

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

IV Year B.Tech. CEE-I Sem

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4	-/-	4

(A70142) TRANSPORTATION ENGINEERING**UNIT I**www.universityupdates.in

Highway Development and Planning: Highway development in India – Necessity for Highway Planning- Different Road Development Plans.

Highway Planning : Classification of Roads- Road Network Patterns – Highway Alignment- Factors affecting Alignment- Engineering Surveys – Drawings and Reports, Road Projects initiation need based planning.

UNIT – II

Highway Geometric Design: Importance of Geometric Design- Design controls and Criteria- Highway Cross Section Elements- Sight Distance Elements- Stopping sight Distance, Overtaking Sight Distance and intermediate Sight Distance- Design of Horizontal Alignment- Design of Super elevation and Extra widening- Design of Transition Curves-Design of Vertical alignment-Gradients- Vertical curves. Typical cross sections for different types of roads.

Traffic Engineering: Basic Parameters of Traffic-Volume, Speed and Density- Traffic Volume Studies- Data Collection and Presentation-speed studies- Data Collection and Presentation- Parking Studies and Parking characteristics- Road Accidents-Causes and Preventive measures-Accident Data Recording – Condition Diagram and Collision Diagrams. Traffic, infrastructural and safety audits.

www.universityupdates.in**UNIT – III**

Traffic Regulation and Management: Road Traffic Signs – Types and Specifications – Road markings-Need for Road Markings-Types of Road Markings- Design of Traffic Signals –Webster Method –IRC Method, intelligent transportation systems typical architectures.

Intersection Design: Types of Intersections – Conflicts at Intersections-Types of At-Grade Intersections- Channelization : Objectives –Traffic Islands and Design criteria-Types of Grade Separated Intersections- Rotary Intersection – Concept of Rotary and Design Criteria- Impacts of Geometrics on intersection with reference safety, Operational capacity

UNIT – IV

Introduction to Railway Engineering: Permanent way components – Cross Section of Permanent Way - Functions of various Components like Rails, Sleepers and Ballast –Rail Fastenings – Creep of Rails- Theories related to creep – Ageing of Sleepers- Sleeper density.

Geometric Design of Railway Track: Gradients- Grade Compensation- Cant and Negative Super elevation- Cant Deficiency – Degree of Curve – Crossings and Turn outs .

UNIT - V

www.universityupdates.in

Airport Engineering: Factors affecting Selection of site for Airport – Aircraft Characteristics- Geometric Design of Runway- Computation of Runway length – Correction for runway length – Orientation of Runway – Wind Rose Diagram – Runway Lighting system.

TEXT BOOKS:

1. Highway Engineering, S.K.Khanna & C.E.G.Justo, Nemchand & Bros., 7th edition (2000).
2. Railway Engineering, A text book of Transportation Engineering – S.P.chadula – S.Chand & Co. Ltd. 2001
3. Highway Engineering, Design – L.R.Kadiyali and Gal Khanna Publications.
4. Airport Planning and Design- S.K.Khanna and Arora, Nemchand Bros.

REFERENCES:

1. Highway Engineering – S.P.Bindra, Dhanpat Rai & Sons, 4th Edition (1981)
2. Traffic Engineering & Transportation Planning – Dr.L.R.Kadyali, Khanna publications – 6th Edition 1997.
3. Railway Engineering – August – Prabha & Co., 15th Edition – 1994.
4. Air Transportation Planning & design – Virendhra Kumar & Stish Chandhra – Gal Gotia Publishers 1999
5. Principles of Traffic Engineering – Garber & Hoel, Cengage Learning.

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(A70141) SOLID WASTE MANAGEMENT**UNIT I:**www.universityupdates.in

Solid Waste and their Handling: Definition of solid wastes – types of solid wastes – Sources - Industrial, mining, agricultural and domestic – Characteristics. Solid waste Problems - impact on environmental health

UNIT II:

Collection, Segregation and Transport AND Management of Municipal Solid Wastes: Handling and segregation, Collection and storage of municipal solid wastes; analysis of Collection systems. Transfer stations – labeling and handling of hazardous wastes. Solid waste processing technologies. Mechanical and thermal volume reduction. Biological and chemical techniques for energy and other resource recovery: composting - types, vermicomposting, termigradation, fermentation. Incineration of solid wastes. Disposal in landfills: site selection, design, and operation of sanitary landfills; Leachate and landfill gas management, landfill closure and post-closure environmental monitoring; landfill remediation. Regulatory aspects of municipal solid waste management.

UNIT III:

Hazardous Waste and Management: Hazardous waste definition. Physical and biological routes of transport of hazardous substances – sources and characterization. Sampling and analysis of hazardous wastes – proximate analysis – survey analysis – directed analysis handling, collection, storage and transport. Hazardous waste treatment technologies TSDF concept - Physical, chemical and thermal treatment of hazardous waste: solidification, chemical fixation; encapsulation, pyrolysis and incineration. Hazardous waste land fills - Site selections, design and operation. HW reduction, recycling and reuse, Regulatory aspects of HWM/HWM rules.

UNIT IV:

Biomedical Waste Management: Classification, collection, segregation Treatment and disposal. Radioactive waste: Definition, Low level and high level radioactive wastes and their management, Radiation standards.

UNIT V:

E-Waste Management: Waste characteristics, generation, collection, transport and disposal, regulatory aspects of e waste, global strategy, recycling.

www.universityupdates.in

TEXT BOOKS:

1. Hazardous waste management Charles A. Wentz. Second edition 1995. McGraw Hill International.
2. Integrated solid waste management George Tchobanoglous, Hilary Theisen & Samuel A. Vigil.

REFERENCES:

1. Hazardous waste management by Prof. Anjaneyulu.
2. Criteria for hazardous waste landfills – CPCB guidelines 2000.
3. Standard handbook of Hazardous waste treatment and disposal by Harry M. Freeman, McGraw Hill 1997.
4. Management of Solid waste in developing countries by Frank Flintoff, WHO regional publications 1976.

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(A70138) ESTIMATING AND COSTING**UNIT - I**

General items of work in Building – Standard Units Principles of working out quantities for detailed and abstract estimates – Approximate method of Estimating.

Detailed Estimates of Buildings.

UNIT - II

Earthwork for roads and canals

UNIT - III

Rate Analysis – Working out data for various items of work over head and contingent charges.

UNIT -IV

Reinforcement bar bending and bar requirement schedules.

Contracts – Types of contracts – Contract Documents – Conditions of contract.

UNIT - V

Valuation of buildings.

www.universityupdates.in

Standard specifications for different items of building construction.

TEXT BOOKS

1. Estimating and Costing by B.N. Dutta, UBS publishers, 2000.
2. Estimating and Costing by G.S. Birdie.

REFERENCES :

1. Standard Schedule of rates and standard data book by public works department.
2. I. S. 1200 (Parts I to XXV – 1974/ method of measurement of building and Civil Engineering works – B.I.S.)
3. Estimation, Costing and Specifications by M. Chakraborti; Laxmi publications.
4. National Building Code.

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(A70136) AIR POLLUTION AND CONTROL**UNIT – I**

Air Pollution – Definitions, Scope, Significance and Episodes, Air Pollutants – Classifications – Natural and Artificial – Primary and Secondary air pollutants, Point, Line and Areal Sources of air pollution- Stationary and mobile sources. Effects of Air pollutants on man, material and vegetation: Global effects of air pollution – Green House effect, Heat Islands, Acid Rains, Ozone Holes etc.

www.universityupdates.in**UNIT – II**

Meteorology and Plume Dispersion; Properties of atmosphere; Heat, Pressure, Wind forces, Moisture and Relative Humidity, Influence of Meteorological phenomena on Air Quality-wind rose diagrams, Lapse Rates, Pressure Systems, Winds and moisture, plume behavior and plume Rise Models; Gaussian Model for Plume Dispersion.

UNIT-III

Control of particulates – Control at Sources, Process Changes, Equipment modifications, Design and operation of control.

Equipment's – Settling Chambers, Cyclone separators, filters, Dry and Wet scrubbers, Electrostatic precipitators.

UNIT – IV

Control of gaseous emissions - General Methods of Control of NO_x and SO_x emissions – In-plant Control Measures, process changes, dry and wet methods of removal and recycling – Adsorption – Absorption – Combustion.

UNIT – V

Air Quality Management – Monitoring of SPM, SO_x, NO_x and CO Emission Standards– Air sampling – Sampling Techniques – High volume air sampler – Stack sampling - Analysis of Air pollutants – Air quality standards – Air pollution control act.

TEXT BOOKS:www.universityupdates.in

1. Air pollution By M.N.Rao and H.V.N.Rao – Tata Mc.Graw Hill Company.
2. Air pollution by Wark and Warner.- Harper & Row, New York.

REFERENCE:

1. An introduction to Air pollution by R.K. Trivedy and P.K. Goel, B.S. Publications.

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(A70139) INDUSTRIAL WASTE WATER TREATMENT**(Elective-II)**www.universityupdates.in**UNIT – I**

Sources of Pollution – Physical, Chemical, Organic and Biological properties of Industrial Wastes – Differences between industrial and municipal waste waters – Effects of industrial effluents on sewers and Natural Water Bodies.

UNIT – II

Pre and Primary Treatment – Equalization, Proportioning, Neutralization, Oil Separation by Flootation – Waste Reduction - Volume Reduction – Strength Reduction.

UNIT – III

Waste Treatment Methods – Nitrification and De-nitrification – Phosphorous removal – Heavy metal removal – Membrane Separation Process – Air Stripping and Absorption Processes – Special Treatment Methods – Disposal of Treated Waste Water.

www.universityupdates.in**UNIT – IV**

Characteristics and Composition of waste water and Manufacturing Processes of Industries like Sugar, Characteristics and Composition of Industries like Food Processing Industries, Steel, Petroleum Refineries,

UNIT – V

Characteristics and Composition of Industries like Textiles, Tanneries, Atomic Energy Plants and other Mineral Processing Industries - Joint Treatment of Raw Industrial waste water and Domestic Sewage – Common Effluent Treatment Plants (CETP) – Location, Design, Operation and Maintenance Problems – Economical aspects.

TEXT BOOKS

1. Industrial Waste Water Pollution Control by W. Wesley Eckenfelder – McGraw-Hill.
2. Industrial Waste Treatment by Rao & Datta.

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(A72803) ENVIRONMENTAL POLLUTION OF SOIL AND REMEDIATION**(Elective-III)**www.universityupdates.in**Unit I**

Introduction on soil environment interaction, properties of water in relation to the porous media. Soil-three phase system, clay- the most active soil fraction.

Unit II

Water cycle with special reference to soil medium, soil behavior, soil mineralogy mineralogical characterization - soil-water interaction, diffuse double layer models, force of attraction and repulsion, soil -water contaminant interaction.

Unit III

Ion exchange methods - softening, aeration & adsorption techniques - defluoridation - removal of iron, lead, arsenic, manganese, influence of organic and inorganic chemical interaction.

Unit IV

Introduction to unsaturated soil contamination, sources of contamination, water retention property and soil water characteristics - Concepts of waste contaminant facilities- desirable properties of soil - contaminant transport and retention.

Unit V

Soil modification by environmental changes, stabilization of soil by environmental changes, use of additives and their basic mechanisms - Introduction to advanced soil characterization techniques, volumetric water content, electrical and thermal properties, pore-size distribution.

TEXT BOOKS:

1. Soil Pollution by Dr. S.G. Misra and Dinesh Mani - A.P.H. Publishing.
2. Introduction to Environmental Geotechnology by Fang, H-Y, CRC Press.
3. Waste Contaminant Systems by Sharma H.D. et.al, John- Wiley and Sons Inc.
4. Geoenvironmental Engineering - Principles and Applications by Reddi, L.N. and Inyang H.F., Marcel Dekker Inc.

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(A70145) WATERSHED MANAGEMENT**(Elective -II)**www.universityupdates.in**UNIT-I**

Introduction: Concept of watershed development, objectives of watershed development, need for watershed development in India, Integrated and multidisciplinary approach for watershed management.

Characteristics of Watershed: size, shape, physiography, slope, climate, drainage, land use, vegetation, geology and soils, hydrology and hydrogeology, socio-economic characteristics, basic data on watersheds.

UNIT-II

Watershed delineation – Runoff Computations from a watershed – Flood Frequency Analysis – Gumbell, Log-Pearson and Weibull Methods of Analysis.

Planning of watershed management activities, peoples participation, preparation of action plan, administrative requirements

UNIT-III

Principles of Erosion: Types of erosion, factors affecting erosion, effects of erosion on land fertility and land capability, estimation of soil loss due to erosion, Universal soil loss equation.

Measures to Control Erosion: Contour techniques, ploughing, furrowing, trenching, bunding, terracing, gully control, rockfill dams, brushwood dam, Gabion.

UNIT-IV

Water Harvesting: Rainwater Harvesting, catchment harvesting, harvesting structures, soil moisture conservation, check dams, artificial recharge, farm ponds, percolation tanks.

www.universityupdates.in**UNIT-V**

Forest and Grass Land Management: Interpretation of Satellite Imageries-Land use and Land Cover. Land capability classification, management of forest, agricultural, grassland and wild land. Reclamation of saline and alkaline soils.

Ecosystem Management: Role of Ecosystem, crop husbandry, soil enrichment, inter, mixed and strip cropping, cropping pattern, sustainable agriculture, bio-mass management, dry land agriculture, Silvi pasture, horticulture, social forestry and afforestation.

TEXT BOOKS:

1. Watershed Management by JVS Murthy, - New Age International Publishers.
2. Water Resource Engineering by R.Awurbs and WP James, - Prentice Hall Publishers.

REFERENCE:

1. Land and Water Management by VVN Murthy, - Kalyani Publications.
2. Irrigation and Water Management by D.K.Majumdar, Printice Hall of India.

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(A72804) ENVIRONMENTAL SANITATION**(Elective-Ist)**www.universityupdates.in**UNIT - I**

Epidemiology – Principles of protecting the environmental sanitation measures, Insect and Rodent Control – Occupational hazards, Industrial hygiene, Rural Water Supply and sanitation, biogas.

UNIT – II

Sanitation - community sanitation measures – sanitation of camps, festivals, schools, swimming pools etc. Food and milk sanitation, hotel management with reference to sanitation – food preservation, pasteurization methods and plants. Housing need – lighting and ventilation, natural and artificial provisions.

UNIT - III

Solid wastes – characteristics, collection, disposal by landfill, composting, incineration and other methods.

Handling and disposal of Hazardous Wastes. Industrial Hygiene – Occupational hazards – Various operations in industrial units, Engineering and safety measures. Radiological health – radioactive wastes and disposal.

UNIT - IV

Noise Pollution and control – Introduction, Measurement of noise, Effects of noise and control measures.

UNIT - V

Rural sanitation various methods of collection and disposal of faecal matter – community toilets – septic tanks and soak pits – biogas plants - Public Health – Aspects of slums – Problems associated with slum rehabilitation.

TEXT BOOKS :

1. Municipal and Rural Sanitation by Eulers and Steel, Tata McGraw-Hill Publishing Co., New Delhi.
2. Environmental Sanitation by Salvato – John Wiley & Sons.
3. Environmental Protection by Chanlet- McGraw-hill New York.
4. Environmental Sanitation by Baljeet S. Kapoor, S. Chand & Co., New Delhi.

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(A70330) FINITE ELEMENT METHODS**(Elective-III)**www.universityupdates.in**UNIT – I**

Introduction to Finite Element Method – Basic Equations in Elasticity – stress strain equations – concept of plane stress – plane strain— advantages and disadvantages of FEM.

Element shapes – nodes – nodal degree of freedom – strain displacement relations.

UNIT – II

Finite Element Analysis (FEA) of – one dimensional problems – Bar element – Shape functions stiffness matrix.

FEA Beam elements – stress strain relation- shape functions -stiffness matrix-continuous beams.

UNIT – III

FEA Two dimensional problem – CST – LST element – shape function – stress – strain.

Lagrangian – Serendipity elements – Hermite polynomials – regular, Irregular 2 D & 3D – Element –shape functions.

UNIT – IV

Isoparametric formulation – Concepts of isoparametric elements for 2D analysis -formulation of CST element, 4 –noded and 8-noded iso-parametric quadrilateral elements.

UNIT-V

Solution Techniques: Numerical Integration, Static condensation, assembly of elements and solution techniques for static loads.

TEXT BOOK:

1. Introduction to Finite elements in engineering by Chandrupatla, Belegundu, Prentice Hall.
2. Finite element method by Daryl L. Logan, CENGAGE Learning.

REFERENCES:

1. Finite element analysis by S.S. Bhavikatti-New age International publishers.
2. Finite element analysis by P. Seshu, PHI.

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(A70140) REMOTE SENSING & GIS**(Elective -III)****UNIT - I**

Introduction to Photogrammetry: Principles & types of aerial photograph, geometry of vertical aerial photograph, Scale & Height measurement on single vertical aerial photograph, Height measurement based on relief displacement, Fundamentals of stereoscopy, fiducial points, parallax measurement using fiducial line.

www.universityupdates.in**UNIT - II**

Remote Sensing --: Basic concept of Remote sensing, Data and Information, Remote sensing data Collection, Remote sensing advantages & Limitations, Remote Sensing process.

Electro-magnetic Spectrum, Energy interactions with atmosphere and with earth surface features (soil, water, vegetation), Indian Satellites and Sensors characteristics, Resolution, Map and Image and False color composite, introduction to digital data, elements of visual interpretation techniques.

UNIT - III

Geographic Information Systems: Introduction to GIS; Components of a GIS; Geospatial Data: Spatial Data-Attribute data - Joining Spatial and Attribute data; GIS Operations: Spatial Data Input-Attribute data Management -Data display- Data Exploration- Data Analysis. COORDINATE SYSTEMS: Geographic Coordinate System: Approximation of the Earth, Datum; Map Projections: Types of Map Projections-Map projection parameters-Commonly used Map Projections - Projected coordinate Systems.

UNIT -IV

Vector Data Model: Representation of simple features- Topology and its importance; coverage and its data structure, Shape file; Data models for composite features Object Based Vector Data Model; Classes and their Relationship; The geobase data model; Geometric representation of Spatial Feature and data structure, Topology rules.

UNIT -V

Raster Data Model: Elements of the Raster data model, Types of Raster Data, Raster Data Structure, Data Conversion, Integration of Raster and Vector data.

Data Input: Metadata, Conversion of Existing data, Creating new data; Remote Sensing data, Field data, Text data, Digitizing, Scanning, on screen

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digitizing, importance of source map, Data Editing.

TEXT BOOKS:

- 1 Remote sensing of the environment – An earth resource perspective – 2nd edition – by John R. Jensen, Pearson Education.
- 2 Introduction to Geographic Information System – Kang-Tsung Chang, Tata McGraw-Hill Education Private Limited.

REFERENCES:

1. Concepts & Techniques of GIS by C.P.Lo Albert, K.W. Young, Prentice Hall (India) Publications.
2. Remote Sensing and Geographical Information systems by M.Anji Reddy JNTU Hyderabad 2001, B.S.Publications.
3. Principals of Geo physical Information Systems – Peter A Burragh and Rachael A. Mc Donnell, Oxford Publishers 2004.
4. Basics of Remote sensing & GIS by S.Kumar, Laxmi Publications.

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(A70195) CONCRETE AND HIGHWAY MATERIALS LAB**I. ROAD AGGREGATES:**

1. Aggregate Crushing value
2. Aggregate Impact Test.
3. Specific Gravity and Water Absorption.
4. Attrition Test
5. Abrasion Test.
6. Shape tests

II. BITUMINOUS MATERIALS:

1. Penetration Test.
2. Ductility Test.
3. Softening Point Test.
4. Flash and fire point tests.

III. CEMENT AND CONCRETES :**TESTS ON CEMENTS :**

1. Normal Consistency of fineness of cement.
2. Initial setting time and final setting time of cement.
3. Specific gravity and soundness of cement.
4. Compressive strength of cement.
5. Workability test on concrete by compaction factor, slump and Vee-bee.
6. Young's modulus and compressive strength of concrete.
7. Bulking of sand.
8. Non-Destructive testing on concrete (for demonstration)

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(A70191) ENGINEERING GEOLOGY LAB

1. Study of physical properties and identification of minerals referred under theory.
2. Megascopic and microscopic description and identification of rocks referred under theory.
3. Megascopic and microscopic identification of rocks & minerals.
4. Interpretation and drawing of sections for geological maps showing tilted beds, faults, uniformities etc.
5. Simple Structural Geology problems.

LAB EXAMINATION PATTERN:

1. Description and identification of SIX minerals
2. Description and identification of Six (including igneous, sedimentary and metamorphic rocks)
3. Interpretation of a Geological map along with a geological section.
4. Simple strike and Dip problems.