrication – basics of lithographic techniques for nanoelectronics.

#### Unit II

Quantum electron devices – from classical to quantum physics: upcoming electronic devices – electrons in mesoscopic structure – short channel MOS transistor – split gate transistor – Electron wave transistor – Electron spin transistor – quantum cellular automate – quantum dot array – Principles of Single Electron Transistor (SET) – SET circuit design – comparison between FET and SET circuit design.

# Unit III

Nanoelectronics with tunneling devices and superconducting devices – tunneling element technology - RTD: circuit design – Defect tolerant circuits - Molecualr electronics – elementary circuits – flux quantum devices – application of Superconducting devices – Nanotubes based sensors, fluid flow, gas, temperature, Strain – oxide nanowire, gas sensing (ZnO, TiO, SnO, WO), LPG sensor (SnO powder)- Nano 2 2 3 2 designs and Nanocontacts – metallic nanostructures.

# Unit IV

A survey about the limits – Replacement Technologies – Energy and Heat dissipation – Parameter spread as Limiting Effect – Limits due to thermal particle motion – Reliability as limiting factor – Physical limits – Final objectives of integrated chip and systems.

# Unit V

Memory devices and sensors – Nano ferroelectrics – Ferroelectric random access memory – Fe-RAM circuit design – ferroelectric thin film properties and integration – calorimetric sensors – electrochemical cells – surface and bulk acoustic devices – gas sensitive FETs – resistive semiconductor gas sensors –electronic noses – identification of hazardous solvents and gases – semiconductor sensor array.

#### Unit VI

**Sensor Characteristics And Physical Effects:** Active and Passive sensors – Static characteristic - Accuracy, offset and linearity – Dynamic characteristics - First and second order sensors – Physical effects involved in signal transduction- Photoelectric effect – Photo dielectric effect – Photo luminescence effect – Electroluminescence effect – chemiluminescence effect – Doppler effect – Barkhausen effect – Hal effect – Ettinshausen effect – Thermoelectric effect –

Peizoresistive effect – Piezoelectric effect – Pyroelectric effect –Magneto-mechanical effect (magnetostriction) – Magneto resistive effect.

#### **Text Books:**

- 1. K.Goser, P.Glosekotter & J.Dienstuhl, "Nanoelectronic and Nanosystems From Transistors to Molecular Quantum Devices" Springer, 2004
- 2. Rainer Waser, "Nanoelectronics and Information Technology: Advanced Electronic Materials Novel and Devices" Wiley VCH, 2005.
- 3. Kourosh Kalantar Zadeh, Benjamin Fry, "Nanotechnology- Enabled Sensors", Springer ,2008
- 4. H.Rosemary Taylor, "Data acquisition for sensor systems", Chapman & Hall, 1997

#### **Refrence Books:**

- 1. W. Roy VCH, Nano Electronics and Information Technology, 2nd Edition, Rainen waser 2005
- 2. Chonles P.Pook Jr., Frank. J. Owens, *Introduction to Nano technology*, 1 st Edition, Wiley Interscience, 2003
- 3. T. Pradeep, Nano: The essentials, , 1 st Edition, Tata McGraw Hill, 2007
- 4. Mark Ratne, Danill Ratne, Nano Technology, 1 st Edition Pearson education, 2006
- 5. W.R. Fahrner, "Nanotechnology and Nanoelectronics: Materials, Devices, Measurement Techniques", Springer, 2010.
- 6. Branda Paz, "A Handbook on Nanoelectronics", Vedams books, 2008.

# NOTE:

**Internal Assessment:** The question paper for sessional examination shall have one compulsory question carrying 6 marks and five other conventional (descriptive or analytical type) questions carrying 8 marks each. The compulsory question consists of objective type questions like the multiple choice, fill in the blanks etc. Apart from the compulsory question, the student has to answer any 3 from the remaining 5 conventional questions.

#### IDE306: INTRODUCTION TO INFORMATION SYSTEMS (IIS) (Interdisciplinary Elective for B. Tech. – VI Semester)

Scheme : 2013 Internal Assessment : 30 End Exam Marks : 70 End Exam Duration : 3 hrs

L	T/D	Ρ	С
3	0	0	3

#### **Course Objectives:**

- (i) Students will learn the fundamentals of computer organization, how operating systems
- (ii) are implemented, Assemblers, Compilers, Linkers, loaders, Interpreters, Software (iii)Development Life Cycle (SDLC)
- (iv)To Interpret an Entity Relationship Diagram (ERD) to express requirements and demonstrate
- (v) Skills to model data requirements and create Data models in to normalized designs.

#### Course Outcomes: Student will be able to:

- (i) Learn the concepts of computer organization, operating systems, compiler design including its phases and components and become acquainted with the life cycle of software project and its various phases
- (ii) Use SQL, to create Database objects.

#### Unit-I

**Fundamentals of Computers & Computer Architecture:** Introduction, Organization of a small computer, Central Processing Unit, Execution cycle, Instruction categories, measure of CPU performance Memory, Input/output devices, BUS, addressing modes.

System Software: Assemblers, Loaders and linkers, Compilers and interpreters.

#### Unit-II

**Operating System:** Introduction, Process Management, CPU scheduling, Memory Management Schemes, Page replacement algorithms.

**Software Engineering:** Introduction to software engineering, Life cycle of a Software Project, Software Development Models.

# Unit-III

**Coding Standards and Best Practices:** Introduction to C Programming, Basics of C Language, Data Types in C, Functions, arrays, pointers, structures.

**Sorting and Searching Techniques:** Searching Algorithms – Linear Search, Binary Search, Sorting Algorithms – Bubble Sort, Selecting Sort and Insertion Sort.

#### **Unit-IV**

**Relational Database Management System:** Introduction to DBMS, the database technology, data models. Database Users.

**Entity Relationship (E-R) Modeling:** Introduction, Notations, Modeling E-R Diagrams, Case Study1,2 & 3, Merits and Demerits of E-R modeling.

#### Unit-V

**Normalization:** Introduction, Need for Normalization, Process Normalization, Types of Normal Forms (1 NF, 2 NF, 3 NF & BCNF), Merits and Demerits of Normalization.

#### Unit-VI

**Structured Query languages (SQL):** History of SQL, Data Types, Data Definition Language Statements (DDL), Data Manipulation Language (DML), Data Control Language (DCL), writing simple queries.

#### **Text Books:**

- 1. Campus Connect Foundation Program *Computer Hardware and System Software Concepts, Programming Fundamentals* Vol. 1, INFOSYS.
- 2. Campus Connect Foundation Program *Relational Database management System, Client Server Concepts, Introduction to Web Technologies* Vol. 2, INFOSYS
- 3. Campus Connect Foundation Program Object Oriented Concepts System Development Methodology, User Interface Design - Vol. – 3, INFOSYS
- 4. Yashwant Kanetkar, *Let us ''C''* bpb Publications 8th ed., 2007.

#### **Reference Books:**

- 1. Andrew S. Tanenbaum, Structured Computer Organization, PHI, 3rd ed., 1991
- 2. Silberschatz and Galvin, Operating System Concepts, 4th ed., Addision-Wesley, 1995
- 3. Wilbert O. Galitz, Essential Guide to User Interface Design, John Wiley, 1997
- 4. Alex Berson, Client server Architecture, Mc Grew Hill International, 1994
- 5. Henry F Korth, Abraham Silberschatz, *Database System Concept*, 2nd Edition, McGraw-Hill International editions, 1991
- 6. Roser S. Pressman, *Software Engineering-A Practitioners approach*, McGraw Hill, 5th ed., 2001

# NOTE:

**Internal Assessment:** The question paper for sessional examination shall have one compulsory question carrying 6 marks and five other conventional (descriptive or analytical type) questions carrying 8 marks each. The compulsory question consists of objective type questions like the multiple choice, fill in the blanks etc. Apart from the compulsory question, the student has to answer any 3 from the remaining 5 conventional questions.

# IDE 307: Mechatronics (MT) (Interdisciplinary Elective for B. Tech. – VI Semester)

Scheme : 2013		
<b>Internal Assessment</b>	:	30
End Exam Marks	:	70
<b>End Exam Duration</b>	:	3 hrs

L	T/D	Р	С
3	0	0	3

#### **Course Objectives:**

The aim of this course is dealing with the integration of mechanical devices, actuators, sensors, electronics, intelligent controllers and computers

#### **Course Outcomes:**

At the end of the course students able to learn & achieve in-depth knowledge in fundamentals, design, analysis and operation of mechatronic systems.

#### UNIT-I

Introduction: Definition of Mechatronics, Mechatronics in manufacturing, Products, and design. Comparison between Traditional and Mechatronics approach.

#### UNIT-II

Review of fundamentals of electronics. Data conversion devices, sensors, microsensors, transducers, signal processing devices, relays, contactors and timers. Microprocessors controllers and PLCs.

#### UNIT-III

Drives: stepper motors, servo drives. Ball screws, linear motion bearings, cams, systems controlled by camshafts, electronic cams, indexing mechanisms, tool magazines, transfer systems.

# UNIT-IV

Hydraulic systems: flow, pressure and direction control valves, actuators, and supporting elements, hydraulic power packs, pumps. Design of hydraulic circuits.

# UNIT-V

Pneumatics: production, distribution and conditioning of compressed air, system components and graphic representations, design of systems. Description

# UNIT-VI

Description of PID controllers. CNC machines and part programming. Industrial Robotics.

#### **TEXT BOOKS:**

- 1. HMT ltd. Mechatronics, Tata Mcgraw-Hill, New Delhi, 1988.
- 2. G.W. Kurtz, J.K. Schueller, P.W. Claar . II, Machine design for mobile and industrial applications, SAE, 1994.
- 3. T.O. Boucher, Computer automation in manufacturing an Introduction, Chappman and Hall, 1996.

#### **REFERENCE BOOKS:**

- 1. R. Iserman, Mechatronic Systems: Fundamentals, Springer, 1st Edition, 2005
- 2. Musa Jouaneh, Fundamentals of Mechatronics, 1st Edition, Cengage Learning, 2012.

# NOTE:

**Internal Assessment:** The question paper for sessional examination shall have one compulsory question carrying 6 marks and five other conventional (descriptive or analytical type) questions carrying 8 marks each. The compulsory question consists of objective type questions like the ultiple choice, fill in the blanks etc. Apart from the compulsory question, the student has to answer any 3 from the remaining 5 conventional questions.

## **IDE308:** Control & Automation (CA) (Interdisciplinary Elective for B. Tech. – VI Semester)

Scheme: 2013 Internal Assessment: 30 End Exam Marks : 70 End Exam Duration: 3 hrs

L	T/D	Р	С
3	0	0	3

# **Course Objectives:**

- (i) To help the students understand concept of open loop and closed loop system.
- (ii) To study the concept of time response and frequency response of the system and the basics of stability analysis and state variable analysis.
- (iii)To Learn the major components of a Programmable Logic Controller (PLC)i.e.,CPU, input modules, and output modules in a PLC;
- (iv)To learn programming of PLC; Work with PLC programming using ladder logic

# **Course Outcomes:**

- (i) Represent the mathematical model of a system
- (ii) Determine the response of different order systems for various step inputs
- (iii)Analyze the stability of the system.
- (iv)Demonstrate an ability to program Programmable Logic Controllers using ladder logic and other programming standards
- (v) Describe the advantages, use and applications of Programmable Logic Controllers (PLC's).

# Unit – I

**Modeling of Linear Control Systems:** open-loop and closed-loop systems, control system components, Advantages, disadvantages & Applications of automated control system. Servo motors, position control systems, Transfer functions, equations of electrical and mechanical systems.

# Unit – II

**Block Diagrams:** block diagram representation and manipulation, signal flow graphs-mason's gain formula to determine overall system gain.

Feedback Characteristics of Control Systems: Feedback and non-feedback systems, effects of feedback.

# Unit – III

**Time Response:** Types of input, transient response of second order system for step input, imeresponse specifications, steady state error and error constants, proportional, derivative and integral controls.

Concept of Stability: Stability of systems-Routh Hurwitz criterion.

**Compensation** (Without Design): The necessity of compensation, series and parallel compensation. Realization of basic lead, Lag and lead-Lag compensators.

# Unit – IV

**Root Locus:** Definition of Root Locus, construction Procedure, properties of typical systems analyzed by root locus techniques. Bode Plot

# Unit – V

**PLC Basics:** PLC system, I/O modules and interfacing, CPU processor, programming Equipment, programming formats, construction of PLC ladder diagrams, Devices connected to I/O modules.

**PLC Programming:** Input instructions, outputs, operational procedures, programming examples using contacts and coils. Drill press operation

## Unit – VI

**Digital logic gates**: Programming with logic gates, programming in the Boolean algebra system, conversion examples

**PLC Functions:** Timer functions & Industrial applications, counters, counter function industrial applications, Arithmetic functions, Number comparison functions, number conversion functions

#### **TEXT BOOKS:**

- 1. Nagrath and Gopal, "Control systems Engineering", New Age International Publications. 2003
- 2. B.C.Kuo, "Automatic Control Systems", Oxford. 2003
- 3. K. Ogata, "Modern control Engineering", Pearson 2003
- 4. Naresh K.Sinha, "Control Systems", New Age International Publishers. 1998
- 5. B.S.Manke, "Linear Control Systems". 1996
- 6. John W. Webb & Ronald A. Reiss, "Programmable Logic Controllers- Principles and Applications" Fifth Edition, PHI

#### **REFERENCE BOOKS:**

- 1. Madan Gopal, "Control Systems", TMH. 2003
- 2. Dorf, Bishop, "Modern Conrtol systems", Addison Wesley 1998
- 3. (Shaum's out line series), "Feedback control systems", TMH 1986
- 4. R.C.Shukla, "Control Systems", Dhanpat Rai.
- 5. Ashok Kumar, "Control Systems", TMH.
- 6. JR. Hackworth & F.D. Hackworth Jr., "Programmable Logic Controllers- Programming Method and Applications", Pearson. 2004

# NOTE:

**Internal Assessment:** The question paper for sessional examination shall have one compulsory question carrying 6 marks and five other conventional (descriptive or analytical type) questions carrying 8 marks each. The compulsory question consists of objective type questions like the multiple choice, fill in the blanks etc. Apart from the compulsory question, the student has to answer any 3 from the remaining 5 conventional questions.

# **IDE 309: WEB DEVELOPMENT PROGRAMME (WDP)** (Interdisciplinary Elective for B. Tech. – VI Semester)

Scheme: 2013 Internal Assessment: 30 End Exam Marks : 70 End Exam Duration: 3 hrs

L	T/D	Р	С
3	0	0	3

#### **Course Objectives:**

- (i) To excel in the basic concepts of Website design.
- (ii) To understand various considerations in building a website.
- (iii)To visualize the concepts of HTML.
- (iv)To introduce basic concepts of CSS.
- (v) To develop the concept of web designing.

#### Course Outcomes: Student will be able to:

- (i) Develop the skill & knowledge of Web page design.
- (ii) Understand the knowhow and can function either as an entrepreneur or can take up jobs in the multimedia and Web site development studio and other Information technology sectors.

#### Uni1-1

**Introduction To The Web:** Understanding The Internet And World Wide Web, History Of The Web, Protocols Governing The Web, Creating Websites For Individuals And The Corporate World, Web Applications, Writing Web Projects, Identification Of Objects, Target Users, Web Team.

#### Unit-2

**Planning and process development:** Planning And Process Development, Web Architecture, Major Issues in Web Solution Development, Web Servers, Web Browsers, Internet Standards, TCP/IP Protocol Suite, IP Addresses, Cyber Laws.

# Unit-3

**Hypertext Transfer Protocol:** Introduction, Web Servers And Clients, Resources, URL And Its Anatomy, Message Format, Persistent And Non Persistent Connections, Web Caching, Proxy.

#### Unit-4

**Hypertext Markup Language (HTML):** History Of HTML And W3C, Html and Its Flavors, Html Basics, Elements Attributes And Tags, Basic Tags, Advanced Tags, Frames, Images, Meta Tag, Planning Of Web Page, Model And Structure For A Website, Designing Web Pages, Multimedia Content Frames.

#### Unit-5

**Cascading Style Sheet (CSS):** Introduction, Advantages, Adding CSS, Browser Compatibility, CSS and Page Layout, Selectors.

# Unit-6

**Hosting And Promoting Websites:** Structure of Websites, Web Development Tools, Web Files Using Microsoft Word, Microsoft Front Page, Adobe Dreamweaver, GIF Animator, Hosting Websites, Getting A Domain Name, Redirectors On The Web, Server Software, Submitting For Search Engines, Visitor Analysis And Statistics, Website Promoting Methods.

# Text books:

1. Utam K.Roy, "Web Technologies", Oxford Higher Education.

2. K.L.James, "The Internet- A User Guide", 2nd Edition, PHI Publications.

#### **Reference books:**

1. Kognet Learning Solutions inc., "HTML5 in Simple Steps". Dreamtech press.

2. Steven M.Schafer, "HTML,XHTML and CSS Bible 5th Edition", Wiley India.

#### NOTE:

**Internal Assessment:** The question paper for sessional examination shall have one compulsory question carrying 6 marks and five other conventional (descriptive or analytical type) questions carrying 8 marks each. The compulsory question consists of objective type questions like the multiple choice, fill in the blanks etc. Apart from the compulsory question, the student has to answer any 3 from the remaining 5 conventional questions.

# **IDE 310 Environmental and Water Resources Engineering**

(Inter disciplinary Elective for B. Tech. – VI Semester)

Scheme : 2013 Internal Assessment : 30 End Exam Marks : 70 End Exam Duration : 3 hrs

L	T/D	Р	С
3	0	0	3

**Course Objectives:** This course has the objective of introducing the students to various aspects of sources of waste water, their characterization and disposal system of liquid and solid waste without harmful to public, Hydrological cycle, flood management, Financial analysis of water resources project, Geological formations of ground water, Hydro power development.

**Course Outcomes:** Students shall be able to identify the source of waste water and solid waste, identifying the physical, chemical and biological properties of waste water, India's water budget, Irrigation methods, fundamentals of Hydro power development.

#### Unit – I

**Water Supply System:** Need for protected water supply system – Objectives of Water supply system – Routine water analysis for physical, chemical and bacteriological characteristics and their significance – Standards for drinking water – Water borne diseases and their control.

#### Unit – II

**Sanitation:** Aim and objectives of sanitation – Conservancy and water carriage systems – Classification of sewerage systems – Separate, combined and partially combined systems – disposal of domestic waste water.

#### Unit – III

**Urban Solid Waste Management:** Types, sources, quantity and composition of urban solid waste – Collection, transportation, recovery & reuse – Disposal methods such as composting, incineration, sanitary land fill.

# Unit – IV

**Hydrology:** Hydrologic cycle – Global water budget – India's water budget – Practical applications of Hydrology – Climate and weather seasons of India – Floods – Flood management.

#### Unit – V

**Water Resources Development:** Planning for WRD – Purposes of WRD project multipurpose project – Functional requirements – Financial analysis of a project – Irrigation methods – Ground water – Geological formations – other sources of ground water – Water wells.

# Unit – VI

**Water Power Engineering:** Sources of energy – Classification – Types of power planning for water power development – History – Advantages – Comparison – Layout of hydro power plant – Economics of Hydro power development.

#### **Text Books:**

- 1. Santosh Kumar Garg [1992], Environmental Engineering Vol.1, Khanna Publications.
- 2. P. Jaya Rami Reddy, A Text book of Hydrology (3rd Edition, 2011), Laxmi Publications, New Delhi.
- 3. Dr. P.N. Modi [2014], Irrigation and water Resources Engineering, Standard Book House

#### **Reference books:**

- 1. S.K.Hussain [1994], Water supply and sanitary Engineering, Oxford & IBH.
- 2. H.M. Raghunath [2009], Groundwater, Wiley Eastern Ltd
- 3. K.Subramanya, *Engineering Hydrology*, Tata Mc Graw Hill Publishing Co. Ltd, New Delhi.
- 4. M.M. Dandekar and K.N. Sharma [2010], *A Text Book of Water Power Engineering*, Vikas Publications.
- 5.R.K.Sharma and T.K.Sharma [2003], A Text book of Water Power Engineering including Dams, Engg. Hydro & Fluid Power Engg., S. Chand Company Ltd., New Delhi–110 055

## NOTE:

**Internal Assessment:** The question paper for sessional examination shall have one compulsory question carrying 6 marks and five other conventional (descriptive or analytical type) questions carrying 8 marks each. The compulsory question consists of objective type questions like the multiple choice, fill in the blanks etc. Apart from the compulsory question, the student has to answer any 3 from the remaining 5 conventional questions.

# **List of Global Electives**

- 1. GE401 Introduction to Psychology
- 2. GE402 Research Methodology
- 3. GE403 Entrepreneurship Development
- 4. GE404 Intellectual Property Right and Patent Filing
- 5. GE405 Constitution of India
- 6. GE406 Ethical Hacking
- 7. GE407 Information Security and Cyber Laws
- 8. GE408 Foreign Languages

#### **GE401: Introduction to Psychology (IPY)** (Global Elective for B. Tech. – VII Semester)

Scheme: 2013 Internal Assessment: 30 End Exam Marks : 70 End Exam Duration: 3 hrs

L	T/D	Р	С
2	0	0	2

#### **Course Objectives:**

To explain the primary objectives of psychology: describing, understanding, predicting and controlling behavior and mental processes.

#### **Course Outcomes:**

Be able to articulate the general history of psychology by explaining depth and breadth of the field from the field from the perspective of a future educator or researcher.

# Unit – I

Introduction: Defining Psychology & Behavior-Branches and fields of Psychology, Utility of Psychology

Methods of Psychology: Introspection Method, Naturalistic observation, Experimental Method-Differential Method, Clinical Method, Psycho Physical Methods

#### Unit – II

Physiological Basis of Behavior: The Neuron-Central Nervous system, Brain and localization of Brain functions, Spinal chord Influence of Nervous system on human behaviour, Endocrine system and it's impact, The role of heredity and environment in the development of personality

#### Unit – III

Instincts, Emotions Senses and Sensitivity: Instincts and Reflex actions-Emotion & it's characteristics-Physiology of Emotions-Sensation and Sensitivity

# Unit – IV

Thinking, Reasoning and Problem solving: Nature of thinking-Elements of thoughts, Tools of Thinking, Rigidity, Types of thinking, Reasoning & types, Problem solving and it's methods.

#### Unit – V

Motivation and Behavior & Attention & Learning: Biological and socio psychological Needs, Drives and Incentives, Motives and Types of Motives, Types & Effect of attention, Types of Learning, Problem Solving, Mechanism of Memorization.

#### Unit – VI

Intelligence, Aptitude, Personality: Nature of Intelligence-Concept of Metal age and IQ Constantly of IQ-IQ Classification, Aptitude Ability & Achievement, Measurement of Aptitude, Features and Characteristics of Personality, Personality Assessment, Walters social Learning Theory.

#### **TEXT BOOKS:**

1. S.K. Mangal, "General Psychology", Sterling Publishers Private Limited

#### **REFERENCE BOOK:**

1. Saundra K.Ciccarelli&Gkenn E.Meyer, "Psychology", Dorliing Kindersley (I) Pvt Limited

# NOTE:

**INTERNAL ASSESSMENT:** Two Internal Examinations will be conducted for 50 Marks each. The Question paper consists of SIX questions. The FIRST question is compulsory. It consists of 10 questions of two marks each. Four questions to be answered from the remaining five questions and each question carries 7.5 marks.

**END EXAM:** There is no End Examination for this subject.

## GE402: Research Methodology (RM) (Global Elective for B. Tech. – VII Semester)

Scheme: 2013 Internal Assessment: 30 End Exam Marks : 70 End Exam Duration: 3 hrs

L	T/D	Р	С
2	0	0	2

#### **Course Objectives:**

- (i) To know the meaning and objectives of research.
- (ii) To know the various types of research.
- (iii)To understand the limitations of research in social science.
- (iv)To familiarize the students with the significance of economic research.
- (v) To develop a thorough understanding of the issues involved in planning, designing, executing, evaluating and reporting research.

#### **Course Outcomes:**

- (i) Able to understand overview of research process, state research problem and conduct a preliminary literature review of the concepts comprising the research questions.
- (ii) Student able to study the features and uses & evaluation of data.
- (iii)Able to understand the organization structure and style of report writing.
- (iv)Able to understand that precautions which are to be taken while writing research report.

#### Unit – I

**Research Methodology:** Introduction –Meaning-Objectives & Motivation of Research-Types & Significance of Research-Research Methods (Vs) Methodology.

Researching process-Technique involved in defining a problem- Definition of a Hypothesis Role of Hypothesis-Types of Hypothesis-Criteria of Good Hypothesis.

#### Unit – II

**Research Design and Sampling Design:** Need for Research Design-Features of good Design-Concepts Related to Research Design-Different research designs-Basics Principles of Experimental Designs-Steps in sampling design-Characteristics of good sample design-Various types of sample designs-Complex Random sampling designs

# Unit-III

**Measurement and Scaling Techniques:** Errors in Measurement, Tests of Sound Measurement, Scaling and Scale Construction Techniques, Forecasting Techniques, Time Series Analysis, Interpolation and Extrapolation.

#### Unit – IV

#### **Data Collection and Processing:**

Primary Data: Data Collection through observation method & Interview Method-Data Collection through Questionnaires & schedules- Comparison of data collection methods- -Collection of Secondary data.

**Processing:** Measures of Central Tendency-Measures of Dispersion-Measures of Asymmetry - Measures of Relationship-Simple Regression Analysis-Chi-square Test for comparing valiance

# Unit – V

**Correlation and Regression Analysis:** Method of Least Squares, Regression vs. Correlation, Correlation Vs Determination, Types of Correlation and Their Specific Applications.

**Sampling Fundamentals:** Central Limit Theorem-Sampling Theory-Concept of standard error-Estimating population Mean-Sample size & Determination

#### Unit – VI

**Interpretation of Data and Report Writing:** Meaning-Technique & precautions of Interpretation Significance of Report writing, Steps- Layout of a Research report, -Types of Reports-Mechanics of writing a Research Report- Precautions of Report Writing.

#### **TEXT BOOKS:**

1. C.R. Kothari, "*Research Methodology (Methods & Techniques)*", New Age International Publishers.

#### **REFERENCE BOOKS:**

1. R. Cauvery, V. K. Sudha Nayak, M. Girija, "*Research Methodology*", S. Chand Publications.

#### NOTE:

**INTERNAL ASSESSMENT:** Two Internal Examinations will be conducted for 50 Marks each. The Question paper consists of SIX questions. The FIRST question is compulsory. It consists of 10 questions of two marks each. Four questions to be answered from the remaining five questions and each question carries 7.5 marks.

**END EXAM:** There is no End Examination for this subject.

#### GE403: Entrepreneurship Development (ED) (Global Elective for B. Tech. – VII Semester)

Scheme : 2013 Internal Assessment : 30 End Exam Marks : 70 End Exam Duration : 3 hrs

L	T/D	Р	С
3	0	0	3

#### **Course Objectives:**

To promote entrepreneurial culture amongst students and help them acquire competencies needed for setting up small enterprises.

#### **Course Outcomes:**

Be able to build on personal as well as external resources with a view to successfully launching and subsequently managing their enterprises.

#### Unit - I

Introduction: Concept of an entrepreneur; Definition of an entrepreneur; Types of entrepreneurs; Characteristics of an entrepreneur.

Entrepreneurship: Definitions; Theories of entrepreneurship; Key elements of entrepreneurship; Six important segments of entrepreneurship environment; Advantages of entrepreneurship; Barriers to entrepreneurship; Role of entrepreneurship in economic development.

#### Unit – II

Rural Entrepreneurship: Meaning; Need; Retrospection of rural industrialization in India; Problems of rural entrepreneurship; Development plan for rural entrepreneurship.

Small Enterprises: Definition of SSI; Types, Characteristics of SSI; Role of SSI in economic development; Problems faced by SSI.

#### Unit – III

Project Planning: Project Identification; Project Selection; Project Report – Contents & Formulation; Methods of Project Appraisal.

# Unit – IV

Ownership Structures: Sole Proprietorship; Partnership; Company; Co-operative; Selection of appropriate ownership structure.

#### Unit – V

Institutional Finance: Commercial banks; Other Financial Institutions – IDBI, IFCI, ICICI, IRBI, SFC, SIDC, SIDBI & EXIM Bank.

# Unit – VI

Institutional Support: Need; Support to Small Entrepreneurs – NSIC, SIDO, SSIB, SSIDC, SISI, DICs

#### **TEXT BOOKS:**

1. Prof. Satish C. Ailawadi & Mrs. Romy Banerjee, "Principles of Entrepreneurship", Everest Publishing HousePub.

#### **REFERENCE BOOKS:**

1. S.S. Khanka, "Entrepreneurial Development", S. Chand & Company Ltd. Pub.

# NOTE:

**INTERNAL ASSESSMENT:** Two Internal Examinations will be conducted for 50 Marks each. The Question paper consists of SIX questions. The FIRST question is compulsory. It consists of 10 questions of two marks each. Four questions to be answered from the remaining five questions and each question carries 7.5 marks.

**END EXAM:** There is no End Examination for this subject.

#### GE404: Intellectual Property & Patent Filing (IPPF) (Global Elective for B. Tech. – VII Semester)

Scheme : 2013 Internal Assessment : 30 End Exam Marks : 70 End Exam Duration : 3 hrs

L	T/D	Ρ	С
2	0	0	2

#### **Course Objectives:**

To develop IPR awareness among the students and to improve their exposure to IP basic legal concepts.

#### **Course Outcomes:**

Be able to acquire fundamental competencies with regard to intellectual property rights.

#### Unit – I

Basics of IPR: Introduction to intellectual property right (IPR) -Need for IPR in India-Systems-Benefits of IPR-Various Types of IPR-Violation of IPR

#### Unit – II

Patents: Introduction to Patents-Various kinds of Patents-Patenting Process-Patent and kind of inventions protected by patent- Patent documents- How to protect your inventions? -Granting of patent Rights of a patent -How extensive is patent protection-Searching a patent -Drafting of a patent

#### Unit – III

Copy Right: What is copyright?- What is covered by copyright?- Fair use of copyrighted works (e.g., for classroom use)-Contributory copyright infringement -Rights covered by copyright?- Critical differences between patent and copyright protection-Copyright infringement distinguished from plagiarism- Remedies against Infringement

# Unit – IV

Method of Designing Registrations: Designing Registrations-How Chart for Registration-Trade Mark-Geographical Indications Integrated Circuits-Trade Secrets

#### Unit – V

IPR Policy: IP in various sectors like Government and Nation-R &D organizations-IT, Media,Entertainment.

#### Unit – VI

Management of Intellectual Property Rights-Trademarks, Geographical Indications and Domain Names-Chemical Engineering & Services Sector-Industries & Small Scale Industry

#### **TEXT BOOKS:**

- 1. "Intellectual Property Rights: Key to New Wealth", National Research Development Corporation
- 2. Prabuddha Ganguli, "Intellectual Property Rights", TMH

#### **REFERENCE BOOKS:**

1. P. Narayanan; "Law of Copyright and Industrial Designs"; Eastern law House, Delhi, 2010

# NOTE:

**INTERNAL ASSESSMENT:** Two Internal Examinations will be conducted for 50 Marks each. The Question paper consists of SIX questions. The FIRST question is compulsory. It consists of 10 questions of two marks each. Four questions to be answered from the remaining five questions and each question carries 7.5 marks.

**END EXAM:** There is no End Examination for this subject.
## GE405: Constitution of India (CI) (Global Elective for B. Tech. – VII Semester)

Scheme : 2013 Internal Assessment : 30 End Exam Marks : 70 End Exam Duration : 3 hrs

L	T/D	Р	С
2	0	0	2

### **Course Objectives:**

To create a meaningful understanding of basic philosophical tenets of Indian Constitutional Law.

### **Course Outcomes:**

Be able to know how constitution governs the allocation of power in society and the way in which the Indian constitution was made.

## Unit – I

Historical back ground, Significance of Constitution, Making of the constitution, Role of the constituent Assembly, Salient features, the Preamble, Citizenship, procedure for amendment of Constitution Fundamental rights-Derivative principles of state policy-Elections in India.

## Unit – II

Union Executive: Structures of Union Government & Functions, President, Vice President, Prime Minister, Cabinet Parliament-Supreme Court of India

### Unit – III

State Executive: Structures and Functions, Governor, Chief Minister, Cabinet, State Legislature, High Courts & Sub ordinate courts

### Unit – IV

Central, State Relations, President's Rule, Constitutional Amendments [42, 44, 74, 76, 86 & 91]-Constitutional functionaries, working of Parliamentary system in India

### Unit – V

Nature, Meaning & Definition, Indian Social Structure, Language in India-Political Parties & Presume groups, Right of Women-S.C's, S.T's & other weaker sections.

### Unit – VI

Judiciary: Structure, Organisation of Judiciary, independence of the Judiciary, role and functions of Supreme Court, Judicial Review.

### **TEXT BOOKS:**

- 1. Durga Das Basu, "Introduction to the Constitution of India", Wedwe & Company
- 2. Macivel, Page, "An Introduction Analysis", Society
- 3. M.V. Pylee, "Indian Constitution", S. Chand Publications
- 4. Subhash C Kashyao : "Our Constitution", National Bank, Trust, India.

### **REFERENCE BOOKS:**

- 1. Durga Das Basu, "Introduction to the Constitution of India", Wedwe & Company
- 2. Macivel, Page, "An Introduction Analysis", Society

# NOTE:

**INTERNAL ASSESSMENT:** Two Internal Examinations will be conducted for 50 Marks each. The Question paper consists of SIX questions. The FIRST question is compulsory. It consists of 10 questions of two marks each. Four questions to be answered from the remaining five questions and each question carries 7.5 marks.

**END EXAM:** There is no End Examination for this subject.

## GE 406: ETHICAL HACKING (EH) (Global Elective for B. Tech. – VII Semester)

Scheme : 2013 Internal Assessment : 30 End Exam Marks : 70 End Exam Duration : 3 hrs

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Course	Obiec	tives:

- (i) To quantitatively assess and measure threats to information assets.
- (ii) To evaluate where information networks are more vulnerable.
- (iii)To investigate and mitigate data risks.
- (iv)To design security plans at protecting data assets.

### **Course Outcomes:**

- (i) Students will be able to provide security to their own systems.
- (ii) Students will learn how to crack the system passwords.
- (iii)Students will able to perform penetration tests.
- (iv)Students will able to develop an ongoing security strategy.

## UNIT I:

**Introduction To Ethical Hacking :**Basic Terminology, Defining Hacker, Defining Malicious User, Recognizing How Malicious User Beget Ethical Hacker, Ethical Hacking Vs Auditing, Policy onsiderations, Compliance And Regulatory Concerns, Understanding The Need To Hack Your Own Systems, Understanding The Dangers Your Systems Face, Non Ethical Attacks, Network Infrastructure Attacks, Operating System Attacks, Application And Other Specialized Attacks.

## UNIT II:

**Attacks And Ethical Hacking Commandments:** Non Ethical Attacks, Network Infrastructure Attacks, Operating System Attacks, Applications And Other Specialized Attacks, Working Ethically, Respecting Privacy, Not Crashing Your Systems, Using The Ethical Hacking Process, Formulating Your Plan, Selecting Tools, Executing The Plan, Evaluating Results.

### **UNIT III:**

**Cracking The Hackers Mindset And Ethical Hacking Plan :**Think Like Bad Guys, Who Breaks Into Computer Systems, Why They Do It, Planning And Performing Attacks, Maintaining Anonymity, Establishing Your Goals, Determining Which System Hack, Creaing Testing Standards, Timing, Running Specific Tasks, Blind Vs Knowledge Assessments, Picking Your Location, Respond The Vulnerabilities, Selecting Security Assessment Tools.

### **UNIT IV:**

**Hacking Methodology:** Setting The Stage For Testing, Gathering Public Information, Mapping The Networks, Scanning Systems, Determining What's Running On Open Ports, Assessing Vulnerabilities.

## UNIT V:

**Passwords:** Understanding Password Vulnerabilities, Organizational Password Vulnerabilities, Technical Password Vulnerabilities, Cracking Passwords, Cracking The Passwords The Old Fashioned Way, Cracking The Passwords With High-Tech Tools, Cracking Password Protected Files, Understanding Other Ways To Crack Passwords, General Password Cracking Countermeasures.

L	T/D	Ρ	С
2	0	0	2

## UNIT VI:

Mobile Devices: Cracking Laptop Passwords, Cracking Phones and Tablets, Cracking ios Passwords.

### **Text Books:**

1. Kevin Beaver, "Hacking for dummies", 4th Edition, Wiley India Pvt.Ltd.

#### **Reference Books:**

1. Rafay Baloch "A Beginners guide to ethical hacking", www.hacking-book.com.

### NOTE:

**INTERNAL ASSESSMENT:** Two Internal Examinations will be conducted for 50 Marks each. The Question paper consists of SIX questions. The FIRST question is compulsory. It consists of 10 questions of two marks each. Four questions to be answered from the remaining five questions and each question carries 7.5 marks.

**END EXAM:** There is no End Examination for this subject.

Scheme: 2013 Internal Assessment: 30 End Exam Marks : 70 End Exam Duration: 3 hrs

L	T/D	Р	С
2	0	0	2

## **Course Objectives:**

- (i) To learn the basics of information systems and information security.
- (ii) To gain comprehensive understanding of achieving security using firewalls and Virtual Private Networks.
- (iii)To understand security implementation in Emails, Databases and Operating Systems.
- (iv)To gain knowledge about cyber laws and their impact on IT.

### **Course Outcomes:**

- (i) Students will understand different threats related to information systems.
- (ii) Students will learn about firewall and VPN techniques.
- (iii)Students will analyze the security aspects of Databases, OS and Email.
- (iv)Students will be aware of the cyber laws, patents and copyright terms.

## Unit: I

**Information Systems in Global Context:** Basics and importance of Information Systems, Changing Nature of Information Systems, Global Information Systems: Role of Internet and Web Services. **Threats to Information Systems:** New Technologies Open Door to the Threats, Information- Level Threats versus Network-Level Threats, Threats and Attacks, Classifications of Threats and Assessing Damages, Protecting Information Systems Security.

### Unit: II

**Building Blocks of Information Security:** Principles of Information Systems Security, Three Pillars of Information Security.

**Intrusion Detection for Securing the Networks:** Intrusion Monitoring and Detection, Intrusion Detection for Information Systems Security.

### Unit: III

**Firewalls for Network Protection:** Firewalls, Demilitarized Zone (DMZ), Need and Protection provided by Firewalls, Proxy Servers, Topologies for Different Types of Firewalls.

Virtual Private Networks for Security: VPN, Need and Role of a VPN for an Enterprise, Working of VPN, VPN Architecture.

### Unit: IV

**Security of Electronic Mail Systems:** Today's Email Usage Scenario, Email System Mechanism, Security Threats posed by Emails, Protection from Threats, Governance for Emails Systems.

**Security of Databases:** Database Security Issues, Federated Databases: Need and Security Issues, Securing the Mobile Databases, Securing Connectivity with Enterprise Databases, Data Integrity as a parameter for security, Database Security Policy.

### Unit: V

**Security of Operating Systems:** Operating Systems role in Information Systems Application, Operating System Types, Functions and Tasks, Network Operating Systems and Security, Host Security and OS Hardening, Patched Operating System, OS hardening fundamentals.

Security Models, Frameworks, Standards and Methodologies: Terminology, Methodologies for Information Systems Security.

## Unit: VI

**Introduction To Cyber Laws:** Introduction to Indian Cyber Law, Objective and Scope of the IT Act, 2000, Intellectual Property Issues, Overview of Intellectual-Property- Related Legislation in India, Patent, Copyright, Law Related to Semiconductor Layout and Design, Software License

### **Text Books:**

- 1. Nina God bole, "Information Systems Security: Security Management, Metrics, Frameworks and Best Practices", Wiley India Pvt.Ltd., 2013.
- 2. Surya Prakash Tripati, Ritendra Goel, Praveen Kumar Shukla "Introduction To Information Security And Cyber Laws", Wiley India Pvt.Ltd., 2014.

### **Reference Books:**

1. Michael E. Whitman and Hebert J Mattord, *"Principles of Information Security"*, 4th edition Ed. Cengage Learning 2011

### NOTE:

**INTERNAL ASSESSMENT:** Two Internal Examinations will be conducted for 50 Marks each. The Question paper consists of SIX questions. The FIRST question is compulsory. It consists of 10 questions of two marks each. Four questions to be answered from the remaining five questions and each question carries 7.5 marks.

**END EXAM:** There is no End Examination for this subject.