

SYLLABUS & WEIGHTAGE OF QUESTIONS FOR
COMPUTER BASED TEST
ADVERTISEMENT No: 12/2026/CHQ/DR-CBT

MANAGER (ENGG.-CIVIL)

Total Marks: 120

Duration: Two hours

Part-A

General Knowledge, General Intelligence,
General Aptitude, English etc.

Weightage 30%

Part-B

Questions on subjects relating to
Educational Qualifications

Weightage 70%

1. Engineering mechanics, Strength of Materials and Structural Analysis:

1.1 Engineering Mechanics:

Units and Dimensions, SI units, Vectors, Concept of Force, Concept of particle and rigid body. Concurrent, Non Concurrent and parallel forces in a plane, moment of force, free body diagram, conditions of equilibrium, Principle of virtual work, equivalent force system.

1.2 Strength of Materials:

Simple Stress and Strain, Elastic constants, axially loaded compression members, Shear force and bending moment, theory of simple bending, Shear Stress distribution across cross-sections, Beams of uniform strength.

Deflection of beams; Macaulay's methods, Mohr's Moment area method, Conjugate beam method, unit load method. Torsion of Shafts, Elastic stability of columns, Euler's Rankine's and Secant formulae.

1.3 Structural Analysis:

Castigliano's theorems I and II, unit load method of consistent deformation applied to beams and pin jointed trusses. Slope-deflection, moment distribution.

Rolling loads and Influences lines: Influences lines for Shear Force and Bending moment at a section of beam. Criteria for maximum shear force and bending Moment in beams traversed by a system of moving loads. Influences lines for simply supported plane pin jointed trusses.

Arches: Three hinged, two hinged and fixed arches, rib shortening and temperature effects.

Matrix methods of analysis: Force method and displacement method of analysis of indeterminate beams and rigid frames.

Plastic Analysis of beams and frames: Theory of plastic bending, plastic analysis, statical method, Mechanism method.

Unsymmetrical bending: Moment of inertia, product of inertia, position of Neutral Axis and Principle Axes, calculation of bending stresses.

2. Design of Structures: Steel, Concrete and Masonry Structures:

2.1 Structural Steel Design:

Structural Steel: Factors of safety and load factors. Riveted, bolted and welded joints and connections. Design of tension and compression member, beams of builtup section, riveted and welded plate girders, gantry girders, stanchions with battens and lacings.

2.2 Design of concrete and Masonry Structures:

Concept of mix design, Reinforced Concrete : Working Stress and Limit State method of design – Recommendations of I.S. codes Design of one way and two way slabs, stair-case slabs, simple and continuous beams of rectangular, T and L sections, Compression members under direct load with or without eccentricity.

Cantilever and Counter fort type retaining walls.

Water tanks: Design requirements for Rectangular and circular tanks resting on ground.

Prestressed concrete: Methods and systems of prestressing, anchorages, Analysis and Design of sections for flexure based on working stress, loss of prestress.

Design of brick masonry as per I.S. codes.

3. Geotechnical Engineering:

Soil Type and structure – gradation and particle size distribution – consistency limits.

Water in soil – capillary and structural – effective stress and pore water pressure – permeability concept – field and laboratory determination of permeability – Seepage pressure – quick sand conditions – Shear strength determination – Mohr Coulomb concept.

Compaction of soil – Laboratory and field tests.

Compressibility and consolidation concept – consolidation theory – consolidation settlement analysis.

Earth pressure theory and analysis for retaining walls, Application for sheet piles and Braced excavation.

Bearing capacity of soil – approaches for analysis – Field tests – settlement analysis – stability of slope of earth wall.

Subsurface exploration of soils – methods

Foundation - Type and selection criteria for foundation of structures – Design criteria for foundation – Analysis of distribution of stress for footings and pile – pile group action – pile load test. Ground improvement techniques.

Soil stabilization.

4. Construction Technology, Equipment, Planning and Management:

4.1 Construction Technology:

Engineering Materials:

Physical properties of construction, materials with respect to their use in construction – Stones, Bricks and Tiles; Lime, Cement, different types of Mortars and Concrete.

Specific use of ferro cement, fibre reinforced C.C., High strength concrete and PPC.

4.2 Construction:

Masonry principles using Brick, stone, Blocks – construction detailing and strength characteristics.

Types of plastering, point, flooring, roofing and construction features.

Common repairs in buildings.

Principles of functional planning of building for residents and specific use – Building code provisions.

Basic principles of detailed and approximate estimating – specification writing and rate analysis – principles of valuation of real property.

Machinery for earthwork, concreting and their specific uses – Factors affecting selection of equipments – operating cost of equipments.

4.3 Construction Planning and Management:

Construction activity – schedules – organization for construction industry – Quality assurance principles.

Use of basic principles of network – analysis in form of CPM and PERT – their use in construction monitoring, Cost optimization and resource allocation.

5. Surveying Transportation Engineering

5.1 Surveying:

Common methods and instruments for distance and angle measurement for CE work – their use in plane table, traverse survey, leveling work, triangulation, contouring and topographical map.

Basic principles of photogrammetry and remote sensing.

5.2 Highway Engineering:

Principles of Highway alignments – classification and geometrical design elements and standards for Roads.

Pavement structure for flexible and rigid pavements – Design principles and methodology of pavements.

Typical construction methods and standards of materials for stabilized soil WBM, Bituminous works and CC Roads.

Different types of joints in pavements.

Surface and sub-surface drainage arrangements for roads – culvert structures.

Pavement distresses and strengthening by overlays.

6. Environmental Engineering:

6.1 Water Supply:

Predicting demand for water, impurities, of water and their significance, physical, chemical and bacteriological analysis, waterborne diseases, standards for potable water.

6.2 Intake of water:

Water treatment: principles of coagulation, flocculation and sedimentation; slow; rapid – pressure, filters; chlorination, softening, removal of taste, odour and salinity.

6.3 Sewerage systems:

Domestic and industrial wastes, storm sewage-separate and combined system, flow through sewers, design of sewers.

6.4 Sewage characterization:

BOD, COD, solids, dissolved oxygen, nitrogen and TOC. Standards of disposal in normal watercourse and on land.

6.5 Sewage treatment:

Working principles, units, chambers, sedimentation tanks, trickling filters, oxidation ponds, activated sludge process, septic tank, disposal of sludge, recycling of wastewater.

6.6 Solid waste:

Collection and disposal in rural and urban contexts, management of long-term ill effects.

7. Environmental pollution: Sustainable development, Rawastes and disposal. Environmental impact assessment for thermal power plants, mines, river valley projects. Air pollution. Pollution control acts.

8. Basic of computer software usage

Basic knowledge of MS Office (MS Word, MS Excel, MS Power Point)

ADDITIONAL TOPICS

1. Introduction:

- CPWD/PWD/MES – Schedule of Rates
- Estimation
- Bar Bending Schedule
- Knowledge of NBC and IS codes

2. Basic principles of Analysis of Rates:

- Methodology of (AOR) Analysis of Rates
- Market Rate Item
- Quotation from vendor

3. Specifications of common Items.

4. Principles of Construction Contracts:

- Item Rate
- Lump sum
- EPC
- Statutory Provisions of contract
- Labour Laws

5. Quality Control and Assurance:

- For Pavement work
 - Rigid (PQC)
 - Flexible (Bituminous)
- For building works
 - Material – Bricks, Aggregate, Sand, Steel, Cement, Glass and other important building materials.

6. Project Management:

- MS Project/ Primavera
- Revision of schedule
- Critical Activity etc.
- Milestones

7. Green building concept:

- Basic idea of Rating systems like GRIHA / LEEDS etc.
- Environmental clearance
- Management of solid and liquid waste
