

Syllabus	:	Trade Certificate in Turner
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1. Soft Skills: its importance and Job area after completion of training. Importance of safety and general precautions observed in the in the industry/shop floor. Introduction of First aid. Operation of electrical mains. Introduction of PPEs. Response to emergencies e.g.; 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.
2. Measurement, line standard and end standard, steel rule different types, graduation and limitation. Hammer and chisel materials, types and uses. Prick punch and scriber.
3. Vice – types and uses, Files - different types of uses, cut, grade, shape, materials etc. Try square-different types, parts, material used etc. Calipers types and uses (firm joint).Vee – block, scribing block, straight edge and its uses. Hacksaw-their types & uses.
4. Center punch- materials, construction & material uses. Drill machine-different parts. Hacksaw blades- sizes, differentParts. Hacksaw blades-sizes, different pitch for different materials. Nomenclature of drill.
5. Surface plate its necessity and use. Tap - different types (Taper 2nd and bottoming) care while tapping. Dies different types and uses. Calculation involved to find Out drill size (Metric and Inch).
6. 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. History and gradual development of lathe. Classification of lathe in Function and construction of different parts of Lathe. Types of lathe drivers, merit and demerit. Description in details-head stock- cone pulley type- all geared type construction & function. Tumbler gear set.Reducing speed-necessary & uses. Back Gear Unit –its construction use. Lathe cutting tool-different types, shapes and different angles (clearances and rake), specification of lathe tools.
7. Combination drill - appropriate selection of size from chart of combination drill. Drill, chuck- its uses. Lathe accessories, chuck independent, self-centering, collet, magnetic etc., its function, construction and uses.
8. Vernier caliper- its construction, principle graduation and reading, least count etc. Digital vernier caliper. Outside micrometer –different parts, principle, graduation, reading, construction. Digital micrometer. Cutting speed, feed depth of cut, calculation involved-speed feed R.P.M. etc. recommended for different materials.
9. Different types of micrometer, outside micrometer. Vernier scale graduation and reading. Sources of error withmicrometer & how to avoid them. Use of digital measuring instruments.
10. Drills-different parts, types, size etc., different cutting angles, cutting speed for different material. Boring tool. Counter sinking and Counter boring. Letter and number drill, core drill etc. Reamers-types and uses. Lubricant and coolant-types, necessity, system of distribution, selection of coolant for different material: Handling and care.
11. Knurling meaning, necessity, types, grade, cutting speed for knurling. Lathe mandrel - different types and their uses. Concept of interchangeability, Limit, Fit and tolerance as per BIS: 919-unilateral and bilateral system of limit, Fits- different types, symbols for holes and shafts. Hole basis & shaft basis etc. Representation of Tolerance in drawing.
12. Driving plate. Face plate & fixed & traveling steadies- construction and use. Transfer caliper-its construction and uses. Lathe centers-types and their uses. Lathe carrier function types & uses. Mandrel – Different types and its use. Magnetic stand dial indicator, its used and care.

13. Taper – different methods of expressing tapers, different standard tapers. Method of taper turning, important dimensions of taper. Taper turning by swiveling compound slide, its calculation.
14. Bevel protector & Vernier bevel protractor-its function & reading. Method of taper angle measurement. Sine bar-types and use. Slip gauges-types, uses and selection.
15. Method of brazing solder, flux used for tip tools. Basic process of soldering, welding and brazing.
16. Vernier height gauge, function, description & uses, templates its function and construction. Screw thread-definition, purpose & its different elements. Driving plate and lathe carrier and their usage. Fundamentals of thread cutting on lathe. Combination set-square head. Center head, protractor head its function construction and uses.
17. Different types of screw thread- their forms and elements. Application of each type of thread. Drive train. Chain gear formula calculation. Different methods of forming threads. Calculation involved in finding core dia., gear train (simple gearing) calculation. Calculations involving driver driven, lead screw pitch and thread to be cut.
18. Thread chasing dial function, construction and use. Calculation involving pitch related to ISO profile. Conventional chart for different profiles, metric, B.A., With worth, pipe etc. Calculation involving gear ratios and gearing (Simple & compound gearing). Screw thread micrometer and its use. Calculation involving gear ratios metric threads cutting on inch L/S Lathe and vice-versa.
19. Tool life, negative top rake-its application and performance with respect to positive top rake. Calculation involving tool Thickness, core dia., pitch proportion, depth of cut etc. of sq. thread. Calculation involved – depth, core dia., pitch proportion etc. of Acme thread. Calculation involved depth, core dia., pitch proportion, use of buttress thread. Buttress thread cutting (male & female) & tool grinding
20. Different lathe accessories, their use and care.
21. Lubricant-function, types, sources of lubricant. Method of lubrication. Dial test indicator use for parallelism and concentricity etc. in respect of lathe work Grinding wheel abrasive, grit, grade, bond etc.
22. Form tools-function-types and uses, Template-purpose & use. Dial test indicator- construction & uses. Calculation involving modified rake and clearance angles of lathe tool at above and below the center height. Subsequent effect of tool setting. Jig and fixture-definition, type and use. Chip breaker on tool purpose and type.
23. Cutting tool material-H.C.S., HSS, Tungsten. Carbide, Ceramic etc, - Constituents and their percentage. Tool life, quality of a cutting material.
24. Checking of taper with sin bar and roller-calculation involved
25. Cutting speed, feed, turning time, depth of cut calculation, cutting speed chart (tungsten carbide tool) etc. Basic classification of tungsten carbide tips.
26. Accessories used on face plate –their uses. Angle plate-its construction & use. Balancing its necessity. Surface finish symbols used on working blueprints- I.S. system lapping, honing etc.
27. Preventive maintenance, its necessity, frequency of lubrication. Preventive maintenance schedule., TPM (Total Productive Maintenance), EHS (Environment, health, Safety) Marking table-construction and function. Angle plate - construction, eccentricity checking.
28. Roller and revolving steadies, Necessary, construction, uses etc.
29. Different types of attachments used in lathe. Various procedures of thread measurement thread screw pitch gauge. Screw thread micrometer, microscope etc.

30. Tool maker's button and its parts, construction and uses, telescopic gauge its construction and uses.
31. Inside micrometer principle, construction graduation, reading, use etc. (Metric & Inch.)
32. Care for holding split bearing. Fixture and its use in turning.
33. Calculation involving fractional threads. Odd & even threads. Multiple thread function, use, difference between pitch & lead, formulae to find out start, pitch, lead. Gear ratio etc. Indexing of start - different methods tool shape for multi-start thread. Setting of a lathe calculation for required change wheel.
34. Calculation involving shape of tool, change wheel, core dia etc. Calculation involving shape, size pitch, core dia. Etc. Helix angle, leading angle & following angles. Thread dimensions-tool shape, gear, gear calculation, pitch, depth, lead etc.
35. CNC technology basics: Difference between CNC and conventional lathes. Advantages and disadvantages of CNC machines over conventional machines. Machine model, control system and specification. Axes convention of CNC machine - Machine axes identification for CNC turn centre. Importance of feedback devices for CNC control. Concept of Co-ordinate geometry, concept of machine axis.
36. Programming – sequence, formats, different codes and words. Co-ordinate system points and simulations. Workpiece zero points and ISO/DIN G and M codes for CNC. Different types of programming techniques of CNC machine. Describe the stock removal cycle in CNC turning for OD / ID operation. L/H and R/H tool relation on speed. Describe CNC interpolation, open and close loop control systems. Co-ordinate systems and Points. Program execution in different modes like manual, single block and auto. Absolute and incremental programming. Canned cycles. Cutting parameters- cutting speed, feed rate, depth of cut, constant surface speed, limiting spindle speed, tool wear, tool life, relative effect of each cutting parameter on tool life. Selection of cutting parameters from a tool manufacturer's catalog for various operations. Process planning & sequencing, tool layout & selection and cutting parameters selection. Tool path study of machining operations Prepare various programs as per drawing.
37. Tool Nose Radius Compensation (G41/42) and its importance (TNRC). Cutting tool materials, cutting tool geometry – insert types, holder types, insert cutting edge geometry. - Describe Tooling system for turning - Setting work and tool offsets. - Describe the tooling systems for CNC TURNING Centers. - Cutting tool materials for CNC Turning and its applications - ISO nomenclature for turning tool holders, boring tool holders, indexable inserts. - Tool holders and inserts for radial grooving, face grooving, threading, drilling.
38. Prepare various part programs as per drawing & check using CNC simulator. Processes and Tool selection related to grooving, drilling, boring & threading.
39. Describe Tapping on CNC turning. - Programming for Grooving/Threading on OD/ID in CNC Turning. - Trouble shooting in CNC lathe machine - Identify Factors affecting turned part quality/ productivity. - Parting off operation explanation. - Bar feeding system through bar feeder. - Input and Output of Data. - DNC system. Interlacing with PC. - Use of CAM Programme.
40. Setting of tools for taper threads-calculation of taper setting and thread depth. Heat treatment – meaning & procedure hardening, tempering, carbonizing etc. Different types of metal used in engineering application.
41. Interchangeability meaning, procedure for adoption, quality control procedure for quality production.
42. Importance of Technical English terms used in industry –(in simple definition only) Technical forms, process charts, activity logs in required formats of industry, estimation, cycle time, productivity reports, job cards.

43. Terms used in part drawings and interpretation of drawings – tolerances, geometrical symbols - cylindricity, parallelism. etc.
44. Automatic lathe-its main parts, types diff. Tools used-circular tool etc. Related theory and calculation.
45. **Workshop Science and Calculation :**
- Introduction to Iron and Steel. Differences in Iron & steel.
 - Introduction to Property and uses of C.I. and wrought Iron. , Iron and steel properties and uses.
 - Properties and uses of plain carbon steel and alloy steel.
 - Properties and uses of non ferrous metals and alloys Fraction and decimal - conversion fraction decimal and vice-versa.
 - Properties and uses of copper, zinc, lead, tin, aluminum.
 - Composition, properties and uses of brass, bronze, solder, bearing material, timber, rubber etc.
 - System of units, British, metric and SI units for length, area, volume capacity, weight, time, angle, their conversions. , Effect of alloying elements in the properties of C.I. & steel.
 - Unit of temperature for & related problems. Standard & absolute temp.
 - Mass, volume, density, weight, sp. Gravity & specific weight. S.I. M.K.S. and F.P.S. units of force, weight etc. their conversion to related problems.
 - Inertia, rest and motion, velocity and acceleration.
 - Types of forces, its units and Weight calculation.
 - Revision & Test , Power and roots Factor, Power base exponents number. Multiplication and division of power and root of a number. Square root of number and problems.
 - Heat & temperature, thermometric scales, their conversions.
 - Work energy and power, their units and applied problems.
 - Percentage, changing percentage to decimal and fraction and vice versa. Applied problems.
 - Problem on percentage related to trade.
 - Different types of loads, stress, strain, modulus of elasticity. Ultimate strength, different types of stress, factor of safety, examples.
 - Ratio & proportion- Ratio, finding forms ratio proportions, direct proportion and indirect proportion. Application of ratio and proportion & related problems.
46. **Engineering Drawing :**
- Engineering Drawing - introduction to Engg. Drawing and its importance.
 - Use of drawing instruments –Drawing of straight, inclined and curved lines.
 - Exercise on linear and angular measurements.
 - Types of lines their meaning & application as per BIS SP: 46-2003.
 - Simple conventional symbols for material and parts as per BIS SP: 46-2003. , Geometrical construction of rectangles, square, circles.
 - Geometrical construction of polygon and ellipse, parabola & hyperbola.
 - Geometrical construction of involutes, oval, and helix.
 - Free hand sketching of straight lines, rectangles, circles, square, polygons, ellipse.
 - Standard printing style for letters and numbers as per BIS : SP: 46-2003 using stencils
 - Free hand sketching of simple geometrical solids, cube, cone, prism, cylinder, sphere, pyramids.
 - Scales- Types & its use.
 - Revision & Test, Construction of diagonal scale.

- Simple dimensioning technique, size and location, dimensions of parts, holes angles, taper, screw etc. as per BIS SP: 46-2003.
- Transferring measurements for linear, angular, circular dimensions from the given object to the related free hand sketches using different measuring instruments.
- Pictorial drawings, isometric drawings of simple geometrical solids.
- Oblique/orthographic projection of simple geometrical solids.
- Orthographic drawings: Application of both the first angle and third angle. Isometric drawing of simple machined & casting blocks.
- Free hand sketches of trade related hand tools and measuring tools

Note: The above syllabus is indicative and the questions in the test may include similar other topics pertaining to the level and content of essential qualification.