

V SEMESTER B.E. (CIVIL)

CE -501:

ENVIRONMENTAL ENGINEERING –II

Course scheme					Evaluation scheme (Theory)				
Lecture	Tutorial	Practical	Periods/week	Credits	Duration of paper hour	MSE	IE	ESE	Total
3	1	3	0	3	3	10	10	80	100

UNIT	Topic	Hrs
1	<p>INTRODUCTION: Necessity for sanitation, methods of domestic waste water disposal, types of sewerage systems and their suitability. Dry weather flow, factors affecting dry weather flow, flow variations and their effects on design of sewerage system; computation of design flow, estimation of storm flow, rational method and empirical formulae of design of storm water drain.</p> <p>DESIGN OF SEWERS: Hydraulic formulae for velocity, effects of flow variations on velocity, self cleansing and non scouring velocities, Design of hydraulic elements for circular sewers flowing full and flowing partially full.</p> <p>MATERIALS OF SEWERS: Sewer materials, shapes of sewers, laying of sewers, joints and testing of sewers, ventilation and cleaning of sewers.</p>	9
2	<p>SEWER APPURTENANCES: Catch basins, manholes, flushing tanks, oil and grease traps, Drainage traps. Basic principles of house drainage. Typical layout plan showing house drainage connections, maintenance of house drainage.</p> <p>WASTE WATER CHARACTERIZATION: Physical, Chemical and Biological characteristics, Aerobic and Anaerobic activity. BOD and COD, their significance & problems</p>	9
3	<p>TREATMENT OF WASTE WATER: Flow diagram of municipal waste water treatment plant. Preliminary & Primary treatment: Screening, grit chambers, skimming tanks, primary sedimentation tanks Design criteria & Design examples.</p>	9
4	<p>SECONDARY TREATMENT: Suspended growth and fixed film bioprocess. Trickling filter – theory and operation, types. Activated sludge process- Principle and flow diagram, Modifications of ASP, F/M ratio. (No design), Anaerobic Sludge digestion, Sludge digestion tanks, Sludge drying beds. Low cost waste treatment method. Septic tank with design, Oxidation Pond and Oxidation ditches</p>	9
5	<p>Introduction to industrial waste water treatment (flow equalization, neutralization, adsorption, chemical & biological treatment etc.).</p> <p>DISPOSAL OF EFFLUENTS: Disposal of Effluents by dilution, self-purification phenomenon. Oxygen sag curve, Zones of purification, Sewage farming, sewage sickness, Effluent Disposal standards for land & surface water.</p>	9

TEXT BOOKS/ REFERENCE BOOKS:

1. B.C.Punmia, " Waste Water Engineering" - Laxmi Publication
2. S.K.Garg, "Environmental Engineering" -Vol II Standard Publication.
3. Manual on Waste Water Treatment: CPHEEO, Ministry of Urban Development, New Delhi.
4. Environmental Engineering: Howard S. Peavy, Donald R. Rowe, George Tchobanoglous McGraw Hill International Edition.
5. Water and Wastewater Engineering Vol-II :- Fair, Geyer and Okun : John Willey Publishers, New York.
6. Waste Water Treatment, Disposal and Reuse: Metcalf and Eddy Inc: Tata McGraw Hill Publications.

CE-502–TRANSPORTATION ENGINEERING-I

Course scheme					Evaluation scheme (Theory)				
Lecture	Tutorial	Practical	Periods/week	Credits	Duration of paper hour	MSE	IE	ESE	Total
3	1	3	0	3	3	10	10	80	100

Unit	Topics	Hrs
UNIT- I	<p>1. Development and Planning :Road transport Characteristic, Classification of roads, development plants, network patterns, data collection and surveys, principles of alignment, evaluation of plan proposals.</p> <p>2. Traffic Engineering: 3E`s of, traffic characteristics, Surveys, Intersection-type, layouts, design principles, Urban traffic, parking, lighting, Accidents, Traffic control Devices-marking, Sign, Singals, Regulation Motor Vehicle Act and rule.</p>	10
UNIT-II	<p>3. Geometric Design : Road , road user & road vehicle characteristic, Factors affecting design standards. Cross Section elements, stopping & overtaking sight distance overtaking zones. Horizontal alignment – Curves, design of super elevation, widening, transition curves, vertical alignments, Design of summit & Valley Curves, I.R. C. standards for Geometric Design, Geometric, Geometrics of Hill Roads.</p> <p>4. Pavement Design : Types of pavement & Characteristic, Design parameters, Axel & Wheel load, tyre pressure, ESWL for dual Wheels, repetitions, Group Index & CBR method of flexible pavement design. Analysis of load & temperature stresses of rigid pavement, Joints.</p>	10
UNIT III	<p>5. Materials : Subgrade Soil –AASHO Classification, group Index, Subgrade soil Stabilization. CBR, aggregates physical and mechanical propertis & tests-Bituminous materials classification sources properties and tests. Cutback & Emulsions, IRC/IS standards, Introduction to Geotextiles.</p> <p>6. Construction & Maintenance: IRC, most specifications for quality & quantity highway construction and maintenance of earthen / gravel road , WBM and WMM , Bituminous pavement , cement concrete pavement, pavement failures .</p>	10
UNIT-IV	<p>7 General: Components, classification and Identification, Data Collection site Selection. Economic Span.</p> <p>8 Hydrology : Estimaton of flood, discharge, water way, scour depth, depth of Foundation, Afflux, clearance and free board.</p> <p>9 Loads , Forces , Stresses : IRC Specification & code of practices, critical Combinations.</p> <p>10 Sub- Structure :</p> <p>(A) Types of foundations & their choice, estimation of BC of foundation strata, Open, pile and well foundation , pneumatic Caissions, cofferdams .</p> <p>(B) Abutment, piers & Wingwalls Their types general design principles (Empirical), Choice.</p>	10

UNIT-V	<p>11. Super Structure :Different structural forms culverts, causeways, minor and major bridges, suitability and choice precast, post tensioned and segmental Construction. Launching, operation systems, Bearings, Architecture.</p> <p>12. Rating and Maintenance :Methods & Techniques of rating of existing bridges Inspection, Repairs, maintenance, corrosion- causes and prevention, Aesthetics.</p>	10
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TEXT BOOK/ REFERENCE BOOKS

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| 1. | Highway Engineering Khanna and Justo | Nem Chand |
| 2. | Bridge Engineering by S.P.Brindra | Dhanpat Rai Publication |
| 3. | Bridge Engineering by S.C.Rangwala | Charotar Publishing House Ptv |
| 4. | Principles and practices of Highway Engineering by S.K. Sharma | Khanna Publication |
| 5 | Pavement Design : Yoder and Witzak | Wiley |
| 6 | Traffic Engineering : L.R.Kadiyali | Khanna Publishers |

Course Code: CE 507 : Transportation Engineering-1

Course scheme				Evaluation scheme (LABORATORY)		
Lecture	Tutorial	Practical	Credits	TW	POE	Total
		3	2	25	25	50

EVERY STUDENT MUST CARRY MINIMUM OF 10 EXPERIMENTS FROM THE FOLLOWING

Sub grade soil : CBR test
Sub grade soil : AASHO Classification (grouter index)
Aggregates : crushing value test
Aggregates : Los Angeles abrasion value test
Aggregates : impact test
Aggregates : shape test. (Elongation index , flakiness index and Soundness test)
Aggregates : Specific Gravity and Water absorption test
Bitumen : Penetration value
Bitumen : Ductility Test
Bitumen : Softening point test.
Bitumen : Flash and fire point test
Bitumen : Specific gravity
Bitumen : Adhesion Test.
Short Field Visit .

Course scheme					Evaluation scheme (Theory)				
lecture	Tutorial	Practical	Periods/week	Credits	Duration of paper hour	MSE	IE	ESE	Total
3	1	3	0	3	4	10	10	80	100

UNITS	TOPICS	Hrs
UNIT I	Introduction to the Working Stress Method of RCC design. Basic concepts in a Design for flexure, assumptions, design constants Analysis of the rectangular Section, Balance, under-reinforced and over-reinforced sections. Drawbacks and limitations of Working stress method , shear reinforcement. Design of singly reinforced , doubly reinforced beam and T-beam by WSM.	10
Unit-II	Introduction to Limit State Design: Concept of probabilistic design and limit State design. Characteristic values, partial safety factors, stress strain Relationship stress block parameters, failure criteria, types and properties of Reinforcement, limit state of serviceability and limit state of collapse. Other Limit states. Review of IS – 456-2000. Limit state of Collapse in Shear & Bond: Design of beam for shear, shear Span, post cracking resistance, shear mechanism approach, shear failure modes and collapse loads, interaction of shear, flexure and axial force, Check for development length.. Limit state of collapse in flexure: Analysis and design of singly reinforced Rectangular section. Doubly reinforced rectangular section . Balance failure mode, primary tension failure mode and Primary compression failure mode	11
Unit-III	Limit state of Collapse in Flexure : Analysis & Design of the Tee & L-beam Section. Limit state of collapse in compression: Analysis & design of short axially Loaded column. Columns subjected to uniaxial bending, development and use of interaction Curves. Unsupported length , End condition . introduction to long columns. Limit state of Serviceability (i) Causes and control of cracking: Crack in plastic concrete at early age, Cracks due to temperature and shrinkage, restrain induced Cracks, Cracks due to loading. Needs for crack width control. (ii) Moment curvature relationship; deflection control of beams and One Way slabs. (no numerical calculation) (iii) Deflection control, calculation of deflection for simply supported beams acceptance criteria need of deflection control.	12
Unit – IV (with WSM)	Design of circular water tank with roof slab/ dome resting on ground by Approximate methods/ IS code method. Design of rectangular water tank with one-way roof slab resting on ground by Approximate method/IS code method. Design of prestressed slab/ rectangular beam. Prestressed Concrete :Properties of high grade materials, concepts of Prestressed concrete, methods of prestressing, losses in prestressing. Various systems for prestressing with particular reference to Freyssined Magnel Blatton and Fifford Udall systems. Analysis of rectangular, T and I Section.	05 05

Unit – V (with LSM)	Design of one-way, simply supported, single span and cantilever slabs, and Continuous slab/ beam with IS coefficients. Design of rectangular pad/ sloped footing for axial load Design of Dog-legged and open well staircases	07
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Text Books:

Reinforced concrete structures- S.N.Sinha ,

□ Limit State Design of Steel Structures by A.K. Jain, B.C.Punmiya

□ Limit State Design of Steel Structures: Based on IS : 800-2007 - [Dr. Ramchandra, Virendra Gehlot](#)

Publisher :Scientific Publishers

□ Design of steel structures by K.S.Sairam- Publisher: Pearson Education

Course Code: CE-508 - RCC Structures

Course scheme				Evaluation scheme (LABORATORY)		
Lecture	Tutorial	Practical	Credits	TW	POE	Total
		3	2	25	25	50

Practical shall consist of minimum four design assignments with detailed drawing on A-2 size sheets and detailed calculations in journal.

1.	Single span prestressed concrete rectangular beam/ slab.
2.	One- way slab, continuous slab/beam
3.	Rectangular pad / slopped footing./ circular footing
4.	Dog- legged and Open Well Staircases
	One field visit and its report in the journal

Course scheme					Evaluation scheme (Theory)				
lecture	Tutorial	Practical	Periods/week	Credits	Duration of paper hour	MSE	IE	ESE	Total
3	1		0	3	3	10	10	80	100

UNIT-I	<p>ENGINEERING ECONOMICS: Nature and scope of Economics and relationship with Engineering. Demand analysis : Law of demand, Elasticity of Demand, Demand Forecasting Production : Meaning and Factors of Production, Law of return, economics of scale location of Industries. Cost analysis : Fixed and variable cost, Prime and supplementary costs, Average and marginal cost, methods of allocation of overhead costs. Money and banking : Functions of money, Foreign investments, function of bank various types markets and price determination, scope of privatization in india.</p>	Hr 09
UNIT-II	<p>PROJECT / CONSTRUCTION MANAGEMENT. Introduction : Project Management, Types of Projects, Various phases of project, project proposal, Components of planning, Objectives of planning, factors effecting planning, organisational setup, establishment of premises and site organisation programme. Major cause of project delay. Job planning :- Bar diagrams and bar charts, C.P. M. activity identification computation of activity time, network preparation and analysis. Logical and other constraints, project duration, floats and slacks. Ladder construction. P. E .R. T. : Event identification, event time , network preparation and analysis, precedence network, network and cost interaction. Optimisation of project cost. Cost slope concept and simple compression calculation.</p>	10
UNIT-III	<p>Resource Planning, Resource Allocation, Resource leveling, Resourcebased Net work.System approach, system formation, effectiveness and control ,general principles of quality control measurements and achievements . Planning for safety construction hazards, safety in construction, industry and at work site. Nation safety council , Safety organisation, accidents, its cost, cause, types and preventions , losses, during natural calamities, floods and fire, and methods to reduce them.</p>	10
UNIT-IV	<p>Management information System: System approach to management, Management and systems. Inference Techniques- Use of various statistical methods and tests, graphical representation. Material Management : Functions, objectives, purchasing, procedures, records, stock taking, inventory control, ABC analysis storing. Equipment management : Classification of Construction equipments, factors effecting selection, Operation and Maintenance cost, Depreciation and Replacement cost, Economic life, down time cost, cost of owning equipment.</p>	10
UNIT-V	<p>Equipments of Major projects :- Excavating machines such as : Power shovels, Drag line, Bulldozer, Scraper, Drilling and Blasting Equipments, Material Transporting and handling equipment such as Cranes, Hoists, conveyer belts, dumpers , cableways, rail system (Size, performance and limitations) Concrete equipments : Different types of mixers Vibrators, batch mixing plants, transportation of concrete, concrete pumps and placers. Guniting and its equipment.</p>	11

REFERENCE BOOKS:

1. Modern economic theory : K.K.Dewatt . S. Chand Publication New Delhi
2. Element of economic theory : J. D. Verma S. Chand company New Delhi
3. Construction Management : Peurifoy MC- Graw Hill Education (India) Ptv.Ltd.
4. CPM and PERT : L.S. Srinath Affiliated East- West Pvt.Ltd. New Delhi
5. Equipment management : Mahesh Verma Metropolitan Book Company new Delhi
6. Construction Planning and management : P.S.Ghatot and B.M.Dhir New Age International (p) Ltd. Publisher , New Delhi.
7. Fundamental of CPM/PERT and project management : S.K. Bhattachajee khanna publisher Delhi
8. Project Planning and control with PERT and CPM : Dr. B.C.Punmia and K.K.Khandelwar Laxmi publication (p) Ltd New Delhi.

CE-505:**BUILDING DESIGN & DRAWING**

Course scheme					Evaluation scheme (Theory)				
lecture	Tutorial	Practical	Periods/week	Credits	Duration of paper hour	MSE	IE	ESE	Total
1	0	3	0	3	4	10	10	80	100

UNITS	TOPICS	Hrs
UNIT-I	Introduction : Importance of Building drawing as Engineer's Language in construction & costing. Designing of Buildings : Introduction : Site requirements, requirements of owner and Building byelaws. Climate and design consideration, orientation, recommendations of CBRI, Roorki and general principles of planning with emphasis on functional planning. Free hand dimensioned sketches of various building elements. Importance in Civil Engineering.	4
UNIT-II	Method of Drawing : Selection of scales for various drawings, Thickness of lines, Dimensioning, Combined First angle and Third angle method of projection, Abbreviations and conventional representations as per IS 1962. (ii-a) Developing working drawings to scale as per I. S. 962 from the given sketch design and general specifications for terraced and pitched roofs. (ii-b) Developing submission drawings to scale with location site and block plan complete.	6
UNIT-III	Graph paper design (line plans)based on various requirements for residential, public, education and industrial buildings	2
UNIT-IV	Two point perspective of Residential building neglecting small elements of building such as plinth offset, chajja projections etc	3

Question paper pattern

Unit I, Unit III, Unit IV – (Three question Carries total 40 marks)

Unit II – compulsory – (max – marks- 40)

Textbook/References

1. Planning and designing of residential buildings- Y N RajaRao and Y Subramanyam- Standards publishers distributors
2. Building Drawing- Shah M H, Kale C M.- Tata McGraw Hill publications.
3. Building Construction- Rangawala S C- Charotar publications.
4. IS962 Code for practice for architectural and building drawings
5. IS 10714Part25- Technical Drawings-General principles of presentation

Course Code: CE509: Building Design & Drawing (P)

Course scheme				Evaluation scheme (LABORATORY)		
Lecture	Tutorial	Practical	Credits	TW	POE	Total
		3	2	25	25	50

Asign no.	
1.	free hand self explanatory dimensioned sketches of various building , types of lines etc.
2.	Development of plans for residential building , with load beam structure with location plan , site plan and block paln etc.
3.	Developing submission drawings for single storey residential building flat roof framed structure with access to terrace with location plan, site plan and block plan.
4.	Developing submission drawings for double storey residential building load bearing structure with flat roof to scale with location plan, site plan and block plan, etc.
5.	Graph paper design (line plans) based on various requirements for public buildings like hospital / hostel /bank/library etc.(Any two)
6.	Graph paper design (line plans) based on various requirements for shopping complex / primary school building , industrial building etc.
7	Developing submission drawings for multi-storey commercial building load bearing structure with flat roof to scale with location plan, site plan and block plan etc.
8	Two point perspective of the single storied Residential building neglecting small building elements. (Pitched roof / flat roof) (Any one)
9	Tracing of sheet of any one drawing sheet
10	Ammonia print of any one drawing sheet.

Course scheme					Evaluation scheme (Theory)				
lecture	Tutorial	Practical	Periods/week	Credits	Duration of paper hour	MSE	IE	ESE	Total
1	0	3	0	3	4	10	10	80	100

UNITS	TOPICS	Hrs
Unit 1:	TACHEOMETRIC SURVEYING Tacheometric systems - Tangential, stadia and subtense methods - Stadia systems - Horizontal and inclined sights - Vertical and normal staffing - Fixed and movable hairs - Stadia constants - Anallactic lens - Subtense bar.	6
Unit 2:	CONTROL SURVEYING Working from whole to part - Horizontal and vertical control methods - Triangulation - Signals - Base line - Instruments and accessories - Corrections - Satellite station - Reduction to centre - Trigonometric levelling - Single and reciprocal observations - Modern trends – Bench marking	8
Unit 3:	CURVES Simple Compound, Reverse Curves, Vertical Curves. Simple Curves : Elements of simple curves, methods of curve ranging, obstacles in setting out curves. Compound Curves :Elements of compound Curves, setting out the curve. Reverse Curves : Elements of reverse Curves, setting out the curve. Vertical Curves : Elements of vertical curves, types, tangent correction, location of highest or lowest point. Transition Curves : Elements of transition curves, superelevation, length of transition curve, Ideal transition curve, characteristics of transition curve, setting out the transition curve.	13
Unit 4:	ASTRONOMICAL SURVEYING Celestial sphere - Astronomical terms and definitions - Motion of sun and stars - Apparent altitude and corrections - Celestial co-ordinate systems - Different time systems - Nautical almanac - Star constellations - Practical astronomy - Field observations and calculations for azimuth.	11
Unit 5:	OTHER TOPICS Photogrammetry - Introduction - Terrestrial and aerial Photographs - Stereoscapy - Parallax - Electromagnetic distance measurement - Carrier waves - Principles - Instruments - Trilateration - Hydrographic Surveying - Tides - MSL - Sounding methods - Location of soundings and methods - Three point problem - Strength of fix - Sextants and station pointer - River surveys - Measurement of current and discharge - Cartography - Cartographic concepts and techniques - Cadastral surveying - Definition - Uses - Legal values - Scales and accuracies.	12

TEXT BOOKS/REFERENCES

1. Surveying: Vol.I and Vol. II by Dr. B.C. Punmia , Laxmi Publication- New Delhi.
2. Surveying and Levelling Vol. II by T.P. Kanerkar and S.v. Kulkarni, Pune Vidyarthi Publication.
3. Surveying- Vol. II and III by Dr. K.R. Arora Standard Book House.
- 5.Surveying Vol.2 by S.K. Duggal, Mc Graw Hill Publication.
- 6.Bannister A. and Raymond S., Surveying, ELBS, Sixth Edition, 1992.
- 7.Punmia B.C., Surveying, Vols. I, II and III, Laxmi Publications, 1989.

8. Clark D., Plane and Geodetic Surveying, Vols. I and II, C.B.S. Publishers and Distributors, Delhi, Sixth Edition, 1971
9. Elements of Photogrammetry by Paul R. Wolf. McGraw Hill Publication,

Course Code: CE510 : Surveying – II
Practicals (Any Six)

I	Practicals
1	Determination of height and distance when the Instrument station is in the same vertical plane.
2	Determination of height and distance (Base of the object inaccessible) – when the instrument station is not in the same vertical plane.
3	Determination of Tachometer constants, distance and elevation by stadia method.
4	Contouring by tacheometric method.
5	Setting out simple circular curve by linear method.
6	Setting out simple circular curve by angular method.
7	Determination of True North by astronomical survey
8	Demonstration of EDM, Total Station.
II.	Survey camp: On any of following for minimum two days
1	Road Project
2	Irrigation Project
3	Water Supply Project