

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD**

**B.TECH. CIVIL ENGINEERING**

**IV YEAR COURSE STRUCTURE & SYLLABUS (R13)**

**IV YEAR I SEMESTER**

Code	Subject	L	T/P/D	C
A70140	Remote Sensing & GIS	4	-	4
A70143	Transportation Engineering -II	4	-	4
A70138	Estimating & Costing	4	-	4
A70133	Water Resources Engineering	4	-	4
	<b>Elective-II</b>	4	-	4
A70330	Finite Element Methods			
A70134	Advanced Foundation Engineering			
A70145	Watershed Management			
A70136	Air Pollution and Control			
	<b>Elective-III</b>	4	-	4
A70135	Advanced Structural Design			
A70137	Earth and Rock fill Dams and Slope Stability			
A70144	Water Resource System Analysis			
A70139	Industrial Waste Water Treatment			
A70195	Concrete & Highway Materials Lab	-	3	2
A70192	Environmental Engineering Lab	-	3	2
	<b>Total</b>	24	6	28

**IV YEAR II SEMESTER**

Code	Subject	L	T/P/D	C
	<b>Elective-IV</b>	4	-	4
A80151	Rehabilitation and Retrofitting of Structures			
A80148	Geo-Environmental Engineering			
A80147	Design and Drawing of Irrigation Structures			
A80141	Solid Waste Management			
A80150	Prestressed Concrete Structures	4	-	4
A80146	Construction Management	4	-	4
A80087	Industry Oriented Mini project	-	-	2
A80089	Seminar	-	6	2
A80088	Project	-	15	10
A80090	Comprehensive viva	-	-	2
	<b>Total</b>	12	21	28

**(A70140) REMOTE SENSING & GIS**

**UNIT-I**

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

**UNIT-II**

**Remote Sensing** -: Basic concept of Remote sensing, Data and Information, Remote sensing data collection, Remote sensing advantages & Limitations, Remote Sensing process. Electromagnetic 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** □ system: Introduction to GIS; components of a GIS ; Geo spatial Data: Spatial Data- Attribute data-Joining Spatial and attribute □ te 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 feature □ Object □ Based Vector Data Model; Classes and their Relationship; The geobase data model; Geometric representation of Spatial Feature and data structure, Tomography rules.

**UNIT-V**

**Raster Data Modern**: Elements of the Raster data model, Types of Raster Data, Raster Data Structure, Data conversion, Integration of Raster and Vector data.

**Data Input** : Metadata, on version of Existing data, creating new data; remote sensing data, filed data.

IV Year B. Tech CE- I Sem

L	T/P/D	C
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**(A70143) TRANSPORTATION ENGINEERING-II**

**UNIT – I**

**Introduction to Railway :** Permanent way components – Cross Section of Permanent Way – Function of Various Components like Rails, Sleepers and Ballast, Gauge – Creep of Rails – Theories related to Creep – Sleeper density.

**UNIT – II**

**Geometric Design of Railway Track :** Gradients – Grade Compensation – Cant and Negative Super elevation – Cant Deficiency – Degree of Curve, Points and Crossing, Rail Joints & Welding of Joints, Railway station & yards, Signalising & interlocking.

**UNIT – III**

**Airport Engineering :** Airport Site selection – Runway Orientation – Basic Runway Length – Corrections for Elevation, Temperature – Airport Classification – Runway Geometric design – Factors Controlling Taxiway Layout – Terminal Area – Apron – Hangar – Blast Considerations, Typical Airport Layouts – Wind rose diagram – Runway Lightening system & Marking.

**UNIT – IV**

**Port and Harbour Engineering :** Requirements of Port and Harbour, Classification of Port & Harbour, Features of a Harbour, Planning of Harbour, Breakwaters, Dry docks, Jetties, Aprons, Transit shed and Warehouses, Navigational aids, Maintenance of Port and Harbours, Inland Water Transport

**UNIT – V**

**Intelligent Transport Systems :** ITS Definition, Benefits of ITS, user services, Detectors, Automatic Vehicle Location (AVL), Automatic Vehicle Identification (AVI), Introduction to ITS applications; Advanced Traffic Management systems (ATMS), Advanced Public Transportation systems (APTS), ITS architecture components and standards, Overview of ITS implementations in developed countries.

IV Year B. Tech CE- I Sem

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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. Standard specifications for different items of building construction.

**(A70133) WATER RESOURCES ENGINEERING –II**

**UNIT-I**

Storage works - Reservoirs- Types of reservoirs, selection of site for reservoir, zones of storage of a reservoir, reservoir yield, and estimation of capacity of reservoir using mass curve-Reservoir Sedimentation-Life of reservoir.Types of dams, factors affecting selection of site for a dam, factors governing selection of site for dam.

**UNIT –II**

Gravity dams: Forces acting on a gravity dam, causes of failure of gravity dam, elementary profile of gravity dam and practical profile of a gravity dam, limiting height of low gravity dam, Factors of safety- Stability Analysis, Foundation for a Gravity dam, drainage and inspection galleries.

**UNIT-III**

Earth dams: types of earth dams , causes of failure of earth dam, criteria for safe design of earth dam, seepage through earth dam- graphical method, measures for control of seepage.

Spillways: Types of spill ways, Design principles of Ogee spillways- Spillway gates. Energy dissipaters and Stilling Basins Significance of Jump Height Curve and Tail Water Rating Curve- USBR and Indian types of Stilling Basins.

**UNIT-IV**

Diversion Head works: Types of Diversion head works –weirs and barrages, layout of diversion head work – components. Causes and failures of Weirs and Barrages on permeable foundations- Silt Ejectors and Silt Excluders.

Weirs on permeable foundations –Creep Theories , Bligh’s, Lane’s and Khosla’s theories, Determination of uplift pressure-Variou Correction Factors –Design principles of weirs on permeable foundation using Creep theories – exit gradient ,U/S and D/S Sheet piles-Launching Apron.

**UNIT-V**

Canal falls –types of falls and their location, Design principles of Notch Fall and Sarada type Fall.

Canal regulators works, design principles of distributor and head regulators, Cross regulators-canal out lets , types of canal modules,

Cross Drainage works: types, selection of site, Design principles of aqueduct, siphon aqueduct and super passage.

## (A70145)WATERSHED MANAGEMENT

### 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 – Run off computations from a watershed – flood frequency analysis – gum bell, 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 soils loss due to erosion, universal soil loss equation.

**Measures to Control Erosion:** contour techniques, ploughing, furrowing, trenching, bunding, terracing, gully control, rock filldams brushwood dam, Gabion.

### UNIT-IV

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

### 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.

**(A70139) INDUSTRIAL WASTE WATER TREATMENT**

**UNIT-I:**

**Sources of pollution:** Physical, chemical, organic and biological properties of industrial waste-difference 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 floatation-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.

**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

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**(A70195) Concrete and Highway Materials Lab**

**I. ROAD AGGREGATES:**

1. Aggregate Crushing Value
2. Aggregate Impact Value
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
- 5.

**III. CEMENT AND CONCRETES:**

**TESTS OF 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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**(A70192) Environmental Engineering Lab**

**LIST OF EXPERIMENTS**

1. Determination of PH and Turbidity
2. Determination of Conductivity and total dissolved solids (organic and inorganic)
3. Determination of Alkalinity/Acidity.
4. Determination of Chlorides.
5. Determination of iron.
6. Determination of Dissolve Oxygen
7. Determination of Nitrates
8. Determination of Optimum dose of coagulant
9. Determination of Chlorine demand
10. Determination of total Phosphorous
11. Determination of B.O.D
12. Determination of C.O.D
13. Determination of Optimum coagulant dose.
14. Determination of Chloride demand.
15. Presumptive Coliform test

NOTE: At least 8 of the above experiments are to be conducted.

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**(A80151) Rehabilitation and Retrofitting of Structures**

**UNIT—I**

**Introduction** — Deterioration of Structures — Distress in Structures — Causes and Prevention. Mechanism of Damage — Types of Damage

**UNIT—II**

**Corrosion of Steel Reinforcement** — Causes — Mechanism and Prevention. Damage of Structures due to Fire — Fire Rating of Structures — Phenomena of Desiccation.

**UNIT—III**

**Inspection and Testing** — Symptoms and Diagnosis of Distress — Damage assessment — NDT.

**UNIT—IV**

**Repair of Structure** — Common Types of Repairs — Repair in Concrete Structures — Repairs in Under Water Structures — Guniting — Shot Create Underpinning. Strengthening of Structures — Strengthening Methods Retrofitting — Jacketing.

**UNIT—V**

**Health Monitoring of Structures** — Use of Sensors — Building Instrumentation.

## (A80150) PRESTRESSED CONCRETE STRUCTURES

### UNIT I

**Introduction:** Historic development- General principles of prestressing pretensioning and post tensioning- Advantages and limitations of Prestressed concrete- General principles of PSC- Classification and types of prestressing Materials- high strength concrete and high tensile steel their characteristics. Methods and Systems of prestressing: Pretensioning and Posttensioning methods and systems of prestressing like Hoyer system, Magnel Blaton system, Freyssinet system and Gifford- Udall System- Lee McCall system.

### UNIT II

**Losses of Prestress:** Loss of prestress in pretensioned and post-tensioned members due to various causes like elastic shortage of concrete, shrinkage of concrete, creep of concrete, relaxation of stress in steel, slip in anchorage, frictional losses.

### UNIT III

**Flexure:** Analysis of sections for flexure- beams prestressed with straight, concentric, eccentric, bent and parabolic tendons- stress diagrams- Elastic design of PSC beams of rectangular and I sections- Kern line — Cable profile and cable layout.

**Shear:** General Considerations- Principal tension and compression- Improving shear resistance of concrete by horizontal and vertical prestressing and by using inclined or parabolic cables- Analysis of rectangular and I beams for shear — Design of shear reinforcements- Bureau of Indian Standards (BIS) Code provisions.

### UNIT IV

**Transfer of Prestress in Pretensioned Members :** Transmission of prestressing force by bond — Transmission length — Flexural bond stresses — IS code provisions — Anchorage zone stresses in post tensioned members — stress distribution in End block — Analysis by Guyon, Magnel, Zielinski and Rowe's methods — Anchorage zone reinforcement- BIS Provisions

### UNIT V

**Composite Beams:** Different Types- Propped and Unpropped- stress distribution- Differential shrinkage- Analysis of composite beams- General design considerations.  
**Deflections:** Importance of control of deflections- Factors influencing deflections — Short term deflections of uncracked beams- prediction of long. time deflections- BIS code requirements.

**(A80146)Construction Management**

**UNIT-I**

Management process- Roles. management theories . Social responsibilities. planning and strategic management strategy implementation . Decision making: tools and techniques — Organizational structure . Human resource management- motivation performance- leadership.

**UNIT-II**

Classification of Construction projects, Construction stages, Resources- Functions of Construction Management and its Applications .Preliminary Planning- Collection of Data- Contract Planning — Scientific Methods of Management: Network Techniques in construction management – Bar chart, Gant chart, CPM, PERT- Cost & Time optimization.

**UNIT-III**

Resource planning – planning for manpower, materials, costs, equipment. Labour, - Scheduling .Forms of scheduling – Resource allocation . budget and budgetary control methods

**UNIT-IV**

Contract – types of contract, contract document, specification, important conditions of contract — tender and tender document – Deposits by the contractor – Arbitration . negotiation – M.Book – Muster roll -stores.

**UNIT-V**

Management Information System – Labour Regulations: Social Security – welfare Legislation – Laws relating to Wages, Bonus and Industrial disputes, Labour Administration – Insurance and Safety Regulations – Workmen’s Compensation Act -other labour Laws – Safety in construction : legal and financial aspects of accidents in construction . occupational and safety hazard assessment. Human factors in safety. legal and financial aspects of accidents in construction . occupational and safety hazard assessment.

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**(A80087) Industry Oriented Mini Project**

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**(A80089) Seminar**

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**(A80088) Project Work**

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**(A80090) Comprehensive Viva**