

NATIONAL REMOTE SENSING CENTRE
ADVERTISEMENT NO.NRSC/RMT/3/2017 DATED 20.05.2017

Name of the Post : Technical Assistant

Post Code : TA1

SYLLABUS - WRITTEN TEST

Type of Examination	:	Objective Type (Multiple Choice Questions)
No. of Questions	:	80 Questions
Apportionment of marks	:	Each Question carries one mark.
Duration of Examination	:	02 Hours

Qualification Requirement : First Class Diploma in Civil Engineering
(Examination will broadly comprise of below mentioned topics as covered in Diploma courses.)

1. Basics of Computer Science
2. Surveying1 & Surveying 2
3. Engineering Mechanics and Strength of Materials
4. Construction Materials & Practice
5. Theory of structures and Design of RCC Structures AND Steel structures.
6. Quantity Surveying1&2
7. Environmental Engineering
8. Hydraulics
9. Irrigation Engineering
10. Transportation Engineering
11. Geo- Technical Engineering
12. Construction management

(Detailed Syllabus enclosed as Annexure)

Syllabus for Skill Test

1. **SURVEYING PRACTICALS** : Chain and ranging surveys, Theodolite Surveying, Tacheometric Surveying, Electronic Distance measurement instruments, Total Station, Global positioning system.
2. **MATERIAL TESTING LAB**: Standard tests on bricks, cement, aggregate & steel.

ANNEXURE TO SYLLABUS OF TECHNICAL ASSISTANT (CIVIL)-POST NO. TA1

CIVIL ENGINEERING (DIPLOMA LEVEL)

1. Surveying1 & Surveying 2

Principles of surveying, classification of surveys; Measurement of distances and directions, direct and indirect methods; optical and electronic devices; chain and compass survey; leveling and trigonometric leveling, Contours; Theodolite and tachometric survey; Total station, triangulations and traversing; measurements and adjustment of observations, errors and their adjustments, computation of coordinates; minor instruments; area and volumes; curve setting, horizontal and vertical curves; Digital elevation modeling concept; basic concepts of remote sensing, GIS and global positioning system;

2. Engineering Mechanics and Strength of Materials

Forces - types of Forces, Parallelogram, Triangle and Polygon Law of Forces, Lami's theorem; Centre of Gravity and Moment of Inertia; Simple stresses and strains, Hooke's law

– stress strain diagram, working strength, elastic constants, Poisson's ratio, Relationship between elastic constants, compound rods, temperature stresses, strain energy, proof resilience, impact loading; Shear force and bending moment diagrams for simply supported, over hanging and cantilever beams, relation between intensity of loading, shear force and bending moment; Theory of simple bending, modulus of section, moment of resistance, distribution of shear stress in rectangular, circular and I-Sections; Deflection in cantilever and simply supported beams subjected to simple loading; Columns and struts - Euler's and Rankine's formulae, Slenderness ratio, simple built-up columns; Analysis of dams and retaining walls; Simple plane and pin-jointed trusses, Stresses by method of joints and method of sections.

3. Construction Materials & Practice

Properties and uses of construction materials - Stones, Bricks, Tiles, Sand, Cement, Timber, Plastics, Glass, Asbestos, Paints, Distempers, Enamels and Varnishes; Preparation of Cement mortar for various works.

Classification of Buildings as per NBC, Site investigation for foundation as per NBC -Trial Pit and auger boring, classification of foundations, construction of spread footing and well foundation; Stone and Brick masonry - types and principles of construction; Doors and Windows - types, fittings and fastenings, types and functions of Lintels, Sunshades and Roofs, Flooring - Construction and types of material; Types of Stairs; Scaffolding; Types of Plastering, Pointing, Painting and White / Colour Wash.

4. Theory of structures and Design of RCC Structures AND Steel structures.

Analysis of statically determinate and indeterminate structures by force/ energy methods; Method of superposition; Analysis of trusses, arches, beams, cables and frames; Analysis of thin and thick cylinders; Slope deflection, moment distribution, and Stiffness and flexibility methods of structural analysis; Influence lines. I) Reinforced Concrete Structures: Concepts of working stress, limit state and ultimate load design methods; IS code specifications for design of beams, slabs, columns, footings, and walls; design of beams, slabs, columns; Analysis of beam sections at transfer and service loads; Design of wall footings, foundations, retaining walls, and water tanks Principles of pre-stressed concrete, methods of pre-stressing; design of simple members; Design of brick masonry ii) Steel Structures: Concepts of Working stress and Limit state design methods; Design of tension and compression members, beams, columns and column bases; Connections - simple and eccentric, beam-column connections, plate girders and trusses

5. Quantity Surveying1&2

Abstract estimate, detailed estimate - centerline and long & short wall method, various items of Civil Engineering works as per Indian Standards; General Specifications - earth work, brick / stone masonry in cement mortar, RCC, plastering in cement mortar, Floor finishes with ceramic tiles and

marbles, white washing, color washing; Standard schedule of rates, lead and lift, preparation of lead statement; Computation of earth work - Mid-ordinate, Mean Sectional area, Trapezoidal method, Prismoidal Rule; Approximate estimate: Plinth area and cubic rate estimate.

6. Environmental Engineering1

Sources of water: surface and sub-surface water, aquifers, yield from wells, Infiltration galleries, types of intakes and design of intakes, collection and conveyance of water; water demand and its variations, estimation of water demand; quality of water, characteristics, water-borne diseases, water sampling and analysis, water quality standards;

Water Treatment: unit operations and processes for water treatment, sedimentation, coagulation and flocculation, filtration, disinfection, water softening, removal of colour, iron and manganese; aeration, Defluoridation of water, demineralisation of water, R.O. process, principles and design of various water treatment units; Distribution of treated water, systems of water distribution, layouts of distribution systems, components of distribution systems, valves, analysis and design of the water distribution systems, Storage and distribution reservoirs; leakages and control in water distribution system; Rural water supply;

7. Environmental Engineering-2

Systems of sewage collection, conveyance, and disposal; estimation of quantity of sewage and storm water, sewerage systems, sewer appurtenances, material for sewers, laying of sewers, Design of sewers, operation and maintenance of sewerage systems; pumping of sewage; Characteristics of sewage, sampling and analysis of sewage, unit operations and process for wastewater treatment, aerobic, anaerobic, facultative and anoxic processes, principles and design of various wastewater treatment units, principles and design of septic tanks, disposal of septic tank effluent; Common Effluent Treatment Plants, Zero liquid discharge; Disposal of products of sewage treatment; Sludge handling, treatment and disposal; self purification of streams; Building drainage, Plumbing Systems; Rural and semi-urban sanitation; Urban storm water management, Impact of storm water, Management of storm water runoff, design of storm water drainage systems;

8. Hydraulics

Properties of fluids, fluid pressure and its measurement; Types of flows, energies in fluid motion, Bernoulli's theorem and its applications – venturi metre, pitot tube; Orifice and mouthpiece; Notches and weirs; Flow through pipes, hydraulic gradient line and total energy line, laminar and turbulent flow in pipes - Reynolds number, measurement of velocity; open channels; Water turbines – classification, centrifugal and reciprocating pumps; Layout of hydroelectric power plant.

9. Irrigation Engineering

Definitions, duty, delta, base period, rainfall and its measurement, factors affecting runoff, methods of computing maximum flood discharge; Classification of head works, component parts of a weir and barrage, factors influencing selection of site - reservoirs and dams; Classification of canals, canal lining, cross drainage works; Soil erosion, water logging, soil water plant relationship; Necessity of irrigation - advantages and disadvantages, irrigation methods

10. Transportation Engineering

Alignment of roads - plain and hilly terrain, surveys; Cross section of road structure, width of pavement, Camber, Gradient, Super elevation, Transition curves, horizontal and vertical alignment; Pavement marking, traffic signs, traffic islands.

Types of soil, classification of soil - Textural, IS Classification, physical properties - plasticity, cohesion, consolidation, compaction, permeability, compressibility, soil moisture content, specific

gravity, density; Bearing capacity of soil.

11. Geo- Technical Engineering

Physical and index properties of soil, classification and interrelationship; Permeability and seepage, Darcy's law; flow nets, uplift pressure, piping; Compressibility and consolidation; Compaction behaviour, methods of compaction and their choice; Shear strength of soils, stresses and failure, Mohr's circle; Earth pressure theories, stability analysis of slopes, retaining structures, stress distribution in soil; site investigations and sub-surface exploration;

Types of foundations, selection criteria, bearing capacity, effect of water table, settlement, laboratory and field tests; principles and design considerations of shallow and deep foundations; Types of piles, their design and layout, pile load tests, Caissons, Foundations on expansive soils, swelling and its prevention;

12. Construction management

Types of construction projects; Concreting Equipment, Earthwork Equipment, Tendering and construction contracts; Rate analysis and standard specifications; Cost estimation; Project planning and network analysis: PERT and CPM, Resource allocation