

AICTE

Fifth Semester				Civil Engineering		
COURSE CONTENTS						
CE5301	Design of Concrete Structures	L	T	P	Max. Marks	Min. Marks
Duration	5 Hours	3	0	1	70	22

Course Objective

To familiarize students about design aspects of reinforced concrete structure and knowledge of the various codes to be used for designing various structural member.

UNIT - I

Basic Principles of Structural Design: Introduction to working stress method and limit state methods of design, partial safety factor for load and material. Partial load factors and analysis of singly and study of IS-456, IS-875 and SP-16 reinforced beam section by both methods.

UNIT - II

Design of Beams: Analysis Singly and Doubly reinforced sections, Design of rectangular, flanged beams. Design of Lintels, Cantilever, simply supported and continuous beams, Design of beam for shear, bond and torsion.

UNIT - III

Design of Slabs: Slabs spanning in one direction. Cantilever, Simply supported and Continuous slabs, Slabs spanning in two directions with different end conditions.

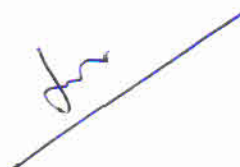
UNIT - IV

Columns: Effective length of columns, Short and long columns, Square, Rectangular and Circular columns. Design of columns subjected to axial loads and uniaxial and biaxial bending moment with the help of SP-16.

UNIT - V

Footings & Staircases: Isolated footings, rectangle & circular footing. Design of different types of staircases.

Note : All the designs for strength and serviceability should strictly be as per the latest version of IS:456. Use of SP-16 (Design aids).



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AICTE

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COURSE CONTENTS						
CE5302	Transportation Engineering	L	T	P	Max. Marks	Min. Marks
Duration	6 Hours	3	1	1	70	22

Course Objectives

- To introduce the basics of transportation systems and considerations in planning along with various cross section elements.
- To elucidate the various materials adopted in highway construction and examine the properties of the respective materials for choice in the highway construction.
- To illustrate the concepts and approaches adopted in the pavement design.
- To demonstrate the various components of railway track with classification and their functions to familiarize the students about principles of signaling and interlocking.
- To explain about the air craft characteristics, considerations and components in airport planning and design.

UNIT - I

Highway planning, Alignment & Geometric Design: Principles of Transportation, transportation by roads, railways, airways, waterways, their importance and limitations. Principles of highway planning, road planning in India and financing of roads, classification patterns. Requirements, Engineering surveys for highway location.

Cross Sectional Elements: Width, camber, super-elevation, sight distances, extra widening at curves, horizontal and vertical curves, numerical problems.

UNIT - II

Pavement materials: materials, properties and testing

Flexible Pavements: Design of flexible pavements, design of mixes and stability, WBM, WMM, BM, IBM, surface dressing, interfacial treatment- seal coat, tack coat, prime coat, wearing coats, grouted macadam, bituminous concrete specification, construction and maintenance, Types of pavements.

UNIT - III

Rigid Pavements: Advantages and disadvantages of rigid pavements, general principles of design, types, construction, maintenance and joints, dowel bars, tie bars. Brief study of recent developments in cement concrete pavement design, fatigue and reliability.

UNIT IV

Introduction, Tractive Resistances & Permanent Way: Principle of railway planning. Route surveys and alignment, railway track, development and gauges. Hauling capacity and tractive effort.

Railway material and its components:

- (i) Rails: types, welding of rails, wear and tear of rails, rail creep.





- (ii) Sleepers: types and comparison, requirement of a good sleeper, sleeper density.
- (iii) Rail fastenings: types, fish plates, fish bolts, spikes, bearing plates, chain keys, check and guard rails.
- (iv) Ballast: requirement of good ballast, various materials used as ballast, quantity of ballast.

Geometric Design, Station & Yards, Points and Crossings, Signaling & Interlocking: Formation, cross sections, super elevation, equilibrium, cant and cant deficiency, various curves, speed on curves. Types, locations, general equipments, layouts, marshalling yards. Definition, layout details, design of simple turnouts. Types of signals in stations and yards, principles of signaling and inter locking.

UNIT - V

Airport Planning, runway & Taxiway: Airport site selection, air craft characteristics and their effects of runway alignments, windrose diagrams, basic runway length and corrections, classification of airports.

Geometrical Elements : Taxi ways and runways, pattern of runway capacity.

Airport Obstructions, Lightning & Traffic Control: Zoning regulations, approach area, approach surface imaginary conical, horizontal. Rotating beacon, boundary lights, approach lights, runway and taxiway lighting etc. instrumental landing system, precision approach radar, VOR enroute traffic control.

List of Experiments:

- (i) Aggregate Crushing Value Test.
- (ii) Determination of aggregate impact value.
- (iii) Determination of Los Angeles Abrasion value.
- (iv) Determination of California Bearing Ratio values.
- (v) Determination of penetration value of Bitumen.
- (vi) Determination of Viscosity of Bituminous Material.
- (vii) Determination of softening point of bituminous material.
- (viii) Determination of ductility of the bitumen.
- (ix) Determination of flash point and fire point of bituminous material.
- (x) Determination of Bitumen content by centrifuge extractor.
- (xi) Determination of stripping value of road aggregate.
- (xii) Determination of Marshall stability value for Bituminous mix.
- (xiii) Determination of shape tests on aggregate



Fifth Semester				Civil Engineering		
COURSE CONTENTS						
CE5303	Advance Structural Analysis	L	T	P	Max. Marks	Min. Marks
Duration	5 Hours	3	0	1	70	22

Course Objective

To analyze indeterminate structures for unknown forces and displacements, adapting various force and displacement methods.

UNIT - I

Moment distribution methods in analysis of frames with sway analysis of beams and frames. Analysis of box frames, analysis of portals with inclined members.

UNIT - II

Theory of Plasticity and plastic analysis of simply supported, Cantilever, fixed and continuous beam and frames,

Unsymmetrical bending: Principal moment of inertia, product of inertia, bending of a beam in a plane which is not a plane of symmetry, shear centre.

UNIT - III

Matrix method of structural analysis: Force method and displacement method, Flexibility and stiffness concept, Analysis of beams, Truss and frames by force and displacement method.

UNIT - IV

Influence lines for intermediate structures, Muller Breslau principle, Analysis of Beam-frames. Introduction to space truss by tension coefficient method.

UNIT - V

Kani's method & Curved Beams: Pure bending of curved beams of rectangular, circular and trapezoidal sections, Stress distribution and position of neutral axis, Analysis of beam and frames by Kani's method.

Course Outcomes

After this course the students would have understood:

- To analyze the frames with sway analysis and analyze frame and portal with inclined members.
- Understand the principles of plastic analysis of determinate and indeterminate structures and the concepts of unsymmetrical bending.
- To analyze the beam using stiffness and flexibility matrix and to analyze truss and frame by force and displacement method.
- The concepts of influence line diagram for indeterminate structures.
- Concepts of pure bending of member having different cross sectional area. To analyze the beam and frames using Kani's method.

Reference Books:

- (i) Wang C.K. Intermediate structural analysis, McGraw Hill, New York.
- (ii) Kinney Streling J. Indeterminate structural Analysis, Addison Wesley.
- (iii) Reddy C.S. Basic Structural Analysis, Tata McGraw Hill Publishing Company, New Delhi.
- (iv) Norris C.H., Wilbur J.B. and Utkys. Elementary Structural Analysis, McGraw Hill International, Tokyo.
- (v) Weaver W & Gere JM, Matrix Methods of Framed Structures, CBS Publishers & Distributors, Delhi.

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Fifth Semester					Civil Engineering	
COURSE CONTENTS						
CE5304	Quantity Estimation and Costing	L	T	P	Max. Marks	Min. Marks
Duration	5 Hours	3	0	1	70	22

Course Objectives:

1. To demonstrate the different types of estimates and procedure adopted in measurement of work in construction projects.
2. To illustrate the different methods for preparation of building estimate.
3. To explain the procedure for measurement of work done, factors considered and rate analysis of work done.
4. To introduce the procedure adopted in valuation of projects.
5. To illustrate the estimate for road section and culvert.

UNIT - I

Procedure of Estimating: Estimate purpose and importance of estimate, principle of estimate, Types of estimates: plinth area, cubical content and preliminary estimate, detailed, revised, supplementary and other important estimates, Mode of measurement, measurement and abstract sheet, bill of quantities. Tender, earnest and security money, contingencies, work charge establishment, centage charge day work etc.

UNIT - II & III

Detailed estimate of Buildings: Methods: Long wall and short wall & centre line, methods of taking out the quantities of items of work, preparation of estimate of small and big building (Residential and other buildings), Various percentage for different services in building, administrative section, technical section etc.

UNIT - IV

Analysis of Rates: Cost of work: Factors affecting cost of work, overhead charges, various factors involved in rates of items, Task for average artisan, Materials and labour requirements for various trades, preparation for rate of important items of work: Cement concrete, R.C.C., brickwork, plastering, C.C. & Mosaic Terrazzo floor and other important items, Current schedule of rates (C.S.R.), Muster roll and measurement book.

UNIT - V

Valuation and Road Estimate: Definition, purpose, various terms used in valuation, year's purchase, sinking fund, depreciation, methods of depreciation, methods of valuation and rent fixation of buildings.

Road Estimate: Earthwork calculations by mid sectional area, area of side slope, mean sectional area, prismoidal and trapezoidal formula, estimate of culvert etc.

Course Outcomes:

- CO 1 Adopt the suitable type of estimate in varying situations.
- CO 2 Prepare detailed building estimate using center line method and individual wall method.
- CO 3 Prepare the estimates for roads and culverts.
- CO 4 Measure the work and analyze rates for construction project.
- CO 5 Estimate the value of a property.

Reference Books:

- (i) Estimating & Costing in Civil Engineering by Dutta, B.N.
- (ii) Estimating, Costing, Specification and Valuation in Civil Engineering by Chakraborti, M.
- (iii) Contracts and Estimates by Patel, B.S.

QEC Laboratory Practice

- 1 Preparation of Detailed Estimate for Two Roomed Building Using Individual Wall and Centreline Methods.
- 2 Preparation of Detailed Estimate for Two Roomed Building With Front Verandah Using Individual Wall and Centreline Methods.
- 3 Preparation of Estimate for Different Types of Buildings.
- 4 Preparation of Estimate for RCC Framed Building.
- 5 Bar Bending Schedule for Estimation of RCC: Slab, Beam, Column and Foundation.
- 6 Preparation of Earthwork Estimate for Roads.
- 7 Preparation of Earthwork Estimate for Hill Roads.
- 8 Preparation of Estimate for Slab Culvert.
- 9 Analyze the Rates of Different Works Adopted in Construction.
- 10 Analyzing the Value of a Property.



Fifth Semester					Civil Engineering	
COURSE CONTENTS						
CE5311	Advanced Survey	L	T	P	Max. Marks	Min. Marks
Duration	6 Hours	3	1	1	70	22

Course Objectives

To familiarize the students with relevant knowledge for calculations & setting out different types of curves, apply the principles of triangulation, adjustments in survey and introduce the concepts of hydrographic surveying and photogrammetry.

UNIT - I

Curves : Classification and use, Notation and elements of circular curves, calculations and setting out simple circular curves by chain and tape (offsets from long chord, successive by section of arcs, offsets from the tangents and offsets from chord produced) and by the theodolite (Rankine's methods of tangential angles, Two theodolites and Tacheometric methods) and obstacle to the location of curves.

UNIT - II

Compound curves, reverse curves, transition curves and vertical curves. Elements, calculation and setting.

UNIT - III

Triangulation: Geodetic surveying, classification triangulation systems, the strength of figures reconnaissance, selection and marking of stations, Inter-visibility and height of stations, Signals and Towers, baseline measurement and corrections, Satellite Station : Reduction to centre.

UNIT - IV

Survey adjustments and Theory of Errors: Introduction, kinds of errors, definitions, the law of accidental errors, general principles of least square, law of weight, determination of probable error, determination of error of field measurements, normal equations, determination of most probable values and triangulation adjustment.

UNIT - V

Hydrographic Surveying and Photogrammetry: Introduction, application, principles shore line survey, Soundings: requirements, equipment's, methods of locating sounding, reduction of sounding and plotting. **Photographic surveying**: Introduction, principles Terrestrial and Aerial photogrammetry.