

**First Semester**  
**(Semester Code no. MCN - 01)**  
**Duration: Six Month**

Week No.	Trade Practical	Trade Theory
1.	<p>Importance of trade training, List of tools &amp; Machinery used in the trade.            Health &amp; Safety: Introduction to safety equipments and their uses. Introduction of first aid, operation of Electrical mains.</p> <p><b>Occupational Safety &amp; Health</b>  <b>Importance of housekeeping &amp; good shop floor practices.</b>            Health, Safety and Environment guidelines, legislations &amp; regulations as applicable. Disposal procedure of waste materials like cotton waste, metal chips/burrs etc. Basic safety introduction, Personal protective Equipments(PPE):-            Basic injury prevention, Basic first aid, Hazard identification and avoidance, safety signs for Danger, Warning, caution &amp; personal safety message.            Preventive measures for electrical accidents &amp; steps to be taken in such accidents.            Use of Fire extinguishers.</p>	<p>Importance of safety and general precautions observed in the in the industry/shop floor. All necessary guidance to be provided to the new comers to become familiar with the working of Industrial Training Institute system including stores procedures. <b>Soft Skills: its importance and Job area after completion of training.</b>            Introduction of First aid. Operation of electrical mains. Introduction of PPEs. Introduction to 5S concept &amp; its application.            Response to emergencies eg; power failure, fire, and system failure.</p>
2.	<p>Identification of tools &amp; equipments as per desired specifications for marking &amp; sawing( Hand tools , Fitting tools &amp; Measuring tools)            Selection of material as per application Visual inspection of raw material for rusting, scaling, corrosion etc., Marking out lines, gripping suitably in vice jaws, hack sawing to given dimensions, sawing different types of metals of different sections.</p>	<p>Hand tools and its importance, steel rule, Try square, chisel, surface gauge and care &amp; maintenance, Hacksaw frame, blades.</p>
3.	<p>Chipping flat surfaces and grinding various angles to chisels, filing flat surface. Grooving with Hammer and chisel.</p>	<p>Classification and types of chisels, files &amp; uses, vices - its constructions and uses. Hammers and its types. Related safety.</p>
4.	<p>Filing Flat surfaces, Uses of marking tools, Punch, Try square &amp; basic measuring tools, caliper, steel rule.</p>	<p>Marking block, Steel rule, and calipers-different types and uses. Combination set-its components and uses.</p>
5.	<p>Filing flat surfaces, checking with steel rule and Try square. Hack sawing.</p>	<p>Hacksaw blade, Hacksaw frame and its types. Drill bits- parts, Types &amp; uses.</p>
6&7	<p>Marking and Drilling holes on flat pieces. Tapping as per simple drawing.</p>	<p>Introduction to Hand Taps &amp; Dies and their types, applications, care and maintenance. Familiar with tap and drill size, Thread Terminology.</p>
8.	<p>Filing Tee shape job.</p>	<p>Forging tools, its importance and types such as tongs, swage block, anvil etc.</p>
9.	<p>Filing flat type polygon.</p>	<p>Heat treatment process Annealing, Normalizing, Tempering, Hardening, case hardening and its importance. Use of vernier caliper and its parts, construction, principle &amp;</p>

		reading, use & care.
10.	Fitting male and female square piece to close limit. Application of vernier caliper in making job.	Outside micrometer, its types and construction, parts, reading use, care and maintenance.
11.	Fitting male and female square piece to close limit. Application of vernier caliper in making job.	Study about Depth gauge, micrometers and dial test indicator - their parts and construction.
12.	Introduction to Shaping machine and its construction. Setting of strokes, tools, job on table machining of Rectangular block, steps, with the use of Basic tools. Safety points to be observed while working on a shaper. Setting of vice, setting of block on vice checking accuracy.	Introduction of shaper, types classification, General principles of power transmission on shaping mechanism.  Shaping parts, construction use of parts, quick return mechanism ratio etc.
13.	Shaping Hexagonal, Rectangular block as per sketch checking with caliper & steel rule, angle protractor.	Various tools of shaping machine and their angles and importance of angles.
14.	Shaping "V" blocks with slides, measurement of 'V' groove with vernier bevel protractor, measurement of slots by vernier caliper with 0.02 mm accuracy.	Various methods of holding jobs, use of clamps, nuts & bolts V- blocks, angle plates shaping operations, their importance.
15.	Shaping Tee slots, shaping angular surfaces.	Tool head - its parts and application, function of each part of tool head.
16.	Cutting of external keyway on shaper.	Shaping tools and types. Speed, feed, depth of cut.
17.	Shaping concave & convex surface with use of tee slot tools, form tools.	Surface finish as per ISI system.
18.	General introduction to slotting. Safety points to be observed while working on a slotter.	Slotter-principle, construction, details, driving mechanism, quick return motion and speed ratio. Safety precaution comparative study with a shaping machine. Classification of slotting machine.
19.	Slotting a rectangular job checking and measuring with gauges & precision measuring instruments.	Job holding devices-vice, clamps, V-block, parallel block etc.
20.	Slotting square and hexagon internal and external. Slotting a double ended spanner.	Slotting tools different types of work tool angles comparison of tool shape with that of shaper
21.	Practice on slotting key ways on pulley-Internal and external slotting irregular shaped jobs having curved surfaces.	Use of tool with holder for internal operations. Precautions to be observed during slotting internal operations.
22.	Slotting internal operations. Slotting concave and convex surfaces.	Introduction to coolant & lubricant-difference between them, types and uses of each. Use of circular marks on the table for slotting curves.
23-25	<b>Revision</b>	
26	<b>Examination</b>	

# **SYLLABUS FOR THE TRADE OF MACHINIST**

## **Second Semester**

**(Semester Code no. MCN - 02)**

**Duration: Six Month**

<b>Week No.</b>	<b>Trade Practical</b>	<b>Trade Theory</b>
1	Introduction of planning machines, Adjustment of stroke, setting of tool, vice on planer table machining of rectangular block on planer. Safety points to be observed while working on a planer.	Introduction to Planing M/c. parts, types, constructions, details of Driving mechanism of planer, quick return motion etc.
2	Planing angular, Horizontal, vertical operations, planing Dovetail.	Tool head of planer its construction and various function of each part v- block, clamps, bolts, step block and other holding devices.
3	Planing of various key ways (open & blind). Types of operation, concave & convex surface i.e. goose neck clamp.	Cutting tools for Planer - their material and types. Templates, gauges, their fixtures and vices.
4	Planing V Block machining of planer gauge.	Hydraulic mechanism of planer their advantages, disadvantages.
5	Planing male & female dovetail, grinding of tools, checking with Vernier bevel protractor & roller methods.	Dovetail measurement external and internal by vernier bevel protractor. Checking of Dovetail by roller method.
6	Introduction to lathe. Holding of round job in an independent chuck and truing it. Holding the tool in a tool post, centering the job with the tool. Facing & drilling.	Introduction to lathe. Its types, engine lathe construction, detail function of parts size and specification. Safety points to be observed while working on a lathe.
7	Parallel turning between centers, parting off, chamfering using roughing, finishing and parting off tools.	Lathe tools their angles & uses. Driving mechanism, speed and feed mechanism & lathe accessories.
8	Holding the job in jaw chuck truing, centering facing. Step turning undercutting, knurling drilling and boring.	Chucks-different types of job holding devices on lathe and advantages of each type. Mounting and dismounting of chucks.
9	Taper turning by offset method checking of the taper with precision instruments. Taper turning by swiveling compound rest, setting the compound rest to correct degree, checking the tool height, clamping the saddle for no longitudinal movement, checking up with precision instruments.	Taper introduction, types and uses. Calculations of tapers. Measurement of taper by sine bar and slip gauges.
10&11	Cutting V thread external and internal in a lathe. Checking up with screw pitch gauge. Cutting square thread external & internal on a lathe.	Different thread forms their related dimensions and calculations screw cutting in a lathe. Measurement of threads by three wire methods.

12	Introduction to milling machine, demonstration on working principle, setting of job, setting of cutter in arbor, setting of vice on table. Safety points to be observed while working on a milling machine.	Milling machine importance of milling machine, types and specification of milling machine, driving and feed mechanism of milling machine.
13	Sequence of milling six faces of a solid block. Checking the accuracy with the help of try-square scribing block and vernier height gauge.	Classification & different types of milling cutters & their use. Parts and nomenclature.
14	Step milling using side and face cutter checking with micrometer.	Vernier height gauge construction, graduations vernier setting & reading, vernier bevel protractor, construction graduation setting and reading. Care and maintenance of vernier height gauge and bevel protractor.
15	Straddle and gang milling operations including up-milling and down milling. Milling concave and convex surfaces.	Different milling operations plain-face, angular, form, slot, gang and straddle milling etc. Up and down milling. Different types of milling attachments and their uses.
16	Introduction to indexing head types, setting and aligning of indexing head with reference to job on milling machine.	Indexing-introduction & types. Indexing head-constructural details, function of indexing plates and the sector arms. Calculation for various types of indexing.
17	Milling square and hexagonal job by simple indexing method.	-do-
18	Milling dovetail and 'T'slots both male and female matching each other. Milling Rack of straight teeth.	Gear introduction, use and type. Elements of a spur gear. Gear tooth of each forms types, merits and demerits of each. Spur gear calculations, curves and their uses.
19	Milling of spur gear having even and odd number of teeth.	Selection of gear cutter type and form & various methods of checking gear and its parts.
20 & 21	Introduction to grinding machine surface grinder, cylindrical grinder. Driving and feed mechanism, job holding devices mounting of wheels. Wheel balancing & truing. Grinding of parallel and stepped jobs. Dressing of grinding wheels.	Grinding machine introduction types, specification, their parts and functions & uses. Safety points to be observed while working on a Grinding machine. Types of Abrasives and their uses, Glazing and loading of wheels. Explain the importance and necessity of quality.
22-23	<b>Implant training / Project work (work in a team)</b>	
24-25	<b>Revision</b>	
26	<b>Examination</b>	

# SYLLABUS FOR THE TRADE OF MACHINIST

## Third Semester

(Semester Code no. MCM - 03)

Duration: Six Month

Week No.	Trade Practical	Trade Theory
01	Checking of alignment of lathe centers and their adjustments. Center drilling, step turning between centers recessing and chamfering & measurement with vernier caliper. Taper turning by taper turning attachment.	Turning of taper by taper turning attachment advantages and dis-advantages taper calculations.
02	Cutting square threads (left & right hand) on a lathe-checking with thread gauge-grinding of tool and setting in correct position.	Screw cutting on a lathe. Terms relating screw thread major/ minor diameter pitch and lead of the screw, depth of thread simple gear train and compound gear train change gears for fractional pitches.
03	1. Cutting multi-start V thread on lathe. 2. Cutting key way broaches.	Difference between single and multi-start threads-their uses merits and demerits. Broach - its types and uses.
04	Cutting ACME threads (Male and female) on a lathe. Lead screw.	Square thread its form and calculation of depth, core dia, pitch dia. Acme thread its forms use and calculations.
05	Cutting acme threads on lathe (Male and female).	Square threads-its forms and calculations of depth, core dia, pitch dia, Acme threads-its forms, use and calculations.
06	Turning of irregular jobs using face plate. Balancing the face plate.	Face plate- its construction safety precaution in holding jobs on face plate.
07	Exercise on use of pillar drill in drilling, counter sinking, counter boring. Spot facing and use of spot facing tools. Further practice of drilling of Radial drills. Practice of reaming on drilled holes.	Pillar drill machine constructional details, functions of parts. Application of pillar drill. Radial drills function parts etc. Reamer- parts, types, uses. Special tools – use and precautions to be observed for shaping internal keyways dovetails & ‘T’ slots.
08	‘T’ slots cutting in shaping machine.	Various material for single point cutting tools, tipped tools, their brazing and grinding process. Tool angles and their effect on cutting various materials.
09	Cross Dovetail cutting on shaper.	Cutting speed, feed, depth of cut for slotting, shaping and time calculation.
10	Shaping cross dovetails mating jobs male and female.	Checking of dovetail grooves with vernier caliper and roller. Their calculations and use of sine bar, slip gauge and dial test indicator.
11	Shaping of casting jobs, using angle plate, jack and clamps. Machining of complex	Properties of metals general idea of physical, mechanical properties of metals, colour,

	shaped intricate casting.	weight, hardness toughness, malleability, ductility their effect on machine ability.
12	Grinding of form tools and shaping of convex and concave surfaces.	Use of radius gauges and template. Introduction to jigs and fixtures. Types and uses.
13	Machining of profiles on a slotting machine. Slotting of a double ended spanner.	Interchangeability – Limit, Fit, Tolerances and allowances.
14	Machining of internal spline and external spline on slotter uses to match each other.	Introduction and their indexing process on a slotter by its rotary table graduations.
15	Cutting external and internal sprocket teeth on slotting machine, use of rotary table.	Form tool for slotting machines. Calculation for spur gear in relation to graduation of circular table.
16	Slotting regular & irregular job and contours and sprockets.	Calculation for cutting sprocket.
17	Planning long jobs having ‘T’ slots and dovetail grooves.	Tool setting for dovetail use of relevant tool and their grinding process. Alignment of long jobs with precision instruments.
18	Setting and planning multiple jobs at a time.	Hydraulic transmission in machine tool- its advantages and application hydraulic system of a planer. Use of planer gauge for setting tool and template for profile checking.
19	Boring a cast block on a vertical milling machine, measurement of bore size.	Vertical milling machine its parts, construction, method of boring in a vertical milling. Difference between horizontal and vertical milling machine.
20	Milling hexagonal hole on a plate by attachment.	Elements of milling cutter Rake angle, primary, secondary and clearance angles, lead etc.
21	Demonstration of marking system of Grinding wheels. Different Tool and Cutter grinding practices on Tool & Cutter grinding m/c. Milling tongue and groove on a mating job. Checking with precision instruments and gauges.	Selection procedure of grinding wheels. Abrasives its types Bonds, Grade Grit, structure, different shape of wheels and their uses. Inside micrometer, Principle, construction graduation reading both in English and metric system gauge types and uses.
22-23	<b>Implant training</b> / Project work (work in a team)	
24-25	<b>Revision</b>	
26	<b>Examination</b>	

# SYLLABUS FOR THE TRADE OF MACHINIST

## Fourth Semester

(Semester Code no. MCN - 04)

Duration: Six Month

Week No.	Trade Practical	Trade Theory
01.	Demo of parts of CNC machining center – control switches, console buttons and machines specifications (spindle power, axes traverse, etc.). Demonstration of machine parts - bed, spindle motor and drive, tool changer, axes motors and ball screws, guideways, LM guides, console, electrical, coolant system, hydraulic system, chip conveyor. Working of parts explained using multimedia CNC teach ware. Parts shown on machine.	CNC technology basics: Difference between CNC and conventional lathes. Advantages and disadvantages of CNC machines over conventional machines. Schematic diagram of CNC system. Axes convention. Working of parts explained using multimedia CNC teach ware. Parts shown on machine.
02.	CNC part programming with simple exercises and various programming codes. Practice on CNC machine simulator.	Programming – sequence, formats, different codes, canned cycles. Absolute and incremental programming. Tool nose radius compensation (G41/42). Cutting tool materials, cutting tool geometry – insert types, holder types, insert cutting edge geometry. Cutting parameters - cutting speed, feed rate, depth of cut. Process planning, tool selection and cutting parameters selection. Explained using multimedia CNC teachware and CNC machine simulator.
03-04	CNC machining center operation in various modes: jog, single block, auto, MDI, edit, etc. Program entry. Setting of tool offsets, entry of tool radius. Practice on CNC machine simulator.	Program execution in different modes like single block, manual and auto. Tool and work offsets setting. Prepare various programs as per drawing. Concepts taught using multimedia CNC teach ware.
05-06	Program and cut parts on CNC machining center with face milling, contour milling with tool radius compensation, pocket milling, drilling, peck drilling, countersinking, tapping operations using canned cycles for hole operations. First 80 % of the practice is on CNC machine simulator, followed by 20 % on machine.	Surface finish. Surface roughness related BIS symbols
07.	Prepare different types of documentation as per industrial need by different methods of recording information	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
08-09	Milling cylindrical cutter.	Spiral introduction, type and elements. Difference between helix & spiral. Difference between R.H. and L.H. helix

10-11	Milling end mill/drum cam.	Spiral-lead, helix angle and calculation. Cam Introduction development and use.
12	Cutting face cam.	Use of proper cutting speed and feed for various metals. Calculation for the machining time, machining allowances. Lubricant/coolants and various ways of their application.
13.	Cutting a plate cam with angular setting	Cam-lobe, lead setting of dividing head, Calculation.
14.	Milling gears by differential indexing, Measuring the teeth with a vernier gear tooth caliper.	Vernier gear tooth caliper, its construction and application in checking gear tooth.
15.	Milling spline (external) Milling straight fluted Reamer.	Introduction to broaching methods of milling splines. Its calculations and selection of cutters.
16.	Milling a helical groove in a vertical milling machine. Milling a slab mill cutter. Milling twist drill.	Spiral milling lead, pitch, helix angle R.H. and L.H. swiveling the table in relation to the helix angle, selection of cutter for spiral milling. Calculations for spiral milling.
17.	Milling a drum cam. Milling a plate cam.	Cam-types, application in modern m/c. tools, its special advantages, manufacturing process, calculation for milling a drum cam.
18.	Milling helical gears. Cutting bevel gears on a milling machine by using bevel gear cutter.	Helical gear introduction elements and calculation. Introduction geometry and uses of bevel gears. Quality control types of variation, causes of variation, measurement of testing, gear & error.
19.	Milling a rack. Milling face cam.	Introduction to rack, its use & application. Rack cutting attachment, calculation for linear pitch, circular pitch, Gear ratio, Indexing movement, etc
20.	Cutting worm and worm wheel on a milling machine, gashing and finishing.	Introduction, geometry and use of worm and worm wheel.
21.	Cutting graduations on a steel rule on milling machine. Use of tolly cutter.	-do-
22-23	<b>Implant training / Project work (work in a team)</b>	
24-25	<b>Revision</b>	
26	<b>Examination</b>	