

Advt. No. 01/2022: Syllabus for Post Code: T-01

Post: Technician (1)

Trade/Area: Fitter

Trade Test Syllabus

- Monitor implementation of safe working practices, environment regulation, housekeeping and demonstrate identification and application of different tools and operations using chisels, hacksaw to make true surfaces.
- Manufacture sheet metal components and join them by soldering, brazing and riveting.
- Marking dimensions, drill & tap blind holes, check the drill hole size using counter bore to remove broken taps.
- Various thread measuring instruments & explain to operate measuring instruments of digital system.
- Joining materials by using arc welding and TIG welding practices.
- Monitor identification of different riveted joints with project on fitting & usages of different types of gauges and heat treatment on gauges.
- Tapping on blind holes at specified depth & identification of the drill jig with its function and simple press and its constructional parts.
- Use and application of different types of comparators, sine bar, dial test indicator, different digital measuring instruments & Coordinate Measuring Machine.
- Assembling and dismantling of different valves and pipe joints, hydraulic and pneumatic systems & monitor maintenance of bearings on machine parts.

Written Test Syllabus

- Introduction of First aid. Operation of electrical mains. Introduction of PPEs. Response to emergencies: its importance and Job area after completion of training. Introduction to 5S concept & its application. Workplace cleaning, machine cleaning, signage, proper storage of equipment etc. Different types of tools – files, chisels and hacksaw – specification.
- Drilling and Milling machine– classification, constructional features, accessories, types of operations and cutters – cutting tool nomenclature; work and tool holding devices; Tapping and Taps - Method of calculation of tap drill size for tapping. Specification of Dies; Grinding wheel truing and dressing.
- Welding machine and accessories- Working principle of Arc welding, Arc welding process, Different types of Arc welding. Introduction to gas welding, gas welding accessories, care and maintenance. Introduction to TIG.
- Concept of Interchangeability. Limit Fits, Tolerance and Allowance; Gauge: Introduction, necessity, Different types, description and uses of Radius, Wire, Snap, plug, Ring, Telescopic Gauge etc.
- Types of locking devices, nuts, washers; rivets and riveting – methods, specification of joints, merits and demerits.

- Jigs, fixtures and templates – definition, differences, types & elements of Jigs and Fixtures. Introduction to presses, their types, main part of a power press; Different types of press tool operations. Die & Punch details and accessories, strip layout, calculation of cutting forces & perimeter Blanking & piercing operations.
 - Broaching, lapping and honing – Working principle, construction features, functions, cutting tools and types. Power transmission joints.
 - Different types of comparators, and CMM – construction, working principles, parts, functions and applications. Surface finish measurement.
 - Vernier Caliper, height gauge, Micrometer – working principle, construction, parts, graduation reading, uses, care and maintenance; Air compressor, Actuators, valves, accumulators and couplings – graphical symbols, functions, types and applications.
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Advt. No. 01/2022: Syllabus for Post Code: T-02

Post: Technician (1)

Trade/Area: Electrician

Syllabus of the Trade Test

1. Identification of the following equipment, Electronic components and Tools etc.

Multimeter, Clamp meter, kWh meter, oscilloscope, DC power supply, relay, contactor, single phase preventer, MCB, MCCB, rotameter, Thermostat, Cable sockets, Crimping machine, types of Cables/Wire joints etc.

2. Measurement:

Current, voltage, power, power factor, resistance, inductance, capacitance

3. Electrical circuits & networks:

Regulated DC power supply, Direct online Starter, star-delta starter, fan, tube light

Syllabus of the Written Test

1. Basic electricity & electrical measuring instruments
 2. Basic Instrumentation concept
 3. House building wiring
 4. Earthing.
 5. AC/DC Motor
 6. Battery & solar cell
 7. Inverter /UPS /Stabilizer
 8. Cable & Joint
 9. Electrical safety, precaution, care & maintenance
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Advt. No. 01/2022: Syllabus for Post Code: T-04

Post: Technician (1)

Trade/Area: Instrument Mechanic/Electronics & Instrumentation

Syllabus of the Trade Test

1. Identification of the following equipments, electronic components and industrial sensors/transducers:

a. Multimeter, clamp meter, kWh meter, oscilloscope, dc power supply, thyristor, relay, contactor, single phase preventer, MCB, MCCB, rotameter, mercury in glass thermometer, thermocouples, RTD, thermostat etc.

2. Measurement:

a. Current, voltage, power, power factor, resistance, inductance, capacitance

3. Electronics circuits & networks:

a. Regulated DC power supply, direct online starter, star-delta starter, transistor

Syllabus of the Written Test

1. Basic electricity & electrical measuring instruments
 2. Basic electronics
 3. Basic Instrumentation concept
 4. Process Instrumentation
 5. PLC and HART Device, DCS & SCADA
 6. Basics of hydraulics & pneumatics
 7. Analytical Instruments.
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Advt. No. 01/2022: Syllabus for Post Code: T-05 & T-10

Post: Technician (1)

Trade/Area: Tool and Die Maker (Dies & Moulds)/Machinist and Machinist

Trade Test Syllabus

- Identify hand tools for different fitting operations and check for dimensional accuracy as per the standard procedure.
- Perform basic fitting operations to close tolerance as per specification to make the job following the safety precautions.
- Set different shaped jobs on different chucks and demonstrate conventional lathe machine operation observing standard operation practice.
- Prepare different cutting tools to produce jobs to appropriate accuracy by performing different turning operations.
- Set the different machining parameters to produce threaded components applying method/ technique and test for proper assembly of the components.
- Set the different machining parameters and cutting tools to prepare jobs by performing different slotting operations.
- Set different machining parameters and cutters to prepare jobs by different milling machine operations.
- Produce the components with high accuracy by using different types of grinding operations.
- Plan and select appropriate methods to re-sharpen the single point and multi-point cutting tools.
- Set (both job and tool) CNC turning centre and produce components as per drawing by preparing part programme.
- Plan and perform simple repair, overhauling of different machines and check for functionality.
- Produce components using EDM as per drawing by preparing part programme with standard accuracy.
- Construct and assemble different Press tools viz. Piercing & Blanking tool, Progressive tool, Compound Tool and verify the component.
- Demonstrate and practice testing of hardness and other properties of materials.

Written Test Syllabus

- Plan and organize the work to make job as per specification applying different types of basic fitting operation and check for dimensional accuracy following safety precautions.
- Engineering materials, Limits, fits & Tolerance terminology.

- Oblique and orthogonal cutting; Lathe – constructional features – types of operations and machines – job and tool holding devices –cutting tool geometry.
 - Drilling and Milling machine– classification, constructional features, accessories, types of operations and cutters – cutting tool geometry, work and tool holding devices; Slotting Machine – construction, tools, work and tool holding devices and applications.
 - Grinding – Classification, working principle, types of grinding wheels and grinding operations, process parameters, work holding devices. Grinding wheel nomenclature, merits and demerits. Grinding allowance - Geometrical accuracy and tolerance by machining process; Honing and lapping.
 - Gear Manufacturing – Process types, application of dividing head for gear cutting using milling machines, gear types, and gear nomenclature.
 - Classification of Tapers, Standard tapers and their uses. Different Taper turning methods, working principle, coolants/lubricants, functions.
 - Definition and calculation of Cutting speed, feed, depth of cut & machining time of lathe. Thread cutting - Different types, Gear Calculation, Tool Setting, Checking the thread. Measurement of thread sections
 - Principles of EDM & Wire EDM - Advantages and applications – Spark erosion terminology – machine tool operating system – dielectric fluid - methods of flushing – Electrode material - application - manufacturing methods – methods of holding electrodes and alignment – determining electrode size and spark gap Work preparation and setting EDM parameters Trouble shooting and maintenance.
 - Introduction to CNC machining center- CNC system- Elements of CNC machine- Hardware & Software- Safety feature – Axes designation- Offset – G & M codes.
 - Heat treatment – purpose and its effect on the properties of metals. Types of heat treatment operations and Material testing – hardness, tensile strength, compressive strength, crack detection and non-destructive methods.
 - Optical comparator, and CMM – Introduction, working principles, parts and functions, construction, application and types of operations.
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Advt. No. 01/2022: Syllabus for Post Code: T-06

Post: Technician (1)

Trade/Area: Draughtsman (Mechanical)

Trade Test Syllabus

- Occupational health and safety, Basic injury prevention, Basic first aid, Hazard identification and avoidance, safety signs for Danger, Warning, caution & personal safety message. Fire & safety: Use of Fire extinguishers.
- Practice in using instruments. Drawing of straight and curved lines, Drawing angles, circles etc.
- Block letters & numerals. Single & double stroke ratio 7: 4, 5: 4, free hand lettering practice. Preparation of Title Block as per Industry Drawing sheet.
- Constructions of different types of scales, their appropriate uses, Principle of R.F, diagonal & vernier.
- Projection of lines and laminae. Projection of solids- prism, cones, pyramids and their frustums.
- Dimensioning technique – presenting on solid geometrical figure. Conventional signs and symbols. Different types of section lines and abbreviations as per B.I.S.
- Sectional views – Different types of solid section.
- Development of surfaces of geometrical blocks.
- Isometric projection of geometrical solids. Oblique projection of solids. Perspective projection of solids.
- Intensive free hand sketching of m/c parts along with projection of simple machine parts in 1st angle projection. Projection of machine parts drawn in the above exercise in 3rd angle projection by taking physical measurement.
- Symbols for machining and surface finishes (grades and micron values)
- Pulleys-solid, stepped and built up pulleys.
- Working drawing of gears such as spur gears.
- Sketching & Assembly Drawing of machine vice.
- Reproduction and duplication of Engineering Drawing. Numbering and preservation of drawing.
- Introduction to CAD, CAD main Menu, screen menu, command line, model space Drawing layouts, Tool bars, File creation, Save, Open existing drawings, creation of Drawing Sheet as per ISO.
- CAD: Practice using Creating templates, inserting drawings, Layers and Modify Layers. Viewing Drawing in viewports in layout space, Exposure of 3D modelling.

Written Test Syllabus

- Importance of safety and general precautions observed in the in the industry/shop floor, Accidents- Definition types and causes. First-Aid, nature and causes of injury and utilization of first-aid, Introduction to 5S concept & its application, Fire: - Types, causes and prevention methods, Pollution: its causes and remedies.
- Nomenclature, description and use of drawing instruments & various equipment's used in drawing office. Their care and maintenance. Different types of Lines and their meanings & their uses. Lay out of a drawing sheet as per B.I.S. Type of lettering proportion and spacing of letters and words. Knowledge of stencil lettering. Constructions of different types of scales, their appropriate uses, Principle of R.F, diagonal & vernier.
- Projections and orthographic projection. First angle and third angle projection. Principal of orthographic projection. Units of dimensioning, system of dimensioning, Method of dimensioning & common features. Section lines of different materials, conventional signs, symbols & abbreviations, hatching.Types of sectional views & their uses.Principle of isometric projection.
- Importance of free hand sketching, machine drawing. Material and equipment required in sketching. Method of using precision measuring instrument such as inside & outside micrometers, depth gauges, vernier calipers, dial indicators, slip gauges, sine bars, universal bevel protractor, etc.
- Limits, fit, tolerance. Dimensional tolerance, geometrical tolerance. Indications of symbols for machining and surface finishes on drawing (grades and micron values) Production of interchangeable parts, geometrical tolerance. Familiarization with IS: 919, IS:2709. Couplings, necessity of coupling, classification of couplings.
- Use of a bearing, types of bearing, frictional and anti-frictional bearings. Parts of anti-frictional bearings (ball, roller, thrust ball, needle & taper roller)
- Belts-power transmitted by belt. Materials of belts slip and creep Velocity of belt. Arc of contact. Simple exercise in calculation of belt speeds, nos. Of belts needed in V-belt drive, velocity, pulley ratio etc. Standard pulleys width of pulley face, velocity ratio chain drive.Use of gears in transmission of power. Different types of gears. Cast gears and machined gears.
- Use of Cams in industry. Types of cams, kinds of motion, displacement diagrams. Terms used in cam. Types of followers.
- Brief Description of lathe, milling, shaping slotting and planning machines; Quick return mechanism of these machines.
- Piping materials and specifications of W.I. & Steel pipes, Pipe threads, Specifications of pipe fittings. Brief description of different pipe joints.
- Classification of charts, graphs and diagram. Blue prints, Plotter print, photo copies, Xerox printing. Method of numbering and preserving of drawings. Preparation of the Master registers of the drawing.
- Introduction to CAD. Advantages of using CAD. Absolute Co-ordinate system, Polar Co-ordinate System and Relative Co-ordinate System Knowledge of Workspace in drawing space: 2D classic, Drafting & annotation, 3D modelling, etc. Customization of working environment with tool using shortcut key, menu driven or ribbon setting. Introduction to 3D, 3D primitives, Extrude, Revolve command.

Advt. No. 01/2022: Syllabus for Post Code: T-08

Post: Technician (1)

Trade/Area: Electronic Mechanic

Syllabus of the Trade Test

1. Identification of the following equipments, electronic components and industrial sensors/transducers:
 - a. Multimeter, clamp meter, kWh meter, oscilloscope, dc power supply, thyristor, relay, contactor, single phase preventer, MCB, MCCB, rotameter, mercury in glass thermometer, thermocouples, RTD, thermostat etc.
2. Measurement:
 - a. Current, voltage, power, power factor, resistance (colour codes), inductance, capacitance
3. Electronics circuits & networks:
 - a. Regulated DC power supply, direct online starter, transistor, Integrated circuits (IC 741, IC 7812, IC 7912, IC 7805, IC 7905)

Syllabus of the Written Test

1. Basic electricity & electrical measuring instruments
2. Basic electronics
3. Basic Instrumentation concept
4. Sensors, transducers and application
5. Communication electronics.

Advt. No. 01/2022: Syllabus for Post Code: TA-01

Post: Technical Assistant

Trade/Area: Electronics & Instrumentation Engineering

Syllabus of the Trade Test

1. Measurement:

a. Measurement of power, current, voltage, resistance (colour codes), capacitor, power factor, temperature, pressure, flow etc.

2. Electronics circuits & networks:

a. Regulated DC power supply, direct online starter, star-delta starter, transistor, Integrated circuits (IC 741, IC 7812, IC 7912, IC 7805, IC 7905)

3. Process control & Instrumentation:

a. On-off control, PID control, thyristor, relay, contactor, voltmeter, ammeter, current transformer, centre tap transformer, kWh meter etc.

4. Industrial transducers/sensors:

a. Thermocouples, 3-wire RTD, 4-wire RTD, mercury in glass thermometer, thermostats, rotameter, vacuum gauges

Syllabus of the Written Test

1. Electrical Engineering & measurements
2. Network analysis
3. Basic electronics
4. Digital electronics
5. Electronics devices and circuits
6. Sensors & Transducers
7. Process Instrumentation
8. PLC, HART Device, SCADA & DCS
9. Analytical Instruments

Advt. No. 01/2022: Syllabus for Post Code: TA-02

Post: Technical Assistant

Trade/Area: Mechanical Engineering

Trade Test Syllabus

- Occupational health and safety
- Understanding and interpretation of various engineering drawings.
- Identification of standard mechanical equipment, machine and tools
- Perform various exercises on given drawing and specifications in carpentry shop, fitting, foundry, forging, casting shop, sheet metal.
- Welding process and safety
- Brazing and soldering process and related tools.
- Various exercises on Lathes, Shaper machines, milling, slotting, planning, turning, drilling machines and CNC machines and related terminology.
- Understanding of fitting practice and use of gauges and work in sheet metal shop and aluminium fabrication.
- Test of UTM.
- Test on impact and hardness testing machine.
- Understanding of pipe friction apparatus. venturimeter, rotameter and water meter, orifice apparatus, Notch apparatus & pipe fittings.
- Understanding of working of refrigeration plant, air-conditioning and determine C.O.P., working of compressor etc.
- Examine the quality of lubricant by finding the properties of lubricants.
- Determination of calorific value of liquid and gaseous fuel.
- Determine thermal conductivity of thick slab, thermocouple, composite wall and thick cylinder.
- Familiarization of various heat engines as diesel engine, petrol and various I.C. engines along with their components.
- Familiarization of the operation and performance of different types of pumps.
- Familiar about different types of turbines and its components.
- Type of mechanism and its degree of freedom.

Written Test Syllabus

- Engineering Mechanics.
- Mechanics of Materials.
- Vibrations.
- Machine Design.
- Theory of Machines.
- Fluid Mechanics.

- Heat-Transfer.
 - Thermodynamics.
 - Power Engineering.
 - Turbo-machinery.
 - Engineering Materials.
 - Computer Integrated Manufacturing.
 - I.C. Engines.
 - Refrigeration and air-conditioning.
 - Production Planning and Control.
 - Casting, Forming and Joining Processes.
 - Machining and Machine Tool Operations.
 - Operations Research.
 - Metrology and Inspection.
 - Inventory Control etc
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Advt. No. 01/2022: Syllabus for Post Code: TA-03

Post: Technical Assistant

Trade/Area: Electrical

Syllabus of the Trade Test

1. **Identification of the following equipments, electronic components and Tools etc.**
Multimeter, clamp meter, kWh meter, oscilloscope, dc power supply, relay, contactor, single phase preventer, MCB, MCCB, rotameter, thermostat, cable sockets, crimping machine, types of Cables/Wire joints etc.
2. **Measurement:**
Electrical Power, Current, Voltage, Capacitance, Inductance, power factor, temperature, pressure, flow etc.
3. **Electrical circuits & networks:**
 - a. Regulated DC power supply, Direct online starter, star-delta starter, diode,
 - b. Circuit diagram for motor ,
 - c. House wiring with earthing.
4. **Instrumentation and control**
On-Off control, relay Contactor, Voltmeter, Ammeter, Current Transformer, centre tap transformer, KWH meter etc.

Syllabus of the Written Test

1. Electrical machine.
 2. Electrical measurement.
 3. Basic Electronics.
 4. Power electronics and drives.
 5. Electrical circuit and Network.
 6. Switchgear and protection.
 7. Electrical device & circuit.
 8. Power system.
 9. Design, estimation& costing.
 10. Illumination
 11. Electrical safety, precaution, care & maintenance.
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Advt. No. 01/2022: Syllabus for Post Code: TA-04

Post: Technical Assistant

Trade/Area: Civil

Syllabus of Trade Test:

1. Identification of building materials and their terminology e.g. brick, aggregate, cement, steel etc.
2. Testing of building material e.g. brick, aggregate, cement, steel etc.
3. Identification of different type of tools/machines used in Civil Work.
4. Identification of safety signs and safety material used in Civil Work.
5. Preparation of building plans/elevation/section using CAD.

Syllabus of Written Test:

1. STRENGTH OF MATERIALS

Centre of gravity of plane and composite figures and simple structural sections, M.I. of lamina, composite areas of simple structural sections, simple stresses & strains, Characteristics of stress-strain curve for Steel, S.F. and B.M. diagrams of loaded beams (fixed beam excluded), Bending & Shear stresses of beams, slope and deflection of cantilever and simply supported beams (point load & UDL), Eccentric loading on masonry pillars.

2. THEORY OF STRUCTURES :Different types of frames-perfect, redundant & deficient, Difference between statically determinate and statically indeterminate frames, Analysis of perfect frames, different methods (names only), Gravity structures – Dams & Retaining Walls (Rectangular & Trapezoidal sections), conditions of stability, Different types of failure of a Dam, Critical load on Columns – Euler's, Rankine's & B.I.S. Code formula.

CONCRETE STRUCTURES :Design of simply supported R.C.C. rectangular beams (singly & doubly reinforced) and slabs (one way & two way), cantilever slabs, singly reinforced T-Beams Design of axially loaded R.C.C. short columns (square, rectangular & circular) by I.S. Code Formula, Isolated R.C.C. square footing of column, Basic Concept of pre-stressed concrete – Materials used.

STEEL STRUCTURES: Design of welded/bolted joints, Failure of welded/bolted joints, Eccentric welded/bolted connections (brackets), Design of rolled steel beams in flexure & shear for a given load, design of axially loaded columns using standard rolled I-sections with or without plates, Design of simple truss.

TIMBER STRUCTURES: Design of simple structures.

3. CONSTRUCTION MATERIALS & PRACTICE

BUILDING MATERIALS :Bricks – Traditional & Modular, I.S. Classifications, Testing of Bricks, Mortar & Concrete –mix proportions, Specific uses, Slump of concrete, Recommended values of slump for various works, Water-Cement ratio – its effect on strength of concrete, Curing of concrete, Sources of coarse aggregate, Sand , use of lime, Mosaic Tiles & Roof Tiles, Commonly used timber in engineering works & their specific uses, Uses of plywood, Laminated Board, Block Board, Particle Board, Expanded metal, Polymer, Plain & Frosted glass, Paints & Varnishes.

CONSTRUCTION :Foundation, Shallow & Deep Foundation, Names of different types, their uses in specific locations, Brick Masonry works, General principles & precautions, damp proofing – materials used, causes & effect of dampness, roofs and roof coverings – different types – uses at specific locations, flooring, doors & windows – different types – uses at specific locations, Stairs, different types (names only), Scaffolding, Shoring, Underpinning, Formwork – materials used, characteristics of good formwork, rules for removal of formwork, Common construction equipments.

4. FIELD SURVEYING

Chain surveying, uses, Triangulation and Traversing, Tie line, Check line & Base line offsets – different types, Field book entry, Right angle setting in field with instruments and with chain or tape.

Compass – different types, uses, bearing, W.C.B. & R.B., Fore & Back bearing, Local attraction, Declination, Dip, closing error of a compass traverse, causes, adjustment, permissible error in compass surveying. Plane Table survey – suitability, advantages & disadvantages, methods of plane tabling,survey. Levelling, types of level & leveling staff (names only), temporary adjustment of level, reduction of level, level book entry, reciprocal and profile levelling, correction for curvature & refraction, contouring, definition of contour, contour interval & horizontal equivalent, characteristics of contour lines, uses of contour map, methods of contouring (names only).

Theodolite Survey – different types of theodolite, important terms in connection with theodolite, uses of a theodolite, theodolite traversing, latitude & departure, closing error in a theodolite traverse, adjustments, permissible limits of error.

Curve setting – degree & radius of a curve, their inter-relation, elements of a simple curve, classification of curves.

5. ESTIMATING, COSTING & CONTRACTS

Specification of works and materials, Estimates, different Types, general items of works, Units of measurement for building works as per B.I.S. Code, method of measurement for different items of work and materials, present market rates of materials & unit rate of items of work, floor area, carpet area and plinth area, F.A.R., Rate analysis – factors governing it, schedule of rates, analysis of rates for different items of works of a building.

Contracts – different types, Contract documents, submission & opening of Tender, earnest money, security deposit, measurement book, work order book, imprest and temporary advance, material at site account, suspense account. Valuation, functions of a Valuer, factors affecting the value of a property, value & cost, scrap value, salvage value, assessed value, speculative value, sinking fund, depreciation.

6. PUBLIC HEALTH ENGINEERING

WATER SUPPLY: Sources of water, Acquifer, Tube-wells – methods of boring, development of Tube-well, determination of tube diameter, length and diameter of a strainer, Motor & Hand Pump. Water requirements per capita demand, domestic, industrial & fire demands, population forecast. Intake works & transportation of water, Purification of Water, Removal of salinity, Arsenic & iron. Raw water and Treated Water Quality. Treatment of water – plain sedimentation, feeding and mixing of coagulants, flocculation devices & clariflocculators, filters – rapid & slow sand filters, removal of hardness, disinfections – methods & applications. Distribution of Waters, different systems & their applications,

SANITARY ENGINEERING:

Elementary knowledge of Water & Air Pollution and Control. Classification of waste, necessity of waste disposal, different systems of Transportation of sewage, Sewers – Types, Sewerage, Sewer appurtenances, laying of sewers, quantity of sewage – domestic, industrial, storm water & ground water infiltration, estimation of run off, time of concentration, characteristics of sewage – Physical & Chemical (e.g. pH, colour, odour, turbidity, BOD, COD, nitrogen, chloride), sewage treatment processes - aerobic & anaerobic treatment, sewage treatment units, activated sludge process, trickling filter, septic tank, Rural Sanitation, Solid Waste disposal methods.

7. IRRIGATION

Necessity & benefits of irrigation – its ill effects, types of irrigation systems, methods of irrigation – surface irrigation, sprinkler irrigation and sub-surface irrigation. Measurement of rainfall – Symon's rain gauge, average rainfall over an area by arithmetical mean method, Run off - factors affecting it. Duty, Delta and base period – their inter-relations, factors affecting duty, methods of improving duty, commanded area, capacity factor, time factor, outlet factor, crop ratio, overlap allowance. Classification of canals, canal linings – Types and advantages, different parts of irrigation canals – their functions, designs of canal sections for a given discharge (using Kennedy & Kutter's formula), Design of canal sections by using Manning Formula, Shallow and deep wells, yield from a well, advantages & disadvantages of well irrigation. Piped Water Irrigation, Design of Pipelines and losses. Aqueduct, super passage, siphon aqueduct, level crossing. Layout and functions of head works, classification of dams, different types of earthen dams, causes of failure of earthen dams and safety measures, difference between weir, barrage and dams.

8. ROADS & HIGHWAYS

Classification of rural (non-urban) & urban roads as per I.R.C., terrain classification as per I.R.C. Road alignment, vertical and horizontal curves. Cross-sectional elements, recommended land width for different classes of roads, recommended speeds, Camber-objective-recommended values of camber for different types of roads, Gradients for roads in different terrains, Grade compensation at curves on hill roads, super-elevation-objects, transition curves objects, sight distance, different types, perception time, brake-reaction time, lag time, lag distance. Equipments used in road construction. Cutting, filling angle of repose, allowance for settlement, profile, benching, lead & lift, borrow pit & spoil bank. Kerb & channel, pedestrian crossing, guide island, refuge island, traffic lane.. Different types, requirements of good road aggregates, testing of road aggregates (names of tests & their objectives). Road structure, component parts, functions, soil

stabilization methods, Road Drainage. Water bound macadam roads – materials required – advantages & disadvantages. Bitumen – sources – types, Asphalt, Tar. Bituminous Road Types – Surface dressing (single & double coat), Grouting (semi grout & full grout), premix type (premix chipping carpet, premix macadam & premix concrete) – Functions, constructions, quantities of materials required for each type. Cement concrete Roads : Pavement joints, necessity types, joint sealer, joint filler, dowel bar, tie bar, mud pumping, Culverts & Bridges – differences – component parts – wing wall, Abutment and Piers. Classification of Bridges, Span, Flood discharge, Waterway, Scouring, Depth of Foundation, Clearance and Free Board, Maintenance of Bridges.

9. SOIL MECHANICS & FOUNDATION ENGINEERING

Classification of soil – Particle size – MIT & IS Sieve Analysis. Index, properties of soil.

Phase diagram for dry, moist and saturated soil, Definition – void ratio, porosity, water content, degree of saturation, Unit weight, Sp. Gr., Density, bulk density, dry density, submerged density, air content etc. Consistency of soil – Moisture content & volume relationship, Definition – Atterberg Limit, plasticity index, density index shrinkage ratio. Permeability of soil – Darcy's law, coeff of permeability, factors affecting permeability. Compaction – Dry density by Proctor's compaction. Consolidation – Difference between compaction & consolidation, compression index, coeff of compressibility, volume compressibility, coeff of consolidation, settlement of foundation. Shear strength – Definition of shear strength and shear parameters. Earth Pressure – Active and passive earth pressure, coeff of passive earth pressure – Rankine's earth pressure theory, Angle of repose, pressure intensity diagram, Resultant thrust.

Foundations – Shallow & deep foundations, types of shallow foundation (names & uses only) types of deep foundation (names & uses only), Bearing capacity, Terzaghi's bearing capacity formula, assumptions & problems, plate load test. Pile foundation – formula related to pile foundation, Dynamic Engineering News formula, Hiley's formula, static formula. Soil Stabilization – Principles, types – Mechanical stabilization, cement stabilization, lime stabilization, bitumen, stabilization by grouting. Soil exploration – Preliminary work – Site reconnaissance, trial pits, boring. Types of soil samples – Procuring & handling of disturbed and undisturbed samples. Presentation of soil investigation result.

10. CIVIL ENGINEERING DRAWING

Plan, elevation, section Isometric view, Development of surface. Autocad

Advt. No. 01/2022: Syllabus for Post Code: TA-11

Post: Technical Assistant

Trade/Area: Electronics & Communication

Syllabus of the Trade Test

Measurement:

a. Measurement of power, current, voltage, resistance (colour codes), capacitor, power factor, temperature, pressure, flow etc.

2. Electronics circuits & networks:

a. Regulated DC power supply, direct online starter, star-delta starter, transistor, Integrated circuits (IC 741, IC 7812, IC 7912, IC 7805, IC 7905)

3. Process control & Instrumentation:

a. On-off control, PID control, thyristor, relay, contactor, voltmeter, ammeter, current transformer, centre tap transformer, kWh meter etc.

4. Industrial transducers/sensors:

a. Thermocouples, 3-wire RTD, 4-wire RTD, mercury in glass thermometer, thermostats, rotameter, vacuum gauges

Syllabus of the Written Test

1. Electrical Engineering & measurements
2. Network analysis
3. Basic electronics
4. Digital electronics
5. Electronics devices and circuits
6. Sensors & Transducers
7. Process Instrumentation
8. PLC, HART Device, SCADA & DCS
9. Communication electronics