


ACADEMIC YEAR (2022-2023)



J.K.K.MUNIRAJAH COLLEGE OF TECHNOLOGY,T.N.PALAYAM  
Approved by AICTE , new Delhi And Affiliated to anna University , Chennai.

Metric No 1.3.2

S.No	Name of the course	course code	programme offering	Experimental learning		Number of students
				project work	internship	
Program specific courses						
(2022-2023)Regulation-2017						
1	Soil Mechanics	CE8491	Civil Engineering			3
2	Design of Reinforced Cement Concrete Elements	CE8501	Civil Engineering	✓	✓	4
3	Water Supply Engineering	EN8491	Civil Engineering	✓		2
4	Foundation Engineering	CE8591	Civil Engineering	✓	✓	3
5	Estimation and Quantity Surveying	CE8701	Civil Engineering	✓	✓	4
6	Project Work	CE8811	Civil Engineering	✓	✓	4

  
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**OF TECHNOLOGY**  
**T.N. PALAYAM (Po)-638 506.**  
**GOBI (TR), ERODE (D)**

**OBJECTIVE:**

- To develop the ability to solve a specific problem right from its identification and literature review till the successful solution of the same. To train the students in preparing project reports and to face reviews and viva voce examination.

**STRATEGY:**

The student works on a topic approved by the head of the department under the guidance of a faculty member and prepares a comprehensive project report after completing the work to the satisfaction. The student will be evaluated based on the report and the viva voce examination by a team of examiners including one external examiner.

**TOTAL: 300 PERIODS****OUTCOME:**

- On Completion of the project work students will be in a position to take up any challenging practical problems and find solution by formulating proper methodology.

  
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**OBJECTIVE:**

- The students will acquire knowledge in estimation, tender practices, contract procedures, and valuation and will be able to prepare estimates, call for tenders and execute works.

**UNIT I QUANTITY ESTIMATION**

9

Philosophy - Purpose - Methods of estimation - Types of estimates - Approximate estimates - Detailed estimate - Estimation of quantities for buildings, bituminous and cement concrete roads, septic tank, soak pit, retaining walls - culverts (additional practice in class room using computer softwares)

**UNIT II RATE ANALYSIS AND COSTING**

9

Standard Data - Observed Data - Schedule of rates - Market rates - Standard Data for Man Hours and Machineries for common civil works - Rate Analysis for all Building works, canals, and Roads- Cost Estimates (additional practice in class room using Computer softwares) - (Analysis of rates for the item of work asked, the data regarding labour, rates of material and rates of labour to be given in the Examination Question Paper)

**UNIT III SPECIFICATIONS, REPORTS AND TENDERS**

9

Specifications - Detailed and general specifications - Constructions - Sources - Types of specifications - Principles for report preparation - report on estimate of residential building - Culvert - Roads - TTT Act 2000 - Tender notices - types - tender procedures - Drafting model tenders , E-tendering-Digital signature certificates- Encrypting -Decrypting - Reverse auctions.

**UNIT IV CONTRACTS**

9

Contract - Types of contracts - Formation of contract - Contract conditions - Contract for labour, material, design, construction - Drafting of contract documents based on IBRD / MORTH Standard bidding documents - Construction contracts - Contract problems - Arbitration and legal requirements.

**UNIT V VALUATION**

9

Definitions - Various types of valuations - Valuation methods - Necessity - Capitalised value - Depreciation - Escalation - Valuation of land - Buildings - Calculation of Standard rent - Mortgage - Lease

**TOTAL: 45 PERIODS****OUTCOMES:**

The student will be able to

- Estimate the quantities for buildings,
- Rate Analysis for all Building works, canals, and Roads and Cost Estimate.
- Understand types of specifications, principles for report preparation, tender notices types.
- Gain knowledge on types of contracts
- Evaluate valuation for building and land.

**TEXTBOOKS:**

- B.N Dutta 'Estimating and Costing in Civil Engineering', UBS Publishers & Distributors (P) Ltd, 2010.
- B.S.Patil, 'Civil Engineering Contracts and Estimates', University Press, 2006
- D.N. Banerjee, 'Principles and Practices of Valuation', V Edition, Eastern Law House, 1998

**REFERENCES:**

- Hand Book of Consolidated Data - 8/2000, Vol.1, TNPWD
- Tamil Nadu Transparencies in Tenders Act, 1998
- Arbitration and Conciliation Act, 1996
- Standard Bid Evaluation Form, Procurement of Good or Works, The World Bank, April 1996
- Standard Data Book for Analysis and Rates, IRC, New Delhi, 2003

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**OBJECTIVE:**

- To impart knowledge to plan and execute a detail site investigation programme, to select geotechnical design parameters and type of foundations. Also to familiarize the students for the geotechnical design of different type of foundations and retaining walls.

**UNIT I SITE INVESTIGATION AND SELECTION OF FOUNDATION 9**

Scope and objectives - Methods of exploration - Auguring and boring - Wash boring and rotary drilling - Depth and spacing of bore holes - Soil samples - Representative and undisturbed - Sampling methods - Split spoon sampler, Thin wall sampler, Stationary piston sampler - Penetration tests (SPT and SCPT) - Data interpretation - Strength parameters - Bore log report and Selection of foundation.

**UNIT II SHALLOW FOUNDATION 9**

Location and depth of foundation - Codal provisions - Bearing capacity of shallow foundation on homogeneous deposits - Terzaghi's formula and BIS formula - Factors affecting bearing capacity - Bearing capacity from in-situ tests (SPT, SCPT and plate load) - Allowable bearing pressure - Seismic considerations in bearing capacity evaluation. Determination of Settlement of foundations on granular and clay deposits - Total and differential settlement - Allowable settlements - Codal provision - Methods of minimizing total and differential settlements.

**UNIT III FOOTINGS AND RAFTS 9**

Types of Isolated footing, Combined footing, Mat foundation - Contact pressure and settlement distribution - Proportioning of foundations for conventional rigid behaviour - Minimum thickness for rigid behaviour - Applications - Compensated foundation - Codal provision

**UNIT IV PILE FOUNDATION 9**

Types of piles and their functions - Factors influencing the selection of pile - Carrying capacity of single pile in granular and cohesive soil - Static formula - Dynamic formulae (Engineering news and Hileys) - Capacity from insitu tests (SPT and SCPT) - Negative skin friction - Uplift capacity - Group capacity by different methods (Feld's rule, Converse - Labarra formula and block failure criterion) - Settlement of pile groups - Interpretation of pile load test (routine test only), Under reamed piles - Capacity under compression and uplift - Cohesive - expansive - non expansive - Cohesionless soils - Codal provisions.

**UNIT V RETAINING WALLS 9**

Plastic equilibrium in soils - Active and passive states - Rankine's theory - Cohesionless and cohesive soil - Coulomb's wedge theory - Condition for critical failure plane - Earth pressure on retaining walls of simple configurations - Culmann's Graphical method - Pressure on the wall due to line load - Stability analysis of retaining walls - Codal provisions.

**TOTAL: 45 PERIODS****OUTCOMES:**

Students will be able to

- Understand the site investigation, methods and sampling.
- Get knowledge on bearing capacity and testing methods.
- Design shallow footings.
- Determine the load carrying capacity, settlement of pile foundation.
- Determine the earth pressure on retaining walls and analysis for stability.

**TEXTBOOKS:**

- Murthy, V.N.S., "Text book of Soil Mechanics and Foundation Engineering", CBS Publishers Distribution Ltd., New Delhi, 2014.
- Arora, K.R., "Soil Mechanics and Foundation Engineering", Standard Publishers and Distributors, New Delhi, 7<sup>th</sup> Edition, 2017 (Reprint).
- Punmia, B.C., "Soil Mechanics and Foundations", Laxmi Publications Pvt. Ltd. New Delhi, 16<sup>th</sup> Edition 2017.

**REFERENCES:**

- Braja M Das, "Principles of Foundation Engineering" (Eighth edition), Cengage Learning 2014.
- Kaniraj, S.R. "Design aids in Soil Mechanics and Foundation Engineering", Tata McGraw-Hill publishing company Ltd., New Delhi, 2014.
- Joseph E bowles, "Foundation Analysis and design", McGraw Hill Education, 5<sup>th</sup> Edition 28<sup>th</sup> August 2015.
- IS Code 6403 : 1981 (Reaffirmed 1997) "Bearing capacity of shallow foundation", Bureau of Indian Standards, New Delhi.

**OBJECTIVES:**

- To introduce the different types of philosophies related to design of basic structural elements such as slab, beam, column and footing which form part of any structural system with reference to Indian standard code of practice.

**UNIT I INTRODUCTION**

9+6

Objective of structural design-Steps in RCC Structural Design Process- Type of Loads on Structures and Load combinations- Code of practices and Specifications - Concept of Working Stress Method, Ultimate Load Design and Limit State Design Methods for RCC -Properties of Concrete and Reinforcing Steel - Analysis and Design of Singly reinforced Rectangular beams by working stress method - Limit State philosophy as detailed in IS code - Advantages of Limit State Method over other methods - Analysis and design of singly and doubly reinforced rectangular beams by Limit State Method.

**UNIT II DESIGN OF BEAMS**

9+6

Analysis and design of Flanged beams for – Use of design aids for Flexure - Behaviour of RC members in Shear, Bond and Anchorage - Design requirements as per current code - Behaviour of rectangular RC beams in shear and torsion - Design of RC members for combined Bending, Shear and Torsion.

**UNIT III DESIGN OF SLABS AND STAIRCASE**

9+6

Analysis and design of cantilever, one way simply supported and continuous slabs and supporting beams- Two way slab- Design of simply supported and continuous slabs using IS code coefficients- Types of Staircases – Design of dog-legged Staircase.

**UNIT IV DESIGN OF COLUMNS**

9+6

Types of columns -Axially Loaded columns – Design of short Rectangular Square and circular columns - Design of Slender columns- Design for Uniaxial and Biaxial bending using Column Curves

**UNIT V DESIGN OF FOOTINGS**

9+6

Concepts of Proportioning footings and foundations based on soil properties-Design of wall footing – Design of axially and eccentrically loaded Square, Rectangular pad and sloped footings – Design of Combined Rectangular footing for two columns only.

**TOTAL: 75 PERIODS****OUTCOMES:**

Students will be able to

- Understand the various design methodologies for the design of RC elements.
- Know the analysis and design of flanged beams by limit state method and sign of beams for shear, bond and torsion.
- design the various types of slabs and staircase by limit state method.
- Design columns for axial, uniaxial and biaxial eccentric loadings.
- Design of footing by limit state method.

**TEXT BOOKS:**

- Varghese, P.C., "Limit State Design of Reinforced Concrete", Prentice Hall of India, Pvt.Ltd., New Delhi, 2002.
- Gambhir. M.L., "Fundamentals of Reinforced Concrete Design", Prentice Hall of India Private Limited, New Delhi, 2006.
- Subramanian, N., "Design of Reinforced Concrete Structures", Oxford University Press, New Delhi, 2013.

**REFERENCES:**

- Jain, A.K., "Limit State Design of RC Structures", Nemchand Publications, Roorkee, 1998
- Sinha, S.N., "Reinforced Concrete Design", Tata McGraw Hill Publishing Company Ltd., New Delhi, 2002
- Unnikrishna Pillai, S., Devdas Menon, "Reinforced Concrete Design" Tata McGraw Hill Publishing Company Ltd., 2009
- Punmia. B.C., Ashok Kumar Jain, Arun Kumar Jain, "Limit State Design of Reinforced Concrete", Laxmi Publication Pvt. Ltd., New Delhi, 2007.

**OBJECTIVE:**

- To impart knowledge to classify the soil based on index properties and to assess their engineering properties based on the classification. To familiarize the students about the fundamental concepts of compaction, flow through soil, stress transformation, stress distribution, consolidation and shear strength of soils. To impart knowledge of design of both finite and infinite slopes.

**UNIT I SOIL CLASSIFICATION AND COMPACTION 9**

History - formation and types of soil - composition - Index properties - clay mineralogy structural arrangement of grains - description - Classification - BIS - US - phase relationship - Compaction - theory - laboratory and field technology - field Compaction method - factors influencing compaction.

**UNIT II EFFECTIVE STRESS AND PERMEABILITY 9**

Soil - water - Static pressure in water - Effective stress concepts in soils - Capillary phenomena - Permeability - Darcy's law - Determination of Permeability - Laboratory Determination (Constant head and falling head methods) and field measurement pumping out in unconfined and confined aquifer - Factors influencing permeability of soils - Seepage - Two dimensional flow - Laplace's equation - Introduction to flow nets - Simple problems Sheet pile and wier.

**UNIT III STRESS DISTRIBUTION AND SETTLEMENT 9**

Stress distribution in homogeneous and isotropic medium - Boussines of theory - (Point load, Line load and ud) Use of Newmarks influence chart -Components of settlement - Immediate and consolidation settlement - Factors influencing settlement - Terzaghi's one dimensional consolidation theory - Computation of rate of settlement. -  $\sqrt{t}$  and  $\log t$  methods.  $e$ - $\log p$  relationship consolidation settlement N-C clays - O.C clays - Computation.

**UNIT IV SHEAR STRENGTH 9**

Shear strength of cohesive and cohesion less soils - Mohr-Coulomb failure theory - shear strength - Direct shear, Triaxial compression, UCC and Vane shear tests - Pore pressure parameters - Factors influences shear strength of soil.

**UNIT V SLOPE STABILITY 9**

Infinite slopes and finite slopes - Friction circle method - Use of stability number -Guidelines for location of critical slope surface in cohesive and c - soil - Slope protection measures.

**TOTAL: 45 PERIODS****OUTCOMES:**

Students will be able to

- classify the soil and assess the engineering properties, based on index properties.
- Understand the stress concepts in soils
- Understand and identify the settlement in soils.
- Determine the shear strength of soil
- Analyze both finite and infinite slopes.

**TEXTBOOKS:**

- Murthy, V.N.S., "Text book of Soil Mechanics and Foundation Engineering", CBS Publishers Distribution Ltd., New Delhi. 2014
- Arora, K.R., "Soil Mechanics and Foundation Engineering", Standard Publishers and Distributors, New Delhi, 7<sup>th</sup> Edition, 2017(Reprint).
- Gopal Ranjan, A S R Rao, "Basic and Applied Soil Mechanics" New Age International Publication, 3<sup>rd</sup> Edition, 2016.
- Punmia, B.C., "Soil Mechanics and Foundations", Laxmi Publications Pvt. Ltd. New Delhi, 16<sup>th</sup> Edition, 2017.

**REFERENCES:**

- McCarthy, D.F., "Essentials of Soil Mechanics and Foundations: Basic Geotechnics". Prentice-Hall, 2006.
- Coduto, D.P., "Geotechnical Engineering - Principles and Practices", Prentice Hall of India Pvt. Ltd. New Delhi, 2010.
- Braja M Das, "Principles of Geotechnical Engineering", Cengage Learning India Private Limited, 8<sup>th</sup> Edition, 2014.

**OBJECTIVE:**

- To equip the students with the principles and design of water treatment units and distribution system.

**UNIT I SOURCES OF WATER 9**

Public water supply system - Planning, Objectives, Design period, Population forecasting; Water demand - Sources of water and their characteristics, Surface and Groundwater - Impounding Reservoir - Development and selection of source - Source Water quality - Characterization - Significance - Drinking Water quality standards.

**UNIT II CONVEYANCE FROM THE SOURCE 9**

Water supply - intake structures - Functions; Pipes and conduits for water - Pipe materials - Hydraulics of flow in pipes - Transmission main design - Laying, jointing and testing of pipes - appurtenances - Types and capacity of pumps - Selection of pumps and pipe materials.

**UNIT III WATER TREATMENT 9**

Objectives - Unit operations and processes - Principles, functions, and design of water treatment plant units, aerators of flash mixers, Coagulation and flocculation - Clarifloccuator - Plate and tube settlers - Pulsator clarifier - sand filters - Disinfection - Residue Management - Construction, Operation and Maintenance aspects.

**UNIT IV ADVANCED WATER TREATMENT 9**

Water softening - Desalination - R.O. Plant - demineralization - Adsorption - Ion exchange - Membrane Systems - RO Reject Management - Iron and Manganese removal - Defluoridation - Construction and Operation & Maintenance aspects - Recent advances - MBR process

**UNIT V WATER DISTRIBUTION AND SUPPLY 9**

Requirements of water distribution - Components - Selection of pipe material - Service reservoirs - Functions - Network design - Economics - Analysis of distribution networks - Computer applications - Appurtenances - Leak detection. Principles of design of water supply in buildings - House service connection - Fixtures and fittings, systems of plumbing and types of plumbing.

**TOTAL: 45 PERIODS****OUTCOMES:**

The students completing the course will have

- an insight into the structure of drinking water supply systems, including water transport, treatment and distribution
- the knowledge in various unit operations and processes in water treatment
- an ability to design the various functional units in water treatment
- an understanding of water quality criteria and standards, and their relation to public health
- the ability to design and evaluate water supply project alternatives on basis of chosen criteria.

**TEXTBOOKS:**

- Garg, S.K. Environmental Engineering, Vol.I Khanna Publishers, New Delhi, 2010.
- Modi, P.N., Water Supply Engineering, Vol.I Standard Book House, New Delhi, 2010.
- Punmia, B.C., Ashok Jain and Arun Jain, Water Supply Engineering, Laxmi Publications (P) Ltd., New Delhi, 2014.

**REFERENCES:**

- Manual on Water Supply and Treatment, CPHEEO, Ministry of Urban Development, Government of India, New Delhi, 1999.
- Syed R. Qasim and Edward M. Motley Guang Zhu, Water Works Engineering Planning, Design and Operation, Prentice Hall of India Learning Private Limited, New Delhi, 2009.

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