CE3403	CONCRETE TECHNOLOGY	L T P C
		3 0 0 3

COURSE OBJECTIVES:

To study the properties of concrete making materials. To have better knowledge about the chemical and mineral admixtures in concrete. To familiarize with the IS method of mix design as per the latest code . To understand the fresh and hardened properties of concrete. To know the importance and applications of special concretes

UNIT I CONSTITUENT ATERIALS 9

Cement-Different types-Chemical composition and Properties -Tests on cement-IS Specifications-Aggregates-Classification-Mechanical properties and tests as per BIS Grading requirements-Water-Quality of water for use in concrete.

UNIT II CHEMICAL AND MINERAL ADMIXTURES 9

Accelerators-Retarders- Plasticisers- Super plasticizers- Water proofers - Mineral Admixtures like Fly Ash, Silica Fume, Ground Granulated Blast Furnace Slag and Metakaoline -Their effects on concrete properties

UNIT III PROPORTIONING OF CONCRETE MIX 9

Principles of Mix Proportioning-Properties of concrete related to Mix Design-Physical properties of materials required for Mix Design - Design Mix and Nominal Mix-BIS Method of Mix Design - Mix Design Examples

UNIT IV FRESH AND HARDENED PROPERTIES OF CONCRETE 9

Workability-Tests for workability of concrete-Slump Test and Compacting factor Test-Segregation and Bleeding-Determination of Compressive and Flexural strength as per BIS - Properties of Hardened concrete- Stress-strain curve for concrete-Determination of Modulus of elasticity.

UNIT V SPECIAL CONCRETES 9

Light weight concretes - High strength concrete - Fibre reinforced concrete – Ferrocement - Ready mix concrete - SIFCON - Shotcrete – Polymer concrete - High performance concrete- self compacting concrete - Geopolymer Concrete.

TOTAL : 45 PERIODS

COURSE OUTCOMES:

At the end of the course the student will be able to

CO1 Understand the requirements of cement, aggregates and water for concrete

CO2 Select suitable admixtures for enhancing the properties of concrete

CO3 Design concrete mixes as per IS method of mix design

CO4 Determine the properties of concrete at fresh and hardened state.

CO5 Know the importance of special concretes for specific requirements.

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CE3404	SOIL MECHANICS	L T P C
		3 0 0 3

COURSE OBJECTIVES

 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**

Formation of soil - Soil description – Particle – Size shape and colour – Composition of gravel, sand, silt, clay particles – Particle behaviour – Soil structure – Phase relationship – Index properties – Significance – BIS classification system – Unified classification system – Compaction of soils – Theory, Laboratory and field tests – Field Compaction methods – Factors influencing compaction of soils.

UNIT II EFFECTIVE STRESS AND PERMEABILITY **9**

Soil - water – Static pressure in water - Effective stress concepts in soils – Capillary phenomenaPermeability interaction – Hydraulic conductivity – Darcy's law – Determination of Hydraulic Conductivity – 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 – Simpleproblems. (Sheet pile and weir).

UNIT III STRESS DISTRIBUTION AND SETTLEMENT **9**

Stress distribution in homogeneous and isotropic medium – Boussinesq theory – (Point land, Line land and udl) Use of New marks influence chart –Components of settlement — Immediate and consolidation settlement – Terzaghi's one dimensional consolidation theory – Computation of rate of settlement. - √t and log t methods– e-log p relationship.

UNIT IV SHEAR STRENGTH **9**

Shear strength of cohesive and cohesion less soils – Mohr-Coulomb failure theory – Measurement of shear strength - Direct shear, Triaxial compression, UCC and Vane shear tests – Pore pressure parameters – Cyclic mobility – Liquefaction.

UNIT V SLOPE STABILITY **9**

Stability Analysis - Infinite slopes and finite slopes – Total stress analysis for saturated clay – Friction circle method – Use of stability number – Method of slices – Fellenious and Bishop's method - Slope protection measures.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

On completion of the course, the student is expected to be able to

CO1 Demonstrate an ability to identify various types of soils and its properties, formulate and solve engineering Problems

CO2 Show the basic understanding of flow through soil medium and its impact of engineering solution

CO3 Understand the basic concept of stress distribution in loaded soil medium and soil settlement due to consolidation

CO4 Show the understanding of shear strength of soils and its impact of engineering solutions to the loaded soil medium and also will be aware of contemporary issues on shear strength of soils.

CO5 Demonstrate an ability to design both finite and infinite slopes, component and process as per needs and specifications.

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CE3501 DESIGN OF REINFORCED CONCRETE STRUCTURAL ELEMENTS L T P C

3 0 0 3

COURSE OBJECTIVE:

 To introduce the different design philosophy for reinforced concrete and discuss the limit state method of design of RC rectangular beams and to learn the concept in the design of RC flanged beams and design for shear and torsion and design of RC slabs and staircase, short RC columns, RC footing for walls, pad, sloped and combined rectangular footings.

UNIT I METHODS OF DESIGN OF CONCRETE STRUCTURES **9**

Concept of Elastic method, ultimate load method and limit state method – Working stress method as detailed in IS code - Design of Singly Reinforced beam 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 LIMIT STATE METHOD - FLANGED BEAM, SHEAR & TORSION **9**

Analysis and design of flanged beams – Use of design aids for Flexure - Behaviour of RC members in bond and Anchorage - Design requirements as per current code - Behaviour of RC beams in shear and torsion - Design of RC members for combined bending, shear and torsion - serviceability.

UNIT III LIMIT STATE DESIGN OF SLABS AND STAIRCASE **9**

Analysis and design of cantilever, one way, two way and continuous slabs subjected to uniformly distributed load for various boundary conditions- Types of Staircases – Design of dog-legged Staircase – Introduction to Flat Slab.

UNIT IV LIMIT STATE DESIGN OF COLUMNS **9**

Types of columns – Design of short Rectangular and circular columns for axial, uniaxial and biaxial bending.

UNIT V LIMIT STATE DESIGN OF FOOTING **9**

Design of wall footing – Design of axially and eccentrically loaded rectangular pad and sloped footings – Design of combined rectangular footing for two columns only.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

At the end of the course the student will be able to

CO1 Know the various design concepts and design RC rectangular beams by working stress and limit state methods

CO2 Understand the design of flanged beams, design for shear and torsion, and anchorage and development length.

CO3 Design a RC slabs and staircase and draw the reinforcement detailing.

CO4 Design short columns for axial, uni-axial and bi-axial eccentric loadings

CO5 Design wall footings, isolated footings and combined rectangular footing.

CE3503 **FOUNDATION ENGINEERING** L T P C

3 0 0 3

COURSE 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 and Evaluation of Liquefaction potential - Selection of foundation based on soil condition- Bore log report.

UNIT II BEARING CAPACITY OF SHALLOW FOUNDATION 9

Introduction – 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 depth for rigid behaviour – Applications – Floating foundation – Special foundations – Seismic force consideration – 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, SCPT) – Negative skin friction – Uplift capacity- Group capacity by different methods (Field'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 – Codal provision.

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 Graphical method – Pressure on the wall due to line load – Stability analysis of retaining walls – Codal provision.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

 On completion of the course, the student is expected to be able to

CO1 Graduate will demonstrate an ability to plan and execute a detailed site investigation to select geotechnical design parameters and type of foundation

CO2 Graduate will demonstrate an ability to design shallow foundations, its component or process as per the needs and specifications.

CO3 Graduate will demonstrate an ability to design combined footings and raft foundations, itscomponent or process as per the needs and specifications.

CO4 Graduate will demonstrate an ability to design deep foundations, its component or process as per the needs and specifications.

CO5 Graduate will demonstrate an ability to design retaining walls, its component or process as per the needs and specifications.

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CE8701 **ESTIMATION, COSTING ANDVALUATIONENGINEERING** **L T PC**

3 0 0 3

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.

UNITI QUANTITYESTIMATION 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)

UNITII RATE ANALYSIS ANDCOSTING 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)

UNITIII SPECIFICATIONS, REPORTSANDTENDERS 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.

UNITIV 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.

UNITV 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.

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CE8811	PROJECT WORK	L T P C
		0 0 20 10

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 ncluding 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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