

## **Subject : Civil Engineering**

**for Sr. Instructor**

### 1.0: Building Construction

- I. Purpose of foundation, types of foundation
- II. Masonry, stone masonry, brick masonry
- III. Damp proof course, purpose
- IV. Types of doors, windows, floors
- V. Plastering, purpose, defects in plastering

### 2.0: Building Materials

- I. Bricks, classification, properties
- II. Grading of aggregates
- III. Cement, grades of cement, testing of cement
- IV. Defects in timber, seasoning , preservation of timber
- V. Mortar and concrete, grading of concrete, curing, water cement ratio.

### 3.0: Surveying

- I. Principles and classification of surveying
- II. Well condition and ill-conditioned triangles
- III. Offsets, kind of offsets
- IV. Bearing of lines, types, whole circle bearing and quadrantal system of bearing, simple problems
- V. Levelling, types, bench mark and its types, reduced level and method of finding out RL, related problems.
- VI. Contouring, characteristics of contours, methods and interpolation of contour.
- VII. Plane table, its accessories, methods of plane tabling,
- VIII. Measurement of horizontal and vertical angles with Theodolite, open traverse and closed traverse, included angles, deflection angles, latitude and departure.

### 4.0: Estimating and costing

- I. Purpose of estimate, unit of measurement, types of estimate
- II. Estimate of brick masonry, concrete work, wood works, plastering works, earthwork etc.
- III. Rate analysis, general and detailed specifications
- IV. Contracts, contract agreement, technical sanction, measurement book,

### 5.0: structural mechanics

- I. Elastic constants and relationship
- II. Shear force and bending moments, related problems
- III. Bending stresses, shear stress in beams
- IV. Long column and short column
- V. Deflection of beams

### 6.0: Hydraulics

- I. Fluid, real and ideal fluid, intensity of pressure, atmospheric pressure, gauge pressure, total pressure, simple problems
- II. Buoyancy, types of equilibrium, metacenter and metacentric height

- III. Equation of continuity, potential, kinetic, pressure energy, Bernoulli's equation,
- IV. Types of Orifices and notches , hydraulic co-efficient
- V. Flow through pipes, types of flow, Reynolds's number, losses in pipes,
- VI. Types of channels, wetted perimeter, hydraulic mean depth, economical section

#### 7.0: Water Resources Engineering

- I. Necessity and types of irrigation, delta, duty and base period,
- II. Types of precipitation, measurement of precipitation
- III. Run-off, hydrograph,
- IV. Components of diversion head works, functions
- V. Types of dams, gravity dam, earth dam, failure of earth dam,
- VI. Classification of canals, canal lining,
- VII. Cross-drainage works, types
- VIII. Water logging, reclamation, causes and remedies of water logging
- IX. River training works, purpose, types

#### 8.0: Geotechnical Engineering

- I. Classification of soil, water content, density, specific gravity, void ration, degree of saturation, simple problems
- II. Liquid limit, plastic limit
- III. Permeability, factors affecting permeability
- IV. Compaction, standard proctor test, consolidation, settlement

#### 9.0: Structural Design and Detailing

- I. Types of loads, their BIS code, partial safety factor, IS:456-2000 specification
- II. Effective depth, effective length, balanced and unbalanced sections
- III. Moment of resistance, simple problems
- IV. Control of deflection, shear stress, shear reinforcement
- V. Design of beams, slabs, column, footings; long column and short column,
- VI. Prestressed concrete, methods of pre-stressing
- VII. Riveted connections, efficiency, rivet value
- VIII. Welded connection, types of welds, tension and compression member problems.

#### 10.0: Transportation Engineering

- I. IRC, CRR I its functions
- II. Classification of roads, camber, gradients, super elevation, transition curves
- III. Water bound macadam road, rigid and flexible pavements,
- IV. Road signals, traffic control devices
- V. Classification of bridges, components of bridges, IRC loadings on bridge,
- VI. Bearings, its functions and types

#### 11.0: Environmental Engineering

- I. Water supply project, per capita demands, factors affecting various demands, population forecast, related problems.
- II. Impurities in water, drinking water standards,
- III. Treatment of water, sedimentation, coagulation, filtration, disinfection, chlorination, hard water and soft water

- IV. Purpose of sanitation, classification of sewerage system,
- V. Composition of sewage, decomposition, BOD, trickling filters, oxidation ponds.

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