DETAILED SYLLABUS FOR THE POST OF JUNIOR INSTRUCTOR IN TOOL & DIE MAKER in INDUSTRIAL TRAINING Dept. - (Cat No: 655/2023)

1	Safe working practices. Soft Skills, its importance and Job area after completion of training. Importance of safety and general precautions observed in the industry/shop floor. Introduction of First aid. Operation of electrical mains and electrical safety. Introduction of PPEs. Response to emergencies. power failure, fire, and system failure. Importance of housekeeping & good shop floor practices. Introduction to 5S concept & its application. Occupational Safety & Health: Health, Safety and Environment guidelines, legislations & regulations as applicable. Bench work – Metal working hand tools and devices –Work bench – vices – files – hacksaw – hammer – spanners – screw drivers. Linear measurements- its units, steel rule dividers, Punch – types and uses. Description use and care of marking table.	10
2	Vernier calliper – its parts, principles, reading, uses and care. Outside micrometer – its parts, principles, reading, uses and care, vernier height gauge. Marking tools – scriber. Marking out – Coordinates system, Rectangular – Polar – Rules for marking. Bevel protractor, combination set- their components, uses and cares. Pedestal grinder, star wheel dresser, safety precautions, care and maintenance. Marking media, special application. Surface plate and auxiliary marking equipment, 'V' block, angle plates, parallel block, description, types, uses, accuracy, care and maintenance. Drill, Tap, Die-types & application. Determination of tap drill size. Reamer- material, types (Hand and machine reamer), parts and their uses, determining hole size for reaming, Reaming procedure. Drilling machines-types and their application, construction of Pillar & Radial drilling machine. Countersunk, counter bore and spot facing tools and nomenclature. Cutting Speed, feed, depth of cut and Drilling time calculations.	10
3	Dial test indicator-its parts, types, construction and uses. Interchangeability: Necessity in Engineering. field, Limit- Definition, types, terminology of limits and fits-basic size, actual size, deviation, high and low limit, zero-line, tolerance zone, allowances. Different standard systems of fits and limits. Geometrical tolerance. British standard system, BIS system. Introduction about metals, difference between Metal and Non-Metal, properties of metal, Classification of metals and its applications, pig – iron, cast iron, wrought iron, steel-plain carbon steel (Low carbon steel, medium and high carbon steels, high speed steel, stainless steel, carbides. Heat treatment of metals, process- such as annealing, nit	10

	riding, hardening, tempering, case hardening, carburizing, cyaniding, flame hardening, Induction hardening, purposes and its effects on the properties of steel.	
4	Getting to know the lathe with its main components, lever positions and various lubrication points as well. Definition of machine & machine tool and its classification. Introduction to lathe. Centre lathe construction, detail function of parts, specification. Safety points to be observed while working on a lathe. Different types of Lathe operations - facing, turning, parting-off, grooving, chamfering, boring etc. Lathe cutting tool-different types, shapes and different angles (clearance, rake etc.), specification of lathe tools. Types of chips, chip breaker. Tool life, factors affecting tool life. Driving mechanism, speed and feed mechanism of Lathe. Concept of Orthogonal and Oblique Cutting. Chucks & different types of job holding devices on lathe and advantages of each type. Mounting and dismounting of chucks.Knurling-types, grade & its necessity. Vernier Bevel Protractor – parts,reading and uses.	10
5	Various material for single point cutting tools, tip tools- their brazing and grinding process. Calculations of taper turning by off-setting tail stock. Sine Bar – description & uses Slip gauge –description and uses. Milling Machine: importance, types, construction and specification. Driving and feed mechanism of Milling Machine Different milling cutter angles, Milling cutter materials. Job holding devices-vice, clamps, V-block, parallel block etc. Milling cutter holding devices, milling process – Up milling and Down milling. Calculation of cutting speed, feed, machining time for milling machine. Milling machine operations. Milling machine attachments – vertical milling attachment Dividing head – Introduction, construction, types. Simple and universal dividing head. Indexing methods – direct indexing, simple indexing, angular indexing, its calculations.	10
6	Grinding machine introduction, types, Surface & Cylindrical grinding Machine- their parts, functions, specification, and uses. Safety points to be observed while working on a Grinding machine. Grinding wheel shapes and sizes. Standard marking system. Selection of grinding wheel. Procedure for mounting of grinding wheels, balancing of grinding wheels. Dressing, types of dresser. Glazing and Loading of wheels – its Causes and remedies. Roughness values and their symbols. Explain the importance and necessity of quality. Abrasives - its types, Bond, Grade, Grit, structure. Tool & cutter grinder- construction, use and specification.	10
7	Lubricating system-types and importance Maintenance: Definition, Types and its necessity. System of symbol and colour coding. Possible causes for failure and remedies.	10

8	Safety Precautions: Safe handling of tools, equipment & CNC machines, CNC turning with FANUC CNC CONTROL- (Fanuc-OiT latest) CNC Machine and Control specifications. CNC system organization Fanuc-0i-T. Coordinate systems and Points. CNC lathe, Types, Machine axes. Safety Precautions: Safe handling of tools, equipment & CNC machines, CNC Mill with FANUC CNC CONTROL- (Fanuc-0i-M latest) CNC Machine &Control. specifications. CNC system organization Fanuc-0i-M. Coordinate systems and Points. CNC Machines Milling, Types, Machine axes.	10
9	Electrical discharge machine (EDM) introduction principle of operation, advantages and disadvantages and its applications. Introduction principle of operation advantaged and disadvantaged and applications.	10
10	Basic principles of hydraulics/ pneumatics system, advantages and disadvantages of hydraulics and pneumatics systems, theory of Pascal's law, Brahma's press, Pressure and flow, types of valves used in hydraulics and pneumatics system.	10

NOTE: - It may be noted that apart from the topics detailed above, questions from other topics prescribed for the educational qualification of the post may also appear in the question paper. There is no undertaking that all the topics above may be covered in the question paper.