



TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

AN AUTONOMOUS INSTITUTION

Accredited by NBA and NAAC with A+ Grade

(Sponsored by TKR Educational Society, Approved by AICTE, Affiliated to JNTUH)

Medbowli, Meerpet, Balapur, Hyderabad, Telangana – 500097



B.TECH CIVIL ENGINEERING – R22

SEMESTER VII

S.No.	Course Class	Course Code	Name of the Subject	L	T	P	C	I	E	Total
1.	PE4	D17PE4	Ground Water Development and Management	3	0	0	3.0	40	60	100
			Foundation Engineering							
			Finite Element Analysis							
2.	OE	D17OE1	Open Elective-I	3	0	0	3.0	40	60	100
3.	OE	D17OE2	Open Elective-II	3	0	0	3.0	40	60	100
4.	PC	D17PC24	Estimation & Costing	3	0	0	3.0	40	60	100
5.	PC	D17PC25	Environmental Engineering Lab	0	0	2	1.0	40	60	100
6.	PW	D17PW1	Project Stage-I	0	0	14	7.0	100	0	100
Total				12	0	16	20	300	300	600

SEMESTER VIII

S.No.	Course Class	Course Code	Name of the Subject	L	T	P	C	I	E	Total
1.	PE5	D18PE5	Prestressed Concrete Structures	3	0	0	3.0	40	60	100
			Advanced Structural Design							
			Structural Analysis by Matrix Methods							
2.	PE6	D18PE6	Traffic Engineering & Management	3	0	0	3.0	40	60	100
			Rehabilitation and Retrofitting of Structures							
			Construction Project Planning & Management							
3.	OE	D18OE3	Open Elective-III	3	0	0	3.0	40	60	100
4.	OE	D18OE4	Open Elective-IV	3	0	0	3.0	40	60	100
5.	PW	D18PW2	Project Stage-II	0	0	16	8.0	40	60	100
Total				12	0	16	20	200	300	500

L - Lecture Hours / Week; T - Tutorial Hours / Week; P - Practical Hours / Week;
 I - Internal Marks; E - External Marks; S – Satisfactory



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(PE-IV) GROUND WATER DEVELOPMENT AND MANAGEMENT - D17PE4

VII Semester

L/T/P/C

3/0/0/3

COURSE OBJECTIVES:

1. Appreciate ground water as an important natural resource.
2. Understand flow towards wells in confined and unconfined aquifers.
3. Understand the principles involved in design and construction of wells.
4. Create awareness on improving the ground water potential using various recharge techniques.
5. Know the importance of saline water intrusion in coastal aquifers and its control measures.
6. Appreciate various geophysical approaches for ground water exploration.

COURSE OUTCOMES: At the end of the course, the student will be able to

1. Estimate aquifer parameters and yield of wells.
2. Analyse radial flow towards wells in confined and unconfined aquifers.
3. Interpret geophysical exploration data for scientific source finding of aquifers.
4. Take effective measures for controlling saline water intrusion and ground water management.
5. Design wells and understand the construction practices.

UNIT-I

Ground Water Occurrence: Ground Water Hydrologic Cycle, Origin of Ground Water, Rock Properties effecting Ground Water, Vertical Distribution of Ground Water, Zone of Aeration and Zone of Saturation, Geologic formation of Aquifers, Types of Aquifers, Porosity, Specific Yield and Specific Retention.

UNIT-II

Ground Water Movement: Permeability, Darcy's law, Storage Coefficient. Transmissivity, Differential Equation Governing Ground Water Flow in three dimensions (3D) Derivations, Ground Water Flow Equation in Polar Coordinate System. Ground Water Flow, Contours - Applications.

UNIT-III

Steady Groundwater Flow towards a Well in Confined and Unconfined Aquifers - Dupuit's and Theim's Equations, Assumptions, Formation Constants, Yield of an Open Well Interface and Well Tests - Recuperation Test.

Unsteady Flow towards a Well - Non-equilibrium Equations - Theis Solution - Jacob and Chow's Simplifications, Leaky Aquifers - Well Interference.

UNIT-IV

Surface and Subsurface Investigation: Surface Methods of Exploration - Electrical Resistivity and Seismic Refraction methods. Subsurface methods - Geophysical Logging and Resistivity Logging - Case Studies in Subsurface Investigation – Artificial Recharge of Ground Water: Concept of artificial recharge – Recharge methods.



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UNIT-V

Well Construction: Drilling Equipment used for Well Construction - Bore log, Interpretation of Log Data.

Saline Water Intrusion in Aquifer: Occurrence of Saline Water Intrusions, Ghyben-Herzberg Relation, Shape of Interface, Control of Seawater Intrusion. Groundwater Basin Management: Concepts of Conjunction Use, Case Studies.

TEXT BOOKS:

1. Ground Water Hydrology by David Keith Todd and Larry W. Mays, John Wiley & Sons.
2. Ground Water by H. M. Raghunath, New Age International Publishers.

REFERENCE BOOKS:

1. Ground Water Systems: Planning & Management, William W.G, Yen, Prentice Hall.
2. Applied Hydrogeology by C.W. Fetta, CBS Publishers & Distributers.
3. Ground Water Assessment, Development and Management by K.R. Karanth, Tata McGraw Hill.



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(PE-IV) FOUNDATION ENGINEERING - D17PE4

VII Semester

L/T/P/C

3/0/0/3

PRE-REQUISITES: Soil Mechanics

COURSE OBJECTIVES: The objective of this course is to

1. Provide the Knowledge about Soil Exploration.
2. Provide the Knowledge on Stability of Slopes and Earth Pressure theories.
3. Provide the Knowledge on Various types of Foundations.

COURSE OUTCOMES: Upon completion of this course, students will be able to

1. Understand the Concepts Involved in Soil Investigations.
2. Analyse the Stability of Slopes by using Different Methods.
3. Analyse the Earth Pressure under Different Soil Conditions.
4. Evaluate the Safe Bearing Capacity (SBC) of Shallow Foundations.
5. Understand the Concepts of Pile and Well Foundations.

UNIT-I

Site Investigation and Soil Exploration: Needs - Methods of Soil Exploration - Boring and Sampling methods - Penetration Tests - Plate Load Test - Pressure Meter - Planning of Programme and Preparation of Soil Investigation Report - Selection of Foundation on Soil Conditions.

UNIT-II

Slope Stability: Infinite and Finite Earth Slopes - Types of Failures - Factor of Safety of Infinite Slopes - Stability Analysis by Swedish Arc Method, Standard Method of Slices, Bishop's Simplified Method - Taylor's Stability Number - Stability of Slopes of Earth Dams under Different Conditions.

UNIT-III

Earth Pressure Theories: Lateral Earth Pressure theories - Rankine's theory and Coulomb's theories - Earth Pressures for different Soils and Layered Soils - Culmann's Graphical Method - Trial Wedge Methods.

Retaining Walls: Types of Retaining Walls - Stability of Retaining Walls against Overturning, Sliding, Bearing Capacity, Drainage from Backfill.

UNIT-IV

Shallow Foundations - Strength Criteria: Types - Choice of Foundation - Location of Depth - Safe Bearing Capacity - Terzaghi, Meyerhof, Skempton and IS Methods.

Shallow Foundations - Settlement Criteria: Safe Bearing Pressure based on N-Value - Allowable Bearing Pressure; Safe Bearing Capacity - Allowable Settlements of Structures.



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UNIT-V

Pile Foundations: Types of Piles - Load Carrying Capacity of Piles based on Static Pile formulae in different Soils - Dynamic Pile formulae - Pile Load Tests - Load Carrying Capacity of Pile Groups in Sands and Clays - Settlement of Pile Groups - Negative Skin Friction.

Well Foundations: Types - Different Shapes of Wells - Components of Wells - Sinking of Wells - Tilts and Shifts.

TEXT BOOKS:

1. Soil Mechanics and Foundation Engineering by K.R. Arora, Standard Publishers and Distributors, Delhi.
2. Soil Mechanics and Foundation by B.C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi Publications Pvt. Ltd., New Delhi.
3. Soil Mechanics and Foundation Engineering by V.N.S Murthy, CBS Publishers and Distributors.
4. Foundation Engineering by PC. Varghees, Prentice Hall (India).
5. Basic Soil Mechanics and Foundations by Alam Singh, CBS Publishers and Distributors.

REFERENCE BOOKS:

1. Analysis and Design of Substructures by Swami Saran, Oxford & IBH Publishing Pvt. Ltd.
2. Geotechnical Engineering by C. Venkataramaiah, New Age International Pvt. Ltd.
3. Geotechnical Engineering Principles and Practices by Donald P. Coduto, Prentice Hall (India).
4. Principles of Foundation Engineering by B.M. Das, PWS Publishing, Singapore.
5. Foundation Analysis and Design by Joseph Bowles, McGraw Hill Education.



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(PE-IV) - FINITE ELEMENT ANALYSIS - D17PE4

VII Semester

L/T/P/C
3/0/0/3

PRE-REQUISITES: Structural Analysis – I & II

COURSE OBJECTIVES:

The Subject Provides Introduction to Finite Element Methods to Analyse Structural Elements.

COURSE OUTCOMES: At the end of the course, the Student will able to

1. Understand the concepts behind formulation methods in FEM.
2. Identify the application and characteristics of FEA elements such as bars, beams, plane and iso-parametric elements.
3. Analyse Simple Structural Elements using Finite Element Approach.

UNIT-I

Introduction to Finite Element Method (FEM) - Basic Equations in Elasticity Stress-Strain equation - Concept of Plane Stress - Plane Strain - Advantages and Disadvantages of FEM. Element Shapes - Nodes - Nodal Degree of Freedom - Displacement Function - Natural Coordinates - Strain Displacement Relations.

UNIT-II

Lagrangian - Serendipity Elements - Hermite Polynomials - Regular, Irregular 2D & 3D - Elements - Shape Functions up to Quadratic Formulation. Finite Element Analysis (FEA) of one Dimensional (1D) Problem - Bar Element - Shape Functions - Stiffness Matrix - Stress-Strain Relation.

UNIT-III

FEA Beam Elements - Stiffness Matrix - Shape function - Analysis of Continuous Beams.

UNIT-IV

FEA 2D Problem - CST-LST Elements - Shape function - Stress-Strain. Iso-parametric formulation - Concepts of ISO-parametric Elements for 2D Analysis - formulation of CST element.

UNIT-V

Solution Techniques: Numerical Integration, Static Condensation, Assembly of Elements and Solution Techniques for Static loads.



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TEXT BOOKS:

1. Finite Element Analysis by S. S. Bhavikatti, New Age International Publishers.
2. Introduction to Finite Elements in Engineering by Tirupathi R. Chandrupatla, and Ashok D. Belegundu, Prentice Hall (India).
3. A First Course in Finite Element Method by Daryl L. Logan, Cengage Learning (India).

REFERENCE BOOKS:

1. Finite Element Analysis by P. Seshu, Prentice Hall (India).
2. Concepts and Applications of Finite Element Analysis by Robert D. Cook et al., Wiley India Pvt. Ltd.
3. Applied Finite Element Analysis by G. Ramamurty, I.K. International Publishers.



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ESTIMATION & COSTING - D17PC24

VII Semester

L/T/P/C

3/0/0/3

COURSE OBJECTIVES:

1. Determination of quantities of items and labour requirement of civil engineering works.
2. Preparation of estimate of the civil engineering works.
3. Preparation of specification of construction items.
4. To introduce the students in-depth knowledge of professional practice as well the quantity analysis of construction works like, multi-storied structures, water works & sanitary works, irrigation works, road estimates, culverts etc.

COURSE OUTCOMES:

1. The students will get a diverse knowledge of estimating, costing.
2. The professional practice, which will be use full in tackling real life problems.
3. The students will be able to understand the procedure to carry out the estimation and steps to prepare reports of construction works.
4. The students will earn the purpose and importance of valuation.
5. The students will get adverse knowledge of bar bending schedules in real life problems.

UNIT-I

Introduction - Type of Estimates - Elements of Estimate - Methods of Estimating - Standard Units - Data Required for Preparation of Estimates - Technical terms used in Preparation of Estimation - Specification Report on Estimate - Principles of Working out Quantities for Detailed and Abstract Estimates - Schedule Items - Non-schedule Items - Problems on Approximate Method.

UNIT-II

Detailed Estimates for Buildings - Estimation of Quantities for Water supply & Sanitary works - Culverts - Road Works - Earthwork Calculations for Roads, Embankments and Canals.

UNIT-III

Specifications - Objectives and Importance of Specifications - Standard Specifications, Specifications for non-schedule Items - Specifications for Different Items of Work - Language for Writing Specifications.

Rate Analysis - Introduction and Principles of Material Rate Analysis - SSR-DSR - Lead Statement - Overhead Charges - Rate Analysis for Schedule items and Non-schedule items - Supplementary items of work - Working-out Rate Analysis for various items of work - Overhead and Contingent Charges.

UNIT-IV

Reinforcement Bar Bending Schedule for Foundations, Beams, Columns and Slabs - Preparation of Work Bills - Record of Measurements - Methods of Measurements of Civil



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Engineering Works - IS Code Provisions - Preparation of Revised Estimates - Contracts and Types of Contracts.

UNIT-V

Valuation of Buildings - Purpose of Valuation, Types of Property - Depreciation, Sinking fund, Lease Hold and Free Hold Property, obsolescence, Gross income, Outgoing and Net Income, Capitalized Value and Year's Purchase. Rental Method of Valuations and Typical Problems.

TEXT BOOKS:

1. Estimating and Costing by B.N. Dutta, UBS Publishers.
2. Estimating and Costing by G.S. Birdie, Dhanpat Rai Publications.

REFERENCE BOOKS:

1. Standard Schedule of Rates and Standard Data Book by Public Works Department.
2. IS-1200 (Parts I to XXVIII 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.
5. CPWD Standard Specifications Vol - 1&2, Government of India



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ENVIRONMENTAL ENGINEERING LAB - D17PC25

VII Semester

L/T/P/C

0/0/2/1

PRE-REQUISITES: Engineering Chemistry, Environmental Engineering

COURSE OUTCOMES:

1. To Quantify the Pollutant Concentration in Water and Wastewater.
2. To Recommend the Degree of Treatment Required for the Water and Wastewater.
3. To Analyze the Survival Conditions for the Micro-organism and its Growth Rate.
4. To Study the Growth of Micro-organism and its Quantification.
5. To Analyze the Characteristics of Water and Wastewater.

LIST OF EXPERIMENTS:

1. Characteristics, Sampling and Preservation methods and Significance of Characterization of Water and Waste Water.
2. Determination of pH
3. Determination of Electrical Conductivity
4. Determination of Acidity and Alkalinity
5. Determination of Hardness
6. Determination of Chlorides
7. Determination of Turbidity
8. Determination of Optimum Coagulant Dosage by Jar test
9. Determination of Suspended, Dissolved and Fixed Solids
10. Determination of available Chlorine in Bleaching Powder
11. Determination of Iron
12. Determination of Phosphate and Nitrates
13. Determination of Dissolved Oxygen
14. Determination of B.O.D
15. Determination of C.O.D Test

REFERENCE BOOKS:

1. IS 10500: 2012 - Indian Standards - Drinking Water Specifications
2. Manual for Water & Waste Water Treatment - CPHEEO.
3. Water Supply and Sanitary Engineering by G.S Birdie, Dhanpat Rai & Sons.
4. Water and Waste Water Technology by Mark J. Hammer, Mark J. Hammer Jr, Prentice Hall (India).



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PRESTRESSED CONCRETE STRUCTURES - D18PE5

VIII Semester

L/T/P/C

3/0/0/3

PRE-REQUISITES: Reinforced Cement Concrete Structures - Analysis & Design, IS 456.

COURSE OBJECTIVES: The objective of this course is to provide

1. The knowledge on concepts of prestressing of concrete structural elements.
2. The exposure in various prestressing methods and construction sequences.
3. The knowledge in analysis and designing of prestressing concrete structural elements.

COURSE OUTCOMES: At the end of the course, the student will be able to

1. Understand the concepts of prestressing in concrete structures and identify the materials for prestressing.
2. Understand the concept of transfer of prestress in prestressed concrete members and the methods and systems of prestressing.
3. Assess the loss of prestress in pre-tensioned and post-tensioned members.
4. Analyse the prestressed concrete structural elements for flexure and shear.
5. Able to design the prestressed concrete structures.

UNIT-I

Introduction: Historic Development - General Principles of Prestressing - Pre-tensioning and Post-tensioning - Advantages and Limitations of Prestressed Concrete - Classification and types of Prestressing - Materials - High Strength Concrete and High Tensile Steel and their Characteristics.

Methods and Systems of Prestressing: Concept of Transfer of Prestress - Pre-tensioning and Post-tensioning methods and Systems of Prestressing like Hoyer System, Magnel-Blaton System, Freyssinet System and Gifford-Udall System and Lee-McCall System.

UNIT-II

Loss of Prestress: Loss of Prestress in Pre-tensioned and Post-tensioned members due to Elastic Shortening of Concrete, Shrinkage of Concrete, Creep of Concrete, Relaxation of Stress in Steel, Slip in Anchorage and Frictional Losses - Provisions for Loss of Prestress in IS 1343 - 2012 Code.

UNIT-III

Flexure: Analysis of Sections for Flexure - Beams Prestressed with Straight, Concentric, Eccentric, Bent and Parabolic Tendons, Kern Line, Stress Diagrams - Elastic Design of Beams of Rectangular and I Sections.

Shear: General Considerations – Shear and Principal Stresses - Ultimate Shear Resistance of Prestressed Concrete Members - 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 Reinforcement - IS 1343-2012 Code Provisions.



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UNIT-IV

Transfer of Prestress in Pre-tensioned 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 - IS 1343-2012 Code Provisions.

UNIT-V

Composite Beams: Different Types - Propped and Un-propped - Stress Distribution - Differential Shrinkage - Analysis of Composite Beams - General Design Considerations.

Deflections: Importance of Control of Deflections - Factors Influencing Deflections - Short Term Deflections of Un-cracked Beams - Prediction of Long Term Deflections - IS 1343-2012 Code Requirements.

TEXT BOOKS:

1. Prestressed Concrete by N. Krishna Raju, Tata McGraw Hill.
2. Prestressed Concrete by K U Muthu, Azmi Ibrahim, Maganti Janardhana and M.Vijayanand, Prentice Hall (India).

REFERENCE BOOKS:

1. Prestressed Concrete by S. Ramamrutham, Dhanpat Rai & Sons, Delhi.
2. Prestressed Concrete by N. Rajagopalan, Narosa Publishing House.
3. Fundamentals of Prestressed Concrete by Dr. N C Sinha and Dr. SK Roy, S Chand Publishers.
4. Prestressed Concrete Design by Praveen Nagarajan, Pearson.
5. Design of Prestressed Concrete Structures by T. Y. Lin and Burn, Wiley Student Edition.



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ADVANCED STRUCTURAL DESIGN - D18PE5

VIII Semester

L/T/P/C

3/0/0/3

PRE-REQUISITES: Reinforced Cement Concrete Design

COURSE OBJECTIVES:

1. Understand the applications of concrete, requirements of concrete structures and learn the design of RCC structures.
2. Understand the behaviour of structural elements that are subjected to different external loadings.

COURSE OUTCOMES: At the end of the course, the student will be able to

1. Design and Detailing of Cantilever Structures elements.
2. Design the Reinforced Circular and Rectangular Water tanks.
3. Design the Flat, Raft and Pile Foundations.
4. Design the Concrete bridges.
5. Design the Industrial Structures like Bunkers, Silos and Chimneys.

UNIT-I

Design and Detailing of Cantilever type of Retaining Walls - Stability Check. Principles of Counterfort Retaining Walls.

UNIT-II

Design of Circular and Rectangular Water Tanks at Ground Level and Elevated with Staging.

UNIT-III

Design of Flat Slabs - Design of Raft Foundations.

UNIT-IV

Designs of Concrete Bridges - IRC Loading, Design of Stab Bridge, T - Beam Girder Bridge.

UNIT-V

Design of RCC Chimneys, Bunkers & Silos.

TEXT BOOKS:

1. Advanced Reinforced Concrete Structures by Varghese, Prentice Hall (India).
2. Bridge Engineering by S Ponnuswamy, Tata McGraw Hill.
3. Reinforced Concrete Design by S.A Pillai and D. Menon, Tata McGraw Hill.
4. Advanced Reinforced Concrete Structures by N. Krishna Raju, CBS Publishers & Distributors Pvt. Ltd.



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REFERENCE BOOKS:

1. Reinforced Concrete Structures Vol.2 by B.C. Punmia, Ashok Kumar Jain and Kumar Jain, Laxmi, Publications Pvt. Ltd. New Delhi.
2. Essentials of Bridge Engineering by D. Johnson Victor, Oxford and IBM Publication Co, Pvt. Ltd.
3. IRC 6: Standard Specifications and Code of Practice for Road Bridges.
4. IRC 112-2011: Code of Practice for Concrete Road Bridges.
5. SP 34-1987: Hand Book on Concrete Reinforcement and detailing.
6. IS 456-2000: Plain and Reinforced Concrete - Code of Practice



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STRUCTURAL ANALYSIS BY MATRIX METHODS - D18PE5

VIII Semester

L/T/P/C

3/0/0/3

PRE-REQUISITES: Structural Analysis, Mathematical knowledge on Matrix Methods.

COURSE OBJECTIVES:

To impart knowledge on the analysis of indeterminate structures like continuous beams, trusses and portal frames by matrix methods.

COURSE OUTCOMES:

1. To understand the importance of degrees of freedom and the concept of principle of superposition.
2. To know about the concept of strain energy and principle of virtual work.
3. To study the transformation of system matrices and element matrices for the determinate and indeterminate structures.
4. To analyze the forces in structures like continuous beams, trusses and frames using flexibility method.
5. To analyze plane truss, plane frame by stiffness method.

UNIT-I

Introduction to Matrix Methods of Analysis (System Approach) - Static Indeterminacy and Kinematic Indeterminacy - Degree of Freedom - Coordinate System - Structure Idealization Stiffness and Flexibility Matrices - Suitability - Element Stiffness Equations - Elements Flexibility Equations - Mixed Force - Displacement Equations - for Truss Element, Beam Element and Tensional Element. Transformation of Coordinates - Element Stiffness Matrix - and Load Vector - Local and Global Coordinates - System Approach.

UNIT-II

Strain Energy - Stiffness and Flexibility Matrices from Strain Energy - Symmetry and other Properties of Stiffness and Flexibility Matrices - Betti's law and its Applications - Strain Energy in Systems and in elements - System Approach.

UNIT-III

Assembly of Stiffness Matrix from element Stiffness Matrix - Direct Stiffness Method - General Procedure - Band matrix - Semi Bandwidth - Computer Algorithm for Assembly by Direct Stiffness Matrix Method - System Approach.

UNIT-IV

Analysis of Plane Truss - Continuous Beams - Plane frame and grids by Flexibility Methods - System Approach.

UNIT-V

Analysis of Plane Truss - Continuous Beams - Plane Frames and Grids by Stiffness Methods.



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TEXT BOOKS:

1. Matrix Analysis of Frames Structures by William Weaver J.R and James M. Gere, CBS Publications.
2. Advanced Structural Analysis by Ashok. K. Jain, Nem Chand Brothers.

REFERENCE BOOKS:

1. Basic Structural Analysis by C.S. Reddy, Tata McGraw Hill.
2. Matrix Structural Analysis by Madhu B. Kanchi, John Willey Publishers.
3. Indeterminate Structural Analysis by K.U. Muthuet al., I.K. International Publishers.
4. Matrix Methods of Structural Analysis by J.L. Meek, McGraw Hill



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TRAFFIC ENGINEERING & MANAGEMENT - D18PE6

VIII Semester

L/T/P/C

3/0/0/3

PRE-REQUISITES: Transportation Engineering

COURSE OBJECTIVES:

1. To give an overview of traffic engineering, traffic regulation, management and traffic safety with integrated approach of traffic planning.
2. To give basic knowledge about the traffic studies and issues.
3. To solve traffic related problems.

COURSE OUTCOMES: On completing this course, the students will be able to

1. Analysis traffic problems and plan for traffic systems various uses.
2. Design channels, intersections, signals and parking arrangements.
3. Students will be able to study about the traffic and congestions.
4. Implement traffic regulations and control measures at intersections.
5. To minimize the road accident rate by using traffic monitoring systems.

UNIT-I

Traffic Characteristics Measurement and Analysis: Basic traffic Characteristics - Speed, Volume and Concentration. Relationship between Flow, Speed and Concentration. Traffic Measurement and Analysis - Volume Studies - Objectives, Methods; Speed studies - Objectives, Definition of Spot Speed, Time Mean Speed and Space Mean Speed; Methods of Conducting Speed Studies; Presentation of Speed Study Data; Headways and Gaps; Critical Gap; Gap Acceptance Studies.

UNIT-II

Highway Capacity and Level of Service: Basic Definitions related to Capacity; Level of Service Concept; Factors affecting Capacity and Level of Service; Computation of Capacity and Level of Service for two-lane highways, Multi-lane Highways and Freeways.

UNIT-III

Parking Analysis and Traffic Safety: Types of Parking Facilities - On-street Parking and Off-Street Parking Facilities; Parking Studies and Analysis of Parking Inventory Study, Parking Usage Study by Patrolling, Questionnaire Survey, Cordon Surveys; Evaluation of Parking Parameters; Parking Accumulation, Parking Load, Parking Turnover, Parking Index, Parking Volume. Traffic Safety - Accident Studies and Analysis; Causes of Accidents - The Road, The Vehicle, the Road User and the Environment; Engineering, Enforcement and Education measures for the Prevention of Accidents.

UNIT-IV

Traffic Control, Regulation Signal Coordination: Traffic Signals - Types of Signals; Principles of Phasing; Timing Diagram; Design of Isolated Traffic Signal by Webster method, Warrants



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for Signalization. Signal Coordination - Signal Coordination Methods, Simultaneous, Alternate, Simple Progression and Flexible Progression Systems.

UNIT-V

Traffic Management: Area Traffic Management System - Traffic System Management (TSM) With IRC Standards - Traffic Regulatory Measures - Travel Demand Management (TDM) - Direct And Indirect Methods - Congestion And Parking Pricing - All Segregation Methods - Coordination Among Different Agencies - Intelligent Transport System For Traffic Management, Enforcement & Education.

TEXT BOOKS:

1. Traffic Engineering and Transport Planning by L.R. Kadiyali, Khanna Publishers.
2. Traffic Engineering - Theory & Practice by Louis J. Pignataro, Prentice Hall Publications.
3. Traffic Management: Planning, Operations and Control by Tyworth, John E.; Cavinato, Joseph L.; Langley, C. John, Jr., Addison Wesley Publishing Company.

REFERENCE BOOKS:

1. Fundamentals of Transportation Engineering by C.S. Papacostas, Prentice Hall (India).
2. Principles of Highway Engineering and Traffic Analysis by Fred Mannering & Walter Kilareski, John Wiley & Sons Publications.
3. Transportation Engineering - An Introduction by C. Jotin Khisty, Kent Lall, Prentice Hall Publications



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REHABILITATION AND RETROFITTING OF STRUCTURES - D18PE6

VIII Semester

L/T/P/C

3/0/0/3

COURSE OBJECTIVES:

To get the knowledge on quality of concrete, durability aspects, causes of deterioration, assessment of distressed structures, repairing of structures and demolition procedures.

COURSE OUTCOMES:

1. Understand the causes and prevention deterioration of structures.
2. Interpret the types of damages and understand their mechanism.
3. Categorize the causes and prevention of corrosion in steel reinforcement and fire induced damages.
4. Examine to inspect and assess the structures using techniques of visual inspection and non-destructive testing (NDT).
5. Make use of the latest health monitoring and building instrumentation methods.

UNIT-I

Introduction - Deterioration of Structures - Distress in Structures - Causes and Prevention. Mechanism of Damage - Types of Damages.

UNIT-II

Corrosion of Steel Reinforcement - Causes - Mechanism and Prevention. Damage of Structures due to Fire - Fire Rating of Structures - Phenomena of Desiccation. Repairs to Overcome Low Member Strength, Deflection, Cracking, Chemical Disruption, Weathering Corrosion, Wear, Fire, Leakage and Marine Exposure.

UNIT-III

Inspection and Testing - Symptoms and Diagnosis of Distress - Damage Assessment - NDT. Maintenance, Repair and Rehabilitation - Facets of Maintenance, Importance of Maintenance Various Aspects of Inspection.

UNIT-IV

Repair of Structure - Common Types of Repairs - Repair in Concrete Structures - Repairs in Underwater Structures - Guniting - Shotcrete - Under Pinning. Strengthening of Structures - Strengthening Methods - Retrofitting - Jacketing.

UNIT-V

Health Monitoring of Structures - Use of Sensors, Building Instrumentation. Engineered Demolition Techniques for Dilapidated Structures - Case Studies.



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TEXT BOOKS:

1. Maintenance and Repair of Civil Structures, B.L. Gupta and Amit Gupta, Standard Publications.
2. Concrete Technology by A.R. Santa Kumar, Oxford University Press.
3. Maintenance, Repair and Rehabilitation and Minor Works of Buildings by PC. Varghese, Prentice Hall (India).

REFERENCE BOOKS:

1. Defects and Deterioration in Buildings, EF & N Spon, London.
2. Non-Destructive Evaluation of Concrete Structures by Bungey, Surrey University Press.
3. Concrete Repair and Maintenance Illustrated by W.H. Ranso, RS Means Company.
4. Building Failures: Diagnosis and Avoidance, EF & N Spon, B.A. Richardson, London.



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CONSTRUCTION PROJECT PLANNING & MANAGEMENT - D18PE6

VIII Semester

L/T/P/C

3/0/0/3

COURSE OBJECTIVES:

1. To learn the fundamental significance of construction project planning.
2. To study about the resource management and schedule of construction.
3. To study about the contract and tender information.
4. To know about the labour administration, safety measures.

COURSE OUTCOMES: Students will be able to

1. Understand the process of planning and management.
2. Understand the construction stages and network techniques.
3. Apply the concept of resource planning & scheduling.
4. Formulate and execute various contract documents and tenders.
5. Understand the labour safety and financial aspects of accidents.

UNIT-I

Introduction to Construction Project Planning and Management, 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, and Resources - Functions of Construction Management and its Applications. Preliminary Planning - Collection of Data - Contract Planning - Scientific Methods of Management, Network Technique in Construction Management - Bar Chart, Ghant Chart, CPM & PERT - Cost & Time Optimization.

UNIT-III

Resource Planning - Planning for Manpower, Material, Costs, Equipment, Class of Labour, Labour Productivity, Classification of Construction Equipment - Scheduling. Forms of Scheduling - Resources 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 - Law 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.



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TEXT BOOKS:

1. Construction Project Management by Kumar Neeraj Jha, Pearson Publications.
2. PERT and CPM Principles and Applications by L.S. Srinath, Affiliated East West Press.
3. Project Planning and Control with PERT and CPM by B. C. Punmia, Laxmi Publications.
4. Construction Project Management, Planning, Scheduling and Control, K.K. Chitkara, Tata McGraw Hill.

REFERENCE BOOKS:

1. Construction Planning, Equipment and Methods by Robert Peurifoy, McGraw Hill.
2. Project Management for Construction Fundamentals by Chris Hendrickson and Tung Au.
3. Scheduling Construction Projects by Willis. E.M., John Wiley & Sons.
4. Financial and Cost Concepts for Construction Management by D.W. Halpin, John Wiley & Sons