

Rajiv Gandhi Proudyogiki Vishwavidyalaya, Bhopal

Branch- Common to All Discipline

ES401	Energy & Environmental Engineering	3L-1T-0P	4 Credits
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The objective of this Course is to provide *an introduction to energy systems and renewable energy resources, with a scientific examination of the energy field and an emphasis on alternative energy sources and their technology and application.*

Module 1: Introduction to Energy Science:

Introduction to energy systems and resources; Introduction to Energy, sustainability & the environment; Overview of energy systems, sources, transformations, efficiency, and storage; Fossil fuels (coal, oil, oil-bearing shale and sands, coal gasification) - past, present & future, Remedies & alternatives for fossil fuels - biomass, wind, solar, nuclear, wave, tidal and hydrogen; Sustainability and environmental trade-offs of different energy systems; possibilities for energy storage or regeneration (Ex. Pumped storage hydro power projects, superconductor-based energy storages, high efficiency batteries)

Module2: Ecosystems

- Concept of an ecosystem; Structure and function of an ecosystem; Producers, consumers and decomposers; Energy flow in the ecosystem; Ecological succession; Food chains, food webs and ecological pyramids; Introduction, types, characteristic features, structure and function of the following ecosystem (a.)Forest ecosystem (b) Grassland ecosystem (c) Desert ecosystem (d) Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

Module 3: Biodiversity and its conservation

- Introduction – Definition: genetic, species and ecosystem diversity; Bio-geographical classification of India; Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values; Biodiversity at global, National and local levels; India as a mega-diversity nation; Hot-spots of biodiversity; Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts; Endangered and endemic species of India; Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

Module 4: Environmental Pollution

- Definition, Cause, effects and control measures of Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Thermal pollution, Nuclear hazards; Solid waste Management: Causes, effects and control measures of urban and industrial wastes; Role of an individual in prevention of pollution; Pollution case studies; Disaster management: floods, earthquake, cyclone and landslides.

Module 5: Social Issues and the Environment

- From Unsustainable to Sustainable development; Urban problems related to energy; Water conservation, rain water harvesting, watershed management; Resettlement and rehabilitation of people; its problems and concerns. Case Studies
Environmental ethics: Issues and possible solutions. Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case Studies Wasteland reclamation; Consumerism and waste products; Environment Protection Act; Air (Prevention and Control of Pollution) Act; Water (Prevention and control of Pollution) Act; Wildlife Protection Act; Forest Conservation Act; Issues involved in enforcement of environmental legislation; Public awareness.

Module 6: Field work

- Visit to a local area to document environmental assets-river/forest/grassland/hill/mountain
- Visit to a local polluted site-Urban/Rural/Industrial/Agricultural
- Study of common plants, insects, birds.
- Study of simple ecosystems-pond, river, hill slopes, etc.

REFERENCE

1. Brunner R.C., 1989, Hazardous Waste Incineration, McGraw Hill Inc.
2. Clark R.S., Marine Pollution, Clarendon Press Oxford (TB).
3. Cunningham, W.P. Cooper, T.H. Gorhani, E & Hepworth, M.T. 2001, Environmental Encyclopedia, Jaico Publ. House, Mumbai,
4. De A.K., Environmental Chemistry, Wiley Eastern Ltd.
5. Trivedi R.K., Handbook of Environmental Laws, Rules Guidelines, Compliances and Standards', Vol I and II, Enviro Media (R)
6. Boyle, Godfrey, Bob Everett, and Janet Ramage (Eds.) (2004), Energy Systems and Sustainability: Power for a Sustainable Future. Oxford University Press.
7. Schaeffer, John (2007), Real Goods Solar Living Sourcebook: The Complete Guide to Renewable Energy Technologies and Sustainable Living, Gaiam

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

New Scheme Based On AICTE Flexible Curricula

Civil Engineering, IV-Semester

CE402 Construction Technology

Unit-I Design features and construction of Foundations Introduction and essential requirements of foundations, footing types and depth of footings, contact pressure below footings such as strip footings, isolated footings, eccentrically loaded footings, Grillage foundations, , design features and construction detail of combined footing, strap footing, problem of frost heave, its causes and prevention, effect of ground water on footings.

Purpose of pile foundation, classification based on different criterion and types, advantages and disadvantages, selection of pile type, pile action, behavior of pile and pile group under load, definition of load failure.

Unit-II Formwork and Temporary structures Design and construction features of different types of temporary structures, stationary and slip form work techniques, special features of in-situ construction, stripping and removal of formworks, formworks for special structures, e. g. shells bridges towers etc.

Unit-III Masonry and walls Brick masonry, Bonds, Jointing, Stone masonry, casting and laying, masonry construction, brick cavity walls, code provisions regarding load bearing and non load bearing walls, common defect in construction and their effect on strength and performance of walls, Design of brick masonry, precast stone masonry, hollow concrete block and hollow block masonry walls, plastering and pointing, white and colour washing, distempering, dampness and its protection.

Doors windows and ventilators: types based on materials etc. size location fittings, construction sunshades, Sills and jambs, RCC doors/windows frames, Stair types, rules of proportionality, etc., Repair Techniques for masonry, walls, doors and windows.

Unit- IV Construction of Floors Ground floor-introduction, Components of a floor, Materials for construction, Selection of flooring material, Construction of Various types of floorings such as Mud, Brick, Cement, Terrazzo, Mosaic, Tiled, Marble, Rubber, Glass and plastic floorings etc., Upper floor- Introduction, construction of Slab floors, Jack arch floors, RCC floors, Ribbed or Hollow tiled flooring, Filler Joist floors, Pre-cast concrete floors, Timber floors etc. Repair Techniques for floors.

Construction of Roofs Introduction and types of roofs, Construction of Pitched roofs, single roofs, double or purlin roofs, trussed roofs, steel roof trusses etc. roof coverings for pitched roofs and flat terraced roof etc. Repair Techniques for roofs.

Unit- V Construction of Earthquake Resistant Building Planning of earthquake resistant building, Construction of walls – provision of corner reinforcement, construction of beams and columns, Base isolation.

Reference:-

1. Mohan Rai & M. P. Jai Singh, Advances in Building materials and Constructions.
2. S. P. Arora and S. P. Bindra, A text Book of Building Construction-Dhanpat Rai and Sons, New Delhi.
3. S. K. Sarkar and Saraswati, Construction Technology- Oxford University Press, New Delhi.
4. Sushil Kumar, Building Construction.
5. B. C. Punmia , Building Construction.
6. Metchell , Building Construction.
7. Chudley R., Construction Technology.
8. Dr. K.R. Arora Soil Mechanics & Foundation Engg - Std. Publishers Delhi
9. B.C. Punmia, Soil Mechanics & Foundation Engg. - Laxmi Publications Delhi

List of Experiments:

1. Tests on Bricks
2. Tests on Aggregates (fine and Coarse)
- 3 Tests on Cements and concrete
4. Tests on tiles

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New Scheme Based On AICTE Flexible Curricula

Civil Engineering, IV-Semester

CE403 Structural Analysis-I

UNIT I Virtual work and Energy Principles: Principles of Virtual work applied to deformable bodies, Strain energy and complementary energy, Energy theorems, Maxwell's Reciprocal theorem, Analysis of Pin-Jointed frames for static loads.

UNIT II Indeterminate Structures-I: Static and Kinematics indeterminacy, Analysis of Fixed and Continuous beams by theorem of three moments, Effect of sinking and rotation of supports, Moment distribution method (without sway)

UNIT III Indeterminate Structures - II: Analysis of beams and frames by slope Deflection method, Column Analogy method.

UNIT IV Arches and Suspension Cables: Three hinged arches of different shapes, Eddy's Theorem, Suspension cable, stiffening girders, Two Hinged and Fixed Arches - Rib shortening and Temperature effects.

UNIT V Rolling loads and Influence Lines: Maximum SF and BM curves for various types of Rolling Loads, focal length, EUDL, Influence Lines for Determinate Structures- Beams, Three Hinged Arches.

References:

1. Rammamurtham, Theory of Structures, Dhanpat Rai .
2. Bhavikatti S.S. Analysis of Structures (I&II) Vikas Publication
3. B C Punmia, Theory of Structures, Firewall Media.
4. A Kassimali, Structural Analysis, Cengage Learning.
5. A Ghali, A Neville, T G Brown, Structural Analysis: CRC Press.
6. Hibbler, Structure Analysis -1, Pearson Education India
7. C S Reddy, Basic Structural Analysis, Tata McGraw Hill Publishing Company.
8. Pandit and Gupta, Theory of Structures – I, McGraw Hills
9. West HH, Fundamental of Structural Analysis, Wiley India
10. Das MM, Structural Analysis, PHI
11. Thandavamurthy TS, Structural Analysis, Oxford
12. Muthuku, Azmi I, Basic Structural Analysis, IK International Publisher
13. C KWang, Intermediate Structural Analysis, McGraw Hill
14. J Kinney Sterling, Indeterminate structural Analysis, Addison-Wesley
15. RR Mamuther S Theoty of Structures Dhanpat Rai
16. Jain O.P.-Jain B.K. Theory& Analysis of Structures (I&II) Nem Chand

Structure Analysis Lab - I

1. To verify Maxwell- Bett's Law.
2. To determine the flexural rigidity of the beam verify it theoretically
3. To determine the deflection of a pin jointed truss and to verify the results theoretically and graphically
4. To verify strain in an externally loaded beam with the help of a strain gauge indicator and to verify theoretically
5. To study behaviour of different types of columns and find Euler's buckling load for each case
6. To study two hinged arch for the horizontal displacement of the roller end for a given system of loading and to compare the same with those obtained analytically
7. To study the behaviour of a portal frame under different end conditions.

Apparatus

8. To find the value of flexural rigidity (EI) for a given beam and compare it with theoretical value
9. To determine the deflection of a pin connected truss analytically & graphically and verify the same experimentally
10. To verify the Muller Breslau theorem by using Begg's deformatior set

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Civil Engineering, IV-Semester

CE404 TRANSPORTATION ENGINEERING –I

Unit–I: Introduction, Tractive resistances & Permanent way : Principles of Transportation, transportation by Roads, railways, Airways, Waterways, their importance and limitations. Route Surveys and alignment, railway track, development and gauges. Hauling capacity and tractive effort.

1. Rails: types, welding of rails, wear and tear of rails, rail creep.
2. Sleepers: types and comparison, requirement of a good sleeper, sleeper density.
3. Rail fastenings: types, Fish plates, fish bolts, spikes, bearing plates, chain keys, check and guard rails.
4. Ballast: Requirement of good ballast, various materials used as ballast, quantity of ballast. Different methods of plate laying, material trains, and calculation of materials required, relaying of track

Unit –II : Geometric Design ; Station & Yards; Points and Crossings & Signaling and interlocking : Formation, cross sections, Super elevation, Equilibrium, Cant and cant deficiency, various curves, speed on curves. Types locations, general equipments, layouts, marshalling yards. Definition, layout details, design of simple turnouts. Types of signals in stations and yards, principles of signaling and inter-locking.

Unit – III : Bridge Site Investigation and Planning ; Loading Standards & Component parts: Selection of site, alignment, collection of bridge design data : essential surveys, hydraulic design, scour depth of bridge foundation, Economical span, clearance, afflux, type of road & railway bridges : Design loads and forces, Impact factor, Indian loading standards for Railways Bridges and Highway Bridges. Bridge super structure and sub-structures, abutments, piers, wing walls, return walls, approaches, floors & flooring system, choice of super structure.

Unit – IV: Bridge Foundations, Construction, Testing and Strengthening of Bridges: Different types of foundation: piles and wells, sinking of wells, coffer-dams. Choice of bridges and choice of materials, details of construction underwater and above water, sheet piles coffer dams, Erection of bridges, girders, equipments and plants, inspection and data collection, strengthening of bridges, Bridge failure.

Unit – V: Tunnels:

1. Selection of route, Engineering surveys, alignment, shape and size of tunnel, bridge action, pressure relief phenomenon, Tunnel approaches, Shafts, pilot shafts.
2. Construction of tunnels in soft soil, hard soil and rock. Different types of lining, methods of lining. Mucking operation, Drainage and ventilation. Examples of existing important tunnels in India and abroad.

References:-

- 1.Chakraborty and Das; Principles of transportation engineering; PHI
- 2.Rangwala SC; Railway Engineering; Charotar Publication House, Anand
- 3.Rangwala SC; Bridge Engineering; Charotar Publication House, Anand
- 4.Ponnuswamy; Bridge Engineering; TMH
- 5.Railway Engineering by Arora & Saxena - Dhanpat Rai & Sons
- 6.Railway Track by K.F. Antia
- 7.Principles and Practice of Bridge Engineering S.P. Bindra - Dhanpat Rai & Sons
- 8.Bridge Engineering - J.S. Alagia - Charotar Publication House, Anand
- 9.Railway, Bridges & Tunnels by Dr. S.C. Saxena
- 10.Harbour, Docks & Tunnel Engineering - R. Srinivasan
- 11.Essentials of Bridge Engg. By I.J. Victor; Relevant IS & IRS codes

Transportation Engineering Lab - I

1. Collection of different types of photographs showing
 - a. Various bridge types
 - b. Rail tracks
 - c. Tunnels
2. Hydraulic design of bridges.
3. Various modern large span bridges: Pre stressed bridges and launching process.
4. Visit of Railway bridges for rehabilitation.
5. Visit of Railway Over Bridges and Under Bridges.

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New Scheme Based On AICTE Flexible Curricula

Civil Engineering, IV-Semester

CE405 ENGINEERING GEOLOGY & REMOTE SENSING

Unit 1: Introduction and physical geology: branches application and scope of geology, age and parts of the earth, weathering of rocks, geological action of river, ground water, sea and oceans, Concept and causes of earthquakes and volcanoes.

Unit 2: Mineralogy and crystallography: fundamentals of mineralogy, physical properties, study of common rock forming minerals and ore minerals, importance to civil engineering, and element of crystals and introduction to crystal systems.

Unit 3: Petrology: rock cycle, composition, classification and structures of igneous, sedimentary and metamorphic rocks of civil engineering importance, study of common rock types, brief geological history of India.

Unit 4: Structural geology: dip, strike, outcrops, classification and detailed studies of geological structures i.e. Folds, Faults, Joints, Unconformity and their importance in civil engineering.

Unit 5: Applied geology and remote sensing, engineering properties of rocks, selection of sites for Dam, Tunnel, Reservoirs and Canals, uses of remote sensing technique. Types, components and elements of remote sensing, EMS and MSS, Visual interpretation technique, application of GIS in civil engineering and resource mapping (site selection, water resources, rocks and soil)

List of Experiment's (Expandable)

1. Identification of simple rock forming minerals and important ores.
2. Identification of rocks
3. Simple map Exercises.
4. Field Visit/Geological Excursion

Reference:

1. Prabin Singh - "Engineering and General Geology"
2. P. K. Mukherjee - "A text Book of Geology"
3. S. K. Garg --"A text Book of Physical and Engineering Geology"

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Civil Engineering, IV-Semester

CE406 SOFTWARE LAB (AutoCAD)

List Of Experiments:

1. Introduction to CAD, Introduction to AutoCAD, Software and hardware requirements, various input and output devices. Getting started with AutoCAD, Setting drawing limits, Units etc.
2. Learning and practice of Draw commands, Modify commands, utility and other commands.
3. Drawing basic Geometric Shapes, Basic Plotting and Editing Tools, Architectural Views & Drafting Views.
4. 3D modelling with AutoCAD
5. Dimensioning, Annotating in AutoCAD with Text & Hatching, Blocks, drafting symbols and Attributes, Layers, Templates & Design Center, Advanced plotting (Layouts, Viewports)
6. Drawing plan, section and elevation of 1 BHK house.

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Credit Based Grading System

Civil Engineering, VI-Semester

CE- 6001 Design of Hydraulic Structures

Unit - I

Gravity dams: Design Criteria, forces acting on gravity dams, elementary profile, low and high gravity dams, stability analysis, evaluation of profile by method of zoning, practical profile, foundation treatment, construction joints, galleries in gravity dams.

Unit - II

Earth and Rock fill dams :

Earth Dams: Types, causes of failure and design criteria, soils suitable for earth dam construction, construction methods, foundation requirements, typical earth dam sections, estimation of seepage through and below the dam, seepage control, stability of slopes by slip circle method of analysis, pore pressures, sudden draw down, steady seepage and construction pore pressure condition.

Rock fill dams: Types, merits and demerits, conditions favourable for their adoption.

Unit - III

Spillways : Ogee spillway and its design, details of syphon, shaft, chute and side channel spillways, emergency spillways.

Unit - IV

Energy dissipators and gates : Principles of energy dissipation Energy dissipators based on tail water rating curve and jump height curves Spillway crest gates - vertical lift and radial gates, their design principles and details. Design of canal regulating structures, Detailed design of Sarda Falls, design of cross drainage works, sphyon aquaduct.

Unit - V

Hydropower Plants: Introduction of Hydropower development, assessment of power potential, types of hydropower plants, general features of hydro-electric schemes, selection of turbines, draft tubes, surge tanks, penstocks, power house dimensions, development of micro hydel stations, tidal plants, pumped storage plants and their details.

Reference Books: -

1. Engineering for Dams (Volumes I, II & III) by Creager, Justin & Hinds
2. Hydroelectric Hand Book by Creager
3. Hydraulic Structures by Varshney
4. Irrigation & Water Power Engg. by Punmia & Pandey
5. Water Power Engineering by Dandekar

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Credit Based Grading System

Civil Engineering, VI-Semester

CE- 6002 Structural Design-I (RCC)

Unit - I.

Basic Principles of Structural Design : Assumptions, Mechanism of load transfer, Various properties of concrete and reinforcing steel, Introduction to working stress method and limit state methods of design, partial safety factor for load and material. Calculation of various loads for structural design of singly reinforced beam, Partial load factors.

Unit - II.

Design of Beams: Doubly reinforced rectangular & Flanged Beams, Lintel, Cantilever, simply supported and continuous beams, Beams with compression reinforcement: Redistribution of moments in continuous beams, Circular girders: Deep beams. Design of beam for shear and bond.

Unit-III.

Design of Slabs: Slabs spanning in one direction. Cantilever, Simply supported and Continuous slabs, Slabs spanning in two directions, Circular slabs, Waffle slabs, Flat slabs, Yield line theory.

Unit -IV.

Columns & Footings: Effective length of columns, Short and long columns- Square, Rectangular and Circular columns, Isolated and combined footings, Strap footing, Columns subjected to axial loads and bending moments (sections with no tension), Raft foundation.

Unit -V.

Staircases: Staircases with waist slab having equal and unequal flights with different support conditions, Slabless tread-riser staircase.

NOTE :- All the designs for strength and serviceability should strictly be as per the latest version of IS:456. Use of SP-16 (Design aids)

Suggested Books: -

1. Plain & Reinforced Concrete Vol. I & II – O.P. Jain & Jay Krishna
2. Limit State Design by P.C.Varghese ; Prentice Hall of India, New Delhi
3. Design of Reinforced Concrete Elements by Purushothman; Tata McGraw Hill, New Delhi
4. Reinforced Cement Concrete by Gupta & Mallick, Oxford and IBH
5. Reinforced Cement Concrete by P. Dayaratnam, Oxford and IBH
6. Plain & reinforced concrete - Rammuttham
7. Plain & reinforced concrete – B.C. Punnia
8. Structural Design & Drawing by N.K.Raju.
9. Design of Concrete Structure, Ramchandra & V.Gehlot, Scientific Publisher, Jodhpur

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Credit Based Grading System

Civil Engineering, VI-Semester

CE- 6003 Geotechnical Engineering – I

Unit - I

Basic Definitions & Index Properties: Definition and scope of soil mechanics, Historical development. Formation of soils. Soil composition. Minerals, Influence of clay minerals on engineering behaviour. Soil structure. Three phase system. Index properties and their determination. Consistency limits. Classification systems based on particle size and consistency limits.

Unit - II

Soil Water and Consolidation: Soil water, Permeability Determination of permeability in laboratory and in field. Seepage and seepage pressure. Flownets, uses of a flownet, Effective, neutral and total stresses.

Compressibility and consolidation, Relationship between pressure and void ratio, Theory of one dimensional consolidation. Consolidation test, Fitting Time curves. Normally and over consolidated clays. Determination of preconsolidation pressure, settlement analysis. Calculation of total settlement.

Unit - III

Stress Distribution in Soils and Shear Strength of Soils: Stress distribution beneath loaded areas by Boussinesq and water gaurd's analysis. Newmark's influence chart. Contact pressure distribution.

Mohr - Coulomb's theory of shear failure of soils, Mohr's stress circle, Measurement of shear strength, Shear box test, Triaxial compression test, unconfined compression test, Value shear test, Measurement of pore pressure, pore pressure parameters, critical void ratio, Liquefaction.

Unit - IV

Stability of Slopes: Infinite and finite slopes. Types of slope failures, Rotational slips. Stability number. Effect of ground water. Selection of shear strength parameters in slope stability analysis. Analytical and graphical methods of stability analysis. Stability of Earth dams.

Unit - V

Lateral Earth Pressure: Active, passive and earth pressure at rest. Rankine, Coulomb, Terzaghi and Culmann's theories. Analytical and graphical methods of determination of earth pressures on cohesionless and cohesive soils. Effect of surcharge, water table and wallfriction. Arching in soils. Reinforced earth retaining walls.

LABORATORY WORK : Laboratory work will be based on the above course as required for soil investigators of engineering projects.

List of Experiments:

1. Determination of Hygroscopic water content
2. Particle - size analysis
3. Determination of Specific gravity of soil particles
4. Determination of plastic limit

5. Determination of liquid limit
6. Determination of shrinkage limit
7. Permeability tests
8. Direct shear test
9. Consolidation test

Suggested Books: -

1. Soil Mech. & Found. Engg. by Dr. K.R. Arora - Std. Publishers Delhi.
2. Soil Mech. & Found. by Dr. B.C.Punmia- Laxmi Publications, Delhi.
3. Modern Geotech Engg. by Dr.I Aram Singh - IBT Publishers, Delhi.
4. Geotech Engg. by C. Venkatramaiah - New Age International Publishers, Delhi
5. Soil Mech. & Found. Engg. by S.K. Garg- Khanna Publishers, Delhi.
6. Soil Testing for Engg. by T.W. Lambe - John Wiley & Soms. Inc.
7. Relevant I.S. Codes

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Credit Based Grading System

Civil Engineering, VI-Semester

CE- 6004 Highway Engineering

Unit - I

High way planning, Alignment & Geometric Design: Principles of highway planning, road planning in India and financing of roads, classification patterns. Requirements, Engg. Surveys for highway location.

Cross sectional elements- width, camber, super-elevation, sight distances, extra widening at curves, horizontal and vertical curves, numerical problems.

Unit – II

Bituminous & Cement Concrete Pavements: Design of flexible pavements, design of mixes and stability, WBM, WMM, BM, IBM, surface dressing, interfacial treatment- seal coat, tack coat, prime coat, wearing coats, grouted macadam, bituminous concrete specification, construction and maintenance. Advantages and disadvantages of rigid pavements, general principles of design, types, construction, maintenance and joints, dowel bars, tie bars. Brief study of recent developments in cement concrete pavement design, fatigue and reliability.

Unit – III

Low Cost Roads, Drainage of Roads, Traffic Engg. & Transportation Planning:

Principles of stabilization, mechanical stabilization, requirements, advantages, disadvantages and uses, quality control, macadam roads-types, specifications, construction, maintenance and causes of failures.

Surface and sub-surface drainage, highway materials: properties and testing etc.

Channelised and unchannelised intersections, at grade & grade separated intersections, description, rotary-design elements, advantages and disadvantages, marking, signs and signals, street lighting. Principles of planning, inventories, trip generation, trip distribution, model split, traffic assignment, plan preparation.

Unit - IV

Airport Planning, Runway & Taxiway: Airport site selection. air craft characteristic

and their effects on runway alignments, windrose diagrams, basic runway length and corrections, classification of airports.

Geometrical elements: taxi ways and runways, pattern of runway capacity.

Unit - V

Airport, Obstructions, Lightning & Traffic control: Zoning regulations, approach

area, approach surface-imaginary, conical, horizontal. Rotating beacon, boundary lights, approach lights, runway and taxiway lighting etc. instrumental landing system, precision approach radar, VOR enroute traffic control.

List of Experiments:

1. Aggregate Crushing Value Test
2. Determination of aggregate impact value
3. Determination of Los Angeles Abrasion value
4. Determination of California Bearing Ratio values
5. Determination of penetration value of Bitumen

6. Determination of Viscosity of Bituminous Material
7. Determination of softening point of bituminous material
8. Determination of ductility of the bitumen
9. Determination of flash point and fire point of bituminous material
10. Determination of Bitumen content by centrifuge extractor
11. Determination of stripping value of road aggregate
12. Determination of Marshall stability value for Bituminous mix
13. Determination of shape tests on aggregate

Reference Books & Study Materials:

1. Highway Engineering by Gurucharan Singh
2. Principles of Pavement Design by E.J. Yoder & M.W. Witzech
3. Highway Engineering by O'Fleherly
4. Highway Engineering by S.K. Khanna & C.E.G. Justo
5. Airport Planning & Design by S.K. Khanna & M. G. arora
6. Foresch, Charles "Airport Planning"
7. Horonjeff Robert "The Planning & Design of Airports"
8. Sharma & Sharma, Principles and Practice of Highway Engg.
9. Haung, Analysis and Design of Pavements
10. Relevant IRC & IS codes
11. Laboratory Mannual by Dr. S.K. Khanna
12. Highway Engg. By Hews & Oglesby
13. Highway Material by Walker

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Credit Based Grading System

Civil Engineering, VI-Semester

Elective – II CE- 6005 (1) Advanced Water Resources Engineering

Unit - 1

Optimal Raingauge Network Design, Adjustment of Precipitation Data, Depth Area-Duration Analysis, Design Storm, Probable Maximum Precipitation, Probable Maximum Flood, Flood Frequency Analysis, Risk Analysis,

Unit - 2

Flood Management, Flood Routing through Reservoirs, Channels Routing Muskingum Method, Introduction to Stochastic Models in Hydrology like AR, ARMA, ARIMA etc. Concept of Correlogram.

Unit - 3

System Analysis: Need, Water Resources Systems, Optimisation Techniques, Linear Programming, Feasible Solutions, Graphical Method, Simplex Method, Use of LP in Water Resources, Introduction to Reservoir Operation, Rule curves, Linear Decision Rule

Unit - 4

Dynamic Programming, its utility in Resource Allocation and other Decision Making Problems, Optimal Operating Policies, Use of D. P. in Reservoir, Operation.

Unit-5

Network Methods, Project Optimality Analysis. Updating of Network, Utility in Decision Making.

Book Recommended:

Test Books

1. Subramany K., *Engg. Hydrology*.
2. Philipps & Ravindran: *Operations Research*
3. Hire D.S. & Gupta: *Operation Research*

Reference Books

1. Loucks D.P., Stedinger I.R. & Haith D.A : *Water Resources Systems Engg.*
2. Kottegoda N. T., *Stochastic Water Resources Technology.*
3. Singh V.P. : *Elementary Hydrology*

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Credit Based Grading System

Civil Engineering, VI-Semester

Elective – II CE- 6005 (2) Computational Methods in Structural Engineering

Unit - I.

Matrix formulation for the principle of virtual work and energy principles, principle of contragradience, stiffness and flexibility matrices, Degree of Freedom. Axial, bending, shear and torsional deformations.

Local and Global Element stiffness matrices for bar, beam, shaft, grid, shear wall, beamcolumn,

beam with rigid ends, beam on elastic foundation and elements with special boundary conditions. nonprismatic and curved elements, forces and displacements in general coordinate axes, structure stiffness matrix.

Unit - II.

Basics of the Direct Stiffness method - Analysis of pinjointed frames, rigid jointed structures, plane grids and composite structures for different loads including temperature, shrinkage, prestressing forces. Elastic stability analysis of 2-D rigid jointed frames, (Sway & Nonsway)

Unit - III.

Concepts of Bandwidth, various storage schemes & equation solvers; Reduction in order of stiffness matrix - use of substructures, static condensation method, Exploiting symmetry, skew symmetry and cyclic symmetry in structures, Imposition of Constraints – Lagrange Multiplier and Penalty Methods.

Unit - IV.

Analysis of continuum structures - Fundamental equations of theory of elasticity (2D), basic concepts of Finite Element Analysis, derivation of generalised element stiffness matrix and load vectors, convergence requirements, stiffness matrices for various elements using shape functions, Triangular and Rectangular elements. (PSPS)

Unit - V.

Two Dimensional Iso parametric elements, shape functions for Simplex. Lagrangian and Serendipity family elements in natural coordinates, computation of stiffness matrix for isoparametric elements, degrading of elements, plate bending elements.

Reference Books :-

1. Ghali A & Neville M., Structural Analysis - A Unified Classical and Matrix Approach, Chapman and Hall, New York.
2. Weaver William & Gere James M., Matrix Analysis of Framed structures, CBS Publishers and Distributors, New Delhi.
3. Cook R.D., Concepts and Applications of Finite Element Analysis, Wiley, New York.
4. Gallagher R., Finite Element Analysis Fundamentals, Prentice-Hall, Englewood Cliffs, NJ.
5. Rubenstein M.F., Matrix Computer Analysis of structures, Prentice Hall, Englewood Cliffs, N.J.
6. Zeinkiewicz O.C & Taylor R.L., The Finite Element Method, McGraw Hill, London

W.E.F. July 2017

Academic Session 2017-18

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

Credit Based Grading System

Civil Engineering, VI-Semester

Elective – II CE- 6005 (3) Environmental Impact Assessment

UNIT-I

Concept of EIA : Introduction of EIA, Utility and scope of EIA, Significant Environmental Impacts, Stage of EIA, Environmental Inventory, Environmental Impact Statement (EIS)

UNIT-II

Methods of Impact Identification : Environmental Indices and indicators for describing the affected environment, matrix methodologies, network, checklist, and other method.

UNIT-III

Impact analysis : Framework, statement predication and assessment of impact of air, water, noise and socio-economic environment.

UNIT-IV

Preparation of written documentation : Initial planning phase, detailed planning phase, writing phase, organizing relevant information, co-ordination of team writing effort.

UNIT-V

Public Participation in Environmental Decision making : Basic definitions, Regulatory requirements, Advantages & disadvantages of Public Participation, Selection of Public participation techniques, Practical considerations for implementation.

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

Credit Based Grading System

Civil Engineering, VI-Semester

Elective – II CE- 6005 (4) IPR (Intellectual Property Rights)

Course Objective

Acquaint the students with the basic concepts of Intellectual Property Rights; and sensitize the students with the emerging issues in IPR and the rationale for the protection of IPR.

UNIT I Introduction

Introduction and Justifications of IPR, Nature of IP, Major forms of IP- *Copyright, Patent, Trade Marks Designs, Geographic indication, layout design of Semi conductors, Plant varieties, Concept & Meaning of Intellectual Property.*

Major international documents relating to the protection of IP - *Berne Convention, Paris Convention, TRIPS.* The World Intellectual Property Organization (WIPO).

UNIT II Copyright

Meaning and historical development of copyright , Subject matter , Ownership of copyright, Term of copyright, Rights of owner, Economic Rights, Moral Rights. Assignment and licence of rights, Infringement of copyright, Exceptions of infringement, Remedies, *Civil, Criminal, Administrative*, Registration Procedure.

UNIT III Patents

Meaning and historical development,. Criteria for obtaining patents, Non patentable inventions, Procedure for registration, Term of patent, Rights of patentee, Compulsory licence, Revocation, Infringement of patents, Exceptions to infringement, Remedies, Patent office and Appellate Board.

UNIT IV – Trade Marks, Designs & GI

Trade Marks: Functions of marks, Procedure for registration, Rights of holder, Assignment and licensing of marks, Infringement, Trade Marks Registry and Appellate Board.

Designs: Meaning and evolution of design protection, Registration, Term of protection, Rights of holder, unregistered designs.

Geographical Indication: Meaning and evolution of GI, Difference between GI and Trade Marks, Registration, Rights, Authorised user.

UNIT V Contemporary Issues & Enforcement of IPR

IPR & sustainable development, The Impact of Internet on IPR. IPR Issues in biotechnology, E-Commerce and IPR issues, Licensing and enforcing IPR, Case studies in IPR

W.E.F. July 2017

Academic Session 2017-18

Course Outcome:

1. Students will be able to understand Primary forms of IPR
2. Students will be able to asses and critique some basic theoretical justification for major forms of IP Protection
3. Students will be able to compare and contrast the different forms of IPR in terms of key differences and similarities.
4. Students will be able understand the registration procedures related to IPR.
5. Students will be exposed to contemporary issues and enforcement policies in IPR.

References:

1. P. Narayanan, *Intellectual Property Law*, Eastern Law House
2. . Neeraj Pandey and Khushdeep[Dharni, *Intellectual Property Rights*, PHI, 2014
3. N.S Gopalakrishnan and T.G. Agitha, *Principles of Intellectual Property*, Eastern Book Co. Lucknow, 2009.
4. Anand Padmanabhan, *Enforcement of Intellectual Property*, Lexis Nexis Butterworths, Nagpur, 2012.
5. *Managing Intellectual Property The Strategic Imperative*, Vinod V. Sople, PHI.
6. Prabuddha Ganguli, " *Intellectual Property Rights*" Mcgraw Hill Education, 2016.

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

Credit Based Grading System

Civil Engineering, VI-Semester

CE- 6006 Design of Hydraulic Structures (Lab)

List of Experiments :-

1. To study the characteristics of hydraulic jump development in the laboratory Flume.
2. Potential estimation of a particular dam site.
3. Estimation of live storage of a reservoir and hydropower potential for the site.
4. Estimation of suspended load, bed load and total load, and life of reservoir.
5. Study of various existing barrages and canals.
6. Hydraulic models- all types of dams, spillways, weir & barrages, hydel power plant.

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

Credit Based Grading System

Civil Engineering, VI-Semester

CE-6007 Creativity and Entrepreneurship Development

Course Objective:

- Understand and use tools for generating entrepreneurial ideas and problem solving.
- Understand and use tools for the selection of ideas.
- Understand and gain the skills that are needed to implement ideas in today's society
- Understand Entrepreneurship's part in process that includes idea generation and implementation.
- Understand the concept of Entrepreneurship and its place in today's society

Course Outcomes:

- Recognize an opportunity for a user group and frame an appropriate design challenge that addresses the need for the user.
- Practice observation, interview and empathy skills to evolve a thorough understanding of the needs of the user.
- Share and integrate team leanings.
- Generate, develop and describe creative ideas that address the design challenge.

Syllabus:

1. The concept of Entrepreneurship, its history and its place in society.
2. The concept of Entrepreneurship and its relation to concept of innovation.
3. Creative processes for idea generation and problem solving.
4. Business plan.
5. Role of creativity, innovation and business research.
6. Entrepreneurship opportunities in contemporary business environment.

Reference Books :

1. Dollinger M.J. "Entrepreneurship strategies and resources," 3rd edition Pearson Education New Delhi.
2. Panda, Shiba charan "Entrepreneurship development", Anmol publication New Delhi.
3. Richard Blundel & Nigel locket, "Exploring Entrepreneurship : practices & perspectives Oxford.
4. Charles E. Banford & Garry D. Bruton, "Entrepreneurship – A small business Approach, Mcgrawhill Education.
5. P. Narayana Reddy, "Entrepreneurship" : Text and cases, Cengage learning
6. Rajeev Roy, "Entrepreneurship" Oxford.

RAJIV GANDHI PROUDYOGIKI VISHWA VIDYALAYA, BHOPAL

Credit Based Grading System

Civil Engineering, VIII-Semester

CE-8001 Advance Structural Design –II (Steel)

Unit – I Plate girder bridges (Riveted and welded)

Unit – II Trussed girder bridges for railways and highways (IRC & IRS holding). Bearings for bridges.

Unit – III Water Tanks: Pressed steel tanks, tanks with ordinary plates, square, rectangular, circular with hemispherical bottom and conical bottom.

Unit – IV Chimneys: Guyed and self supporting steel stacks.

Unit – V Bunkers, Silos & Towers

Reference Books :-

1. Design of Steel Structures – Ramammutham
2. Design of Steel Structures – Punia
3. Steel Str. by Ramchandra Vol II
4. Steel Str. by Arya & Ajmani
5. Design of steel structures – L.S. Negi

RAJIV GANDHI PROUDYOGIKI VISHWA VIDYALAYA, BHOPAL

Credit Based Grading System

Civil Engineering, VIII-Semester

CE-8002 GEO TECH. ENGG. – II

Unit – I Shallow Foundations : Type of foundations shallow and deep. Bearing capacity of foundation on cohesion less and cohesive soils. General and local shear failures. Factors effecting B.C. Theories of bearing capacity - Prandle, Terzaghi, Balla, Skempton, Meyerh of and Hansan. I.S. code on B.c. Determination of bearing capacity. Limits of total and differential settlements. Plate load test.

Unit – II Deep Foundation : Pile foundation, Types of piles, estimation of individual and group capacity of piles in cohesion less and cohesive soils. Static and dynamic formulae.. Pile load test, Settlement of pile group, Negative skin friction, under- reamed piles and their design. Piles under tension, inclined and lateral load Caissons. Well foundation. Equilibrium of wells. Analysis for stability tilts and shifts, remedial measures.

Unit – III Soil Improvement Techniques : Compaction. Field and laboratory methods, Proctor compaction tests, Factors affecting compaction. Properties of soil affected by compaction. Various equipment for field compaction and their suitability. Field compaction control. Lift thickness.

Soil stabilisation : Mechanical, Lime, Cement, Bitumen, Chemical, Thermal, Electrical-stabilisation and sabilisation by grouting. Geo-synthetics, types, functions, materials and uses.

Unit – IV Soil Exploration and Foundations on Expansive and Collapsible soils : Methods of soil exploration. Planning of exploration programme for buildings, highways and earth dams. Disturbed and undisturbed samples and samplers for collecting them. Characteristics of expansive and collapsible soils, their treatment, Construction techniques on expansive and collapsible soils. CNS layer.

Unit – V Sheet piles/Bulkheads and Machine foundation : Classification of sheet piles/bulkheads. Cantilever and anchored sheet piles, Cofferdams, materials, types and applications.

Modes of vibration. Mass-spring analogy, Natural frequency. Effect of vibration on soils. Vibration isolation. Criteria for design. Design of block foundation for impact type of machine.

LABORATORY WORK: Laboratory work will be based on the course of Geotech. Engg. I & II as required for soil investigations of engineering projects and not covered in the lab. Work of Geotech. Engg. I.

LIST OF EXPERIMENTS:

1. Indian Standard Light Compaction Test/Std. Proctor Test
2. Indian Standard Heavy Compaction Test/Modified Proctor Test
3. Determination of field density by Core Cutter Method
4. Determination of field density by Sand Replacement Method
5. Determination of field density by Water Displacement Method
6. The corifiled Compression Test
7. Triaxial compression test
8. Lab. Vane Shear test
9. CBR Test
10. Demonstration of Plate Load Test SPT & DCPT

References :--

1. Soil Mechanics & Foundation Engg. by Dr. K.R. Arora - Std. Publishers Delhi
2. Soil Mechanics & Foundation Engg. by B.C. Punmia - Laxmi Publiscations Delhi
3. Modern Geotech. Engg. by Dr. Alam Singh-IBT Publishers Delhi.
4. Geotech. Engg. by C.Venkatramaiah-New AGE International Publishers, Delhi
5. Found. Engg. by GALEonards McGraw Hill Book Co. Inc.
6. Relevant IS Code

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

Credit Based Grading System

Civil Engineering, VIII-Semester

Elective-V CE-8003 (1) PRE-STRESS CONCRETE DESIGN

UNIT-I Introduction–Theory And Behaviour: Basic concepts, Advantages, Materials required, Systems and methods of pre stressing – Analysis of sections, Stress concept, Strength concept, Load balancing concept, Effect of loading on the tensile stresses in tendons, Effect of tendon profile on deflections, Losses of pre-stress.

UNIT-II Design Concepts: Flexural strength, Simplified procedures as per codes, strain compatibility method, Basic concepts in selection of cross section for bending – stress distribution in end block, Design of anchorage zone reinforcement, Limit state design criteria, Partial pre-stressing Applications.

UNIT III Pre-stressed Concrete Slabs: One way slab two way slabs, pre-stressed concrete beam slab construction, pre-stressed flat slab, Deflection and Crack Width : Factors influencing deflection, short term deflections of un cracked members, long term deflection, deflections of cracked members.

UNIT IV Miscellaneous Structural Members : Columns subjected to combined bending and axial force, piles, poles, piers and abutments and Tension member-ring beams. Design of pre-stressed circular concrete tanks – Pipes

UNIT V Pre-Stressed Concrete Bridges: General aspects – pre-tensioned pre-stressed bridge decks – Post tensioned post-stressed bridge decks – Principles of design only.

References

1. Krishna Raju N., Prestressed concrete, Tata McGraw Hill Company, New Delhi 1998
2. Mallic S.K. and Gupta A.P., Prestressed concrete, Oxford and IBH publishing Co. Pvt. Ltd. 1997.
3. Rajagopalan, N, “Prestressed Concrete”, Alpha Science, 2002
4. Jain & Jai Krishna, Plain & Reinforced Concrete Vol – II Nem chand & Bros Roorkee.
5. P. Dayaratran, Pre-stressed Concrete Structures, Oxford & IBH Co. Delhi
6. Ramaswamy G.S., Modern prestressed concrete design, Arnold Heinimen, New Delhi, 1990
7. Lin T.Y. Design of prestressed concrete structures, Asia Publishing House, Bombay 1995.
8. David A. Sheppard, William R. and Philips, Plant Cast precast and prestressed concrete
9. IS 1343-980 code of Practice for Pre-stressed Concrete < Bureau of India Standards New Delhi

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

Credit Based Grading System

Civil Engineering, VIII-Semester

Elective-V CE-8003 (2) TRAFFIC ENGINEERING

Unit -I. Traffic Characteristics : Road user's characteristics - general human characteristics, physical, mental and emotional factors, factors affecting reaction time, PIEV theory. Vehicular characteristics: Characteristics affecting road design-width, height, length and other dimensions. weight, power, speed and braking capacity of a vehicle.

Unit -II. Traffic Studies : Spot Speed Studies and Volume Studies. Speed and Delay Studies purpose, causes of delay, methods of conducting speed and delay studies. Origin and destination Studies (O & D) : Various methods, collection and interpretation of data, planning and sampling. Traffic Capacity Studies: Volume, density, basic practical and possible capacities, level of service. Parking Studies: Methods of parking studies cordon counts, space inventories, parking practices.

Unit -III. Traffic Operations And Control : Traffic regulations and various means of control. One way streets-advantages and limitations. Traffic signals- isolated signals, coordinated signals, simultaneous, alternate, flexible and progressive signal systems. Types of traffic signals, fixed time signals, traffic actuated signals, speed control signals, pedestrian signals, flashing signals, clearance interval and problems on single isolated traffic signal.

Unit -IV. Street Lighting : Methods of light distribution. Design of street lighting system. Definitions- Luminaire, foot candle, Lumen, utilization and maintenance factors. Different types of light sources used for street lighting. Fundamental factors of night vision.

Unit -V. Accident Studies & Mass Transportation : Accident Studies : Causes of accidents, accident studies and records, condition and collision diagram, preventive measures. Expressways and freeways, problems on mass transportation and remedial measures, brief study of mass transportation available in the country.

Reference Books :-

1. Traffic Engineering and Transport Planning by L.R. Kadiyali, Khanna Publishers, Delhi
2. Traffic Engineering by Matson, W.S. Smith & F.W. Hurd
3. G.J. Pingnataro, Principles of Traffic Engineering
4. D.R. Drew, Traffic Flow Theory
5. W.R. Mchne and R.P. Roess "Traffic Engg"
6. Wohl & Martin, Traffic System Analysis for Engineering & Planner

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

Credit Based Grading System

Civil Engineering, VIII-Semester

Elective-V CE-8003 (3) URBAN TRANSPORTATION PLANNING

Unit- I : Transportation Planning Process: Definition of Study Area; Zoning Principles; Types of Surveys: Home Interview Studies, Commercial Vehicle Surveys, Road Side Interview Methods, Public Transport Studies, Land Use Inventory; O-D Matrix and Desire Line Diagram. Accident Studies & Mass Transportation : (i)Accident Studies : Causes of accidents, accident studies and records, condition and collision diagram, preventive measures. (ii) Expressways and freeways, problems on mass transportation and remedial measures, brief study of mass transportation available in the country.

Unit – II : Trip Generation: Four Stage UTP Process; Travel Demand Models; Sequential Models and Direct Demand Models; Factors affecting Travel Demand; Trip Generation; Multiple Regression Analysis; Category Analysis; Aggregate and Disaggregate Models. TRIP Distribution: Trip Distribution Models- Growth Factor Models: Uniform Growth Factor, Average Growth Factor, Fratar Method and Furness Method; Limitations of Growth factor Models; Gravity Model – Calibration of Gravity Model.; Opportunity Models. Traffic Assignment: Purpose of Traffic Assignment; Assignment Techniques-All-or-Nothing Assignment, Multiple Route Assignment, Capacity restraint assignment; Use of Diversion Curves in Assignment.

Unit –III : Mode Split: Factors affecting Mode Split; Pre–distribution Mode Split; Post-Distribution Mode Split; Advantages and Disadvantages; Probit, Logit and Discriminant Analysis in Mode Split. Land use and transportation system: Urban system components, Concept and definitions, criteria for measuring and comparing urban structure, land use and transportation.

Unit – IV : Pavement Design Factors: Design wheel load, strength characteristics of pavement materials, climatic variations, traffic - load equivalence factors and equivalent wheel loads. Flexible Pavements Design: Component parts of the pavement structures and their functions, stresses in flexible pavements, Stress distribution through various layers, Boussinesque’s theory , Burmister’s two layered theory, methods of design, Group Index method, CBR method, IRC method, AASHTO method, Burmister’s method and North Dakota cone method. Applications of pavement design software.

Unit –V : Rigid Pavements: Evaluation of sub grade, Modulus-K by plate bearing test and the test details, Westergaard's stress theory stresses in rigid pavements, Temperature stresses, warping stresses, frictional stresses, critical combination of stresses, critical loading positions. Rigid Pavement Design: Types of joints and their functions, joint spacing; design of CC pavement for roads, highways and expressways as per IRC, AASHTO, design of joints. Design of continuously reinforced concrete pavements. Reliability; Use of software for rigid pavement design.

References

1. Adib Kanafani.(1983). Transportation Demand Analysis. Mc Graw Hill Series in Transportation, Berkeley.
2. Hutchinson, B.G. (1974). Principles of Urban Transport Systems Planning. Mc Graw Hill Book Company, New York.
3. John W.Dickey. (1975). Metropolitan Transportation Planning. Mc Graw Hill Book Company, New York.
4. Papacostas, C.S., and Prevedouros, P.D. (2002). Transportation Engineering and Planning. 3rd Edition, Prentice - Hall of India Pvt Ltd., 318-436.
5. Khisty C.J., Transportation Engineering - An Introduction, Prentice Hall, India, 2002.
6. Yoder and Witczak, Principles of Pavement Design, John Wiley and Sons
7. Yang. H. Huang, Pavement Analysis and Design, Second Edition, Prentice Hall Inc.
8. Rajib B. Mallick and Tahar El-Korchi, Pavement Engineering – Principles and Practice, CRC Press (Taylor and Francis Group)
9. W.Ronald Hudson, Ralph Haas and Zeniswki , Modern Pavement Management, Mc Graw Hill and Co Academic Session 2016-17
10. Relevant IRC Codes
11. Bruton M J (1981), "Introduction to transportation planning", Hutchinson of London
12. Dickey J W(1980), "Metropolitan Transportation Planning", Tata McGraw Hill
13. Principles of Transportation Engineering : P. Chakraborty and A. Das
14. Fundamentals of Transportation Engineering: : C.S. Papacoastas
15. Traffic Engineering and Transport Planning: : L.R. Kadyal

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

Credit Based Grading System

Civil Engineering, VIII-Semester

Elective-V CE-8003 (4) DISASTER RISK MANAGEMENT

UNIT 1: Understanding Disasters: Understanding the Concepts and definitions of Disaster, Hazard, Vulnerability, Risk, Capacity – Disaster and Development, and disaster management

UNIT 2: Types, Trends, Causes, Consequences and Control of Disasters: Geological Disasters (earthquakes, landslides, tsunami, mining); Hydro-Meteorological Disasters (floods, cyclones, lightning, thunder-storms, hail storms, avalanches, droughts, cold and heat waves) Biological Disasters (epidemics, pest attacks, forest fire); Technological Disasters (chemical, industrial, radiological, nuclear) and Manmade Disasters (building collapse, rural and urban fire, road and rail accidents, nuclear, radiological, chemicals and biological disasters) Global Disaster Trends – Emerging Risks of Disasters – Climate Change and Urban Disasters

UNIT 3: Disaster Management Cycle and Framework: Disaster Management Cycle – Paradigm Shift in Disaster Management Pre-Disaster – Risk Assessment and Analysis, Risk Mapping, Zonation and Microzonation, Prevention and Mitigation of Disasters, Early Warning System; Preparedness, Capacity Development; Awareness During Disaster – Evacuation – Disaster Communication – Search and Rescue – Emergency Operation Centre – Incident Command System – Relief and Rehabilitation – Post-disaster – Damage and Needs Assessment, Restoration of Critical Infrastructure – Early Recovery – Reconstruction and Redevelopment; IDNDR, Yokohama Strategy, Hyogo Framework of Action

UNIT 4: Disaster Management in India: Disaster Profile of India – Mega Disasters of India and Lessons Learnt Disaster Management Act 2005 – Institutional and Financial Mechanism National Policy on Disaster Management, National Guidelines and Plans on Disaster Management; Role of Government (local, state and national), Non-Government and Inter-governmental Agencies

UNIT 5: Applications of Science and Technology for Disaster Management: Geo-informatics in Disaster Management (RS, GIS, GPS and RS) Disaster Communication System (Early Warning and Its Dissemination) Land Use Planning and Development Regulations Disaster Safe Designs and Constructions Structural and Non Structural Mitigation of Disasters S&T Institutions for Disaster Management in India, Role of Engineers in Disaster Management

References

1. Coppola D P, 2007. Introduction to International Disaster Management, Elsevier Science (B/H), London.
2. Manual on natural disaster management in India, M C Gupta, NIDM, New Delhi
3. An overview on natural & man-made disasters and their reduction, R K Bhandani, CSIR, New Delhi
4. World Disasters Report, 2009. International Federation of Red Cross and Red Crescent, Switzerland
5. Encyclopedia of disaster management, Vol I, II and III. Disaster management policy and administration, S L Goyal, Deep & Deep, New Delhi, 2006
6. Encyclopedia of Disasters – Environmental Catastrophes and Human Tragedies, Vol. 1 & 2, Angus M. Gunn, Greenwood Press, 2008
7. Disasters in India Studies of grim reality, Anu Kapur & others, 2005, 283 pages, Rawat Publishers, Jaipur
8. Management of Natural Disasters in developing countries, H.N. Srivastava & G.D. Gupta, Daya Publishers, Delhi, 2006, 201 pages
9. Natural Disasters, David Alexander, Kluwer Academic London, 1999, 632 pages
10. Disaster Management Act 2005, Publisher by Govt. of India

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

Credit Based Grading System

Civil Engineering, VIII-Semester

Elective-VI CE-8004 (1) SUSTAINABLE DESIGN AND CONSTRUCTION

Unit – I: Housing Scenario: Introducing, Status of urban housing, Status of Rural Housing. b) Housing Finance: Introducing, Existing finance system in India, Government role as facilitator, Status at Rural Housing Finance, Impedimental in housing finance and related issues. (c) Land use and physical planning for housing: Introduction, Planning of urban land, Urban land ceiling and regulation act, Efficiency of building bye laws, Residential Densities.

Unit – II : Development and adopting sustainable construction technology: Introduction, Adoption of innovative cost effective construction techniques, Adoption of pre-cast elements in partial prefabrication, Adopting of total prefabrication of mass housing in India, General remarks on pre cast roofing/flooring systems, Economical wall system, Single Brick thick loading bearing wall, 19cm thick load bearing masonry walls, Half brick thick load bearing wall, Fly ash-gypsum brick for masonry, Stone Block masonry, Adoption of pre-cast R.C. plank and join system for roof/floor in the building.

Unit – III : Alternative building materials for sustainable construction: Introduction, Substitute for scarce materials, Ferro-cement- Gypsum boards, Timber substitutions, Industrial wastes, Agricultural wastes, cement-soil blocks for masonry, stabilized mud construction Low cost Infrastructure services: Introducing- Present status- Technological options- Low cost sanitation's Domestic wall- Water supply- energy.

Unit – IV: Housing the urban poor: Introduction, Living conditions in slums, Approaches and strategies for housing urban poor. Rural Housing: Introduction, traditional practice of rural housing continuous, Mud Housing technology, Mud roofs, Characteristics of mud, Fire resistant treatment for thatched roof, Soil stabilization, Rural Housing programs.

Unit – V: Construction in Disaster Prone areas: Introduction, Earthquake, Damages to houses, Traditional Housing in disaster prone areas, Type of Damages of non-engineered buildings, Repair and restore action of earthquake Damaged non-engineered buildings recommendations for future constructions, Requirements of structural safety of thin pre-cast roofing units against earthquake forces, Status of R& D in earthquake strengthening measures, Floods- cyclone, future safety.

Reference Books:-

1. Building materials for low-income houses – International council for building research studies and documentations.
2. Hand book of low cost housing by A.K.Lal – Newage international publishers.
3. Properties of Concrete – Neville A.M. Pitman publishing Limited- London.
4. Light weight concrete- Academic kiado- Rudhai .G – Publishing home of Hungarian Academy of Sciences 1963.
5. Low cost Housing – G.C. Mathur
6. Modern trends in housing in developing countries – A.G. Madhava Rao- D.S. Ramachandra Murthy & G.Annamalai.

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

Credit Based Grading System

Civil Engineering, VIII-Semester

Elective-VI CE-8004 (2) WASTE DISPOSAL & MANAGEMENT

UNIT – I Solid Waste And Its Management: Introduction to solid waste-Definition of solid waste, garbage, rubbish-Sources and Types. Characteristics of Solid Wastes: Physical, chemical and biological characteristics. 3Rs- Reduction, reuse, recycling and recovery principles of waste management- Functional elements of Solid Waste management- Waste generation and handling at source-Collection of solid wastes- Collection methods and services- guidelines for collection route layout.

UNIT- II Waste Water And Its Management: Characteristics and analysis of waste water, recycles of decomposition, physical, chemical & biological parameters. Unit operations for waste water treatment, preliminary treatment.

UNIT- III Hazardous Waste And Its Management: Introduction to hazardous waste management issues, classification; Magnitude of problem; Risk assessment; Environmental Legislation; Characterization and site assessment; Waste minimization and resource recovery; Storage and Transportation of Hazardous wastes; Hazard in processing and treatment; Physical, Chemical, Thermal and Biological processes;

UNIT –IV Transfer And Transport Of Wastes: Solid Waste transportation: Transfer station- Processing and segregation of the solid waste- various methods of material segregation. Hazardous waste transportation: According to economic benefits, transfer stations, and types of hazardous waste.

UNIT –V Disposal Of Wastes: Solid waste disposal: Volume reduction, Open dumping, land filling techniques. Landfills: classification-Design and Operation of landfills, Land Farming, Deep well injection. Hazardous waste disposal; Landfill disposal and land storage; Ground water contamination; Containment; remedial alternatives. Natural methods of waste water disposal i.e. by land treatment & by dilution, self purification capacity of stream, Oxygen sag analysis.

Reference Books :-

1. Waste Water Engg. by B.C. Punmia - Laxmi Publication (P) Ltd. New Delhi
2. Environmental Engg. - M.L. Davis & D.A. Cornwell - Mc Graw Hill Company
3. Integrated Solid Waste Management by Tchobanogous
4. Environmental Engineering by Howard S. Peavy, Donald R. Rowe and George.
5. Hazardous Waste Management by Charles A. Wentz - - Mc Graw Hill Company
6. Hazardous Waste Management [Gaynor W. Dawson](#), [Basil W. Mercer](#)

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

Credit Based Grading System

Civil Engineering, VIII-Semester

Elective-VI CE-8004 (3) GEO-INFORMATICS

UNIT I Basic Concepts Of Gis Basics of Geographic Information System (GIS): , Definition, Evolution & Components. GIS data input devices like scanner, digitizer, GPS, Remote sensing etc. Manual and semi-automatic line following digitization. Data Model: Raster Data Model, Grid , Tessellations. Spatial and attribute data visualization and query. Open GIS consortium, Customization in GIS , Object Oriented GIS, Web GIS, Introduction to popular GIS software like Arc GIS and QGIS.

UNIT II Geo Informatics In Urban Mapping And Management: Remote sensing for detection of urban features. Introduction & basic terminology. Digital image processing techniques – Case studies. Segmentation of Built-up areas – Classification algorithms – Land use/ Land cover mapping – change detection – high resolution remote sensing – case studies. Mapping transportation network – Alignment planning – Traffic and parking studies – Accident analysis – case studies. Urban growth modeling – Expert systems in planning.

UNIT III Basic Concepts Of Photogrammetry :History and development:- Types of aerial photo, Classification of aerial cameras, Scale, Overlaps, Stereoscopy, Concepts, Viewing and measuring systems, Image and object coordinates, floating mark, parallax equation, height information, Tilt , Rectification , Displacement. Flight planning, computation for flight plan, photo control, cost estimation, aerial mosaics, types. Concepts of interior, relative, absolute orientation, object, image relation, linearization, effect of orientation elements , scaling and leveling , analytical procedures , map compilation using stereo plotters.

Introduction to digital photogrammetry, Elements of Aero triangulation and analytical method, strip and block adjustment, Terrestrial photogrammetry.

UNIT IV GPS Surveying: Introduction & components of GPS, Space segment, control segment and user segment, Elements of Satellite based surveys-Map datums, GPS receivers, GPS observation methods and their advantages over conventional methods.

UNIT V Remote Sensing: Principle, components, classification, application on environmental engineering, hydrology and water resources , agriculture & forestry, disaster management.

Microwave Remote Sensing: Introduction, basic concepts, terminology and sensors in MWRS. Radar basics, radar interaction with earth surface ,geometry of radar images, radar return and image signature, resolution concepts.

REFERENCES

- 1.Plane Surveying- A. M. Chandra, New Age International.
- 2.Surveying and Leveling-Part-I & IIT- P. Kanetkar and S. V. Kulkarni, Vidyarthi Griha Prakashan.
- 3.Geoinformation: Remote Sensing, Photogrammetry and Geographic Information Systems- Gottfried Konecny, CRCPress
- 4.Elements of Photogrammetry- Paul R.Wolf, McGraw-Hill
- 5.Photogrammetry, Vol 1&II - Karl Kraus, Walter de Gruyter
- 6.Remote Sensing and image interpretation- Lillesand T.M. and Kiefer R. W., Willey.
- 7.Introduction to remote sensing - J. B. Campbell, John Willey.
- 8.Introductory digital image processing- J. R., Jensen Prentice Hall.
- 9.Remote Sensing in Civil Engineering- Kennie, T. J. M. and Matthews M. C., Surrey University Press.
- 10.GPS satellite surveying- Alfred Leick,.Wiley
- 11.GPS Theory, Algorithms and Applications- GuochengXu, Springer
- 12.Microwave remote sensing vol-1,vol-2- Ulaby,F.T.,Moore,K.R. and Fung,Artech House Publishers.
- 13.Principles and applications of Imaging - Floyd. M. Handerson Anthony, J.Lewis, Wiley.
- 14.Air and space borne radar systems-An introduction- Philippe Lacomme and Eric Normant, Elsevier.
- 15.Introduction to microwave remote sensing- Iain H.woodhouse,CRCPress
- 16.Satellite Remote Sensing for Hydrology and Water Management- Eric C. Barrett, Clare H.Power, Taylor & Francis Ltd
- 17.Hydrologic and Hydraulic Modeling Supportwith Geographic Information Systems- Dr. David Maidment, Dr. Dean Djokic, Esri Press.

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

Credit Based Grading System

Civil Engineering, VIII-Semester

Elective-VI CE-8004 (4) Finite Element Method

UNIT-I:Introduction to Finite element method: General applicability and description of finite element method, comparison with other methods.

UNIT-II:Solution of finite element method: Solution of equilibrium problems, eigen value problems, propagation problems, computer implementation of Gaussian eliminations, Choleskis decomposition, Jacobis and Ranga-Kutta method.

UNIT-III:General procedure of finite element method: Descretization of the domain, selection of shapes, types and number of elements, node numbering technique, interpolation, polynomials, their selection and derivation in terms of global and local coordinates, convergence requirements. Formulation of element characteristic matrices and vectors, variational approach.

UNIT-IV:Iso-parametric formulation: Lagrange and Hermite interpolation functions, iso-parametric elements, numerical integration.

UNIT-V

Static analysis: Formulation of equilibrium equation, analysis of truss, frames, plane stress and plane strain problems.

Reference Books:

1. Weaver, Johnson, Finite element and structural analysis
2. HC Martin, Matrix structural analysis
3. CF Abel, CS Desai, Finite element methods
4. Buchanan, Finite element Analysis (Schaum Outline S), TMH
5. Krishnamurthy, Finite element analysis, TM

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

Credit Based Grading System

Civil Engineering, VIII-Semester

CE-8006 NON-DESTRUCTIVE TESTING(NDT)

List of experiment:

1. To study of Rebound Hammer Test.
2. To study of UPV Test.