

CIVIL ENGINEERING DEPARTMENT

B.Tech. CIVIL ENGINEERING

**Course of Study & Scheme of Examination
2016-17**



**Maulana Azad National Institute of Technology
Bhopal**

SCHEME AND SYLLABUS

DEPARTMENT OF CIVIL ENGINEERING (B. Tech.)

FIRST SEMESTER

Course Number	Subject	Scheme of Studies Periods per week			Credits
		L	T	P	
MTH111	Mathematics 1	3	-	-	3
CE112	Basic Civil Engineering	3	-	-	3
PHY113	Physics	3	-	-	3
HUM114	Communication Skills	3	-	-	3
CS115	Computer Programming	3	-	-	3
ME116	Engineering Graphics	-	-	6	3
CS117	Computer Program Lab.	-	-	3	2
PHY118	Physics Lab.	-	-	3	2
Total Credits					22

I semester Soft Technology Division/ II semester machine Technology Division

SECOND SEMESTER

Course Number	Subject	Scheme of Studies Periods per week			Credits
		L	T	P	
MTH121	Mathematics 2	3	-	-	3
CHM122	Engineering Chemistry	3	-	-	3
CE123	Environmental Science	3	-	-	3
EE124	Basic Electronics and Electrical Engineering	3	-	-	3
ME125	Basic Mechanical Engineering	3	-	-	3
CE126	Solid Mechanics	3	-	-	3
ME127	Workshop Practice	-	-	2	1
EE128	Electronic and Electrical Lab.	-	-	2	1
CHM129	Chemistry Lab.	-	-	3	2
Total Credits					22

THIRD SEMESTER

Course Number	Subject	Scheme of Studies Periods per week			Credits
		L	T	P	
MTH211	Mathematics 3	3	-	-	3
CE212	Surveying 1	3	-	-	3
CE213	Structural Analysis 1	3	-	-	3
CE214	Fluid Mechanics 1	3	-	-	3
CE215	Engineering Geology	3	-	-	3
CE216	Building Planning and Drawing	2	2	-	3
CE217	Surveying Lab. 1	-	-	3	2
CE218	Fluid Mechanics Lab.1	-	-	2	1
CE219	Engineering Geology Lab.	-	-	2	1
Total Credits 22					

FOURTH SEMESTER

Course Number	Subject	Scheme of Studies Periods per week			Credits
		L	T	P	
CE221	Geotechnical Engg. 1	3	-	-	3
CE222	Engineering Hydrology	3	-	-	3
CE223	Fluid Mechanics 2	3	-	-	3
CE224	Structure Analysis 2	3	-	-	3
CE225	Structural Design & Drawing 1 (Concrete Structures)	2	2	-	3
CE226	Surveying 2	3	-	-	3
CE227	Surveying Lab. 2	-	-	3	2
CE228	Geotechnical Engg. Lab 1	-	-	2	1
CE229	Fluid Mechanics Lab. 2	-	-	2	1
Total Credits 22					

FIFTH SEMESTER

Course Number	Subject	Scheme of Studies Periods per week			Credits
		L	T	P	
CE311	Structural Design & Drawing 2(Steel Structures)	2	2	-	4
CE312	Geotechnical Engg. 2	3	-	-	3
CE313	Transportation Engineering I	3	-	-	3
	Departmental Elective 1	3	-	-	3
	Departmental Elective 2	3	-	-	3
	Open Elective 1	3	-	-	3
CE314	Geotechnical Engg. Lab. 2	-	-	3	2
CE315	Transportation Engg. Lab.	-	-	3	2
Total Credits 23					

SIXTH SEMESTER

Course Number	Subject	Scheme of Studies Periods per week			Credits
		L	T	P	
CE321	Irrigation Engineering	3	-	-	3
CE322	Project Costing and Contract Management	3	-	-	3
CE323	Water Supply Engineering	3	-	-	3
	Departmental Elective 3	3	-	-	3
	Departmental Elective 4	3	-	-	3
	Open Elective 2	3	-	-	3
CE324	Structural Analysis Lab	-	-	2	1
CE325	CAD Lab	-	-	2	1
CE326	Minor Project	-	3	-	3
Total Credits 23					

LIST OF ELECTIVES

- CE331 Concrete Technology
- CE332 Air Quality Monitoring & Control
- CE333 Applied Geology
- CE334 Ground Water Hydrology
- CE335 Traffic Engineering
- CE336 Open Channel Hydraulics

Department of Civil Engineering

- CE337 Computational Methods in Civil Engineering
- CE338 Highway Geometric Design
- CE339 Solid Waste Management
- CE341 Geodesy and GNSS
- CE342 Ground Improvement Techniques
- CE343 Geotechnical Investigations for Civil Engineering Structures
- CE344 Prestressed Concrete
- CE345 New Technologies for Transportation Engineering

LIST OF OPEN ELECTIVES

- CE351 Remote Sensing & GIS
- CE352 Environmental Monitoring
- CE353 Water Harvesting and Reuse
- CE354 Finite Element Method
- ▼CE355 Theory of Elasticity
- CE356 Instrumentation & Measurements
- CE357 Renewable Energy Systems

SEVENTH SEMESTER

Course Number	Subject	Scheme of Studies Periods per week			Credits
		L	T	P	
CE411	Wastewater Engineering	3	-	-	3
	Departmental Elective 5	3	-	-	3
	Departmental Elective 6	3	-	-	3
	Open Elective 3	3	-	-	3
	Open Elective 4	3	-	-	3
CE412	Water and Wastewater Analysis Lab	-	-	2	1
CE413	Major Project/Seminar	-	3	-	3
CE414	Educational Tour & Training	-	-	-	1
Total Credits					20

EIGHTH SEMESTER

Course Number	Subject	Scheme of Studies Periods per week			Credits
		L	T	P	
CE421	Transportation Engineering II	3	-	-	3
	Departmental Elective 7	3	-	-	3
	Departmental Elective 8	3	-	-	3
	Open Elective 5	3	-	-	3
	Open Elective 6	3	-	-	3
CE422	Major Project/Seminar	-	4	-	4
CE423	General Proficiency	-	-	-	1
Total Credits					20

LIST OF ELECTIVES

CE431 Reinforced Earth and Geo-Synthetics Engineering
 CE432 Modern Foundations
 CE433 Earthquake Resistant Design of Structures
 CE434 Software Applications in Geotechnical Engineering
 CE435 Advanced Reinforced Concrete Design
 CE436 Hydro Power Engineering
 CE437 Sediment Transport Engineering
 CE438 Analysis & Design of Substructures
 CE439 Advanced Structural Analysis
 CE441 Theory of Plastic Analysis
 CE442 Hydraulic Structures
 CE443 Site Investigation & Ground Improvement
 CE444 Soil Dynamics & Machine Foundation
 CE445 Hazardous Waste Management and Risk Analysis
 CE446 Advanced Highway Constructions
 CE447 Pavement Design
 CE448 Design of Steel - Concrete Composite Structures
 CE449 Bridge Design

LIST OF OPEN ELECTIVES

CE451 Fluid Measurement Systems
 CE452 Fluid Power Systems
 CE453 Computational Fluid Dynamics
 CE454 Road Safety Engineering
 CE455 Digital Processing of Remote Sensing Data
 CE456 Water Resources Systems
 CE457 Environmental Legislation

B.Tech. Scheme & Syllabus, 2016-17, Revised in BOS Meeting dt. 21.10.2016

CE458 Environmental Impact Assessment
CE459 Advanced Geology
CE461 Construction Project Management
CE462 Experimental Stress Analysis
CE463 Disaster Mitigation and Management
CE464 Digital Mapping and Cartography
CE465 Industrial Waste Treatment
CE466 Analysis & Design of Piping System
CE467 Organizational Behavior
CE468 Global Environmental Issues & Sustainable Development
CE469 Building Design Studio

COURSE CONTENTS

FIRST AND SECOND SEMESTER (COMMON TO ALL B.TECH STUDENTS)

MTH111 MATHEMATICS 1

Partial differential equation- homogeneous functions, Euler's theorem, Taylor's series, maximum and minima of functions, Lagrange method of undetermined multipliers., Convergence and divergence series- summation of series, beta and gamma functions, length of curves, area volume and surfaces of solids of revolution, Ordinary differential equation statistics –solution, Claitauts forms, methods of variation of parameters.

References

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|-------------------------------------|--|
| 1. Advanced engineering Mathematics | Erwin Krevszig, John Wiley & Sons |
| 2. Advanced engineering Mathematics | Peter V.O.Neil Thomson, Cengage Learning |
| 3. Higher engineering Mathematics | John Bird, Newnes Publishers |

CE112 BASIC CIVIL ENGINEERING

Civil Engineering scope and importance, Construction materials such as Stone, Bricks and timber-Engineering properties, Soils, bearing capacity and its importance. Building components: Foundations- functions, types and applications, Walls, roofs, floors, doors, windows, beams, columns etc. Surveying basics and equipments.

References

- | | |
|--------------------------|---|
| 1. Engineering Materials | Rangwala, Charotar Publishing House pvt. Ltd. |
| 2. Building construction | Sushil Kumar, Standard Publisher dist. |
| 3. Surveying | B.C. Punmia, Laxmi Publications |

PHY113 PHYSICS

Electron ballistic-Motion of charges particles in electric and magnetic field, Electron microscope, Cathode ray tube, Spectrograph, Electron refraction. Bethes law; Solid state and Semi Conductor Physics- Energy bands in solids, Electron and hole mobility, hall effect, PN junction transistor, Transistor parameters, Photo cell and solar cell: Quantum Mechanics-weave equation, Schrodinger equation, tunnel effect, Harmonic oscillator: Laser and fiber optical- Ruby and He-Ne laser and applications, laser holography; Nuclear Physics & Theory of relativity-transformation equation, time dilation mass energy equation, Acoustics

References

- | | |
|---------------------------|---|
| 1. Physics of dielectrics | Tareev, Mir Publishers |
| 2. Principle of optics | Brijlal Subramanyam, S Chand & Company ltd. |
| 3. Engineering Physics | P.G.Kshirsagar, S Chand Publisher |

HUM114 COMMUNICATION SKILLS

Introduction to Communication Process, Verbal and Non-Verbal, Communication, Communication Barriers, Electronic devices in communication. Business communication- Managerial communication, meeting skills, group discussion, presentation skills, negotiation skills. Employment Communication. Speaking Skills, Listening Skills and Reading skills. Writing Skills- Letter writing, report writing, emails, proposals, memorandum, writing notices, minutes and agendas. Soft Skills and Personality Development- Time Management skills, interpersonal skills, Leadership styles, positive personal attitudes, personal SWOT analysis.

References

1. Effective business communications Murphy, McGraw-Hill Companies
2. Effective technical communication, M.Ashraf Rizvi, Tata McGraw-Hill Pub Co. Ltd.
3. The Ace of Soft Skills Gopalaswamy and Mahadevan, Pearson Education

CS115 COMPUTER PROGRAMMING

Concepts, definitions, taxonomy and history of computer programming, operating systems and program execution, Unix system, Input/output devices, Storage devices, Flow chart and algorithm development, Computer program. C programming, Statements, Arrays and functions

References

1. Programming with C Gottfried, McGraw Hill Education
2. C programming Ritchie & Kernighan, Pearson Education India
3. UNIX programming Kernighan & Pike, Pearson Education India

ME116 ENGINEERING GRAPHICS

Geometrical construction, use of instruments, scales, engineering curves, Orthographic projections, conversion of pictorial views to orthographic views and vice versa, Dimensioning, Projections of points, lines, planes and solids. Development of plane and curved surfaces, sections of solids. Orthographic projections of simple elements of machines like nut, bolt, rivets, keys and cotters, joints, pulleys, Introduction of Auto-CAD

References

1. Engineering drawing with AUTOCAD T.Jayapoovam, Vikas Publishing House
2. Engineering graphics K.R.Mohan, Dhanpat Rai Publishing Company
Private Limited

CS117 COMPUTER PROGRAMMING LAB

Introduction to fundamentals of DOS and window, C programming, Operating System, Use of algorithms and execution, small practical problems, Arrays, Matrices.

References

1. Program with C Brain W Kernighan, Prentice Hall
2. C programming Balagurusamy, McGraw Hill Education India Private Limited

PHY117 PHYSICS LAB

Experiments on Zener Diode, characters tics, Newton Rings. Series/parallel resonance, Photo electric and Hall Effect.

References

1. Concepts of Modern physics Arther Beiser, McGraw-Hill Education
2. A text book on advance practical Physics Chauhan &Singh, Pragati Prakashan

MTH121 MATHEMATICS 2

Multiple integral: Multiple and triple integrations, series solution of differential equations Bessel and Legendre functions, Complex variable: Conformal mapping. Cauchy's theorem, Complex integration, Taylor's and Laurent's series, Laplace transform: Laplace transform of elementary functions, Inverse transform, and solution of ordinary differential equations. Vector calculus: Cross products, vector differentiation, gradient and divergent theorem, Green's Gauss and strokes theorem, Partial differential equations.

References

1. Advanced engineering Mathematics Erwin Krevszig, John Wiley & Sons
2. Higher engineering Mathematics John Bird, Newnes Publishers

CHM122 ENGINEERING CHEMISTRY

Lubricants: function of lubricates, solid lubricants, synthetic lubricants, mechanism of lubrication, testing of lubricants Fuels: classifications, calorific value, selection of lubricants ,knocking and anti-knocking compounds, combustion problems., environment Chemistry: air , water and soil, noise , soil and land, Corrosion: chemical corrosion, pitting, stress corrosion, galvanic series, corrosion control, Materials: Iron, steel, heat treatment, non ferrous metals, alloys

References

1. Engineering Chemistry Jain and Jain, Dhanpat Rai Publishing Company
2. Engineering Chemistry S.S. Dara, S Chand
3. Engineering Chemistry Shashi Chawla, Dhanpat Rai & Co.
4. Engineering Chemistry B.K. Sharma, Krishna Prakashan

CE123 ENVIRONMENT SCIENCE

Natural Resources: Study of various natural resources like forest, minerals, atmosphere, soil and water conservation. Ecosystem: structure, function and classification of ecosystem, biogeochemical cycle, hydrological cycle, carbon cycle, nitrogen cycle, oxygen cycle, food chain, food web, and energy flow in ecosystem. Biological diversity and its conservation, Global Environmental Issues, Case studies of environmental disasters like Bhopal Gas Tragedy, Chernobyl Nuclear Accident, and Concept of sustainable development. Environmental Pollution, pollutants and their classification, impact of pollution on environment. Types of pollution such as water, air, solid waste, noise, radioactive etc: sources, impact, Pollution control and environmental management, Basic concepts of Life Cycle analysis, Environmental Impact Assessment.

References

1. Environment engineering and management Suresh K Dhaneja, S. K. Kataria & Sons
2. Environment science S.C.Santra, New Central Book Agency (P) Ltd
3. Environment studies J.P.Sharma, Pinnacle Technology
4. Waste water treatment B.C.Punmia, Laxmi Publications

EE124 BASIC ELECTRONIC AND ELECTRICAL ENGINEERING

D.C. and A.C. sources: loop and nodal equations, superposition theorem, Norton's theorem Star Delta transformers. Simple series and parallel circuits and network analysis, Electrical machines: Faraday's law of electromagnetic induction, Lenz's law and tests on transformer, autotransformer, DC machines, Diodes and transistors: diode characteristics ripple factor, filter circuit, cathode ray oscilloscope, and Power supply.

References

1. Electrical technology H Cotton, Reem Publications Pvt. Ltd
2. Electrical circuits Schaum series, McGraw Hill Education
3. Electronics devices Bell, Oxford

ME125 BASIC MECHANICAL ENGINEERING

Review of Thermodynamics: Units and Dimensions system, Heat and Work, Ideal gas equation. Thermodynamic equations, Zeroth law and first law of Thermodynamics. Enthalpy and Internal energy of gases. Simple numerical of first law as applied to a closed and open system. Statement of Second law of Thermodynamics, Steam Boilers, mountings & accessories. Boiler draught. Properties of Steam: Wet and Superheated steam, Volume, Enthalpy, Entropy and internal Energy of steam, Steam Table.

Internal Combustion Engines: Otto and diesel cycles and their efficiencies. Functions of different parts of the engines. Machine tool: lathe, shaper, drilling machine, types of drilling machine,

machining time for machine tool. Welding : Types of welding process, important terms in welding, types of welding joints, gas welding, arc welding ,comparison between A.C. and D.C. Casting: Pattern materials, types of patterns, pattern allowances, mould, constituents of moulding sand.

References

- | | |
|---------------------------------------|--|
| 1. Elements of mechanical engineering | Gupta P.N and Poonia, Standard Publication |
| 2. Elements of mechanical engineering | Roy and Choudhary, Media Promoters & Pub Pvt Ltd |

CE 126 SOLID MECHANICS

Fundamentals of force systems, concept of Rigid body, Free body diagram Support Reactions, Analysis of Frames and structure. Centroid and moment of Inertia of plane area, Shear force and Bending Moment diagrams, Simple stress and strain, Mechanical properties of the materials, Elastic constants, compound stresses, Mohr's circle of stresses.

References

- | | |
|--------------------------|-----------------------------------|
| 1. Strength of materials | Singer F.L., Longman |
| 2. Mechanics of material | Hearn E.I., Butterworth-Heinemann |
| 3. Engineering mechanics | Merian J.L.Kraige, Wiley |

ME127 WORKSHOP PRACTICE

Students will do practice in following shop.

Carpentry (two models), 2. Fitting, (two models) 3. Foundry (demonstration) 4. Welding. (Demonstration)

References

- | | |
|----------------------------|--|
| 1 Manufacturing science | Ghosh and Mallick, Affiliated East-West Press Pvt. Ltd |
| 2 Manufacturing Technology | P.N. Rao, McGraw Hill Education |

EE128 ELECTRONICS AND ELECTRICAL LAB

Laboratory experiments and assignments to supplement EE124

CHM129 CHEMISTRY LAB

Quantitative Analysis

Oxidation-Reduction Titrations: Estimation of percentage of iron using potassium dichromate by internal indicator method. Estimation of percentage of iron using potassium dichromate by external indicators.

Iodometric titration of copper, sulphate by hypo-iodometric titration of potassium dichromate by hypo.

Water Analysis: Determination of alkalinity, hydroxyl, carbonate and bicarbonate in water. Determination of total hardness in water using soap or EDTA titrations. Determination of salinity of water sample by Mohr's method.

Lubricant Testing: Determination of viscosity of lubricating oil with change of temperature by Determination of Flash and Fire point of liquid fuel and lubricants

References

1. Practical Chemistry S.S. Dara, S. Chand
2. Practical Engineering Chemistry Mittal & Mittal

THIRD SEMESTER

MTH211 MATHEMATICS 3

Numerical Methods: Solution of algebraic and transcendental equations, Solution of linear Simultaneous Equations, Finite Differences, Interpolation and Extrapolation, Inverse Interpolation, Numerical Differentiation and Integration, Numerical solution of Ordinary & Partial Differential Equations.

Statistics: Curve fitting, Correlation and Regression Analysis Probability Distribution, Sampling and Testing of Hypothesis.

References

1. Numerical Analysis Hildebrand, McGraw-Hill Book Company Inc
2. Numerical Analysis Scarborough, John Hopkins University Press
3. Numerical Methods E .Balaguruswamy, Tata McGraw-Hill Education
4. Numerical Methods for scientific and Engineering M.K.Jain, New Age International Publishers

CE212 SURVEYING 1

Basic concepts, Principles and classifications of surveying, Linear measurements, Chain surveying. Measurement of Angles and Directions, Traversing and closing error adjustments. Plane table surveying,

Levelling, Contouring: methods, Characteristics, Uses of contour maps.

Angles and Directions with Theodolites: types of theodolites, Measurement of horizontal and vertical angles. Theodolite traversing, omitted measurements

Computation of area: Planimeter. Computation of volumes: Mass Haul diagram. Hydrographic Surveying: Basic concepts and method

References

- 1 Plane Surveying A. M. Chandra., New Age International publishers
- 2 Surveying and Leveling-Part-I & II T. P. Kanetkar and S. V. Kulkarni, Pune Vidar

- 3 Engineering Surveying: Theory and Examination
- 4 Surveying Principles and Application

Griha Prakashan
W. Schofield. Butterworth-Heinemann Title Problems for Students
B.F. Kavanagh and S.J.G. Bird, Prentice Hall

CE213 STRUCTURAL ANALYSIS 1

Bending moment & shear force diagrams; Direct, Bending & Shear Stresses; Columns & Struts; Unsymmetrical Bending, Torsion of shaft, strain energy, Analysis of trusses, Deflection of determinate beams and trusses, Three hinged arches, Introduction to cable and suspension bridges.

References

- 1 Strength of Materials Timoshenko and young, D. Van Nostrand Company
- 2 Mechanics of Material E.P. Popov., Prentice Hall College Div
- 3 Strength of Materials & Mechanics of Structures', Vol. 1 B.C. Punmia, Laxmi Publications

CE214 FLUID MECHANICS 1

Review of Fluid Properties pressure and its measurement, Fluid Statics, Forces on plane and curved surfaces, Stability of floating and submerged bodies, Relative Equilibrium Fluid Kinematics, Continuity, Energy and momentum equations and their applications; Pressure, Velocity and flow measurement devices. Dimensional Analysis and Hydraulic similitude, Similarity laws, viscous & Stokes law and introduction to turbulent flow and boundary layer, forces on immersed bodies.

References

- 1. Fluids Mechanics & Hydraulics Machines Modi & Seth., Standard Book House
- 2. Fluids Mechanics & Hydraulics Machines A.K. Jain., Khanna Publisher
- 3. Fluid Mechanics Streeter & Wylie., McGraw Hill Education
- 4. Engineering Fluid Mechanics R.J. Garde & A.G. Mirajgaonker, Scitech

CE215 ENGINEERING GEOLOGY

Introduction to Geology, Earth as a part of solar system, Origin of earth, Age of the earth, internal structure of earth, , Weathering of rocks, Geological work of wind, water, glaciers, river and sea. Plate tectonics and Sea-floor spreading, Geological Hazards: Volcanoes, Earthquake and Landslides.

Indian Stratigraphy: Introduction, Geological Time scale, study of different group and systems and their economic importance. Petrology: Mode of origin of Igneous, Sedimentary & Metamorphic rocks, Classification of rocks.

Mineralogy & Crystallography: Common rock forming minerals and their importance in Civil Engineering.

Structural Geology: Engineering Projects: Dams, Reservoirs, Tunnels, Roads, Bridges, Importance of Geology in Engineering project constructions,

Recent Advancements: Fundamentals of Remote Sensing technique and its Applications.

References

1. Engineering Geology B.S. Sathya Narayanan Swami, Dhanpat Rai
2. A Text Book of Geology and Engineering L.M. Bangar, Standard Publishers Distributors
3. Text Book of Geology V.D. Muthayya, Oxford & IBH Publishing Co.
4. Text Book of Geology P.K. Mukherjee, The World Press Private Ltd.
5. Engineering Geology C. Kesavulur, Macmillan

CE216 BUILDING PLANNING AND DRAWING

General principles of composition, Unity, Symmetry, Balance and proportion, Functional treatment. Considerations in building-orientation and design, Circulation, Grouping of areas, Privacy, Planning & design concepts of energy efficient building.

Drawings of simple buildings, Residential buildings and public buildings, Empirical design of foundations, approximate proportioning of structural element. Building regulations: Building by-laws, provisions in developed and developing urban areas, Plan approval process. Introduction to building drawing software like AUTOCAD etc.

References

1. Building Drawing Shah M. G. Kale C. M, Tata McGraw-Hill Education
2. Planning & Designing of Building Sane Y. S, Allies Book Stall
3. Architectural Design Ernest Pickering, J. Wiley & Sons
4. National Building Code

CE217 SURVEYING LABORATORY 1

The laboratory work will consist of experiments and class work based on the topics taught in the theory paper of Surveying-I.

CE218 FLUID MECHANICS LABORATORY 1

List of Experiments

1. Verification of Bernoulli's theorem.
2. Verification of Impulse momentum principle.
3. Study of various types of flows using Reynolds apparatus.

4. Calibration of Venturimeter.
5. Calibration of Nozzle meter.
6. Calibration of Orifice meter.
7. Calibration of Orifice.
8. Calibration of Rota meter
9. Calibration of V-Notch.
10. Calibration of water meter

CE219 ENGINEERING GEOLOGY LABORATORY

List of experiments

1. Determination of Specific Gravity of minerals by steel yard balance.
2. Identification of important rock forming minerals in hand specimen.
3. Identification of important ore minerals in hand specimen.
4. Petrological studies of igneous, sedimentary and metamorphic rocks in hand specimen & under microscope.
5. Study of important crystal models.
6. Study of structural models.
7. Study of geological maps, describing topography, structure, history and geological cross section. Engineering geological maps.
8. Topographical maps, reading and interpretation.
9. Geological field work in and around Bhopal.

FOURTH SEMESTER

CE221 GEOTECHNICAL ENGINEERING 1

Preliminary definitions, Weight-volume relationships. Index properties, Classification of Soil. Pore water pressure and effective stress, Permeability, Stress distribution beneath loaded areas, Newmark's influence chart, Contact pressure distribution. Compressibility & Consolidation: Shear strength of soils, stress path .Soil Exploration and field testing of soils: Significant depth. Penetration Test, Plate Load Test, Pressure Meter Test, data interpretation and reporting.

References

- | | |
|--|---|
| 1. Soil Mechanics and foundation Engineering | B.C. Punmia, Firewall Media |
| 2 Basic & Applied Soil Mechanics | Gopal Ranian and A.S.R. Rao., New Age International Publishers Ltd. |
| 3 Geotechnical Engineering | Purushattam Raj , McGraw-Hill Education |
| 4 Soil engineering in theory and Practice | Alam Singh, Apt Books |

CE222 ENGINEERING HYDROLOGY

Rainfall: Hydrologic cycle, Measurement and analysis of precipitation, Estimation of losses, Runoff estimation and Analysis of flow data, hydrograph analysis: Unit hydrograph theory, Synthetic unit hydrograph, Instantaneous Unit Hydrograph (IUH).

Floods: Estimation, Probability and frequency analysis, Flood routing, Flood control measures, Ground water and wells: Hydraulics of wells, Infiltration galleries, Ground water recharge, Storage works: Site selection, Zones of storage, Mass curve analysis, Life of reservoir.

References

- | | |
|--|--|
| 1. Engineering Hydrology | K.Subramanya, Tata McGraw-Hill Education |
| 2. Hydrology Principles, Analysis and Design | H.M.Raghunath, New Age International |
| 3. Hand Book of Applied hydrology | V.T.Chow, McGraw-Hill, Inc |
| 4. Engineering Hydrology | R.S.Varshney, Nem Chand & Brothers |

CE223 FLUID MECHANICS 2

Turbulent flow, Flow through pipes, Losses in pipes pipe networks. Boundary layer theory, Boundary layer separation and its control. Water Hammer in Pipes.

Flow in open channels, Efficient channel sections, Specific energy concept critical flow and its computations, Channel transitions, Gradually varied flow, Flow profiles, Hydraulic jump, Surges in channels.

Impact of free jets, Turbines- classifications, Specific speed and unit quantities. Design and construction aspects of Impulse and Reaction Turbines, Characteristic Curves, Runaway speed, cavitation. Pumps - classification and working principles, Characteristic Curves. Similarity laws for hydraulic machines.

References

- | | |
|---|---|
| 1. Fluids Mechanics & Hydraulics Machines | Modi & Seth, Standard Book House |
| 2. Fluids Mechanics & Hydraulics Machines | A.K. Jain, Khanna Publishers |
| 3. Mechanics of Fluids | Frank M. White, McGraw-Hill Series |
| 4. Hydraulic Machines | J.Lal, Metropolitan Book Co.Pvt Ltd. |
| 5. Engineering Fluid Mechanics | R.J.Garde. & A.G. Mirajgaonkar, Scitech |
| 6. Open Channel Hydraulics. | K.G. Ranga raju, Tata McGraw-Hill |

CE224 PROJECT COSTING AND CONTRACT MANAGEMENT

Purpose and importance of estimates, principles of estimating methods of taking out quantities of items of work. Mode of Measurement, Measurement sheet and abstract sheet; bills of quantities. Specification of works, introduction to various types of estimates of Building, Services for building such as water supply, drainage.

Estimating for road and culverts. Rate Analysis: various factors involved in the rate of an item, material and labour requirement for various trades; preparation for rates of important items of work. Current schedule of rates (C.S.R)/DSR

Cost of works: Factors affecting cost of work, overhead charges Contingencies and work charge establishment.

Valuation: Purpose, depreciation, sinking fund. Scrap value year's purchase, gross and net income, and dual rates interest. Method of Valuation, rent fixation of buildings.

Contracts: Different types notices inviting tenders, contract documents, security deposit and earnest money, conditions of contract, arbitration.

Preparation of detailed estimate: Detailed estimate for services of plumbing and water supply or Electrification work. Detailed estimate for earth work for the road construction and culvert. Rate analysis for at least 8 items of construction.

References

- | | |
|-------------------------|--|
| 1. Estimation & Costing | B.N. Dutta, UBS Publishers Distributors |
| 2. Estimation & Costing | Rangwala, Charotar Publishing House Pvt. Ltd |

CE225 STRUCTURAL DESIGN & DRAWING 1 (CONCRETE STRUCTURES)

Limit State design of Beams, slabs, columns and footings, stair cases, cantilever and counterfort retaining walls. Introduction of RCC Water Tanks and Prestressed Concrete, Introduction to working stress method, Introduction to relevant software.

References:

- | | |
|---|---------------------------------------|
| 1. Design of Reinforced Concrete Structures | N.Krishnaraju, CBS |
| 2. Design of R.C.C Structures | Vazirani & Ratwani, Khanna Publishers |
| 3. Design of R.C.C Structures | P.C. Warghese, PHI Learning Pvt. Ltd |

CE226 SURVEYING 2

Basic concepts, principle and methods of tachometry, Trigonometry Leveling & triangulation.

Curves: Classifications elements & methods for curves. Setting out vertical curves and obstacles and special problems in the setting out of curves.

Introduction to modern equipments for surveying: like digital levels and theodolite, Total Station and GNSS receivers.

Global Navigation Satellite Systems (GNSS) based Surveying: Definitions terminology & methods, projections and commonly used datum and map projections. GPS survey methods and their advantages.

Photogrammetry: Principle, definitions and classifications of terrestrial and aerial photogrammetry

Remote Sensing and Geographic Information System (GIS): Definition, principle, components, and classifications. Introduction to popular remote sensing data processing and GIS software.

References

- | | |
|---|---|
| 1. Advanced Surveying | A. M. Chandra, New Age International |
| 2. Surveying Vol II | S. K. Duggal, Tata McGraw-Hill |
| 3. Surveying and Leveling-Part-I & II | T. P. Kanetkar and S. V. Kulkarni, Pune Vidyarthi Griha Prakashan |
| 4. Engineering Surveying:
Theory and Examination Problems for Students | W. Schofield, Butterworth-Heinemann |

CE227 SURVEYING LABORATORY 2

The laboratory work will consist of experiments based on the theory paper of Surveying-II.

CE228 GEOTECHNICAL ENGINEERING LABORATORY 1

List of Experiments:

1. Determination of in-situ density of soil by sand replacement method
2. Determination of in-situ density of soil by core cutter method
3. Determination of specific gravity of fine grained soil
4. Determination of specific gravity of coarse grained soil
5. Determination of Atterberg limits of soil
6. Grain size distribution of soil by wet analysis
7. Grain size distribution of soil by dry process
8. Direct shear test

9. Triaxial shear test
10. Unconfined compression test
11. Compaction test

References

1. Soil Mechanics Shamsher Prakash and P.K.Jain, Nemchand Brothers

CE229 FLUID MECHANICS LABORATORY 2

List of Experiments

1. Losses in Pipe lines
2. Velocity distribution in open channel
3. Velocity distribution in pipe flow
4. Board crested weir
5. Pelton wheel
6. Francis Turbines
7. Kaplan turbines
8. Centrifugal Pump
9. Reciprocating Pump.

FIFTH SEMESTER

CE311 STRUCTURAL DESIGN AND DRAWING 2 (STEEL STRUCTURES)

Indian Standard Steel Sections, Design of Bolted and welded connections; Tension and compression members; Built up columns with battens and lacing; Design of simple and built up beams, Plate girders, footings, Introduction to steel water tanks, Introduction to relevant softwares.

References

- | | |
|---|--|
| 1. Design of Steel Structures | Subramanyan, Oxford; Pap/Cdr edition |
| 2. Design of Steel Structures | S.K.Duggal, Tata McGraw-Hill Education |
| 3. Design of Steel Structures | S.A.Kazimi, |
| 4. Comprehensive Design of Steel Structures | B.C.Punmia, Laxmi Publications |

CE312 GEOTECHNICAL ENGINEERING 2

Bearing Capacity - Theories, Determination, Factors Affecting. Foundation on expansive and collapsible soils, Ground improvement techniques.

Stability of Slopes: Finite and Infinite slopes, Stability Analysis, Analytical and Graphical methods.

Deep Foundation: piles, estimation of individual and Group capacity. Pile Load Test, Settlement of Pile Groups, Negative Skin Friction, and Well Foundation: Analysis for stability, well foundation for bridges and aspect of design tilt and shifts, remedial measures. Sheet piles under various end conditions Reinforced earth retaining walls.

References

- | | |
|--|--------------------------------------|
| 1. Soil Mechanics & Foundation Engineering | Arora, Standard Publisher |
| 2. Soil Mechanics & Foundation Engineering | VNS Murthy, CBS |
| 3. Analysis and Design of Structures | Swami Saran, CRC Press |
| 4. Foundation Analysis and Design | Bowels, McGraw-Hill Higher Education |

CE313 TRANSPORTATION ENGINEERING 1

Highway – planning, Classification of roads, surveys and Alignments, Geometric Design, material characterization etc. Design of pavements, Construction and Maintenance-maintenance of bituminous and concrete pavements, Evaluation and Strengthening of pavement

Traffic Engineering and Transport Planning: traffic studies, traffic control devices- signs, Introduction to transportation planning process etc. Basic concepts for intelligent transport system, road safety audit, transport economics, drainage of roads, expressway and freeway.

References

1. Principles of Transportation Engineering Chakroborti and Das,
Prentice Hall India Learning Private Limited
2. Highway Engineering S.K.Khanna & C.E.G. Justo, Nem Chand & Bros
3. Principles & Practice of Highway Engg. L.R. Kadiyali, Khanna Publishers
4. Principles of Pavement Design E.J. Yoder and M.W. Witczak, Wiley

CE314 GEOTECHNICAL ENGINEERING LABORATORY 2

List of Experiments

1. Consolidation test
2. Plate load test
3. Cyclic plate load test
4. Static cone penetration test
5. Standard cone penetration test
6. Block vibration test.

References

1. Manual of soil testing P.K. Jain, Nem Chand & Brothers
2. Engineering soil testing Alam Singh, CBS Publishers & Distributors

CE315 TRANSPORTATION ENGINEERING LABORATORY

List of Experiments

1. Aggregate Crushing Value Test.
2. Los Angeles Abrasion Test
3. Aggregate Impact Test.
4. Specific Gravity of Aggregate
5. Water Absorption of Aggregate
6. Shape Test (a) Flakiness Index (b) Elongation Index
7. Viscosity of Bituminous Material
8. Penetration Test
9. Softening Point Test
10. Ductility Test.
11. Flash and Fire Point Test
12. CBR Test.

References:

1. Highway Materials and Pavement Testing S.K. Khanna, C.E.G. Justo and
A.Veeraragavan, Nem Chand &
Brothers

SIXTH SEMESTER

CE321 IRRIGATION ENGINEERING

Irrigation and water requirement of crops, Soil - water relationship, Methods of water application, Duty, Evapo-transpiration, Reservoir Planning, Diversion works: Weirs and barrage and their design. Design principles of Gravity and Earth dams, Introduction to Spillways.

Flow in canals, Design of unlined and lined canal. Canal structures: Canal falls, Cross drainage works.

References

- | | |
|--|---|
| 1. Irrigation Engineering | G.L. Asawa, New Age International |
| 2. Theory & Design of Irrigation Structure | R.S.Varshney, S.C Gupta & R.L. Gupta, Nem Chand & Bros, |
| 3. Irrigation Engineering & Hydraulic Structures | S.K.Garg, Khanna publishers |
| 4. Irrigation Theory and Practice | A.M.Michael, Vikas Publishing House |

CE322 STRUCTURAL ANALYSIS 2

Determinacy and indeterminacy of structures; Analysis of fixed and continuous beams; two hinged arches; Rolling load and Influence Line; Moment Distribution Method (sway and Non sway); Slope deflection Method; Kani's Method; Introduction to Plastic Analysis, Approximate methods of frames for lateral loads, Matrix Method of Structural Analysis.

References

- | | |
|--------------------------|---|
| 1. Analysis of Structure | Vajirani and Ratwani, Khanna Publishers |
| 2. Theory of Structures | Ramamurutham, Dhanpat Rai Publishing |
| 3. Theory of Structures | B.C. Punmia, Vol. 2, Firewall Media |

CE323 WATER SUPPLY ENGINEERING

Water demand, Population forecasting, Sources of water and augmentation. Water quality requirements, water borne diseases, Standards for different uses, Water Conveyance System: Intake Structures, Rising and gravity mains, Pumps systems and pumping stations, Valves and appurtenances, Pipe materials and Pipe fitting, O&M and trouble shooting for conveyance system.

Aeration Sedimentation Coagulation and Flocculation, Filtration, Disinfection. Purification Processes in natural systems, Water Softening, Removal of Taste and odor, Deflouridation, Dissolved solids removal.

Distribution reservoir capacity, Water distribution network, distribution network, leak detection, Water supply in buildings and plumbing. Management issues in water supply & Treatment. Rural water supply, Introduction to environmental softwares.

References

1. Environmental Engineering Vol. 1 Santosh kumar Garg, Khanna Publishers
2. Environmental Engineering Howard S.Peavy, Donald R. Rowe and
George Tchobanoglous, McGraw Hill Education
3. Water Supply and Sewage Terence J.McGhee, Mc Graw Hill Ltd
4. Water and Waste Water Technology Mark T Hammer, Pearson
5. Manual on Water Supply Engineering CPHEEO,

CE324 STRUCTURAL ANALYSIS LABORATORY

List of experiments

1. Compression test. (Concrete & mortar cubes, bricks)
2. Modulus of rupture of concrete.
3. Flexural rigidity of beam.
4. Buckling of struts with different end conditions.
5. Reactions of statically determinate beams.
6. Non destructive testing of concrete using Rebound Hammer Method.

CE325 CIVIL ENGINEERING SOFTWARE LAB

This laboratory will provide training to the students in using popular software's for various Civil Engineering Applications such as: STAAD Pro, PLAXIS, MX Road Suite, STORM CAD, SEWER CAD, HDM IV etc.

CE326 MINOR PROJECT

DEPARTMENT ELECTIVES

CE331 CONCRETE TECHNOLOGY

Concrete Technology:- Concrete making materials : Cements, Aggregates, Water, Admixtures, Properties of Fresh and Hardened Concrete, Variability of Concrete Strength, Extreme Weather Concreting. Testing of Concrete Mixes, Modern Construction Equipments.

Mix Design-Principles of Concrete Mix Design, Basic Considerations, IS Guidelines, Introduction to Other Mix Design Practices such as ACI, USBR, British mix etc. Building Materials:- Bricks, stones, glass, wood, plywood doors, shutters, plastics, tiles, aluminum, steel, properties and tests. IS code procedures.

References

1. Hand Book of Mix Design BIS Publication
2. Concrete Technology M.S.Shetty, S Chand
3. Civil Engineering Materials and Testing Syed Danish Hasan, Alpha Science Intl Ltd
4. Mechanics of Materials Adarsh Swaroop, New Age International Pvt. Ltd

CE332 AIR QUALITY MONITORING & CONTROL

Sources of Air pollution, Effects of air pollution on health, Animal, plants and Materials. Properties of Typical Air Pollutants, Toxicity of various pollutants, Photochemical Smog. Meteorological aspects, lapse rate, plume behavior, air pollution dispersion, Gaussian dispersion model, stack height. Air pollution problem: historical episodes of air pollution. Sampling of air pollutants, ambient air sampling, sampling instruments, standards of air pollution. Stack sampling. Analysis of air pollutants: Sulphur dioxide, nitrogen oxide, carbon monoxide, ozone, hydrocarbons. Principle of air pollution control, site selection and zoning, control methods, process and equipment changes, design and operation of various air pollution control equipments for gaseous and particulate pollutants.

References

1. Air Pollution MN Rao & MN Rao, Tata Mc Graw Hill
2. Air Pollution Control A.C. Stern, Tata Mc Graw Hill
3. Air Pollution Perkins, H.C. Wark and Warner, Tata Mc Graw Hill

CE333 APPLIED GEOLOGY

Study of minerals with their properties, crystallography, Study of igneous, sedimentary and igneous rocks, engineering properties of rocks for civil engineering work. Ground Water – sources, Ground water potential of India. Aerial photo geological study and remote sensing. Earthquake Study of structural features such as folds, faults, unconformity and joints. Physical and engineering properties of soil. Soil groups of India. Geophysical investigation methods and its importance for geological investigation of dams, reservoirs, tunnels, roads, bridges etc.

References

1. Engineering and General Geology Parbeen Singh, S. K Kataria & Sons
2. Physical & Engineering Geology S.K.Garg., Khanna Publisher
3. Principles of Engineering Geology Rebert B Johnson, Jesome V.Degraff, John Wiley & Sons
4. Geology for Engineers Joseph M.Trefethen, Van Nostrand Reinhold Inc.US

CE334 GROUND WATER HYDROLOGY

Fundamentals of ground water flow and Well Hydraulics, Unsteady Ground Water Flow Surface and Subsurface investigations, Ground water flow modelling, Pollution of aquifers, sea water intrusion, Aquifer remediation and management, Groundwater recharge, Ground water legislation

References

1. Ground Water Hydrology D. K Todd, Wiley
2. Groundwater H.M.Raghunath, New Age International
3. Groundwater System Planning & Management R.Willes & W.W.G.Yeh, Prentice Hall

CE335 TRAFFIC ENGINEERING

Traffic Characteristics: Road user characteristics, vehicular characteristics- static and dynamic characteristics of vehicles affecting traffic performance etc.

Traffic Studies: Spot speed studies and volume studies, Speed and delay studies, Origin and destination studies (O&D), Traffic capacity studies, Accident studies, preventive measures.

Traffic operations and Control: Traffic regulations and various means of control. Traffic control devices, One way streets, Traffic Signals

Basic concepts for traffic flow theory, intelligent transport system, traffic forecasting, road safety audit, transport economics, expressway and freeway, design of traffic facilities like intersections, parking, street lighting etc.

References

1. Traffic Engineering and Transport Planning L.R. Kadiyali, Khanna Publisher
2. Principles of Transportation Engineering Chakroborti and Das, PHI Learning Pvt. Ltd

CE336 OPEN CHANNEL HYDRAULICS

Channel controls and transitions, application of specific energy and critical depth concepts.

Gradually varied Flow – Types, governing equation characteristics and classification of surface curves, computations of gradually, varied flow in prismatic and non prismatic channels, hydraulic Jump, surges.

References

1. Open Channel Hydraulics V.T. Chow, Blackburn Press
2. Open Channel Hydraulics Subrhamanyam, Tata McGraw-Hill Education
3. Open Channel Hydraulics Richard H. French, McGraw-Hill Book Company

CE337 COMPUTATIONAL METHODS IN CIVIL ENGINEERING

Need of computational methods, numerical errors, and numerical methods for linear and non linear equations, regression and statistical analysis of data applicable to civil engineering problems

Boundary and Eigen value problems, advanced numerical method, simple computer programs for problems related to civil engineering.

References

1. Numerical Methods for Mathematics, Engineering Mathew John H. , Prentice Hall
2. Numerical Methods for Engineers Chapra S.C. and Canale R.P, McGraw Hill

CE338 HIGHWAY GEOMETRIC DESIGN

Introduction: Importance and necessity, geometrical design elements, design control and criteria, highway cross sectional elements: pavement surface characteristics camber, right of way, and width etc, Sight Distances Considerations:

Design of Horizontal Alignment: elements of horizontal alignments like radius, speed, super elevation, transition curves etc. Design of Vertical Alignment: gradient, vertical curves, valley and summit curve etc. Design of intersection: types of intersection, design of at grade intersections like rotary etc.

Introduction to relevant design softwares.

References

1. Highway Engineering S.K.Khanna & C.E.G. Justo., Khanna Publishers
2. Principles & Practice of Highway Engg. L.R. Kadiyali, Khanna Publishers
3. Principles of Transportation Engineering Chakroborti and Das , PHI Learning Pvt. Ltd
4. Relevant Indian Standards and Guidelines

CE339 SOLID WASTE MANAGEMENT

Solid Waste: Nuisance, potential and extent of solid waste problems, scope and necessity of solid waste management. Sources, type, compositions, physical, chemical and biological properties of solid wastes, sources and types of hazardous and infectious wastes in municipal solid wastes. Solid waste generation, collection, handling, storage, processing, transportation, container carrier system and route, selection and its suitability under Indian conditions

Materials separation and processing, recycling of material in municipal solid wastes. Thermal conversation, types of incinerator, biological conversations, Methods of composting, anaerobic digestion of waste. Disposal methods: Land filling, gas generation in landfill, closure of landfills.

References

- 1 Handbook of solid waste management Frank Kreith, McGraw-Hill Education
- 2 Management of Solid Wastes in Developing Countries Frank Flintoff, World Health Organization
- 3 Solid Waste Management in Developing Countries A.L. Bhide and B.B. Sundarasan, Indian National Scientific Documentation Centre
- 4 Solid Waste Conversion to Energy Harvey Alter, J.J. Dunn, Jr., M. Dekker
- 5 Manual on solid waste management CPHEEO

CE341 GEODESY & GLOBAL NAVIGATION SATELLITE SYSTEM (GNSS)

Global Navigation Satellite System (GNSS) Survey – introduction, principle, components of GNSS, Different types of GNSS receivers,

Elements of Geodesy & Satellite based surveys –International and local datum, time systems, satellite orbit determination, Map projection-necessity and classification, properties of cylindrical and conical projections. WGS-84 and Indian datum and transformation of GPS coordinates from WGS-84 to local datum.

GNSS Surveys: Methods & data analysis, Differential positioning, Static positioning and Kinematic positioning, data pre-processing and data formats. Sources of errors in GPS observations. Ground control and Real time kinematic (RTK) surveys.

Applications of GNSS technology in the management and monitoring of natural resources, engineering projects, planning etc.

Reference

- | | |
|--|--|
| 1 Understanding GPS : Principles and Applications | Kaplan, E.D., Artech House Inc. |
| 2 Global positioning system: Theory and practice | Hofman-Wellenhof, B. et. Al, Springer |
| 3 Essentials of GPS | Agrawal, N. K., Geodesy and GPS Service |
| 4 Global Positioning System: Principles and Applications | Satheesh, G., Tata McGraw-Hill Education |

CE 342 GROUND IMPROVEMENT TECHNIQUES

Requirements of ground improvement technique, Factors affecting ground improvement techniques.

Compaction: Principles of compaction, Laboratory compaction, comparison of properties of soil compacted to wet and dry-of optimum moisture content, Compaction control. Field methods for shallow surface compaction

Deep compaction methods: vibro-flotation, Terra Probe, Dynamic compaction Preloading, sand drains and sand columns.

Soil Stabilization: Mechanical Stabilization, Role of fine and coarse fractions, method of mixing soil to get designed plasticity Index.

Stabilization with Additives: Lime, fly ash, cement, bitumen and other chemicals.

Grouting, Grout materials, Grouting techniques, Dewatering Methods, Use of Geo synthetics in ground Improvement, Modern techniques involved in ground improvement.

References:

- | | |
|-------------------------------------|---|
| 1.Ground Improvement Techniques | Dr. P. Purushothama Raj, Firewall Media |
| 2. Basic and Applied Soil Mechanics | Dr. Gopal Ranjan, A.S.Rao , New Age International |

CE343 GEOTECHNICAL INVESTIGATIONS FOR CIVIL ENGINEERING STRUCTURES

What is geotechnical investigation, Reasons for geotechnical investigation, The objectives of geotechnical investigation, The requirements of geotechnical investigation, Site reconnaissance, Design of a geotechnical investigation; Field Operations, Soil Exploration: Auger Boring, Wash Boring, Percussion Boring, Rotary Drilling, Types of Samples, In Situ Tests like Standard Penetration Test, Dynamic Cone Penetration Test, Static Cone Penetration Test, Plate Load Test, Cyclic Plate Load Test, Pile Load Test, Cyclic Pile Load Test, Field Permeability Tests, Geophysical Tests etc. Laboratory Tests like Classification Tests, Strength Tests, Lab Permeability etc., Relevant theoretical concepts and data interpretations for determination of engineering properties of soils, and their application to geotechnical design. Preparation of geotechnical investigation reports. Examples of Geotechnical Investigation for Buildings, Highways, Dam, Sea Shore Area etc.

References :

- | | |
|--|--|
| 1. Basic and Applied Soil Mechanics | Ranjan and Rao New Age International |
| 2. Geotechnical Engineering | P. Purushothama Raj, McGraw-Hill Education |
| 3. Advanced Soil Mechanics | Das B. M, CRC Press |
| 4. Engineering Properties of Soil and Their Measurements | Bowles, B McGraw-Hill Companies |

CE345 NEW TECHNOLOGIES FOR TRANSPORTATION ENGINEERING

New developments in functional and structural evaluation of pavement, Use of falling weight deflectometer, light weight deflectometer, dynamic cone penetrometer, British pendulum tester. Polymer modified bitumen in road construction, technological enhancements in road construction and maintenance practices, advanced Transit Technologies, Intelligent transportation system, Traffic Management Techniques

References

- | | |
|--|---|
| 1. Traffic Engineering and Transportation Planning | L.R. Kadiyali and N.B.Lal, Khanna Publishers |
| 2. Principles of Highway Engineering and Analysis | F.L.Mannering & W.P.Kilareski, John Wiley Publishers. |
| 3. Fundamentals of intelligent transportation systems planning | Mashrur A. Chowdhury, Adel Wadid Sadek |
| 4. Pavement Management System' | Haas and Hudson McGraw Hill Book Co |
| 5. Indian Roads Congress and MoRT&H specifications | |

Open Electives

CE351 REMOTE SENSING AND GIS

Remote Sensing Technology: Introduction , Concepts & terminology, Passive and active remote sensors.

Geometry, radiometry and pre-processing of remotely sensed imagery. Ground truth collection and geo- referencing of imagery. Characteristics of photographic images, photo-interpretation keys. Digital image classification techniques and extraction of thematic information. Raster to vector data conversion, coordinate systems for the mapping, datum, map projection, analytical transformation, rubber sheet transformation, rectification and registration, manual digitizing and semi-automatic line following digitization

Geographic Information System (GIS) – Definition of Basic concepts and component, Introduction to GPS technology and its role in GIS data input.

GIS data analysis tools and applications of GIS in various natural resources mapping and management and various Civil Engg. projects.

References

1. Remote Sensing and image interpretation Lillesand T.M. and Kiefer R. W, Wiley
2. Introduction to remote sensing J. B. Campbell, Guilford Press
3. Principles of Geographic Information Systems for land Resources Assessment P.A. Burrough, Oxford University Press

CE352 ENVIRONMENTAL MONITORING

Principals of instrumentation: advantages. applications and limitations of the analytical techniques- Spectrophotometry, Atomic absorption and emission spectrophotometry, Flame photometry, Nephelometry, inductively coupled plasma spectrometry, mass spectrometry, FTIR, NMR Electrochemical methods: Polarography, ion selective electrodes

Chromatography: Classification, general ideas about absorption, partition and column chromatography, paper and thin layer chromatography, Gas chromatography, High performance liquid chromatography, ion chromatography

Remote Sensing Application: Basics of remote sensing, Application of remote sensing in environmental monitoring – landforms, soil, vegetation, land use and wetland mapping
Monitoring of Air Quality Parameters: Methods, Equipments, Standards
Monitoring of Water and Soil Quality Parameters: Methods, Equipments, Units and Standards
Environmental modeling, Environmental indices, Noise pollution and its monitoring.

References

1. Quality assurance in environmental Monitoring: Instrumental methods G. Subramanian, Wiley
2. Environmental Monitoring G. Bruce Wiersma, CRC Press
3. Chemical methods in industrial hygiene Frederick Herbert Goldman, Interscience

CE 353 WATER HARVESTING AND REUSE

Concept and characteristics of watershed, planning and management of watershed, need for artificial recharge and rainwater harvesting, Selection of artificial recharge zones, estimation of probable runoff from an area including from roof tops, artificial recharge structures: ponds, pits, wells, bore wells.

Rainwater harvesting in urban areas: Roof top rain water harvesting structures – design – construction maintenance and monitoring of RWH structures.

Effect on local groundwater environments -, Recycling of domestic water – sources of water for recharge in urban areas.

Reference

1. Ground Water H.M.Raghunath, New Age International
2. Rainwater Harvesting Kollegal & Maghshyam, J.M. Jaina & Brothers

CE354 FINITE ELEMENT METHOD

Basic concepts of mathematical models and numerical simulation, Initial and boundary value problems, classification of partial differential equations, features and steps of FEM analysis.

Weak formulation, Ritz method, weighted residual methods, discretization of domain, coordinate systems, interpolation functions, element matrix, assembly of element matrices, application of boundary conditions, solution of algebraic equations, numerical integration, parametric formulations, serendipity elements, Jacobians, application of FEM to simple discrete system and continuous domain problems of civil engineering

References

1. An Introduction to The Finite Element Method Reddy J.N., McGraw Hill
2. Finite Element Analysis- Theory and Programming, C.S. Krishnamoorthy, McGraw-Hill Inc
3. Finite Element Handbook H. Kardestuncer , Cambridge University Press

CE 355 THEORY OF ELASTICITY

Elasticity, Generalized Hooke's Law, two dimensional stress tensor and transformation, Equilibrium equations in Cartesian system, Plane stress and plain strain problems, Strain-displacement relations, Strain tensors and its transformation, Compatibility conditions, Energy principles, Stress function, stresses and strains in polar coordinate system, equation of equilibrium and compatibility in polar system, stresses in rotating cylinder, disc, stress in curved bars, Normal and tangential stresses on oblique plane, Mohr's circle for evaluation of principal stresses and strains, strain energy.

References

1. Theory of Elasticity Timoshenko and Goodier, McGraw Hill Book Company
2. Applied Elasticity Wang, S. N, Publisher
3. Mechanics of deformable solids Irving Shames, Krieger Pub Co

CE356 INSTRUMENTATION & MEASUREMENTS

General characteristics of measurements, errors, Temperature measurement, Pressure measurement, Torque measurement, Speed measurement, Flow measurement, Acoustic & noise measurement, Force measurement, calibration of instruments.

References

1. Instrumentation, Analysis and Measurement, Nakra and Choudhary, Tata McGraw-Hill Education
2. Industrial Instruments A.L. Seutko, Thomas Delmer
3. Measurement and Instrumentation Systems W. Bolton, Newnes Publishing

CE357 RENEWABLE ENERGY SYSTEMS

Global & national energy scenario, conventional & renewable energy sources, environmental aspects of renewable energy system, solar energy system, wind energy systems, Bio energy systems, Hydel energy systems, Tidal energy, Geo thermal energy systems, Waste to energy systems.

References

1. Energy conservation systems Rakosh Das Begmudre, New Age International
2. Non conventional energy sources GD Rai, Khanna publications
3. Solar Energy by Padmashree S.P. Sukhatme, Universities Press
4. Solid waste Conversion to Energy Harvey A., Dunn J.J, M. Dekker

SEVENTH SEMESTER

CE411 WASTE WATER ENGINEERING

Wastewater Characteristic & Collection: Biological water quality Parameters, Flow fluctuations and estimations for domestic & industrial sewage, sewerage schemes and design of sewers for both separate and combined systems, sewer appurtenants, construction and maintenance of sewer, pumping stations, effluent standards. Engineered Systems for Wastewater Treatment: Water purification processes in natural systems: physical, chemical and biochemical processes involved, organic discharge and stream ecology. Preliminary and primary treatment methods.

Aerobic Systems for Wastewater Treatment: Theory and design of biological treatment methods such as trickling filters, activated sludge process include their modifications , stabilization ponds, oxidation ditches and aerated lagoons. Anaerobic Systems and Treatment of Sludge: Introduction to Anaerobic process such as Anaerobic filters, UASB etc. , Anaerobic lagoons, septic and Imhoff tanks, Source and Treatment (aerobic/ anaerobic) of sludge, sludge thickening, sludge drying beds and disposal of sludge.

Wastewater Treatment Plants and Advanced Wastewater Treatment: Treatment Plants : site selection, plant design, Hydraulic Profiles, operation and maintenance aspects. Disposal of treated effluents, standards for disposal, reuse of effluents. Advanced Wastewater treatment for Nutrient and Solids removal, tertiary treatment.

Introduction to related software.

References

1. Sewage treatment S.K.Garg, Khanna
2. Solid waste engineering W.A.Worrel &P.A.Vesilind , Thomson Brooks/Cole
3. Manual on Sewer and CPHEEO Sewerage System

CE412 WATER AND WASTE WATER ANALYSIS LABORATORY

List of Experiments

1. Determination of Turbidity
2. Determination of Total, Dissolved and Suspended Solids
3. Determination of Alkalinity
4. Determination of Acidity
5. Determination of Hardness
6. Determination of Dissolved Oxygen
7. Jar Test for determination of optimum dose of coagulant
8. Most Probable Number (MPN) Test
9. Determination of Volatile and Fixed Solids
10. Determination of Chlorides
11. Determination of Sulphate
12. Determination of Biochemical Oxygen Demand
13. Determination of Chemical Oxygen Demand

CE413 MAJOR PROJECT/SEMINAR

CE414 EDUCATION TOUR & TRAINING

EIGHTH SEMESTER

CE421 TRANSPORTATION ENGINEERING 2

Railway engineering: General Introduction to Transportation Engg. - Characteristics and comparison of important modes of Transportation in India. Permanent Way: surveys and alignment, gauges, coning of wheels etc. Components of permanent way, Geometric design, Various tractive resistance, hauling capacity & tractive efforts, Stations & yards, Signaling & interlocking, Modern techniques for safety in railways. Basic concepts of Bridges & tunnels

Airport Engineering: Airport site selection, wind rose diagram, basic runway length & corrections, runway and taxi way geometrics, airport lighting & traffic controls etc.

Docks & Harbours Engineering: Introduction to docks & harbour & their types, design & construction of break waters, port building, navigational aids etc.

References

- | | |
|---|---|
| 1. A Text Book of Railway Engg | S.C. Saxena & S.P.Arora, Dhanpat Rai Publications (p) Ltd |
| 2. Airport planning and design | K Khanna, Arora and Jain, Nem Chand |
| 3.A Course in Docks and Harbour Engineering | S.P Bindra, Dhanpat Rai Publications |
| 4. Railway Track Engineering | I.S. Mundry. |

CE422 MAJOR PROJECT&SEMINAR

CE423 GENERAL PROFICIENCY

DEPARTMENTAL ELECTIVES

CE431 REINFORCED EARTH AND GEO-SYNTHETICS ENGG.

Reinforced Earth: History, field of applications, natural fibers, and overview of Geotextiles, Geomembranes, Geogrids, Geo-nets, Geo-webs, Geo-mats and Geo-composites. Geotextiles, composites, physical, hydraulic and chemical properties. Functions of Geo-synthetics, fluid transmission, filtration, separation, protection.

Soil Reinforcement: Basic principle of soil reinforcement, shear strength of reinforced soil, factors affecting and requirements on synthetic reinforcement, installation techniques.

Use of Geo-synthetics for, embankment on soft soils, internal stability, overall stability, foundation stability and bearing capacity failures -Construction of the steep slope, retaining walls-external stability, internal stability. Use of Geo-synthetics in Roads and Railways, drainage system - Control of groundwater level, dewatering and reclamation of land, use of Geo-membranes - For lining application, management and maintenance

References

- 1 Geotextiles and Geomembranes in Civil Engineering Gerard P.T.M., A.A. Balkema
- 2 Reinforced Soil and Geotextiles J.N. Mandal, Oxford and IBH publishing company private Ltd
- 3 Geosynthetics : Application and Design Construction R.J. Tarmat, A. A. Balkema, publisher-Brookfield
- 4 Geosynthetics World J.N. Mandal, Willey Eastern Limited

CE432 MODERN FOUNDATIONS

Foundations in difficult terrain, Foundations in expansive soils, foundations in soft and compressible soils, foundations in over consolidated desiccated soils. Modern Foundation Techniques: Drilled piers, reinforced earth, and reinforced concrete retaining walls with relieving shelves. Diaphragm walls and vibrofloatation, stone columns, sand piles. Foundations for special structures: Foundations for water tanks, chimneys and towers,

References

1. Design and construction of Foundations Kurian. Narosa, New Delhi
2. Foundation Analysis and Design Bowels, McGraw-Hill Higher Education

CE433 EARTHQUAKE RESISTENT DESIGN OF STRUCTURES

Introduction: Engineering seismology, the concept of plate tectonics, earthquake damage, intensity & magnitude, seismic waves, seismic instruments. Sub surface exploration, liquefaction, mitigation of liquefaction, ground improvement techniques. Concepts of seismic design and configuration: Behavior of buildings, response spectra, seismic structural configurations, irregularities, time period, behavior of masonry, R.C.C. and steel, shear walls. Seismic detailing, design procedures, introduction to Indian building codes on earthquake engineering, i.e. IS: 1893, IS:4326, IS:13926 etc.. Seismic assessment, rehabilitation and retrofitting of R.C.C. Masonary buildings.

References

1. Earthquake Resistant Design of Structures S.K. Duggal, Oxford University Press
2. Earthquake Design Concepts NICEE Publications CVR Murthy, Andrew W. Charleson.
3. Manual of Seismic Design James L. Stratta., Prentice Hall
4. Earthquake Dynamics of Structures A Primer Anil K. Chopra, Earthquake Engineering Research Institute

CE434 SOFTWARE APPLICATION IN GEOTECHNICAL ENGINEERING

Introduction to modeling, Constitutive models (elasticity, ideal plasticity, Mohr-Coulomb model, plasticity with hardening). FEM Analysis of simple Geotechnical Problems using PLAXIS Software.

Theory and modeling of shallow foundations, deep foundations, retaining walls, reinforcement structures (nail, geosynthetic), embankments and cuttings, and underground structures.

Application of ANN Modeling in area of Geotechnical Engg,

References

1. Neural Networks, Fuzzy Logic and Genetic Algorithm Rajasekaran S., Vijaylakshmi , PHI
2. Synthesis and Applications Pai G.A, Prentice-Hall of India

CE435 ADVANCED REINFORCED CONCRETE DESIGN

Design of slabs, waffle slabs, slab of irregular shape by yield-line theory, circular slabs for different loading and edge conditions, circular slabs with central hole.

Design of water tanks, folded plates and cylindrical shells.

References

1. Reinforced concrete design Sinha &Roy, McGraw Hill Education
2. Advanced reinforcement concrete design Krishnaraju, CBS Publisher

CE436 HYDRO POWER ENGINEERING

Current scenarios in hydropower development, Hydropower Project Planning, Site selection, Hydropower development schemes. Hydropower potential of a basin - estimation of available power, storage, pondage, load & power factor.

Types of hydraulic turbines, their parts and selection of turbines.

Hydraulic design of various components of hydropower plants: Dams, intakes, water conveyance systems, Surge tanks, Types of Power houses. Project feasibility, Impact of hydropower development on water resources systems, and environment.

References

1. Water Power Engineering, M.M.Desmukh, Dhanpat Rai & Sons
2. Water Power Engineering M.M.Dandekar & K.N.Sharma, Vikas Publisher
3. Water Power Engineering H.K.Barrows, New York: McGraw-Hill Book Company,
4. Water Power Development E. Mosoyani, Vol. I & II, Pub. House of the Hungarian Academy of Sciences

CE437 SEDIMENT TRANSPORTATION ENGINEERING

Introduction to sediment & fluvial hydraulics. Properties of sediments, movement of sediments
Flow regimes and velocity distribution, bed load transport, suspended load transport, total load
transport , design of stable channels sediment control in canals.

References

1. The Flow of Complex Mixtures in Pipes G.W. Govier & K.Aziz, Van Nostrand Reinhold
2. Hydraulics Transport of Bulky Materials I. Zandi, Pergamon Press Ltd.
3. Hydraulics of Sediment Transport W.H.Graf, Water Resources Publications, LLC
4. Mechanics of Sediment Transportation R.J.Garde & K.G.Ranga , Taylor & Francis
and alluvial Stream Problems,.

CE438 ANALYSIS AND DESIGN OF SUBSTRUCTURES

Geotechnical Exploration–Penetration Tests, plate load test, field vane shear, large box shear,
pressure meter test, foundation instrumentation – settlement and displacement gauges. Shallow
Foundation: Bearing capacity & settlement analysis, Design for shallow Foundation under
vertical, horizontal and moment loading. Pile Foundation – pile capacity and settlement analysis
for individual and group piles under vertical, horizontal and moment loading, pile load test,
Foundation under Uplift Loads, negative skin friction, Foundations on rocky strata.

References

1. Foundation Engineering Hand book, Winterkorn & Fang, Van Nostrand Reinhold
2. Foundation Design Manual, N.V. Nayak, Dhanpat Rai and Sons, Delhi.
3. Foundation Analysis and Design Joseph E. Bowels, McGraw-Hill Book Company
4. Foundation Design & Construction M.J.Tomlinson, Prentice Hall Publication.

CE439 ADVANCED STRUCTURAL ANALYSIS

Analysis of redundant frames (Castigliano's Theorem), Deflection of perfect frames. Moment
Distribution Method (Non sway analysis)

Advance Plastic Analysis

Rolling load and Influence Line diagram (for indeterminate structures)

Matrix Method of Structural Analysis (flexibility method & stiffness method)

Reference :

1. Analysis of Structure Vazirani and Ratwani, Khanna publishers
2. Theory of Structure Ramamurutham, Dhanpat Rai publishing company
3. Theory of Structures B.C., Punmia Vol. 2, Laxmi Publications
4. Indeterminate Structure R.L.Jindal, S. Chand

CE 441- THEORY OF PLASTIC ANALYSIS

Analysis of Structures for Ultimate Load: Fundamental Principles, statistical method of Analysis Mechanism method of analysis , Method of analysis, Moment check, Carry over factor ,Moment Balancing Method. Design of Continuous Beams, Continuous Beams of uniform section throughout, Continuous Beams with different cross-sections, Secondary Design Problems: Introduction, Design of Connections, Design of Steel Frames, Ultimate Deflections.

References

1. Plastic Design of Steel Frames, L.S.Beedle. John Wiley & Sons Inc
2. Design of steel structure S. Subramanyam., Oxford
3. Plastic Analysis B.G.Neal, John Wiley & Sons, Inc.

CE442 HYDRAULIC STRUCTURES

Design of gravity and Arch Dam, Design of Earth & Rock fill Dams. Causes of failure and design criteria, Estimation and prevention of seepage, Stability analysis.

Spillways: Type and selection of spillway, Design of Ogee Spillway, Energy dissipation, Introduction to Hydro Power Structures.

References

- 1 Theory & Design of Irrigation Structure R.S.Varshney, S.C Gupta & R.L. Gupta, Nem Chand
2. Hydraulic Structures Narayanan & Novak., CRC Press
3. Hydraulic Structures R.S.Varshney, Nemchand & Brother ,Roorkee
4. Irrigation Engineering and Hydraulic Structures S.K.Garg, Khanna Publisher

CE443 SITE INVESTIGATION AND GROUND IMPROVEMENT

Site Investigation, Planning, Drilling methods, Geophysical methods: electrical resistivity, seismic refraction methods. Sampling disturbances, Sub Soil Investigation Report writing.

Compaction: Compaction control. Field methods for shallow surface compaction, Deep compaction methods for cohesion less and cohesive soils.

Soil Stabilization: Mechanical Stabilization: method of mixing soil to get designed plasticity Index Stabilization with Additives: Lime, flyash, cement and other chemicals and bitumen. Deep stabilization: Preloading, sand drains and sand columns.

Grouting: Grout materials, Grouting techniques.

References

- | | |
|---|---|
| 1. Modern Geotechnical Engineering | Alam singh., CBS Publishers & Distributors |
| 3. Analysis and Design of Substructures | Swami Saran. Oxford & IBH Publishing Company Pvt. Limited |
| 4. Foundation Analysis and Design | Bowels. McGraw-Hill Higher Education; |

CE444 SOIL DYNAMICS AND MACHINE FOUNDATION

Soil dynamics importance, applications, dynamic soil parameters, factor affecting, wave propagation through soils. Theory of Vibration : Free and forced vibrations – un-damped and damped for single degree of freedom system. Harmonic and transient conditions. Mass Spring-Dashpot model and calculation of response magnification. Transmissibility vibration isolation. Determination of dynamic Soils constants C_u , C_τ , C_ϕ , C_ψ , G and D etc and approximate values. Machine Foundations, types, nature of dynamic forces produced by common machines, design criteria and permissible amplitudes, design approaches. Design of machine foundation, for impact and reciprocating machine.

Effects of dynamic loads on bearing capacity and earth pressure and slope stability.

References

- | | |
|---|--|
| 1. Soil Dynamics and Machine Foundation | Swami Saran, Galgotia Publications Pvt Ltd |
| 2. Soil Dynamics | Shamsher Prakash. McGraw Hill Higher Education |
| 3. Principles of Soil Dynamics | B.M.Das. Thomsons Engineering |
| 4. Handbook of M/c Foundation | Srinivasan & Vaidanathaln, McGraw Hill Education |

CE445 HAZARDOUS WASTE MANAGEMENT AND RISK ANALYSIS

Hazardous wastes: Landmark episodes, classification, generation, guidelines of HWM, Regulatory frame work, Basal Convention, Monitoring of critical parameters/provide risk analysis. HAZON, HAZOP, Consequence analysis. Fault and inventory analysis, Emergency Management: Indian and international legislation in respect of the above. Case Studies, leakage, explosion, oil spills and fire of hazardous chemical storage. Leakage in atomic plants.

Hazardous chemicals: Physical properties, chemical composition, lethal dose and concentration. Storage, collection and transport.

Hazardous waste treatment: Characterization of waste, compatibility and flammability of chemicals, Physico-chemical and biological treatment of Hazardous Waste including waste reduction, neutralization, incineration, combustion and pyrolysis, stabilization, solidification, bioremediation. Precautions in collection, reception, transport, storage and disposal. Import procedure for environmental surveillance.

Radioactive Waste Management -Sources, measures, health effects; nuclear power plants and fuel production; waste generation from nuclear power plants; disposal options. Hazardous waste management system. Environmental Risk Assessment: Defining risk and environmental risk, methods of risk assessment, case studies, dose-response assessment, risk exposure assessment

References

- | | |
|---|---|
| 1. Hazardous Waste Management | Michael LaGrega, Waveland Pr Inc; |
| 2. Risk Assessment and Management:
Chemistry | R E Hester, R M Harrison Royal Society of |
| 3. Hazardous waste management | Charles A. Wentz, McGraw-Hill Inc |

CE446 ADVANCED HIGHWAY CONSTRUCTION

Introduction: Types of Highway constructions, construction equipments, safety during construction, Bituminous Mixes- Design of bituminous mixes and methods of testing, concrete paving mixes- mix design methods

Construction techniques and quality control of embankment, subgrade, sub-base and base course construction. Low Cost Road Construction, Construction of WBM and gravel roads etc. Bituminous Road Construction, construction techniques and quality control etc. Concrete Road Construction.

References

- | | |
|--|--|
| 1. Highway Engineering | S.K.Khanna & C.E.G. Justo, Khanna Pub. |
| 2. Principles of Transportation Engineering | Chakroborti and Das, PHI Learning Pvt Ltd. |
| 3. Principles & Practice of Highway Engg | L.R. Kadiyali, Khanna Publishers |
| 4. Principles of Pavement Design | E.J. Yoder And M.W. Witczak, John Wiley & Sons |
| 5. Guidelines for Design of Flexible Pavements | IRC:37-2012 |
| 6. Guidelines for Design of Rigid Pavements | IRC:58-2011 |

CE447 PAVEMENT DESIGN

Introduction: Important types of pavement, Component parts of the pavement structures and their functions, design factors etc, Design of Flexible Pavements: stresses in flexible pavements, various design methods, design as per latest Indian standards guidelines.

Design of Rigid Pavements: stresses in rigid pavements, various design methods, design as per latest Indian standards guidelines: Design parameters and their estimation, design procedure etc., Design of Joints etc. Rigid and flexible overlays and their design Procedures etc.

References

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|---|---|
| 1. Highway Engineering | S.K.Khanna & C.E.G.Justo., Khanna Publisher |
| 2. Pavement Design | Yoder & Witczak, Wiley |
| 3. Principles of Transportation Engineering | Chakraborti and Das, Prentice Hall India |
| 4. Concrete Road Design | HMSO |

CE448 DESIGN OF STEEL - CONCRETE COMPOSITE STRUCTURES

Introduction to steel concrete composite structures their advantages and applications, types of composite beams and their design, types of composite floors & their design, various types of composite columns and their design, study of Indian and European codes.

References

1. Composite structures of steel and concrete Johnson, R. P, Wiley
2. IS: 11384 and Eurocode -8.

CE449 BRIDGE DESIGN

Bridge system, planning, economic considerations, aesthetics and selection of type of bridge. Introduction to IRC Bridge Design Course, loading standards, super structure analysis, effective width method of analysis , Pigeaud's theory, Courbon's method of analysis of girder bridges, design of solid slab bridges, t-beam, girder bridge, bearings, design of box culverts.

References

- 1 Concrete Bridge Practice Raina, V. K., Shroff Publishers and Distributors Pvt. Ltd
2. Essentials of Bridge Engineering Victor, D.J., Oxford & IBH
3. Bridge Engineering Demetrios E. Tonnias, McGraw-Hill Education

Open Electives

CE451 FLUID MEASUREMENT SYSTEMS

General characteristics of a measurement system, characteristics of measuring instruments, pressure and vacuum measurements, velocity measurement, flow measurement, Force Power measurement, Viscosity measurement, mass flow measurement, level measurement, calibration of measuring instruments.

References

1. Instrumentation, Analysis and Measurement Nakra and Choudhary , Tata McGraw Hill
2. Industrial Instruments A.L. Seutko, Thomas Delmer, Vikas publisher
3. Measurement and Instrumentation Systems W. Bolton , Newnes

CE452 FLUID POWER SYSTEM

Type of prime movers, their selection criteria, positive displacement pumps, rotary pumps, air lift pumps, compressors, hydraulic ram, hydraulic accumulator, hydraulic intensifier, hydraulic press and lift, hydraulic coupling.

References

1. Hydraulic Machines Jagdish Lal Metropolitan Book Co.Pvt Ltd.
2. Fluid Mechanics and Hydraulic machines Modi & Seth, Standard Book House

CE453 COMPUTATIONAL FLUID DYNAMICS (CFD)

Introduction and overview of CFD, need, accuracy, consistency, stability, convergency, mathematical models of fluid dynamics, finite difference methods, explicit and implicit formulations, finite element methods, finite volume method, turbulence models, boundary conditions, coordinate transformations, numerical integration, grid generation, element geometries, structured and unstructured mesh, mesh refinement, conformal mapping.

References

1. An Introduction to Computational Fluid Dynamics Versteeg H.K., Malalasekera W., PHI
2. Computational Techniques for Fluid Dynamics Fletcher C.A.J, Springer
3. Computational Methods for Fluid Flow Peyrate R., Taylor T.D. Springer
4. Fluid Dynamics-Theoretical and Computational Warsi Z.U.A. CRC Press
Approaches

CE454 ROAD SAFETY ENGINEERING

Introduction, road safety scenario etc, Causes of accidents and measures to reduce accident, Accident studies and record, Analysis of Accident, Road Safety Audit: advantages, procedure. Checklist, Safety during construction of road projects

References

1. Principles of Transportation Engineering Chakroborti and Das, PHI
2. Traffic Engineering and L.R. Kadiyali, Khanna Publishers
Transport Planning
3. Principles of Pavement Design E.J. Yoder & M.W. Witczak, John Wiley & Sons
4. Highway Engineering S.K.Khanna & C.E.G. Justo, khanna Publishers

CE455 DIGITAL PROCESSING OF REMOTELY SENSED DATA

Basic Concepts of Digital images: Commercial image processing system software. Image rectification and restoration: Geometric and radiometric correction, establishing, spatial transformation, model using GCP's, intensity interpolation techniques (nearest neighbour, bilinear and cubic convolution.

Image Enhancements: Contrast manipulation: Grey Level threshold, level slicing and contrast stretching. Spatial feature manipulation: spatial filter, edge enhancement and Fourier analysis. Point, local and regional operation –Fourier transform, scale- space transform, wavelet transform –principle component analysis- Multi image manipulation: Multi-band rationing and differencing principal components, vegetation indexes, color composition and Intensity Hue Saturation (IHS).

Initial statistics extraction from digital images: Image histogram, mean, standard deviation, variance, covariance matrices. Image display alternatives: mono and color, composites of MSS, Band Combination and optimum index factor (OIF), Variance-Covariance and correlation

matrices. Pattern recognition, boundary detection and representation, textural and contextual analysis, Image Classification and thematic information extraction, General steps for land cover information extraction, classification levels and supervised and unsupervised classification techniques, selection of appropriate algorithms for classification: Parallelopiped, Minimum distance, Maximum likelihood, Isodata, fuzzy classification, classification accuracy assessment. Hybrid training, Non- parametric, and sub-pixel classification, Hyper – spectral image analysis.

References

1. Physical Principles of Remote Sensing, W.G.Rees Cambridge University Press
2. Remote sensing models & methods for image processing, Robert Shcowebgerdt , Academic Press
3. Digital Image Processing (3rd Edition) Rafael C. Gonzalez , Richard E. Woods, Pearson
4. Remote Sensing Digital Image Analysis John A.Richards, Springer

CE 456 WATER RESOUCES SYSTEMS

Water Resources Management – Water supply, water budget, water quality management. System Approach – Types of systems, stages in water resources systems. Optimization principles, objective functions and constraints, Optimization methods and problems, linear programming, dynamic programming economic considerations project feasibility and optimality, cost allocations. Single purpose and multipurpose systems, Dam –break analysis. Introduction to soft computing techniques.

References:

1. Water Resources Systems Subhas Chander and Rajesh Prasad , Jain Brothers
2. Water Resources System Planning and Management S.K.Jain and V.P.Singh , Elsevier
3. Water Resources Systems S. Vedula and P. P. Majumdar, Tata McGraw-Hill
4. Water Resources System Planning and Analysis D.P.Loucks, J.R.Stedinger,D.A.Haith., Moskva :

CE457 ENVIRONMENTAL LEGISLATION

Environmental Acts - Their need, historical background, National and International Acts and Agreements.

Major National Acts – The Water (prevention and control of pollution) Act, The Air Act, The Environment (protection) Act, Hazardous waste Rules, Biomedical Waste (Management and Handling) Rules,, Municipal Solid Waste Rules, Batteries (Management and Handling) Rules, e-waste (management and handling) Rules, Prevention of Cruelty to Animals (Slaughter House) Rules, Slaughter Act. ISO: 14000 - its need, procedure and significance, ISO: 14000 Certification, National Certifications, Role of BIS. Role of Public Hearing, Non Governmental

Organisations and their role, Role of Civil Society, and Judiciary. Amendments to various Acts from time to time.

Environmental legislation rules for management of fly ash and nuclear waste.

References

1. Environmental Legislation in India K.R. Gupta, Atlantic
2. Environmental Law DS Sengar, Prentice-Hall of India
3. ISO 14001 and beyond: environmental management systems in the real world Christopher Sheldon, Greenleaf

CE458 ENVIRONMENTAL IMPACT ASSESSMENT

Role of EIA as a tool for Sustainable Development. Concept of Carrying Capacity and Limits to growth in terms of population, Food, Resources, Capital, Energy, Land Services etc.

Impact Assessment: Environmental, Social and Economic issues, Issues in collection of baseline data, preliminary concept of Natural Resource Accounting, Concept of Screening, Initial environmental examination (IEE), Environmental Impact Assessment (EIA), Environmental Impact Statement (EIS).

Rapid and Comprehensive EIA. Methodologies: Including Checklists, Matrices and Networks.

EIA: Case studies and Issues. Procedures for Environmental Clearance by the Government of India.

Mitigation Strategies, Environmental Management, Appropriate Siting of Industries and Projects for minimizing impacts. Concept of Zoning Atlas,

References

- 1 Introduction to environmental impact assessment John Glasson, Riki Therivel, Routledge
2. Methods of environmental impact assessment Peter Morris, Riki Therivel, Taylor & Francis
3. Environmental impact assessment: theory and practice Peter Wathern, Routledge

CE459 ADVANCED GEOLOGY

Soil description and classification, Flow of water through Soils, Influence of mineralogy and fabric on strength of soils, Engineering & geological characteristics of Sediments, Problematic Soils.

Physical and mechanical properties of Rocks, Stress and Strain in rocks, Strength and deformability of rock & rock masses, Discontinuity, Field description for rock mass characterization, Rock mass classification.

Hydrogeological behavior of Soils and rocks, Hydrogeological parameters, Darcy's law and fundamental flow equations in porous media, Chemical properties of water, Evaluation methods of hydrogeological parameters.

Site investigation- Planning and design, Procedure, Remote sensing application and interpretation, Preliminary Investigation Report, Geophysical surveys- Electrical methods,

Seismic methods, Gravity methods, Magnetic methods, Electromagnetic methods, Ground penetrating Radar methods.

Engineering Geological Mapping – Types of Maps, Mapping methods, Data collection, Applications and Engineering geological criteria for various structures like foundation, dams and reservoirs, tunnels, slopes.

Reference:

- | | |
|--------------------------------------|--|
| 1. Geological Engineering | Luis I , Gonzalez De Vallejo CRC Press |
| 2. Principles of Engineering Geology | Rebert B Johnson, Jesome V. Degraff., Wiley |
| 3. Engineering and General Geology | Parbeen Singh, S K Kataria & Sons |
| 4. Geology for Engineers | Joseph M.Trefethen, Van Nostrand Reinhold Inc.,U.S |

CE461 CONSTRUCTION PROJECT MANAGEMENT

CPM- project management, bar chart mile stone charts, element of network and its analysis. Project Organization, Construction Economics, Construction Planning, Project scheduling and resources leveling ,contractor's Estimation of cost and bidding strategy, construction accounts management, project cost and value management, construction quality management, risk and insurance in construction, construction safety management, project monitoring and control system, construction claims, disputes, and project closure, factors behind the success of a construction project. Equipment management, Inventory management.

References

- | | |
|--|--|
| 1. Construction Project Management | Kumar Neeraj Jha, Pearson Education India |
| 2. Construction engineering and Management | S. Seetharaman, Umesh Publications |
| 3. Construction Planning and Management | U.K. Shrivastava , Galgotia Publications Pvt Ltd |
| 4. Principles of construction management | Roy Pilcher, McGraw Hill Higher Education |

CE462 EXPERIMENTAL STRESS ANALYSIS

Basic concepts of theory of elasticity: Stress and strain at a point, equations of equilibrium, stress-strain relationships plane stress and plain strain, equations of equilibrium and compatibility, transformation of strains, principal stresses

Measurement of Strains: Various types of strain gauges, requirement of an ideal strain gauge, working principle of electrical strain gauge, strain sensitivity, strain gauge materials, installation procedure for strain gauges, temperature compensation, gauge factor, axial, normal and cross strain sensitivities, determination of actual strains

Strain Gauge Rosette: Concept of rosette, types of rosette, Rosette analysis using rectangular rosette, delta rosette, Tee-D-delta rosette

Strain Measuring Circuits: Potentiometer circuit, circuit sensitivity of potentiometer, temperature compensation, wheatstone bridge, sensitivity of wheatstone bridge, active and dummy strain gauges, analysis of strains using wheatstone bridge

Photoelasticity: Basic principle, wave theory of light, plane polarized and elliptically polarized light, stress-optic law, analysis of light vector through plane and circular polariscope,, requirements of ideal photoelastic material, concept of fringe and fringe order, Interpretation of isoclinics, isochromatics and fractional fringe orders, calibration of photoelastic material, transition from model to prototype, various methods of separation of principal stresses, oblique incidence method, shear difference method

Brittle Coating Method: Concept of brittle coating, various types of coating materials, calibration of coating, threshold strain application of failure theory to brittle coating, advantages and limitations of brittle coating method

References:

Experimental stress analysis-	Dr. Sadhu Singh, Khanna Publishers
Experimental stress analysis –	Dr. A. Mubeen, Dhanpat Rai & Co (P) Ltd
Experimental stress analysis of stress and strain	T.K. Ray, S. Chand,

CE463 DISASTER MITIGATION AND MANAGEMENT

Natural Disasters- Meaning and nature of natural disasters, their types and effects. Floods, drought, cyclone, earthquakes, landslides, avalanches, Volcanic eruptions, Heat and cold waves, Climatic change: global warming, Sea level rise, ozone depletion.

Man Made Disasters- Nuclear disasters, chemical disasters, biological disasters, building fire, coal fire, forest fire, oil fire, air pollution, water pollution, deforestation, industrial waste water pollution, road accidents, rail accidents, air accidents, sea accidents.

Disaster Management- International strategy for disaster reduction. Concept of disaster management, national disaster management framework; financial arrangements; role of NGOs, community –based organizations and media. Central, state, district and local administration; Armed forces in disaster response; Disaster response; Police and other organizations. Disaster preparedness.

References

1. Disaster Management	G.K. Ghosh, APH Publishing Corporation
2. Disaster Management	B Narayan APH Publishing Corporation
3. Disaster Management: Through the New Millennium	Ayaz Ahmad, Anmol Publications Pvt. Ltd.
4. Modern Encyclopedia of Disaster and Hazard Management,	B. C Bose, Rajat publishers

CE464 DIGITAL MAPPING AND CARTOGRAPHY

Definition of GIS, Cartography and GIS, GIS database: spatial and attribute data; Spatial models: Semantics, spatial information, temporal information, conceptual models of spatial information, representation of geographic information: point, line and area features, toplogy, raster and vector data, raster to vector data conversion, map projection, analytical transformation, rubber sheet transformation, manual digitizing and semi-automatic line following

digitizer; Remote sensing data as an input to GIS data; Attribute database: scale and source of inaccuracy; GIS functionality; data storage and data retrieval through query, generalization, classification, containment search within a spatial region; Overlay: arithmetical, logical and conditional overlay, buffers, inter visibility, aggregation; Network analysis; Applications of GIS in planning and management of utility lines and in the field of environmental engineering, geotechnical engineering, transportation engineering and water resources engineering.

References

1. Geographic Information Systems: A Management Perspective Stan Arnoff, Wdl Pubns
2. Fundamentals of Spatial Information Systems Robert Laurini and Derek Thompson, Academic Press
3. Geographical Information Systems, Vo. I and II edited Paul Longely, M.F. Goodchild, Wiley

CE465 INDUSTRIAL WASTE TREATMENT

Problem of Water Pollution: Effects of wastes on streams and sewage treatment plant, stream standards and effluent standards, Sampling of waste waters, grab and composite samples. analysis of waste water Biochemical oxygen demand, chemical oxygen demand and pH value of waste, toxicity of waste by bio-assay method.

treatment of Wastes : Volume and strength reduction, recovery of bye products , reuse of wastewater, regulation. Sewer rental charge instrumentation in wastewater treatment plants, collection of data, operation and maintenance of plants, water pollution control board.

Brief study of industrial processes and treatment methods of waste water from common industries, such as textile dairy, paper and pulp, tannery, distillery.

References

1. Industrial Water Pollution Control Eckenfelder, McGraw-Hill Higher Education
2. Environmental Industrial Pollution control P.R.Trivedi and Gurdeep Raj. Akashdeep Publishing House
3. Pollution Control in process industries S.P.Mahajan. Tata McGraw-Hill Education
4. Waste Water Treatment for Pollution Control J.Arcieivala, McGraw Hill Education

CE466 ANALYSIS & DESIGN OF PIPING SYSTEM

Pipe materials and sizes, laminar and turbulent flow in pipes, pipe fittings, losses in pipes and fittings, pipes in series and parallel, Methods of steady and transient analysis of pipe networks Pipe network analysis software.

References

1. Fluid mechanics & Hydraulic machines Modi & Seth, Standard Book House
2. Fluid mechanics Streeter & Wylie, McGraw Hill Education
3. Water Transmission and Distribution AWWA, American Water Works Association
4. Piping - Handbook Nayyor, McGraw-Hill Education

CE467 ORGANIZATIONAL BEHAVIOUR

Definition, need and importance of organizational behaviour – Nature and scope – Frame work – Organizational behaviour models. Personality – types – Factors influencing personality – Theories – Learning – Types of learners – The learning process – Learning theories – Organizational behaviour modification. Misbehaviour – Types – Management Intervention. Emotions - Emotional Labour – Emotional Intelligence – Theories. Attitudes – Characteristics – Components – Formation – Measurement- Values.

Perceptions – Importance – Factors influencing perception – Interpersonal perception-Impression Management. Motivation – importance – Types – Effects on work behavior.

Organization structure – Formation – Groups in organizations – Influence – Group dynamics – Emergence of informal leaders and working norms – Group decision making techniques – Team building - Interpersonal relations – Communication – Control.

Meaning – Importance – Leadership styles – Theories – Leaders Vs Managers – Sources of power – Power centers – Power and Politics.

Organizational culture and climate – Factors affecting organizational climate – Importance.

Job satisfaction – Determinants – Measurements – Influence on behavior. Organizational change – Importance – Stability Vs Change – Proactive Vs Reaction change – the change process – Resistance to change – Managing change.

Stress – Work Stressors – Prevention and Management of stress – Balancing work and Life.

Organizational development – Characteristics – objectives –. Organizational effectiveness

References

1. Organizational Behavior Stephen P. Robins, Prentice Hall
2. Organizational Behavior Fred Luthans, McGraw-Hill Education;
3. Organizational behavior Schermerhorn, Hunt and Osborn, Wiley
4. Understanding Organizational Behavior Uday Pareek, Oxford University Press

CE468 GLOBAL ENVIRONMENTAL ISSUES AND SUSTAINABLE DEVELOPMENT

Overview of Environmental Concepts, State of the World, Human Population and its role in a limited closed system in terms of supportive and assimilative capacities of nature.

Global Warming, Ozone Layer & UV Radiations, Biodiversity & Introduced Species, Carbon sequestration, Acid rain, depletion of Fossil fuels and Non-conventional energy.

Deforestation, Energy & Matter Cycles, Genetically modified foods, Urbanization and its consequences, Case Studies of Significant Environmental Problems and Disasters and the lessons learnt, Historical role of Technology, and the consequences of modern technology.

Role of environmental ethics, Anthro-Centric versus Eco-centric world views, Ecological traditions, Religio-philosophical approaches, Semitic versus non-Semitic perceptions of Environment and their fallouts, Role of Science and Technology in Environmental degradation and Conservation, the Concept of Deep ecology and Gaia hypothesis.

References

- 1 Global Environmental Issues Frances Harris Wiley
- 2 An introduction to global environmental issues, Kevin T. Pickering, Lewis A. instructor's manual Owen Psychology Press
- 3 Global environmental issues: a climatological approach David D. Routledge

CE469 BUILDING DESIGN STUDIO

Preparation of basic structural drawing plan based on Architectural drawings, Study of Codal provisions, Calculation of loads, systematic analysis, design and preparation of detailed structural drawings of a building project, Use of relevant software available for building design.

References

1. BIS Codes
2. Relevant Software's