ANNEXURE - I

CIVIL ENGINEERING

(SYLLABUS)

STRENGTH OF MATERIALS

UNIT:1 Simple Stresses and Strains-Curves for Ductile Materials-Mechanical Properties of Materials-Hooke's Law-Lateral Strain-Poisson's Ratio-Elastic Constants and The Relation between Them-Composite Sections- Resilience-Strain Energy-Gradual and Sudden Loading-Shear Force and Bending Moment Diagrams for Cantilever, Simply Supported, Fixed, Continuous and Overhanging Beams Subjected to Point Loads and UDL

UNIT:2 Theory of Simple Bending-Assumptions-Bending Equation-Bending Stresses-Section Modulus-Shear Stress Distribution Across Various Sections Like Rectangular, Circular and I-Sections.

THEORY OF STRUCTURES:

UNIT:3 Deflection of Cantilevers and Simply Supported Beams-Double Integration and Macaulay's Methods-Mohr's Theorems for Slope and Deflections-Calculation for Propped Cantilevers Subjected to Simple Loading-Analysis of Fixed And Continuous Beams of Uniform Section for Simple Loading Without Sinking of Supports. Columns and Struts-Types-Slenderness Ratio- Euler's and Rankine's Formulae for Axial Loading. Determination of Forces in Members of Statically Determinate, Plane and Pin-Jointed Trusses for Dead Loads Only. Dams and Retaining Walls-Conditions for Stability-Middle Third Rule-Rankine's Formula for Active Earth Pressure.

REINFORCED CONCRETE STRUCTURES:

UNIT:4 Grades of Concrete, Characteristic Strength, Modulus of Elasticity-I.S. 456 -2000-Philosophy of Limit State Design. Limit State of Strength and Serviceability, Partial Safety Factor-Design Strength of Materials and Design Loads-Assumptions. Analysis and Limit State Design Of Rectangular Beams-Singly, Doubly Reinforced and T-Beams. Shear in RCC Beams, Lintels and Sunshades-Development Length. Slabs-Analysis and Limit State Design of One-Way And Two-Way Slabs as Per IS.456-2000.Torsion Reinforcement. Design of Continuous Slabs and Beams-Deflection Check for Slabs And Beams. Detailing of Reinforcement in Singly Reinforced and Doubly Reinforced Simply Supported Beams of Rectangular Sections and Lintels, One Way and Two Way Slabs.

UNIT:5 Columns: Codal Provisions of I.S 456-2000-Short and Long Columns-Different Shapes-Design of Short Columns by Limit State Method-Long Columns- Concept, Effective Length for Different End Conditions. Footings-Isolated Column Footings-One Way Shear and Two-Way Shear. Stairs-Types, Loads on Stairs. Working Stress Method of Design: Basic Principles, Neutral Axis, Lever Arm-Design and Analysis of Singly Reinforced Simply Supported Rectangular Beams. Comparison of Limit State and Working Stress Methods.

SURVEYING:

UNIT:6 Chain Surveying- Purpose and Principle- Errors and Corrections- Different Operations in Chain Surveying- Obstacles – Methods of Calculation of Area. Compass Surveying-Purpose and Principle-Bearings-Traversing Using Prismatic Compass-Local Attraction-Errors. Levelling-Definitions - Component Parts-Errors - Classification of Levelling-Contouring-Characteristics and Methods. Theodolite- Principles and Component Parts- Fundamental

Lines and Relationship Among Them- Adjustments of Theodolite- Measurement of Horizontal and Vertical Angles-Errors-Traverse Computations- Bowditch and Transit Rule. Tacheometry-Principle-Stadia Tacheometry-Tangential Tacheometry, Total Station, Global Positioning System – Importance, G.I.S – Use and Applications in Civil Engineering

HYDRAULICS

UNIT:7

Fluid Properties-Specific Weight–Mass Density-Specific Gravity-Surface Tension-Capillarity-Viscosity. Atmospheric Pressure, Gauge Pressure and Absolute Pressure. Fluid Pressure on Plane Surfaces-Centre of Pressure, Measurement of Fluid Pressure Using Piezometer and Mano Meters. Types of Flows-Uniform, Nonuniform, Steady, Unsteady, Laminar and Turbulent Flows. Energies of Liquid in Motion-Continuity Equation. Bernoulli's Theorem-Pitot Tube-Venturi Meter. Flow Thorough Small and Large Orifices, Free Orifices, Submerged Orifices, Coefficients of Orifices- C_c, C_v and C_d. Flow Through Internal, External, Convergent and Divergent Mouthpieces. Types of Notches-Rectangular and Triangular, Flow Over Notches. Types of Weirs-Sharp Crested and Broad Crested-Mathematical Formulae for Discharge-Francis and Bazin's Equations.

UNIT:8 Flow Through Pipes-Major and Minor Losses-Chezy's and Darcy's Formulae for Loss of Head Due to Friction-HGL & TEL- Reynold's Number for Laminar and Turbulent Flows. Flow Through Open Channels-Rectangular and Trapezoidal-Chezy's Formula for Discharge - Kutter's and Manning's Equation for Chezy's Constants-Most Economical Sections. Centrifugal Pumps Without Problems. Classification of Turbines- Kaplan, Franci's and Pelton Wheel Without Problems-Use of Draft Tube. Hydro-Electrical Installations-Components and Uses.

IRRIGATION ENGINEERING

UNIT:9 Necessity of Irrigations- Perennial and Inundation Irrigation, Flow and Lift Irrigation, Principal Crops-Kharif and Rabi Seasons-Duty, Delta and Base Period. Methods of Irrigation-Check Flooding, Basin Flooding, Contour Bunding, Furrow, Sprinkler and Drip Irrigations. Hydrology – Rainfall, Types of Rain Gauges, Types of Catchments-Rain Fall and Run Off. Measurement of Velocity of Flow in Streams-Ryve's and Dicken's Formulae for Computing Maximum Flood Discharge. Classifications of Head Works-Component Parts of Diversion Head Works. Weirs and Barrages. Percolation and Uplift Pressures. Types of Reservoirs-Dead Storage, Live Storage and Surcharge Storage.

UNIT: 10 Storage Head Works-Different Types of Dams-Rigid and Non-Rigid Dams- Gravity Dams-Low and High Dams. Elementary Profile of a Dam. Failures of Gravity Dams-Drainage Galleries. Ogee and Siphon Spill Ways. Earth Dams— Types, Failures and Precautions. Phreatic Lines and Drainage Arrangements in Earthen Dams. Distribution Works-Classifications and Alignment of Canals-Typical Cross Section of a Canal-Berm and Balanced Depth of Cutting- Canal Lining. Lacey's Silt Theory. Cross Drainage Works–Types and Functions.

ANNEXURE - II

CIVIL ENGINEERING

(SYLLABUS)

DISTRIBUTION OF QUESTIONS UNIT WISE

Units	Topic	Questions
1 and 2	Strength of Materials	20
3	Theory of Structures	20
4 and 5	Reinforced Concrete Structures	20
6	Surveying	15
7 and 8	Hydraulics	15
9 and 10	Irrigation Engineering	10

ANNEXURE - II

CIVIL ENGINEERING

(SYLLABUS)

MODEL QUESTIONS

1. What is the Bending moment equation for a simply supported beam with uniformly distributed load, 'ω' with a span of 'l'

   1) $\frac{wl}{2}$ 2) $\frac{wl^2}{8}$ 3) $\frac{wl^2}{2}$ 4) $\frac{WL^2}{4}$

2. What is a long column with load w and effective length l with span to effective depth ratio

   1) $> \frac{l}{12}$ 2) $= \frac{l}{12}$ 3) $< \frac{l}{12}$ 4) $\geq \frac{l}{10}$

3. The Reduced bearing with W.C.B = 120^0

   1) N 30^0 E 2) S 60^0 E 3) N 30^0 W 4) S 30^0 W

4. What is the relation between c_d, c_v, c_c with orifices

   1) $c_d = \frac{cc}{c\,v}$ 2) $c_c = c_v \times c_d$ 3) $c_d = c_c \times c_v$ 4) $c_v = c_c \times c_d$