Name of the Post: Technical Assistant Gr.II (Jr. Draughtsman)

PHASE II
SYLLABUS FOR WRITTEN TEST (Objective Type) & SKILL TEST

(For Civil Engineering Candidates)
Syllabus for Written Test

UNIT 1: BASIC ENGINEERING DRAWING

Engineering Drawing: State the importance of engineering drawing, State the areas of civil engineering drawing. List of drawing instruments, equipments and materials to be used during training: State instruments, equipments and materials, List out instruments, equipments and materials, State the standard as per 962-1987, To use different drawing instruments, equipments and materials, Follow precautions in the use of instruments, equipments and materials .Layout of drawing Sheet: State the system of layout of drawing sheet, List the different layout for designated drawing sheet Explain the title block. Folding of drawing Sheet: State the purpose of folding a drawing sheet, Explain the method of folding for drawing sheet, Lettering, dimensioning and scale, Plane geometrical construction, Conic section and projection

UNIT 2: CHAIN SURVEYING

Introduction - History and principles of chain survey and instrument & employed. Define surveying, Explain the classification of Surveying, Narrate different methods of measurements, Express the instruments used for chain surveying. Introduction about chain survey instruments. State the construction and uses of the chain survey instruments. Testing of metric chain (20m/30m): State the necessity of checking the chain, State the methods of testing, List out then errors in the chain, State the limits of error in chain, Explain the adjust the chain, State Indian optical square. Measurement of distance by chain and chaining. State chaining and chaining a line, State unfolding the chain, Describe the reading the chain, State folding the chain, Calculate the errors in chaining.

UNIT 3: COMPASS SURVEYING

Identification and parts of instruments in compass survey: State about traversing, State types of compass, Name the prismatic compass and construction, Construction of survey's compass. Determining the bearing of a given triangular plot of ABC and calculationof included angles: Calculate angles from bearing, Calculate bearing from angles. Determining the bearing of a given pentagonal plot of ABCDE and calculation of included angles. Calculate angles from bearings for a closed traverse, Calculate bearing fromangles for a closed traverse, Calculate bearing of a pentagon. Magnetic declination and local attraction. Define the dip of the Magnetic needles, State the magnetic declination and variations, Calculate true Bearing, State local attraction and its elimination, Explain about errors and limits, State the testing the prismatic compass.

UNIT 4: PLANE TABLE SURVEYING

Instrument used in plane table surveying: State plane tabling, Name the instruments and accessories used in plan tabling, State the construction and uses of instruments and accessories used in plan tabling, Explain about leveling, centering and orientation inplain tabling, Explain the methods of plain tabling. Resection method of plane table survey: State the resection method of plane table survey

UNIT 5: LEVELLING

Types of levelling: Name the various types of levelling, Explain simple levelling, Explaindifferential levelling, Complete the reduced levels of points.

UNIT 6: TOTAL STATION

Introduction to total station: Get introduced to the Total station, Learn the evaluation of Total station from the convectional equipment Total Station, Explain the benefit Total Station anduses of Total station. Types of total station: Explain the advantages and disadvantages of Total station, Explain the typesof Total Station, Explain the precautions to be taken while using Total Station. Measurement with total station: Explain the equipment required for Total Station surveying, Explain the procedure of measurement with Total Station Characteristics and features of total station: Define the features of Total Station, State the characteristics of Total Station, Advantages and disadvantages of Total Station Principle of EDM- Working need setting and measurement Total Station: Define EDM, State the principle of EDM, Features of EDM. Setting and measurement Total Station: Define distance measuring, State principal of EDM, State classification of EDM Total station Prism- instrument error operation: Explain Total Station prisms, Describe sources of error in EDM, EDM instrument operation, Uses of EDM. Electronic display and data recording: Define electronic data recording, Explain field computers, Define recordingmodule, Internal memories. Rectangular and Polar Co-ordinate system: Illustrate rectangular and polar coordinates.

UNIT 7: GLOBAL POSITIONING SYSTEM

Introduction of GPS: Explain GPS coordinate system, Describe Geographic latitude and longitude, GPS equipment. Satellite and Conventional Geodetic system: What is satellite system, Define Geodetic system. GPS coordinate system and component Total Station of GPS & Systemsegment Total Station: Explain GPS coordinate system, Describe Geographic Latitude and Longitude, Explain and describe component Total Station GPS receiver. GPS segment Total Station: Define GPS segment. Principle of Operation of GPS and surveying with GPS: State the Principle of Operation of GPS, Describe the role of transit in GPS. Remote sensing: Explain Remote sensing, Distinguish between GPS, GIS and Total Station. GPS signal code - GPS basics: Introduction to digital signal, Explain data acquisition system, Describe signalprocessing, Explain code an basics.

UNIT 8: CAD

Introduction to AutoCAD. Basic commands. Draw tool bar: Explain draw commands in CAD – Explain the method of drawing geometrical shapes. CAD Layers: Explain the dimensioning method in CAD – Explain the use of object snap in CAD. Modifying tool bar: List out various modifying tools in CAD – Explain the uses of modifying tools in CAD. Function keys and shortcut keys, 2D drafting, 3D modelling- Both Autocad and Revit, knowledge of layout, Plotting and printing.

UNIT 9: BUILDING & DRAINAGE

Building Drawing: State the requirement of a good building drawing – State the method of drawing plan, elevation and typical section – State the scales used in building drawing – State Dimensioning and printing for building drawing. Building rules and byelaws. Drainage: State drainage and surface drainage – State four shapes of surface drainage.

UNIT 10: BUILDING MATERIALS AND BUILDING CONSTRUCTION

Properties of engineering materials, Building Stones, bricks, lime, timber, tiles, sand, cement mortar and concrete, Admixtures, Ferrous metals, Non-ferrous metals, Glass, Protective materials. Stonemasonry, Brick masonry, composite masonry, Foundation, Bearing capacity of the soil, Scaffolding shoring and underpinning, Damp proofing waterproofing and termite proofing, Arches, lintels, stairs, RCC -introduction, uses materials proportions Formwork including bending of bars and construction reference of BIS code, RCC lintel, column, slab, beam, footings, Method of mixing concrete, slump test Steel structures – Common forms of steel sections, Tension and compression member, Types of riveted joints, welded joints, Doors and windows, Roofs, Floors and floorings.

SYLLABUS FOR SKILL TEST

1. 2D Drafting and 3D Modelling in AutoCad/Revit for a given Residential or Commercial Building.

2. General Commands, Shortcut Keys in AutoCad/Revit.

3. Workflow of a Residential or Commercial Building Project.

4. Determination of horizontal and vertical measurements using total station. Traversing using total station. Distance, gradient, difference, height between two inaccessible points using total station. Basic Handling of Total Station Device. Setting, Obtaining values, Processing and Analysing the values in data sheet, Report Generation.

5. Basic Handling of GPS Device. Latitude and Longitude Measurements, Obtaining values, Processing and Analysing the values in data sheet, Report Generation.

(For Mechanical Engineering Candidates)

Syllabus for Written Test

1. **Theory of Machines and Machine Design:** Concept of simple machine, Four bar linkage and link motion, Flywheels and fluctuation of energy, Power transmission by belts – V-belts and Flat belts, Clutches – Plate and Conical clutch, Gears – Type of gears, gear profile and gear ratio calculation, Governors – Principles and classification, Riveted joint, Cams, Bearings, Friction in collars and pivots.

2. **Production Technology:** Foundry - patterns - special casting techniques - welding - hot and cold working – drawing, rolling and forging - powder metallurgy - plastics - rubber - ceramics - refractories - lathe work - planner - shaper - slotter - drilling machine - milling machines - grinding machines - broaching - boring and jig boring - Gears manufacturing practice - Heat treatment and metal finishing - press work – computer integrated manufacturing.

3. **Fluid mechanics and Machinery:** Working of differential manometer - use of Venturimeter and orifice classification of mouthpieces meter - working of Pelton wheel, Francis turbine and Kaplan turbine - construction and working principle of reciprocating pump, centrifugal pump and gear pump - quick return mechanism of shaping machine - table movement in a milling machine.

4. **Heat Power & Energy Engineering:** Working principle and comparison of Otto and diesel cycles - construction and working of two stroke and four stroke engines - Heat balance test on I.C. engine - working principle of single and multistage compressors - Comparison of reciprocating and rotary compressors - classification of steam boilers - construction and working of steam turbines - Working principle of steam power plant - Main elements of a nuclear power plant - Vapour compression cycle - factors affecting human comfort - working principle of Refrigeration - window air conditioner and central air conditioning system - Renewable energy sources – Solar energy – Wind energy – Bio energy – Energy management.

5. **Mechanics of Materials & Computer Applications:** Mechanical properties of metals - simple stresses and strains – modulus of elasticity - geometrical properties of sections - thin cylinders bending moment and shear force - theory of simple bending - torsion and springs.

   Working principle and constructional details of computer - classification of Computer – Input / Output devices - flow charting – MS Office – creating Documents – presentations – sending emails.

6. **Industrial Engineering:** Factors influencing plant location - principles of layout - techniques used to improve layout - primary and secondary causes of an accident - personal protective devices - method study procedure - flow diagram, string diagram and two handed process chart - principles of motion economy-procedure for conducting stopwatch time study, production study and ratio delay study - objectives of preplanning, routing, scheduling, dispatching and controlling - difference between inspection and quality control - types of plant maintenance.

SYLLABUS FOR SKILL TEST (100 Marks)

1. Creation of CAD model using Auto CAD platform.
2. Preparation of part program for CNC Turning Operation.
3. Preparation of part program for CNC Milling Operation.
4. Demonstrate the Functionality of Automobile components.
5. Connection of Solar PV Inverter system and operation.

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DIRECTOR