

**B.TECH CIVIL ENGINEERING SYLLABUS
VII SEMESTER**

ENVIRONMENTAL ENGINEERING – II 7111 C

Unit 1

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.

Unit 2 & 3

Engineered Systems for Wastewater Treatment :

Water purification processes in natural systems : physical, chemical and biochemical processes involved, organic discharge and stream ecology.

Preliminary treatment methods sedimentation tanks. Theory and design of biological treatment methods such as trickling filters, activated sludge process include their modifications , stabilisation ponds, oxidation ditches and aerated lagoons.

Unit 4

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.

Unit 5

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. Introductory Concepts of treatment of industrial sewage and common effluent treatment plants.

Text Book :-

1. Environmental Engineering by Peauy, Rowe, Techobauoglous.
2. Water & Wastewater Engineering by Birdi
3. Manual of Wastewater Treatment, CPHEEO.

TRANSPORTATION ENGINEERING-II 7112 C

(A) HIGHWAY ENGINEERING (60 MARKS)

Unit I

1. Introduction :- Scope of highway engineering, road planning and finances in India.

Classification of roads, planning surveys.

2. Highway Alignments :- Requirements, Surveys for highway location.

3. Transportation Planning : Transport planning process, transportation survey, trip generation, trip distribution, traffic assignment , model split evaluation , land use transport model, transport planning for small and medium sized cities.

Unit II

1. Highway Geometric Design :- Introduction , highway cross section elements, sight distance, design of horizontal alignment, design of vertical alignment.

2. Highway Materials : sub grade soil, stone aggregates, Bituminous paving mixes.

Unit III

1. Design of highway pavements : Introduction , design factors of flexible pavements, design of rigid pavements.

Highway construction : Construction of earth roads, construction of WBM roads construction of bituminous pavement, construction of cement concrete pavements and their joints.

Drainage of roads : surface and subsurface drainage.

(B) TRAFFIC ENGINEERING (40 MARKS)

Unit IV

1 Traffic characteristics : Road users and the vehicle characteristics.

2.Traffic surveys : Speed journey time delay surveys, vehicle volume count classification and occupancy, O&D surveys, parking surveys. Use of photographic techniques in traffic engg.

3. Modern aids in traffic surveys : GIS in traffic engineering.

4. Traffic controls : Traffic sign and signals, road marking , traffic control aids and steel furniture.

5. Traffic capacity studies : volume , density, capacity, level of service.

Unit V (20 marks)

1. Current topics in transportation engineering : Expressways and freeways, problem of mass transportation flyovers, traffic and environment, intelligent transport system.

2. Transport Economics : Economics evaluation of transportation plans, vehicle operating costs, value of travel time saving, accident costs, traffic congestion, traffic restraints and road pricing.

Text Book :-

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|---|--|
| 1. Highway Engineering | By S.K.Khanna & C.E.G. Justo |
| 2. Principles & practice of Highway Engg. | By L.R. Kadiyali |
| 3. Principles of pavement Design | By E.J. Yoder and M.W. Witczak |
| 4. Highway Engineering hand Book | By K.B.Wood |
| 5. Airport planning and Design | By S.K.Khanna, Arora and Jain |
| 6. Planning and Design of Airports | By Robert horonjeff and Francis X. Mckelvey. |

STRUCTURAL DESIGN AND DRAWING – II 7113 C

Unit I

Design of domes, Design of water tanks with domical top and flat bottom, tanks with domical top and bottom, Tanks on ground and overhead tanks, Intze tanks, staging and foundation.

Slab bridges and T-beam Bridges for IRC loading.

Unit II

Introduction to prestressed concrete, systems of prestressing, losses of prestress. Design of prestresses concrete beams.

Design of R.C.c., soils and bunkers.

(B) Steel Structures

Unit III

Design of plate girder railway bridges.

Design of trussed girder railway bridges.

Unit IV

Design of steel tanks with conical and hemispherical bottom.

Design of pressed steel tanks square and rectangular, design of supporting towers with foundations.

Design of steel chimneys bunkers.

Text Books :-

1. Design of Steel Structures by P.Dayaratnam
2. Design of Steel Structures by S.K.Duggal
3. Design of Steel Structures by N.S.Negi
4. Design of Steel Structures by S.A.Kazimi
5. Comprehensive Design of Steel Structures by B.C.Punmia.

ELECTIVE - I

APPLIED GEOLOGY 7114 C (i)

Unit I

Study of minerals with their properties - Rock forming and one minerals. crystallography - crystal systems and crystal symmetry.

Unit II

Study of igneous, sedimentary and igneous rocks. Classification of rocks and petro graphic properties. Engineering properties of rocks for civil engineering work.

Unit III

Ground Water - sources, water bearing properties of rocks, porosity and permeability , free ground water and confined water. Ground water potential of India. Aerial photogeological study and remote sensing.

Unit IV

(A) Earthquake - Terminology related to earthquake, causes of earthquake intensity and magnitude. engineering considerations of earthquake.

(B) Study of structural features such as folds, faults, unconformity and joints. Their different kinds and causes of folding, faulting, unconformities. Land slides study, causes and effects. Importance of these features in Engineering importance.

Unit V

(1) Physical and engineering properties of soil, soil formation and classification. Soil groups of India.

(2) Geophysical investigation methods and its importance for geological investigation, objects of Geological investigation for engineering projects like dams , reservoir, tunnels, roads, bridges etc. Indian examples of dams & Tunnels. Aerial photogeological and Remote Sensing.

Text Books :-

- 1.Principles of Engineering Geology - Rebert B Johnson, Jesome V.Degruff.
- 2.Engineering and General Geology by Parbeen Singh.
- 3.Geology for Engineers by Joseph M.Trefethen,
- 4.Physical & Engineering Geology by S.K.Garg.
- 5.Text Book & Geology by V.D.Muthayya.
- 6.Test Book of Geology by P.K.Mukharjee.
7. A text book of Geology : General and Engineering by K.M.Basngar.

ELECTIVE – I

SOLID & HAZARDOUS WASTE MANAGEMENT 7114 C (ii)

Unit I

Solid Waste : Sources, types compositions, physical, chemical and biological properties of solid wastes, sources and types of hazardouns and infactions wastes in municipal solid wastes.

Unit II

Solid waste generation and collection, Handling storage, processing, transportation.

Unit III

Disposal of solid Waste : Materials separation and processing, thermal conversation, biological and chemical conversation , recycling of material in municipal solid wastes. Land filling , Composting gas generation, closure of landfills.

Unit IV

Industrial Solid Wastes : Composition, biodegradable, non biodegradable hazardous, toxic solid wastes, methods of detoxification, disposal on land disposal into water bodies. Legal aspects of municipal solid waste collection, conveyance, treatment and disposal.

Unit V

Hazardous Wastes : Origin , quantity and quality parameters. Treatment and disposal methods, physico-chemical and biological, stabilization and solidification , thermal methods, land disposal , site remediation.

ELECTIVE –I

ENGINEERING ECONOMICS & BUSINESS ORGANIZATION 7114 C (iii)

Unit I : Introduction to Economics

Introduction to Economics, its importance, principles, approaches and use of study, Engineering and economics, Economic problems, economic good and wealth, demand and supply, competition, monopoly, theory of firm, money and its function, theory of money and choice, the bank and its functions, employment and income, gross national product, net national product consumption, savings and investment.

Unit II : Features of Indian Economy-I

Broad features of Indian Economy, Natural resources and economic development, Infrastructure in the Indian Economy, Agriculture development, green revolution, population, population theories, unemployment , poverty and balance regional development. Economic growth and economic development , Indian industries, industrial policy, industrialization in India, role , plan and pattern of Industrialization, public vs private sectors, economic reforms in India, India's five year plans.

Unit III : Features of Indian Economy –II

The indigenous and modern banking system in India, reserve bank of India, monetary and fiscal policies, financial institutions and SEBI, free trade protection, India's foreign trade and WTO, balance of payments, Indian currency system and foreign exchange, foreign capital investment , foreign aid and FEMA.

Unit IV : Introduction to Business Organization –I

Concept , nature and scope of business, business and its environment, profit maximization vs social responsibility of business, business ethics, business enterprise, entrepreneurship, promotions, types and functions, stages in company formation, concept of business growth, rationale and types of growth , rationale and types of growth strategies, joint venture-definition, scope, role and problems of small business, concepts and features of public enterprise, multinationals.

Unit V : Introduction to business Organization –II

Time value of money, simple and compound interest , annuity , depreciation, definitions, characteristics, life and salvage value, method of proving for depreciation, relationship between depreciation, repairs, renewals, depletion cost, replacement , amortization and present worth.

Books :-

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|---------------------------------------|---------------------------|
| 1.Economics of Development & Planning | Agrawal & Lal, Vikas Pub. |
| 2. Engineering Economics | Tarachand |
| 3. Economics | Samualson |
| 4. Business Organization | Shukla |

ELECTIVE -I

SEDIMENT TRANSPORTATION ENGG. 7114 C (iv)

Unit I

Introduction to sediment & Fluvial Hydraulics.

Properties of Sediments : Origin & formation of sediments, fundamental properties of individual sediment particles, bulk properties of sediments.

Incipient motion of sediment particles, competent velocity, life concept, critical tractive force, critical tractive stress.

Unit II

Regime of Flows : Description in Regimes of flow of regimes.

Velocity Distribution in Alluvial Streams : Velocity distribution and resistance in turbulent flow over rough boundaries, resistance to flow in alluvial stream, velocity distribution in alluvial streams.

Unit III

Bed Load Transport : Bed load equations empirical, semi theoretical and based on dimensional considerations saltation.

Suspended Load Transport : Mechanism of suspension, general equations of diffusion, sediment distribution equations, effect of temperature on suspended load transport, wash load.

Unit IV

Total load transport : Approaches to the problem, microscopic and macroscopic methods , some approximate methods, effect of hydraulic conditions on sediment transport.

Unit V

Design of Stable Channels : Variables in channels design and conditions of design, secondary factors influencing stable channel design , stable channels carrying clear water in coarse, non-cohesive materials and alluvial materials.

Sediment Control in Canals : Sediment controlling actions, methods of sediment control and their details , water requirements.

Text Book

1. The Flow of Complex Mixtures in Pipes by G.W. Govier & K.Aziz, van Nostrand Reinhold Ltd. Toronto.
2. Hydraulics Transport of Bulky Materials I.Zandi, Pergamon Press.
3. Hydraulics of Sediment Transport, W.H.Graf, McGraw Hill Series in Water Resources.
4. Mechanics of Sediment Transportation and alluvial Stream Problems, R.J.Garde & k.g.Ranga Raju willey Eastern Ltd.

ELECTIVE –I

TRANSPORTATION PLANNING 7114 C (v)

UNIT-I

Hierarchical levels of planning, passenger and goods transportation, general concept and process, Urban travel characteristics, private and public travel behavior analysis.

UNIT-II

Travel demand estimation and forecasting, trip generation methods and there comparison, model split analysis, behavioral approach, two stage model splits models.

Unit-III

Trip distribution – Growth factor methods, gravity model, intervening opportunity and competing opportunity models, trip route assignment.

UNIT-IV

Land use transport planning, transport related land use models, corridor type travel planning, state wide and regional transportation planning.

UNIT-V

Intelligent transportation system, Urban mass transportation planning, LRT, development of bus as a transit systems, economic evaluation of transport plan.

Books:

- 1.Hutchinson B.G. , Principles of urban transport system planning. McGraw Hill, New York.
- 2.Kadiyali L.R. , Traffic engineering and transport planning. Khanna publishers.
- 3.Florian Michael. , Transportation planning models. Elsevier science publishers,Netherlands.
- 4.Khanna and Justo. , Highway engineering. Nemchand brothers,Roorkee.

ELECTIVE -I

PRESTRESSED CONCRETE 7114 C (vi)

1. Principle of prestressing , materials for prestressing , loss of prestress, pretensioning and posttensioning anchorage.
2. Design of pretensioned and post-tensioned (Type I,II,III) beams. choice of section and cable profile, design for shear and bond, stresses in end block. calculation of deflections. limit state design.
3. Design of composite prestressed beams , stresses due to shrinkage , shear connectors.
4. Circular prestressing, design of cylinder pipes, non cylinder pipes and water tanks.
5. Design of continuous beams.
6. Design of portal frames.

ELECTIVE –I

REINFORCED EARTH AND GEOSYNTHETICS ENGG. 7114 C (vii)

Unit -I

Reinforced Earth : History ,field of applications, natural fibres , overview of Geotextiles, Geomembranes, Geogrids, Geonets,Geoweb,Geomats and Geocomposites and economic aspects of their applications.

Unit - II

Production of Geotextiles , composites, physico- mechanical ,hydraulic and chemical properties. Functions of Geosynthetics, fluidtransmission,filtration,separation, protection.

Unit- III

Soil Reinforcement :

Basic principle of soil reinforcement, shear strength of reinforced soil, theoretical strength delts, factors affecting ,requirements on synthetic reinforcement, installation techniques.

Unit- IV

Calculation methods :

Basic concepts,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 .

Unit - V

Use of Geosynthetics in Roads and Railways, drainage system - Control of groundwater level, dewatering and reclamation of land , use of Geomembranes - For lining application, management and maintenance

References:

- Geotextiles and Geomembranes in Civil engg- Gerard P.T.M. Van santvrot, A.A. Balkema,Oxford and IBH publishing company,New Delhi.
- Reinforced Soil and Geotextiles -J.N. Mandal, proceedings FIGC- 1988,Oxford and IBH publishing company private Ltd.,New Delhi.

- Geosynthetics : Application ,Design and Construction- R.J. Tarmat,proceedings First European Geosynthetics Conference,Netherland .A.A.Balkema,publisher-Brookfield ,U.S.A.
- Geosynthetics World . -J.N. mandal,Willey Eastern Limited , New Delhi.

ELECTIVE-II

ENERGY PLANNING AND MANAGEMENT 7115 C (i)

1. Planning : Energy scenerio of the world in general and India in particular with respect to demand, supply and resources. energy requirement and demand forecasting. isolated and integrated planning, concept of national grid, rural energy planning.

2. Generation : Production of energy from conventional and non conventional sources - Hydel, Thermal, Nuclear, Solar, Tidal , wind , M.H.D., Geothermal, Bioconversion etc. Economic feasibility and cost analysis.

3. Ecological & Environmental aspects : Impact assessment of power plants on environment and ecosystem. Environmental degradation & control strategies, Air pollution, water pollution and their control.

4. Engineering Aspects : Load predictions , peak load, base load, load factor, plant factor, capacity factor etc. operation and economics of power stations.

Losses in energy generation, transmission and distribution, energy storage and conservation techniques, reliability analysis energy system, energy audit and economics.

5. Instrumentation : measurement of pressure , flow temperature and humidity, concept of automatic control, power & frequency control , voltage & reactive power control. microprocessor applications in power systems.

Text Book :-

1. Energy Planning & Management by D.Sawyer.

ELECTIVE II

ENVIRONMENTAL IMPACT ASSESSMENT AND MANAGEMENT 7115 C (ii)

Unit I

Environmental Problems and Issues : Explosion of Environmental issues and scientific, technological and regulatory responses. Effects on ecology, environment, society, health and economy. Review of national and international developments related to environmental issues.

Unit II

Review of Remedial Actions : Rural and urban approaches, energy approach, transportation approach, industrial approach, agricultural approach, Technological solutions and Role of technology . Religio- philosophical approaches and concept of Deep ecology. Market based instruments including taxation for pollution control; Role of environmental ethics.

Unit III

Environmental Management, Planning and Economics : Multidisciplinary environmental strategies, planning and decision making, human dimensions. Siting of industries and concept of Zoning Atlas, Economic valuation of environmental assets and preliminary concept of Natural Resource Accounting.

Unit IV

Sustainable development : Concept of limits to growth in terms of population, Food, Resources, Capital, Energy, Land Services etc. Their interlinkages and use of Systems approach including feed back loops. Carrying capacity of systems, prerequisites for sustainable development, concepts of sustainable development in the various sectors of economy such as Industry, Agriculture and Infrastructure.

Unit V

Impact Assessment: Collection of baseline data, concept and methodologies for initial environmental examination (IEE), Environmental Impact Assessment (EIA) , Environmental Impact Statement (EIS), Environmental Audit (EA), Risk Assessment (RA) etc. Case studies for the above.

Text Book :-

1. Ecology and Environment by P.D.Sharma
2. Environment Management in India by R.K.Sapru.
3. Environmental Quality Management by Bindu N.Lohani.
4. Studies in Environment and Development by R.B.Singh.
5. Environmental Impact Assesment by Larry W.Canter.
6. Environmental Planning, Policies and Programmes in India by K.D.Saxena.
7. Concepts in Environmental Impact Analysis by S.K.Shukla & P.R.Shrivastava.

ELECTIVE-II

ADVANCED REINFORCED CONCRETE DESIGN 7115 C(iii)

1. Design of slabs, Waffle slabs, slabs of irregular shape by yield-line theory, circular slabs for different loading and eadge conditions. circular slabs with central hole.
2. Composite construction. Steel-concrete composite beams, beams with in-situ slab and precast rib.
3. Design of buildings, buildings frames and industrial frames.
4. Folded plates and cylindrical shells.

Text Book :-

1. Reinforced Concrete Design by Sinha & Roy.
2. Advanced Reinforced Concrete Design by Krishnaraju.
3. Composite Structures Vol.-I by R.P. Johnson.

ELECTIVE-II

APPLIED SOIL MECHANICS 7115 C (iv)

1. Stress distribution in soils :- Boussinesq & Waster gaard's formule for point loads and their comparison. computation of vertical stress beneath loaded areas line and stril loads - stresses beneath rectangular and circular areas, New mark's influence chart, contact pressure and settlements.
2. The improvement of soil, laboratory and field compaction, effect of compaction on soil properties, equipments used for field compaction, field control, compaction ratio.
3. Soil stabilisation, mechanical, chemical, thermal and electromosis, stabilisation of subgrade for roads and embankments , field control.
4. Application of one and three-dimensional consolidation theories to soil engineering problems, used of sand drains, secondary compressions.
5. Earth Pressure Theories : Non cohesive and cohesive backfill analytical and graphical methods for uniform and non uniform surcharge. arching in soil , distribution of earth pressure in deep excavation, sheet piles and anchor bulk heads.

6. Stability of Slopes : Infinite slope, total and effective stress analysis, factor of safety, consideration of earthquake forces in slope stability analysis.

7. Bearing Capacity of Shallow Foundation, Terzaghi's theory, Meyerhoff and Balla's theory, Skempton corrections, bearing capacity of deep foundation failure surface and settlement calculations.

8. Soil testing techniques, analysis of test results, use of grain size distribution curves, engineering uses of index properties, expansive soils and their engineering problems, uses on under - reamed piles.

Text Book :-

1. Advanced Soil Mechanics by Varada Rajan.

ELECTIVE -II

TRAFFIC ENGINEERING 7115 C (V)

Unit-I

Traffic characteristics :

- 1) Road user characteristics - General human characteristics, physical ,mental and emotional factors , practice affecting reaction time , PIEV theory .
- 2) Vehicular characteristics - Characteristics affecting route design width, height,length and other dimensions,weight ,power,speed and braking capacity of a vehicle.

Unit-II

Traffic studies :

- 1) Spot speed studies and volume studies.
- 2) Speed and delay studies - Purpose ,causes of delay,methods of conducting speed and delay studies
- 3) Origin and destination studies(O&D) - Various methods ,collection and interpretataion of data, planning and sampling

Unit-III

- 1) Traffic capacity studies - Volume,density, basic practical and possible capacities,level of service .
- 2) Parking studies- Methods of parking studies cordon counts, space inventories, parking practices.
- 3) Accident studies - Causes of accidents, accident studies and records,condition and collision diagram, preventive measures.

Unit-IV

Traffic operations and Control :

- 1) Traffic regulations and various means of control.
- 2) One way streets - Advantages and limitations.
- 3) 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 signals.

Unit-V

Street Lighting :

- 1) Methods of light distribution.
- 2) Design of street lighting system
- 3) Definitions - Luminaire, foot candle, lumin, utilization and maintenance factors

- 4) Different types of light sources used for street lighting.
- 5) Fundamental factors of night vision.

Mass Transportation :

- 1) Express ways and free ways, Problems on mass transportation and remedial measures, brief study of mass transportation available in the country.

References:

- 1) Traffic Engineering and Transport Planning by L.R. kadiyali
- 2) Traffic Engineering by Matson, Smith and Hurd
- 3) Transportation and Traffic Engineering by Randbrook, ITE
- 4) Manual of Transportation Engg. Studies, ITE
- 5) Traffic System Analysis for Engineering and Planning by Wohe and Martin

ELECTIVE II

HYDRO DYNAMICS 7115 C (vi)

Unit I

Introduction : Fluid Mechanics & Hydrodynamics types of fluids, fluids as continuum, ideal & real fluid properties, rheological properties.

Fluid Kinetics : Mathematical and streamline representation of velocity, steady, unsteady and relative motions acceleration, continuity equation (Lagrange's & Euler's form and relation between the two forms). Irrotational and rotational motion, vorticity vector, circulation, Kelvin's relation.

Potential and stream functions : Velocity potential, stream function, Kinematics boundary conditions and impulsive motions.

Unit II

Fluid Kinetics : Equation of motion, integration of equations of motions, singular forces in terms of velocity potential (Blasius theorem and application, Kutta-Joukowski law, Lagally's theorem), source, sinks doublet and image, stagnation points.

Vortex Dynamics : General fluid motions, description of vortex motions (line vortices & line doubles), vortex construction theorems, Kelvin's circulation theorem, vortex streets (rows), and D'Alembert's paradox.

Unit III

Methods of solution (Potential Flows): Hydrodynamics singularities in two-dimensional flows. Conformal transformation and mapping (including Schwarz Christoffel), numerical methods of solution, electro conductivity analogy, other analogies.

Unit IV

Hydraulic Flows : Confined porous-media flow, Darcy's law, wells in uniform bed, and seepage under dams.

Wave Motions : Water waves, wave celerity and types, standing waves (deep water & shallow water dams).

Unit V

Magneto Hydrodynamics : Definition, basic field equations (medium at rest, medium in motion), simplification of field equations, Alfvén theorem, MHD waves and Alfvén waves.

ELECTIVE - II

REMOTE SENSING IN CIVIL ENGG. 7115C (vii)

Unit I

Introduction : Physical basis of Remote Sensing, Sensor systems ground based, air borne and satellite, passive scanning system multi-spectral scanners (MSS), Thermal Infrared Scanning system, Radio-meters, Active Scanning system: Radar, Lidar, Satellite data-types, description and utility for various Civil Engineering projects.

Unit II

Remote Sensing in Civil Engineering Projects : Introduction, Role of remote sensing in terrain investigation, photogrammetry, photo-interpretation, Selection of appropriate data, Digital processing of satellite data, Necessity of field work to collect ground truth.

Unit III

Topographic Mapping using remote sensing : Introduction , Aerial photographs, Scale, geometric characteristics, parallax bar, generation of Digital Elevation Model, Stereoplotters, Requirements for cartographic presentation of satellite data. Mapping using satellite image interpretation, Mapping of inaccessible areas using side Looking Airborne Radar data.

Unit IV

Resources mapping for civil engineering projects : Identification of Geomorphic and Hydro-geomorphic features and mapping. Locating construction materials - water resources, sand, soil, kankar, rocks.

Soil characteristics using remote sensing : Application of visible, infra-red and microwave remote sensing for identification of soil types, grain size and soil moisture studies, Monitoring areas prone to Landslides using remote sensing, digital model and GIS.

Unit V

Application in water resources engineering : Mapping surface water bodies using satellite data, studies related to floods, snow melts, wetland, coastal environment, sediment transport, ground water targetting, bathymetry.

Regional and urban planning using remote sensing : Land use. Land cover classification, urban land use planning, urban sprawl monitoring, waste disposal sites.

Text book :-

1. Introductory Digital Image Processing - J.R.Jeusen
2. Remote Sensing for Environment and Forest Management by A.Mehrotra & R.K.Suri
3. Remote Sensing and Image Interpretation by Lilles T.M.and kiefer R.W.
4. Manual of Remote Sensing - Vol-I.
5. Principles of Remote sensing - P.T.
6. Mapping & Compiling by K.K.Rampal
7. Manual of Photographic Interpretation.
8. A Multipurpose Level Information system for Rural resources planning (soil & water conservation) by S.J.Ventura, Niemann B.J. and D.D. Mayer.

ELECTIVE - II

RENEWABLE ENERGY SYSTEMS 7115C (vii)

Unit I-Introduction

Global and National Energy Scenario, Conventional Energy Sources, Renewable Energy Sources need and Development of Renewable Energy Sources, types of Renewable Energy Systems.

Unit II-Solar Energy System

Principle and Scope, Solar Radiation, Energy Collection and Devices, Solar Cells, Solar Water Heater, Solar Pump etc.

Introduction to Wind Energy Conversion, Wind Turbines, Wind Farms.

Unit III-Bio Energy System

Biomass and its uses, characteristics of biomass, bio mass conversion processes, Gasification and Combustion of Bio-mass, Gasifiers.

Bio-gas as a Renewable Energy Source, Bio-gas Plant and its components, types of bio-gas plants, Design and constructional features.

Unit IV- Hydel Energy System

Types of Hydro Power Plant, Importance of Small Hydro Power Plants, and their Elements, types of turbines for small hydro, estimation of Primary and Secondary Power.

Tidal and Wave Energy its scope and Development, Scheme of Development of Tidal Energy.

Unit V- Solar Energy System

MHD and Geo Thermal Renewable Energy Systems - Principles and Application Appropriate Energy Technology for Rural Development, Energy Conservation, Environmental aspects of renewable Energy Systems.

ENVIRONMENTAL ENGINEERING LAB –II 7116 C

List of Experiments :

1. To determine Biochemical Oxygen Demand of waste water sample.
2. To determine chemical oxygen demand of waste water sample.
3. Determination of Ammonia Nitrogen, Organic Nitrogen, Nitric Nitrogen and Nitrate Nitrogen of waste water sample.
4. Determination of solids in waste water sample – Total solids, settleable solids, suspended solids and dissolved solids.
5. Determination of phosphorous and phosphate.
6. Determination of Volatile acids.
7. Analysis of waste sample for Carbon Dioxide , Oxygen, Hydrogen Sulphide, Methane.
8. Ambient air analysis by high volume sampler.
9. Determination of Sodium and Potassium by Hanne Photometer.

TRANSPORTATION ENGINEERING LAB –II 7117 C

List of Experiments :

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

MAJOR PROJECT 7118 C

Each candidate shall work on an approved Civil Engg. Project and shall submit design and a set of drawings on the project.