COURSE STRUCTURE & SYLLABUS OF BACHELOR OF TECHNOLOGY (B.TECH)

In

Civil

Course Structure

Fourth Year

Seventh Semester

Syllabus

Paper	Name of the Subject
Code	
BEC1	Irrigation Engineering
BEC2	Prestressed Concrete & Adv. Design Of Structure
BEC3	Quantity Surveying & Contract. & Tenders
BEC4	Finite Elements Method of civil Engineering
BEC5	Elective-I
BEC2P	Prestressed Concrete & Adv. Design Of Structure Practical
BEC3P	Quantity Surveying & Contract. & Tenders Practical

BEC1: IRRIGATION ENGINEERING

1. INTRODUCTION TO HYDROLOGY

Introduction, Water Resources, Hydrologic Cycle, Scope and Applications of Hydrology

2. PRECIPITATION

Introduction, Types of Precipitation, Precipitation in India, Forms of Precipitation, Measurement of Precipitation, Types of rain Gauges, Modern Methods of measurement of Precipitation, Optimum Number of Raingauge Stations, Statistical Method of Determination of Optimum Number of Rain Gauges, Estimating Missing Rainfall Data, Double Mass Curve Analysis, Representation of Rainfall Data, Intensity Duration and Depth-duration Frequency Curve, Depth Area Duration Analysis, Determination of Average Precipitation over on area, Illustrative Problems

3. ELEMENTARY CONCEPTS OF EVAPORATION AND INFITRATION

Introduction, Evaporation and Factors affecting Evaporation, Measurement of Evaporation, Methods of Reducing Evaporation from Lakes or Reserviors, Evarporation from Land surfaces, Transpiration, Evapotranspiration, Infiltration, Methods of Determining Infiltration Rate, Infiltration Capacity Curve, Infiltration Indices, Illustrative problems

4. STREAM GAUGING

Introduction, Selection of site, Determination of River stage, Stream flow measurements, Stage-Discharge curve

5. RUNOFF

Introduction, Run off and its Classification, Factors Affecting Runoff, Rainfall-Runoff Relationship, Methods of Estimating Runoff, Hydrograph, Factor Affecting Shape of Hydrograph, Methods of Base Flow Separation, Unit Hydrograph, S-Curve or S-Hydrograph, Synthetic Unit Hydrograph, Estimation of Peak floods

6. INTRODUCTION TO IRRIGATION

Introduction, Functions and Necessity of irrigation, Advantages of Irrigation, Disadvantages of Irrigation, Irrigation Development and present status in India

7. WATER REQUIREMENTS OF CROPS

Introduction, Soil classification, Soil moisture and water requirements of crops, Water requirements of crops: Definition of terms, Factors affecting duty of water, Crop seasons in India, Crop seasons in Maharashtra, Water Requirements of crops, Definitions of some terms, Optimum Crop Requirements, Command Areas, Computations of capacity of the canal, Irrigations of Efficiencies, Illustrative Problems

8. RESERVIOR PLANNING

Introduction, Types of Reservior, Types of Developments, Investigations for Reservior Planning, Selection of suitable site for a Reservior, Zones in the Reservior starage, Reservior Starage Capacity and yield, Computation of Reservior Capacity for a specific yield, Safe yield from a Reservior of Given capacity, Reservior sedimentation, Determination of useful Life of Reservior, Flood Routing, Selection of Dam site and Economic Height of Dam, Reservior Losses, Multipurpose Reservior Planning, Flood Routing, Benefit Cost Ratio Analysis, Apportionment of Total cost of a Multipurpose Reservior, Application of Optimisation techniques: Systems Approach, Economics of Reservior planning, Illustrative Problems

9. GROUND WATER HYDROLOGY

Introduction, Occurrence of Ground Water, Definition of Terms, Divisions of Sub-surface Water, Types of Aquifer, Movement of Ground Water, Hydraulics of Well, Determination of Coefficient of Transmissibility, Well Losses, Specific Capacity of Wells and Efficiency of Well, Well Irrigation, Tube Wells, Construction of Tube Wells, Well Completion and its Maintenance, Well Shrouding and Well Development, Radial Wells or Collectors, Comparison Between Well Irrigation and Canal Irrigation system

10. WATER LOGGING AND LAND DRAINAGE

Introduction, Ill Effects of Water Logging, Causes of Water Logging, Remedial Measures Drainage of Irrigation Land, Advantages of Tile Drains Over Open Drains, Merils of Tile Drains, Spacing and Depth of Tile Drains, Reclamation of Land

11. LIFT IRRIGATION SCHEMES

Introduction, Planning of Lift Irrigation Schemes, Contour Survey of the area, Component parts of Lift Irrigation Schemes, Classification of Lift Irrigation Schemes, Design Criteria, Determination of Water rates

12. APPLICATION OF WATER

Introduction, Basic functions of Irrigation water, Methods of applying Irrigation water, Modern methods of irrigation system, Distribution of water, Rotational application, Water management

13. ASSESSMENT OF LANAL REVENUE

Introduction, Considerations for determining the water charges, Criteria for fixing water charges, Methods of Assessment

BEC2: PRESTRESSED CONCRETE & ADV. DESIGN OF STRUCTURE

1. INTRODUCTION TO PRESTRESSED CONCRETE

Introduction, Reinforced Concrete Versus Prestressed Concrete, Prestressing System, Loss Of Prestress, Steel For Prestressing, Basic Concepts Of Prestressed Concrete, Homogeneous Beam Concept, Pressure Line, Load Balancing Concept, Shear And Pricipal Streses

2. SYSTEMS OF PRESTRESSING

Classifications Of Prestressed Concrete Members, Hoyer System, The Freyssinet System, The Magnel Balton System, Gifford Udall System, P.S.C.Monowire System, C.C.L Standards System, LEE-McCall System

3. PRESTRESSED CONCRETE BEAMS

Introduction, Limit State Of Collapse, Limit State Of Collapse In Shear, Limit State Of Serviceability, Prestressed Concrete Poles, Other Design Considerations, Selection Of Sectional Dimensions, Detailing Of Reinforcement, Limits State Of Serviceability For Deflection

4. END BLOCK

Introduction, Magnel's Method, Guyon's Method, Beam With Two Anchor Plates Symmetricaly Placed On The Face Of The Beam, Cable At An Eccentricity

5. PRESTRESSED CIRCULAR TANKS AND PIPES

Introduction, Principles of Circumferencential Prestressing, Methods Of Design

6. SMALL PRESTRESSED CONCRETE DAMS

Introduction, Design Requirements, Design

7. PRESTRESSED CONCRETE PILES

Introduction, Convenient Ways of Lifting A Pile, Maximum Length Of Pile

BEC3: QUANTITY SURVEYING AND CONTRACT & TENDERS

1. ESTIMATING

Introduction, Definition, Data Required for Preparation of an estimate, Types of Estimates, Items of Work, Description of an Item of Work, Measurement of Works, Guidelines for Measurements, I.S. mode or Units of Measurements, Plinth Area, Floor Area, Carpet and F.S.I.

2. APPROXIMATE ESTIMATES

Introduction, Definition, Purpose of Necessity, General Principle of Preparing Approximate Estimates, Methods of Preparing Approximate Estimates

3. TAKING OUT QUANTITIES

Introduction, Definition, General procedure of measurement of works, Methods of taking out Quantities, Comparison of English and P.W.D. method, Various items of works, Prime Costs (P.C.) and Provisional Sums (P.S.), Provisional Quantities, Spot Items, Contingencies, Work-charged Establishment, Centage Charges, Building Estimate Methods, Checks over the Accuracy of Detailed Estimates, Relation between Cost of various Items with respect to Total Cost of Building, Some typical estimates of Works, Schedule of Rates for Common Items of works in Building construction

4. ANALYSIS OF RATES (OR PRICES)

Introduction, Purpose of Analysis of Rates, Factors Affecting Rate analysis, Task Work, Table showing the Task Work, Table showing Materials Required for Different Items of Works, Labour Requirements for different Items of Works, Computations of Quantities of Materials required for Various Items of Works, Increase in Rates or Prices for Additional Floors, Water Charges, Requirements of Cement bags for various items of works, Approximate Rates of Materials of Construction, Approximate Rates of Equipment/Machinery required for works, Transportation of Materials and cost, Rates specified for various categories of Laborers in Building Industry, Analysis of Rates of Principles of Items of Work in the Building Construction

5. SPECIFICATIONS

Introduction, Definition of Specifications, Purpose of Specifications, Types of Specifications, Classification of Specifications According to Purpose, Requirements of Good Specifications, Detailed Specifications, Standard Specifications, Detailed Specifications for Common Items of Building Work

6. VALUATION OF PROPERTY

Introduction, Cost Price and Value, Purpose (or Object) of Valuation, Factors affecting Valuation of a Property, Different Nomenclatures for the Value, Year Purchases (Y.P.), Sinking Fund and Sinking Fund Installment, Valuation Tables, Annuity, Ownership of the Property, Returns from the Property, Depreciation and Methods of Computations of Depreciation, Mortgage, Easement, Methods of Valuation Property, Fixation of Rent of a

Property, Reversionary Value of Land (or Land on Reversion), Illustrative Problems, Valuation of a (Building) Property

7. CONTRACTS AND TENDERS

Methods of Executing Works, Tenders, Contracts

BEC4: FINITE ELEMENTS METHOD OF CIVIL ENGINEERING

1. INTRODUCTION

Introduction. Historical Background. Design Considerations. Need Of Finite Element Method. The Process Of Finite Element Method, Field And Boundary Conditions, Steps Involved In Fem, The Standard Discrete System, Transformation Of Co-Ordinates.

2. FINITE ELEMENTS OF ELASTIC CONTINUUM DISPLACEMENT APPROACH

Introduction, Direct Formulation Of Finite Element Characteristic, Generalized Nature Of Displacements, Strains, And Stresses, Generalization To The Whole Region--Internal Nodal Force Concept Abandoned, Displacement Approach As A Minimization Of Total Potential Energy, Convergence Criteria, Discretization Error And Convergence Rate, Displacement Functions With Discontinuity Between Elements--Non-Conforming Elements And The Patch Test, Bound On Strain Energy In A Displacement Formulation, Direct Minimization.

3. GENERALIZATION OF THE FINITE ELEMENT CONCEPTS WEIGHTED RESIDUAL AND VARIATIONAL APPROACHES

Introduction, Weighted Residual Methods, Approximation To Integral Formulations: The Weighted Residual Method, Virtual Work As The 'Weak Form' Of Equilibrium Equations For Analysis Of Solids Or Fluids, Variational Principles, Establishment Of Natural Variational Principles For Linear, Self-Adjoint Differential Equations, Maximum, Minimum, Or A Saddle Point, Constrained Variation Principles, Lagrange Multipliers And Adjoin Functions.

 STRAIN PLANE STRESS AND PLANE Introduction, Element Characteristics, Some Practical Applications, Special Treatment Of Plane Strain With An Incompressible Material.

5. AXI-SYMMETRIC STRESS ANALYSIS Introduction, Element Characteristics, Some Illustrative Examples.

6. THREE – DIMENSIONAL STRESS ANALYSIS Introduction, Tetrahedral Element Characteristics.

7. ELEMENT SHAPE FUNCTIONS SOME GENERAL FAMILIES OF C₀ CONTINUITY

Introduction, Two – Dimensional Elements, Completeness Of Polynomials, Rectangular Elements – Lagrange Family, Rectangular Elements – 'Serendipity' Family, Triangular Element Family, One-Dimensional Elopements, Three-Dimensional Elements, Other Simple Three-Dimensional Elements.

8. CURVED, ISOPARAMETRIC ELEMENTS AND NUMERICAL INTEGRATION

Introduction, Parametric Curvilinear Co-Ordinates, Geometrical Conformability Of Elements, Variation Of The Unknown Function With In Distorted, Curvilinear, Elements, Continuity Requirements, Transformations, Element Matrices, Area And Volume Co-Ordinates, Convergence Of Elements In Curvilinear Co-Ordinates, Numerical Integration.

9. SOME APPLICATIONS OF ISOPARAMETRIC ELEMENTS IN TWO- AND THREE-DIMENSIONAL STRESS ANALYSIS

Introduction, A Computational Advantage Of Numerically Integrated Finite Elements.
