Syllabus for the Post of Technician (Civil Engineering)

TOPIC	DETAILS
Basic Fundamentals of Fluid Mechanics	Properties of Fluids, Hydrostatic Pressure, Measurement of Pressure, Fundamentals of Fluid Flow, Flow Measurement, Flow through Pipes, Flow Through Open Channels, Hydraulic Pumps
Building Materials	Laboratory based characterization of stones, bricks, tiles, cement, concrete, timber, steel, Block Board, Commercial Board, Flush Door, Shutter, Chequered Tiles, Kerb Stone, Paver Blocks, Sound and Thermal Insulation materials and flyash. Awareness of relevant codes.
Building Construction	Basic construction technology and requirements for brick masonry, stone masonry, arches, trusses, Concrete structures, scaffolding, foundation construction. Different surface finishing processes such as Plastering, Pointing, Painting, White-Washing and distempering. Anti-termite treatments in building
Surveying	Principles of surveying, survey instruments, chain surveying, working of prismatic compass, compass traversing, bearings, local attraction, plane table surveying, theodolite traversing, adjustment of theodolite, Leveling, temporary and permanent adjustments, tachometer, GPS, Introduction to remote sensing and GIS
Soil Mechanics	Classification of various types of soils, type of foundation structure, computation of shear strength parameters of soil, compaction and consolidation of soils, bearing capacity of soil
Quantity Surveying and Evaluation	Units of measurement, Calculating quantities of materials and prepare the material chart, rate analysis, tender document of different civil engineering items by using C.S.R. rates with premium, Valuation of Billing
Structural Mechanics	Physical properties of steel, Computation of direct and bending stresses for beams and columns, M.O.I, Second Moment of Inertia, Radius of Gyration, Section Modulus of Resistance for steel sections, Calculation of Bending Stresses, Moment of Resistance of simply supported beams, Stress Distribution Diagram for rectangular section.
Irrigation Engg	Different crops and their water requirements, Concept of Design rainfall and runoff, Hydrographs, Installation of tubewells and water harvesting techniques, Supervise maintenance and construction work of canal head works and cross regulators, Supervise construction of various river training works, desilting operations.
Concrete Technology	Physical properties of cement as per IS Codes, Various tests on aggregates in laboratory, grading charts for different aggregates, Properties, Advantages and uses of concrete, water cement ratio, workability, bleeding, segregation, harshness defects, mix design, storage, batching, mixing, placement, compaction, finishing and curing of concrete, quality control of concrete, hot and cold weather concreting, NDT of Concrete.
Water Supply and Waste Water Engineering	Physical and chemical tests of water, Calculation of size of different pipes to carry water, network of pipes for water supply as well as sewerage. Necessity of systematic collection and disposal of waste, Collection and conveyance of sewage, Estimation of waste quantities, treatment methods, waste characterization, Waste water Conservancy

	and water carriage systems, their advantages and Disadvantages (a) Surface drains: various types, Types of sewage: Domestic, industrial, storm water and its seasonal variation.
Highway Engg.	Cross sectional elements, types of pavements, characterization of pavement materials ï aggregates and bitumen, Introduction to flexible and rigid pavements ï Water Bound Macadam (WBM) and Wet Mix Macadam (WMM), Gravel Road, Bituminous construction, Rigid pavement, Determination of the California bearing ratio (CBR) for the sub-grade soil.
Railways Bridges & Tunnels	Railway Engineering Components of permanent way ï sleepers, ballast, fixtures and fastening, track geometry, points and crossings, track junction, stations and yards. Different types of rail gauges used in India, Use of different types of rail fastenings and fixtures, Classification of bridges Essential components of a ROB and RUB
RCC Design	Design concept of structural components as per relevant codes, Design of axially loaded column and footing. Limit State and Working Stress methods, Introduction to Pre-Stressed Concrete
Steel Structure Design	Structural properties of steel and its designation as per Indian Standards, types of joints, different types of trusses, their components and usability, simply supported steel beams, types of plate girders.

LIST OF PRACTICALS FOR SURVEYING

Chain surveying:

1. Ranging a line
2. Taking offsets - perpendicular and oblique (with a tape only)
3. Setting out right angle with a tape

Chain Survey of a small area.

Compass Surveying:

Study of prismatic compass

Setting the compass and taking observations

Measuring angles between the lines meeting at a point

Plane Table Surveying:

Study of the plane table survey equipment

Setting the plane table

Marking the North direction

Plotting a few points by radiation method

Orientation by Trough compass, Back sighting

Plotting few points by intersection, radiation and resection method

Traversing an area with a plane table

Layout of Buildings (from given drawing of two room residential building) by use of surveying instruments.

LIST OF PRACTICALS FOR HIGHWAY ENGINEERING LAB

S. No.	Name of Experiment
1.	Determination of Softening Point of Bitumen
2.	Determination of Penetration of Bitumen

3.	Determination of Ductility of Bitumen
4.	Determination of Flash and Fire Point of Bitumen
5.	Determination of Stripping Value of Bitumen
6.	Determination of CBR Value of Subgrade
7.	Determination of Bitumen Content in Bituminous Mixes
8.	Determination of Marshall Stability and Flow Value of Bituminous Mixes

LIST OF PRACTICALS FOR HIGHWAY ENGINEERING LAB

S. No.	**Name of Experiment**
1.	Determination of pH value of water
2.	Determination of Conductivity and Total Dissolved Solids in water
3.	Determination of Alkalinity
4.	Determination of Acidity
5.	Determination of Hardness
6.	Determination of Anions and Cations using spectrophotometer
7.	Determination of COD
8.	Determination of BOD

LIST OF PRACTICALS FOR MATERIAL LAB

S. No.	**Name of Experiment**
1.	Determination of Ultrasonic Pulse Velocity of structural elements
2.	Determination of Rebound Hammer Number of Structural Elements

CONCRETE TECHNOLOGY LABORATORY

List of practicals:

1. **Tests on Cement**
    a. Normal Consistency
    b. Initial and Final Setting Time
    c. Soundness
    d. Fineness by Blaineôs Air Permeability

e. Compressive Strength

2. **Tests on Cement**
    a. Flakiness and Elongation Index
    b. Deleterious Materials (Silt & Clay)
    c. Specific Gravity and Water Absorption
    d. Bulk Density and Voids in coarse and fine aggregate
    e. Grain Size Analysis & Grading of Aggregate
    f. Aggregate Impact Value
    g. Aggregate Crushing Value
    h. Aggregate Abrasion Value
    i. Soundness of Aggregate
    j. Ten Percent fines value
    k. Moisture Content
    l. Water Absorption Value
    m. Silt Content in Fine Aggregate
    n. Bulking of Sand

3. **Tests on Concrete**
    a. Workability by Slump Cone
    b. Workability by Compacting Factor
    c. Workability by Vee-Bee Consistometer
    d. Split Tensile Strength
    e. Flexural Strength of concrete
    f. Abrasion Resistance test on Concrete

SOIL ENGINEERING LABORATORY

List of Practicals:

1. Particle Size Distribution
2. Water Content Determination
3. Specific Gravity by Pycnometer & Density Bottle
4. Field Density by Sand Replacement Method
5. Field Density by Core Cutter Method
6. Proctor Compaction Test
   Light Compaction & Heavy Compaction

7. Atterberg Limits
   Liquid Limit, Plastic Limit and Shrinkage Limit
8. Liquid Limit by Cone Penetrometer
9. Permeability Test
   Constant Head Method & Falling Head Method
10. Direct Shear Test
11. Laboratory Vane Shear Test
12. Standard Penetration