

**Syllabus for Written Test for Technical Assistant (Civil) against VC No. 105/16 in
RITES Ltd.**

WATER & WASTE WATER ENGINEERING

Types of Demand, water quality, Forecasting of design Demand, Types of intakes. types of Conveyance of Water. types and layout of distribution system, Discharge through Open Channel, Economical Cross-sections, and condition for Maximum Discharge through Channel of trapezoidal Section. Hydraulics of pressure conduits. capacity of distribution reservoirs

Treatment of Water - design of conventional water treatments systems

Types of sewers. Determination of design quantity of domestic sewage, industrial sewage. storm water runoff, hydraulic design of sewers. principles of design of treatment systems. Effluent Disposal

HIGHWAY ENGINEERING

Classification of Highways. Types of surveys. Cross-section and Profiles, Soil Investigation
Elements of Right of Way and standards, Gradient. Speed, Sight Distances. Curves
Testing of Aggregate, bitumen and Cement

RAILWAY ENGINEERING

Types of alignment survey. Parameters of Speed. loading and permanent way for various classes of railway line, Schedule of dimensions.

Curves. gradient. earthwork and permanent way - rails, sleepers, ballast, fastenings and fixtures. points and crossings, Level crossings.

Daily Maintenance periodical maintenance, Maintenance of Track Alignment.

Maintenance of Drainage. Maintenance of Track Components. Maintenance of Points and Crossings, Maintenance of Level Crossing.

PORTS AND HARBOURS

Criteria for design of waterway, aids to navigation, dredging methods

Design criteria for design of berths and harbour protective structures. planning considerations for port roads, port railways and buildings, types of cargo handling equipment.

URBAN TRANSPORT

Measures of traffic management, types and design criteria of Intersections of roads, types and criteria of mass transit systems

Planning of route alignment for mass rapid transit systems - underground and elevated. planning standards of stations

Standards of Construction of track and underground and elevated structures.

SURVEYING

Measuring on sloping ground and to overcome obstacles. Accuracy of linear measurements, calculation of areas.

Types of leveling Instruments. Temporary adjustments. Booking and reducing of levels
Checking the levelling work, longitudinal section, Cross Sections. Error due to curvature and refraction

Theodolite Surveying - measurement of horizontal angles, Methods of Closed traverse and Open traverse, Checks in open traverse, Checks in closed traverse, Balancing the traverse. Errors in theodolite survey and their elimination.

Trigonometrical Levelling - Heights and Distances, Base of the Object Accessible, Base of the Object inaccessible, Instrument Stations not in the same Vertical Plane as the Elevated Object, Geodetical Observations, Determination of Difference in Elevation

Triangulation Systems, Strength of Figure, Base Line Measurement, Calculations of Length of Base. Measurement of Horizontal Angles

Contours and Contour Interval, Procedure in Topographic Surveying. Methods of Locating Contours. Interpolation of Contours

Route Surveying - Elements of Reconnaissance Survey. Preliminary Survey. Location Survey. Construction Survey

Simple. compound. reverse and transition curves, Vertical curves for roads and railways. Setting out curves. curve calculations

Total station / GPS Survey - Features of total station and GPS, Principles of working with GPS. adjustments of errors, Open and closed traverse and their application to engineering problems

Hydrographic survey - sounding, charting. cross section of streams and rivers. gauging of discharges and survey of shore lines

Principles and utility of Aerial photogrammetry and remote sensing.

BUILDING CONSTRUCTION

Types of Foundations. Foundations in Special Conditions

Foundation Failures

Elements of construction of residential and industrial buildings. safety in construction
Construction Schedules, Bar Chart, PERT Network, CPM Network

STRUCTURAL ANALYSIS

Beam. Types of Loads. Types of Supports. Shear Force and Bending Moment, Shear Force and Bending Moment Diagrams, S.F. and B. M. Diagrams for Simply Supported Beams. S. F. and B.M. Diagrams for Overhanging Beams. Relationship between Rate of Loading. Shear Force and Bending Moment, Graphical Method of Plotting S. F. and B. M. Diagrams. Uniformly Distributed Loads

Beams - Deflections by Moment Area Method and Conjugate Beam Method. Slope and Deflection for Cantilever and simply Supported Beam, Analysis of Fixed Beam and Continuous Beams

Column Carrying Eccentric Load. Laterally Loaded Columns. Empirical Formulae

Types of riveted and bolted joints, Failure of a riveted joint, Strength of riveted/bolted joint. Assumptions in the theory of riveted joints. Efficiency of a joint. Design of riveted joints for axially loaded members, Welded joints, Types of welds. Design of fillet welds. Design of butt weld.

Deflection of framed structures Moving loads on simply supported beams, Influence lines for bending moment and shear force in members of framed structure. Moment distribution and slope deflection methods.

Analysis of frames by moment distribution for non-prismatic members. with two degrees of freedom (sway as well as non-sway). Beams curved in plan. Influence lines for forces in members of statically indeterminate structures

Stress, complementary shear stress, simple shear, the state of pure shear, principal stresses and principal planes, sign convention, Mohr's circle for biaxial stresses. Mohr's circle.

Strain on an Oblique Plane, Mohr's Circle of Strain. and Compatibility Equations

Hookes Law. Poisson's Ratio, Differential Equation of Equilibrium, The Stress Function-Plane Stress

DESIGN OF REINFORCED CONCRETE STRUCTURES

Methods of Design - Working Stress Method. Ultimate Load Method. Limit State Method

Singly and doubly Reinforced Beams and slabs, columns

Shear Stress. Diagonal Tension. Shear Reinforcement, Development Length. Anchorage Bond. Flexural Bond

Basic Concepts of Prestressed Concrete

DESIGN OF STEEL STRUCTURES

Compression Members -Effective length. Slenderness ratio. Column design formula. Types of sections. Assumptions, Design of axially loaded compression members

Tension Members -Net sectional area, Permissible stress. Design of axially loaded tension member

Economical depth and self-weight of plate girder. Design of web, Design of flanges

FOUNDATION ENGINEERING

Ultimate Bearing Capacity of Shallow Foundations. concepts of ultimate bearing capacity, estimation of safe allowable bearing capacity, Plate load test. Elements of combined and raft foundations

Classification of piles. bearing capacity of deep foundations, settlement prediction in case of piles in compressible soils, Elements of well foundations. Pile load test and use of relevant I.S. Code.

Different methods of improving the soil characteristics at site. Elements of soil stabilization, sand drains and vibro - flotation techniques.

Composition of soil. Permeability of soils. Darcy's law, capillary pressure. Seepage, Laplace's equation. yield of wells

Compaction, field methods of compaction and its control, General principles of stabilization of soil, stresses in soil and shear strength of soil, triaxial and unconfined compression apparatus, Mohr's diagram, Consolidation. Terzaghi's theory of

consolidation. Compressibility of soils. California Bearing Ratio, methods of estimating thickness of roads and runways.

Stability of slopes classical theories of earth pressure by Rankine and Coulomb, active and passive pressure against retaining walls

Functions of foundations, requisites of a good foundation. Different types of foundation, Bearing capacity of soils

Determination of safe bearing capacity of soils. IS plate load test. Distribution of bearing pressure, Vibro-flotation, Settlement of foundations-causes, Methods of reducing differential settlement. Permissible settlement.

Pile Foundations : General considerations in pile foundations. Types of piles.

Exploratory borings; depth of exploration; spacing and number of boring; methods of sampling and types of samples; bore logs; core recovery; rock quality designation; field

vane shear test; standard penetration test and its applications; field plate load test and limitations.

ENVIRONMENTAL ENGINEERING

Noise Sources and Control. planning and operation of sanitary land fill

Elements Of Environmental Impact. Project Design and Construction. Project Operations. Socioeconomic Analysis, Environment Impact Assessment and impact mitigation measures.

QUANTITY SURVEYING AND CONTRACT & TENDERS

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.

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 and Provisional Sums. Provisional Quantities, Spot Items, Contingencies, Work-charged Establishment. Centage Charges, Building Estimate Methods. Checks over the Accuracy of Detailed Estimates

Analysis Of Rates - quantities of Materials and labour Required for different items of Works. 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 Principal Items of Work in the Building Construction

Types of Specifications. Detailed Specifications, Standard Specifications

AIRPORT ENGINEERING

Airport Site Selection. Estimation of Future Air Traffic Needs

Runway Orientation. Runway Configuration. Basic Runway Length. Correction for Elevation. Temperature and Gradient. Airport Classification. Airport Capacity, Runway Capacity, Gate Capacity, Taxiway Capacity. Airport layout.