

## DRAFT SYLLABUS FOR THE TRADE OF MACHINIST UNDER CRAFTSMANSHIP TRAINING SCHEME

### Period of Training : 2 Years

Week No.	Practical Work	Trade Theory	Engineering Drawing	W/s. Calculation & Science
1.	Introducing Training Familiarization with the Industrial Training Institute importance of trade as per industrial growth and various types of machines used including safety related to each machines.	Importance of Housekeeping surrounding environment of shop needs and safety to be observed personnel, machines and housekeeping, various types of medical facilities provided and nearest hospitals.		
2.	Introduction to basic tools (I) Hand tools (II) Fitting tools (III) Measuring tools.	Hand tools and its importance, steel rule, Try square chisel, surface gauge and care & maintenance, Hacksaw frame, blades.	Reading of simple drawing, Engineering drawing & its importance and instruments used in drawing.	
3.	Chipping flat surface & grooving with Hammer & grinding various	Classification and types of files & uses, vices & its uses, constructions. Hammers and its types,	(I) Making of Title blocks as per IS-sp 465-1988. (II) Various sizes of	Simple arithmetic, Addition, Subtraction Multiplication, Division of whole and

	angles to chisels, filing flat surface.	Safety.	drawing sheets. (III) Various types of pencils & sharpening methods. (IV) Types of lines & their application as per SP 46: 1988.	partial number.  Properties of metals and their importance in trade.
4.	Uses of marking tools, punch, try square and basic measuring tools caliper, steel rules.	Marking block, steel rule, and its types calipers.	-do-	
5.	Filing flat surface hack sawing checking with steel rules and try square.	Hacksaw blade hock saw frame and its type	Use of drawing tools simple geometrical construction	Fraction decimal conversation of fraction to decimal & vice versa.
6.	Drilling holes of flat piece. Taping as per simple drawing	Introduction of taps & dies and their types application care and maintenance familiar with tap and drill size trade terminology.	Geometrical construction regular polygon circle	Properties of CI and its type use properties of non ferrous metals and how its identifications.
7.	Filing tee shape job.	Forging tools its importance & types such as tongs, swage block, anvil act.	Geometrical construction of polygon inscribed circles.	Properties of copper, zinc, mild steel, aluminium etc.

8.	Filing plate type polygon.	Heat treatment process analyzing, Normalising, Tempering, Hardening and its importance, use of Micrometer and its parts constructions.	Curves and types of curves & their application and method of drawing curves.	Properties of Brass, steel, bearing metals, Temper etc.
9.	Fitting male and female square piece to close limit.	Outside micrometer, its types and const., parts, reading, use, care and maintenance.	Geometrical construction, cycloid, Hyperbola, Parabola curves, Ellipse.	Decimals, Division, Multiplication.
10.	Vernier Caliper, use, constructions, parts, principles, application to making jobs.	Depth gauge, micrometers parts construction, dial test indicator.	-do-	Logarithm and how to find out montisa & characteristics.
11.	Quarterly Test revision and achievements.	Test	Free hand sketch of lines, polygons, ellipse etc.	Properties of C.I. steel.
12.	Shaping Machine and its introduction, construction, setting of strokes, tools, job on table machining of steps, Rectangular block with the use of	Introduction of shaper, types classification, General principles of power transmission shaping mechanism.	Free hand sketch of basic tools and simple geometrical const. Cone, pyramid frustum/prisms etc./sphere.	Work, power, energy.

	Basic tools.			
13.	-do-Setting of vice, setting of block on vice checking accuracy.	Shaping parts, constructions use of parts, quick return mechanism ratio etc.	-do-	Motion, velocity and problems.
14.	Shaping Hexagonal, Rectangular block as per sketch checking with caliper & steel rule, bevel protractor.	Shaping various tools and their angles and importance of angles.	Construction of scale diagram, division of odd parts of scale with drawing instruments by sketch.	Volume, mass, density applied problems.
15.	Shaping 'V' blocks with slides, measurement of 'V' groove with vernier bevel protractor, measurement of slots by vernier caliper with 0.02 mm acc.	Various methods of holding jobs, use of clamps, angle plates shaping operations, their importance.	Letters and its types and drawing of letters.	Properties of metals and their applications.
16.	Shaping Tee slots, shaping angular surfaces, shaping concave with use of tee slot tools, form tools.	Tool head its parts and application, function of each part of tool head.	Methods of ellipse. How to draw by drawing the instruments.	Square roots, power, conversion of decimal to British & vice versa.

17.	1. Cutting of external keyway on shaper. 2. Shaping Block.	Shaping tools and types speed, feed, depth of cut. Surface finish as per ISI system.	Simple dimensions with techniques and location of parts as per dimensions, angle, taper.	Square roots, power conversation of decimal to British and vice versa.
18.	Revision and Test.	Revision & Test.	Transforming of various measurements, linear, Angular, Circular etc.	Multiplication power root of a number.
19.	Introduction of planning machines, Adjustment of stroke, setting of tool, vice on planer table machining of Rectangular block on planer.	Planning M/c. instruction, parts, types constructions, details, Driving mechanism of planer quick return motion etc.	Pictorial drawing. Isometric drawings of simple block.	
20.	Planning angular, Horizontal, vertical operations planning Dovetail.	Tool head of planer its construction and various function of each part veer block, clamps, bolts, step block and other holding devices.	-do-	Problems on work, power & energy.

21.	Planning of various key ways (open & blind) table of operation, concave & concave surface i.e. goose neck clamp.	Planning, cutting tools their material types, templates, gauges, their picture and vises.	Oblique views of simple geometrical constructions.	Ratio & percentages and problems.
22.	Planning male & female dovetail, grinding of tools, checking with Vernier bevel protractor & roller methods.	Dovetail measurements external and internal by vernier bevel protractor.	Isometric drawing on simple blocks.	-do-
23.	-do-	Checking of Dovetail by roller method.		Meaning of stress, strain, energy, elasticity.
24.	Planning V block machining of planner gauge.	Hydraulic mechanism of planer their advantages, disadvantages.	Isometric drawing on completed jobs.	Meaning of stress, strain, energy, elasticity.
25.	Revision and Test.	Revision and Test.	Revision and Test.	Stress and its important factors example.

26.	General introduction to slotting	Slotter-principle, construction, details, driving mechanism, quick return motion and speed ratio. Safety precaution comparative study with a shaping machine. Classification of slotting machine.	Free hand sketches of trade related hand tools cutting tools, measuring tools.	Ratio and proportions, Ratio, finding forms and ratio proportions direct and indirect proportions.
27.	Slotting a rectangular job checking and measuring with gauges & precision measuring instruments.	-do-	-do-	Application of ratio and proportion to shop problems.
28.	Slotting a rectangular job checking & measuring with gauges and precision measuring instruments.	Job holding devices-vice, clamps, vee block, parallel etc.		Mixed direct and indirect proportion problems.
29.	Slotting square and hexagon	Slotting tools different types of work tool angles	Free hand sketches of trades related hand	Machines-basic principles, velocity

	internal and external. Slotting a double ended spanner.	comparison of tool shape with that of shaper.	tools, measuring tools.	ratio, mechanical advantages, efficient simple problems.
30.	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. Precaution to be observed during slotting internal operations.	Orthographic drawings application of both first angle and third angle methods in representing the drawing for simple & complex machine blocks given for exercises with dimensions.	Algebraic symbols & fundamental algebraic operations signs & symbols used in algebra, terms like terms & unlike terms.
31.	-do- Slotting internal gear.	Introduction to coolant & lubricant-different between them, types and uses of each.	-do-	Addition, subtraction, multiplication and division.
32.	Slotting concave and convex surfaces.	Use of circular marks on the table for slotting curves.	Orthographic drawings application of both first angle & third angle. Methods in representing the drawings for simple and complex machine blocks given for exercises with	Logarithm & Antilogarithm. Problems on logarithms.



			dimensions.	
33.	Revision and Test	Revision and Test	-do-	-do- Problems relating to log table.
34.	Introduction to an engine lathe. Holding of round job in an independent chuck and truing if holding the tool in a tool post, centering the job with the tool. Facing & drilling.	Introduction to lathe m/c. types, engine lathe construction-details functions of parts size and specification.	Standard method of sectioning as per IS-696. Exercises for different sectional views on the given orthographic drawing of machine parts, castings etc.	Simple machines like winch pulley & compound axle etc. with examples.
35.	Parallel turning between centers, parting off, chafering using roughing, finishing and parting of tools.	Lathe tools their angles & uses. Driving mechanism, speed and feed mechanism, lathe accessories.	Standard method of sectioning as per IS 696. Exercises for different sectional views on the given orthographic drawing of machine parts, castings etc.	Factors and equations of algebraic formula.
36.	Holding the job in three jaw chuck truing, centering facing. Step	Chucks-different types and advantages of each type. Mounting and dismounting of chucks.	-do-	Factors and equations types of factorizations.

	turning-checking of the taper with precision instruments.			
37.	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 checking up with precision instruments.	Taper introduction, types and uses. Calculations of tapers. Measurements of taper by sine bar.	-do-	Heat treatment of steel hardening, appealing, tempering, normalizing, case hardening standard and measurements-equations-simple simultaneous quadratic.
38.&39	Cutting V thread external and internal in a lathe.	Different thread forms their related dimensions and calculations screw cutting in a lathe. Measurement of threads by three wire methods.	Inter conversion of Isometric to orthographic drawings and vice-versa. Related problems such as V blocks – simple stepped blocks, block	

			oriented by various machining operations etc.	
40.	Revision and Test	Revision and Test	-do-	Atmospheric pressure, pressure-gauge pressure & absolute pressure.
41	Introduction to milling machine, demonstration on working principle, setting of job, setting of cutter in arbor setting of vice on table.	Milling machine importance of milling machine, types and specification of milling machine, driving and feed mechanism of milling machine.	Inter conversion of isometric, oblique drawings to orthographic drawings and vice- versa. Related problems such as V- blocks, simple stepped blocks, block oriented by various machining operations etc.	
42	Step milling using side and face cutter- checking with micrometer.	Classification & different types of milling cutters & their use. Parts or nomenclature.	-do-	
43	Sequence of milling six faces of a solid block checking the accuracy with the help of trisquare	Vernier height gauge- construction, graduations vernier setting & reading, vernier bevel protractor, construction graduation-	Free hand sketch of sectional tools.	Arithmetical operations involving logarithms in the computations.

	scribing block and vernier height gauge.	setting and reading. Care and maintenance of vernier height gauge and bevel protractor.		
44	Straddle and gang milling operation including up-milling and down milling.	Different milling operations plain- face, angular, form, slot, gang, straddle and milling etc. Up and down milling.	Inter conversion of isometric, oblique drawing to orthographic drawings and vice-versa. Related problems such as V block simple stepped blocks, blocks oriented by various machining operations.	Problems related to trade using logarithm tables.
45	Milling concave and convex surfaces.	Different types of milling attachments and their uses.	Surface development of simple geometrical solids like cube, rectangular block, cone, pyramid, cylinder, prism etc.	Density of solid and liquids-simple experimental determination.
46	Introduction to indexing head types and setting and aligning of indexing head with reference to job on milling machine.	Indexing-introduction & types. Indexing head- constructional details, function of indexing plates and the sector arms. Calculation for various types of indexing.	-do-	Specific gravity principle of Archemedies.
47	Milling square and	-do-	-do-	Relation between

	hexagonal job by simple indexing method.			specific gravity and density. Simple experiment ion.
48	Milling dovetail and 'T' slots both male and female matching each other. Milling Rack (Helical)	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.	Interpenetration of solids and conventional application of intersection curves on drawings.	Geometry – Fundamental geometrical definitions angles and properties of angles, triangles and properties of triangles.
49	Milling of spur gear having even odd number of teeth.	Explain the importance and necessity of quality.	-do-	Pythagoras theorem, properties of similar triangles.
50.	Introduction to grinding machine cylindrical, surface grinder. Driving and feed mechanism, job holding devices-mounting of wheel.	Select of gear cutter type and form & various methods of checking gear and its parts.	Solution of NCVT Test paper (Preliminary)	Solution of NCVT test paper (Preliminary).
51.	Grinding of parallel and stepped jobs.	Grinding machine Introduction types, specification and use.	Revision	Revision
52.	Revision and test	Revision and Test	Test(Preliminary)	Test(Preliminary)

53.	Checking of alignment of lathe centers and their adjustments, Center drilling, step turning between centers recessing and chamfering & measurement with vernier caliper.	Turning of taper by taper turning attachment advantages and disadvantages taper calculations.	Revision of 1 <sup>st</sup> year topics.	Revision of 1 <sup>st</sup> year topics.
54.	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 ears-simple train and compound train-change gears for fractional pitches.	Revision of 1 <sup>st</sup> year topics.	Revision of 1 <sup>st</sup> year topics.
55.	<ol style="list-style-type: none"> <li>1. Cutting multi start V thread on lathe.</li> <li>2. Cutting key way broaches.</li> </ol>	Difference between single and multi start threads-their uses merits and demerits. Broach and its types, uses.	Screw thread their standard forms as per I.S. external and internal thread conventions on the features for drawings as per I.S.I.	Rectangle, square Rhombus, parallelograms etc. and their properties.
56.	Cutting ACME	Square thread its form and	-do-	Circle and properties

	threads (Male and female) on a lathe. Lead screw.	calculation of depth, core dia, pitch dia. Acme thread its forms use and calculations.		of Regular polygon.
57.	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.	Sketches for bolts, nuts, screw and other screw screwed members.	Applications of geometry to shop problems.
58.	Turning of irregular jobs using face plate.	Face plate- its construction safety precaution in holding jobs on slotting m/c. rotary table.	-do-	Heat & Temperature thermometric scale their conversions.
59.	Exercises on use of pillar drill in counter-sinking, drilling, counter boring. Spot facing and use of spot facing tools.	Pillar drill machine constructional details, functions of parts. Application of pillar drill.	Standard rivet forms as per ISI.	Temperature measuring instruments.
60.	Further practice of drilling on Radial drills.	Radial drills-function, parts etc. practice on reaming on drilled holes.	-do-	-do-
61.	Shaping key way on gears and	Special tools-use and precautions to be observed	Riveted joints.	Quantity of specific heat of solids, liquids

	pulley blocks.	for shaping internal keyways dovetails & 'T' slots.		& gears.
62.	'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.	Riveted joints butt.	Heat loss and heat gain with simple problem.
63.	Gross Dovetail cutting of shaper.	Cutting speed feed depth of cut for slotting, shaping and time calculation.	Sketches of keys, cutter & pin joint.	Mensurations, plain figures-triangles, square rectangles, parallelogram.
64.	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.	Sketches of keys, cotter and pin joints.	Plain figures-trapezium, regular polygons, circle, hollow circles.
65.	Shaping of casting, jobs using angle plate, jack and clamps. Machining of irregular shaped intricate casting.	Properties of metals-general idea of physical, mechanical properties of metals, colour weight, hardness, toughness, malleability, ductility their effect on machine ability.	Sketches for simple pipe unions with simple pipe line drawings.	Plain figures segment and sector of circle, ellipse fillets.



66.	Grinding of form tools and shaping of convex and concave surfaces.	Use of radius gauges and template. Introduction to jigs and fixtures.	-do-	Solid figures-prism, cylinder, pyramid, cone.
67.	Revision and Test.	Revision and Test.	Concept of preparation of assembly drawing and detailing simple assembly and their details of trade related tools/jobs/exercises with dimensions from the given sample or model. Tool pos for the lathe with screw and washer.	Solid figures-Frustum of cone sphere, spherical segment.
68.	Machining of curves on a slotting machine. Slotting of a double ended spanner.	-do-	Concept of preparation of assembly drawing and dovetailing. Simple assemblies and their details of trade related tools/jobs/exercises with the dimensions	Material weight and cost problems related to trade.

			from the given sample or models. Tool post for the lathe with washer and screw.	
69.	-do- Slotting internal & external operations.	-do-	Details and assembly of Vee blocks with clamps.	Trigonometry, Trigonometrical ratios use of trigono table.
70.	Machining of internal and spline external spline on slotter uses to match each other.	Introduction and their indexing process on a slotter by its rotary table graduations.	Details and assembly of Vee blocks with clamps.	Area of triangle by trigonometry.
71.	Cutting external and internal spur, gear on slotter use of rotary table.	Form tool for slotting machines. Calculation for spur gear in relation to graduation of circular table.	Details assembly of shaft and pulleys.	Finding height and distance by trigonometry.
72.	Slotting regular & irregular job and counters and sprockets.	Calculation for cutting sprocket.	-do-	Application of trigonometry to shop problems.
73.	Cutting reamer on milling m/c.	Reamer cal. & off-setting.	-do-	Application of trigonometry to shop problems.

74.	Milling Drill.	Cam-Introduction development and use.	Types of curves. How to draw?	Triangle of forces. Parallelogram of forces.
75.	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.	Details and assembly of simple coupling.	Composition and resolution of forces.
76.	Cutting a plate cam. With angular setting.	Cam-lobe, lead, setting of dividing head, Calculation.	-do-	Representation of forces by vectors. Simple problems on lifting tackles like jib cranes, wall cranes and solution of problem with the aid of vectors.
77.	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.	Details and assembly of a simple hand vice.	-do-
78.	-do-	-do-	-do-	-do-

79.	Setting and planning no. of casting jobs at a time.	Hydraulic transmission in machine tool-its advantages and application hydraulic system of a planner. Use of planer gauge for setting tool and template for profile checking.		
80.	Marking fabricated jobs & machining on a planer.	-do-	-do-	Simple problems on strength and crank lever.
81.	Grinding m/c. and its types. Abrasive and its types. Marking scheme of Grinding machine.	Combination set – its components and uses – outside and inside micrometer. Principle, construction graduation reading both in English and metric system gauge-types and uses.	-do-	Centre of gravity simple experimental determination stable-unstable and neutral equilibrium simple explanation.
82.	Milling tong and groove on a mating job. Checking with precision instruments and gauges.	-do-	Blue print reading simple exercises related to missing lines.	Friction-co-efficient of friction.
83.	Milling	Spiral introduction, type	-do-	Simple problem

	cylindrical cutter.	and elements. Difference between helix & spiral. R.H. and L.H. helix.		related to friction.
84.	Milling End mill/Drum cam.	Spiral-lead, helix angle and calculation.	Blue print reading simple exercises related to missing views.	Magnetic substances neutral and artificial magnets.
85.	Boring a casting job in a vertical milling machine.	Vertical milling machine its parts, construction, method of boring in a vertical milling. Different between horizontal and vertical milling machine.	-do-	Basic principle of electricity. Method of magnetization & uses of magnets.
86.	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.	Simple exercises related to missing symbols.	Basic principles of electricity.
87.	Milling hexagonal hole on a plate by attachment.	Elements of milling cutter Rake angle, primary, secondary and clearance angles, lead etc. Types of grinding machine.	-do-	Use of fuses, conductors switches, insulator etc.
88.	Milling spline	Introduction to broaching	Simple exercises	Simple electric

	(external) Milling straight listed Reamer.	methods of milling splines. Its calculations and selection of cutters and types of abrasive mfg. Process.	related to missing sections.	circuits. Simple calculations.
89.	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.	-do-	Ohm's law-simple calculations-electrical insulating materials.
90.	Milling a helical groove in a vertical milling machine. Mill a slab mill cutter.	Helical gear introduction elements and calculation.	Simple exercises to missing dimensions.	Graphs-Abscissa & ordinates, graphs of straight line, related to 2 sets of varying quantities.
91.	Milling helical gears.	Introduction to CNC Technology CNC M/c. principle advantages classification, drives, controls.	Hand drawing for indicating switches, buttons controls m/c. tool excess quadrant point value.	-do-
92.	Simple program and operating CNC M/c.	-do-	-do-	Further practice on logarithm.
93.	Cutting bevel	Introduction geometry and		Shop problems on

	gears on a milling machine by using bevel gear cutter.	uses of bevel gears.		estimation of material, time taken of material, time taken for machining a job elementary time and motion study.
94.	-do-	Quality control-types of variation, causes of variation, measurement of testing, gear & error.	Solution of N.C.V.T. Test Paper.	-do-
95.	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.	-do-	-do-
96.	Cutting worm and wheel on a milling machine, gashing and finishing.	Introduction, geometry and use of worm and worm wheel.	-do-	Shop problems on estimation of material, time taken for machining a job, elementary time and energy.
97.	-do-	Surface finish & texture, different errors, basic information on CNC machine & maintenance of CNC M/c.	-do-	Transmission of power by belt pulley and gear drive.

98.	Graduations of steel rule on milling machine. Use of trolley cutter.	Cam-types, application in modern m/c. tools, its special advantages, manufacturing process, calculation for milling a drum cam.	Solution of CNC paper.	-do-
99.	Milling a drum cam. Milling a plate cam.	Reamers, types and uses reamer milling calculations angles of cutter, no. of teeth, increment lead, gear ratio depth of cut etc. selection, setting of cutter.	Revision	Solution of NCVT papers.
100. & 101.	Milling a spiral reamer, milling an end mill cutter with helical teeth.	End mill cutter-types and uses, calculations, angle of cutter, depth of cut, backing off etc. Advantages of helical teeth over straight teeth. Life of a milling cutter.	Revision	-do-
102.	Milling side and face cutter (straight teeth) contouring on CNC Machine.	Side and face cutter types and uses. Its calculation setting of the job for cutting teeth on the face and at the side-tilting of single angle cutter for giving backing.	-do-	Revision
103.	Milling angle	Angle form cutters	Institute Test	Institute Test



	form cutters project work on CNC Trainer.	calculations specifications No. of teeth, bore size, outside dia, angles etc.		
104.	Revision	Revision	Institute Test	Institute Test

Sr. No.	Name of the tools & equipment as per the syllabus	No. of required for Instructor & Trainees for one Unit as per DGET Norms.
1	STEEL RULE 30 CM GRADUATED BOTH IN ENGLISH & METRIC UNITS	12
2	OUTSIDE SPRING CALIPER 150 MM	6
3	INSIDE SPRING CALIPER 150 MM	6
4	HEAMAPHRODITE CALIPER 150 MM	6
5	DIVIDER SPRING 150 MM	6
6	CENTRE PUNCH 100 MM	12
7	HAMMER B.P. 01.5 KG.	2
8	COMBINATION PLIER 150 MM	12
9	SAFETY GLASSES	12
10	FILE FLAT BASTARD 300 MM	12
11	FILE FLAT 2ND CUT 250 MM	12
12	ENGINEERS SCREW DRIVER	12
13	FILE FLAT SMOOTH 200 MM	12
14	COLD CHISEL FLAT 25*200 MM	12
	TOOLS, INSTRUMENTS AND GENERAL SHOP OUT FITS	
15	SURFACE PLATE 400 MM*400MM GRADE 1	1
16	TABLE FOR SURFACE PLATE 900*900*1200 MM	1
17	MAKING OFF TABLE 1200*1200*900 MM HIGH	1

18	SCRIBING BLOCK UNIVERSAL 300 MM	2
19	VEE BLOCK 100/7-80-A	2
20	TRY SQUARE 300 MM	2
21	OUTSIDE SPRING CALIPER 200 MM	2
22	DIVIDER SPRING 200 MM	2
23	INSIDE SPRING CALIPER 200 MM	2
24	STRAIGHT EDGE STEEL 1 METRE	1
25	STRAIGHT EDGE STEEL 500 METRE	1
26	STEEL TAPE 2 METRE IN CASE	1
27	STEEL RULE 60 CM GRADUATED BOTH IN ENGLISH AND METRIC UNITS.	2
28	SPIRIT LEVEL 2V 250, 05 METRE	1
29	HAMMER B.P. 800 GMS. WITH HANDLE	12
30	SCREW DRIVER, HEAVY DUTY 300 MM WITH HANDLE	4
31	HAMMER LEAD 1 KG.	2
32	COMBINATION SET 300 MM	1
33	SPINDLE BLADE SCREW DRIVER 100 MM	4
34	ALLEN HEXAGONAL KEYS 2.5 TO 12	2
35	SPANNER D1.E.G.P. SERIES 2	6
36	ADJUSTABLE SPANNER 300 MM	2
37	REDUCTION SLEEVE MORSE 1-1,3-1,4-1,4-2,5-1,5-2,6-1	2
38	ANGLE PLATE SIZE 200*100*175	2
39	ANGLE PLATE ADJUSTABLE 250*150*175	2
40	SOLID PARALLELS IN PAIRS (DIFFERINT SIZES) IN METRIC	12
41	OIL CANE PRESSURE FEED 500 MG.	6

42	OIL STONE 150*50*25 MM	2
43	MNUMBER DRILLS H.S.S. (PARALLEL SHANK)	1
44	DRILL (PARALLEL SHANK)	2
45	TWIST DRILLS 3 MM TO 13 MM (PARALLEL SHANK)	1
46	DRILL CHUCK 0.20 WITH TAPER SHANK	1
47	CENTRE DRILL A1 TO 5	2
48	GRINDING WHEEL DRESSER (DIAMOND)	2
49	GRINDING WHEEL DRESSER HUNTING TIME TYPE	2
50	CLAMPS C 100 MM	2
51	CLAMPS C 200 MM	2
52	TAP AND DIE SET IN BOX METRIC PITCH	1
53	DRILL HSS TAPER SHANK	2
54	FILE FLAT 2ND CUT 250 MM	4
55	FILE FLAR SMOOTH 200 MM	4
56	FILE H/R 2ND CUT 250 MM	4
57	FILE TRIANGULAR SMOOTH 200 MM	4
58	NEEDLE FILE SET	1
59	FILE SQUARE 2ND CUT 250 MM	4
60	REAMER 6 MM TO 25 MM BY 1 MM	1
61	REAMER ADJUSTABLE 10 MM TO 15 MM BY 75 MM	1
62	TOOLS BITS HSS 6 MM SQUARE	1
63	TOOLS BITS HSS 10 MM SQUARE	1
64	TOOLS BIT HOLDER (AMSTRONG) L.H.	4
65	TOOLS BIT HOLDER (AMSTRONG) R.H.	4

66	ASSORTED TOOLS FOR LATHE, SHAPER, SLOTTER & PLANNER OF DIFFERENT SHAPES AND SIZES	
67	HACKSAW FRAME ADJUSTABLE 250-300 MM WITH BLADES	2
68	TABLE CHUCK 75 MM JAW SWIVEL BASE	1
69	MACHINE VICE 200 MM SWIVEL BASE	4
70	MACHINE VICE 160 MM SWIVEL BASE	2
71	HAND VICE 50 MM JAW	2
72	RADIUS TRUING ATTACHMENT	1
73	ANGLE TRUING ATTACHMENT	1
74	COMPOUND ANGLE VICE (STANDARD SINE)	1
75	UNIVERSAL VICE	1
76	UNIVERSAL TABLE ANGLE PLATE	1
77	TAPER SHANK TWIST DRILL SET 6.30 MM * 1.5 MM TO SUIT RADIAL DRILLING MACHINE	1
78	SHAPER TOOL HOLDER TURRET TYPE	2
79	BASE CHUCK FOR SLOTTER	1
80	SHAPER INDEXING CENTRE	1
81	KNURLING TOOLS (SET OF 3) STRAIGHT AND DIAMOND	1
82	PLIER CUTTING 200 MM	2
83	MAGNIFYING GLASS 75 MM	2
84	CARBIDE TIPPED TOOLS OF DIFFERINT SIZES AND SHAPES (THROW AWAY TIPS)	2
85	HANDS HAMMER 1 KG. WITH HANDIE	2
	MILLING CUTTERS	
1	CYLINDRICAL CUTTER 63*90 BORE DIA.	3

2	CYLINDRICAL CUTTER 80*90 BORE DIA.	3
3	SIDE AND FACE CUTTER B 80*8	2
4	SIDE AND FACE CUTTER B 160*10	3
5	SIDE AND FACE CUTTER B 100*12	2
6	SIDE AND FACE CUTTER B 160*16	2
7	SIDE AND FACE CUTTER A 200*20	3
8	SIDE AND FACE CUTTER A 100*10	2
9	EQUAL ANGLE CUTTER 45 <sup>0</sup> /100	2
10	EQUAL ANGLE CUTTER 60 <sup>0</sup> /100	2
11	EQUAL ANGLE CUTTER 90 <sup>0</sup> /100	2
12	DOUBLE ANGLE UNEQUAL CUTTER 50*12*55 <sup>0</sup>	2
13	DOUBLE ANGLE UNEQUAL CUTTER 63*18*60 <sup>0</sup>	2
14	DOUBLE ANGLE UNEQUAL CUTTER 80*32*70 <sup>0</sup>	2
15	DOUBLE ANGLE UNEQUAL CUTTER 100*36*75 <sup>0</sup>	1
16	SINGLE ANGLE CUTTER 63*18*45 <sup>0</sup> RH	1
17	SINGLE ANGLE CUTTER 63*18*45 <sup>0</sup> LH	1
18	SINGLE ANGLE CUTTER 63*18*60 <sup>0</sup> RH	1
19	SINGLE ANGLE CUTTER 63*18*60 <sup>0</sup> LH	2
	MEASURING INSTRUMENTS	
1	MICROMETER OUTSIDE 0-25 MM	4
2	MICROMETER OUTSIDE 25-50 MM	2
3	MICROMETER OUTSIDE 50-75 MM	1
4	MICROMETER DEPTH GAUGE 0-200 MM	1
5	DIRECT READING VERNIER CALIPER B 300 (DIRECT READING WITH DIAL)	1

6	VERNIER HEIGH GAUGE 250 MM	1
7	VERNIER GEAR TOOTH CALIPER	1
8	VERNIER BEVEL PROTRACTOR WITH 150 MM BLADE	1
9	BEVEL GAUGE 200 MM	1
10	TELESCOPIC GAUGE 13 MM TO 300 MM	1
11	SINE BAR 200 MM	1
12	COMPOUND DIAL GAUGE WITH STAND (METRIC)	1
13	DIAL TEST INDICATOR WITH MAGNETIC GAUGE TYPE 1 GRADE A WITH MAGNETIC BASE	1
14	CENTRE GAUGE 60 <sup>0</sup>	1
15	SLIP GAUGE SET (NORMAL SET) METRIC (FOR THE WHOLE INSTITUTE)	1
16	SCREW PITCH GAUGE FOR METRIC PITCHES (25-6 MM)	2
17	RADIUS GAUGE METRIC SET (1-6 MM)	1
18	LIMIT PLUG GAUGE 5 MM TO 25 MM BY 2.5 MM (GO & NO GO)	1
19	RING GAUGES 5 MM TO 25 MM BY 2.5 MM (GO & NO GO)	1
20	TAPER GAUGE M.T.NO. 1,2,3,4 & 5	1
21	FEELER GAUGE	1
22	PLANER GAUGE STANDARD SIZE	1
23	STEEL LOCKERS FOR 12 TRAINEES	1
24	STEEL CHAIR FOR INSTRUCTOR	1
25	STEEL TABLE FOR INSTRUCTOR	1
26	WORKBENCH FOR FITTERS WITH TWO VICES OF 100 MM JAW	1
27	STEEL CUP BOARD 180*90*45 MM	1
28	STEEL CUP BOARD 120*60*45 CM	1

29	BLACK BOARD WITH EASEL	1
30	FIRST AID BOX	1
	GENERAL INSTALLATION	
1	SHAPING MACHINE 450 MM STROKE (MOTORISED) WITH ALL ATTACHMENTS	2
2	SHAPING MACHINE 315 MM STROKE (HYDRAULIC) WITH ALL ATTACHMENTS	1
3	DOUBLE COLUMN PLANER 1500*1000*1000 (MOTORISED) WITH ALL ATTACHMENTS	1
4	SLOTTER 180 MM STROKE (MOTORISED) WITH ALL ATTACHMENTS	1
5	LATHE GENERAL PURPOSES ALL GEARED HEIGHT OF CENTRES 150 MM TO BELOW BETWEEN CENTRES 150 MM SUPPLIED WITH 3 JAW & 4 JAW CHUCK, FACE PLATE, TAPER TURNING ATTACHMENT STEADIES ECT. AND SET OF LATHE TOOL.	3
6	TOOL & CUTTER GRINDER 250 MM TO ADMIT 450 MM BETWEEN CENTRE-FULLY MOTORISED WORK HEAD SUPPLIED WITH TOOL REST OF DIFFERENT TYPES TABLE CLAMPS AND OTHER ATTACHMENTS.	1
7	DRILLING MACHINE PILLAR 20 MM CAPACITY	1
8	RADIAL DRILL 1200 MM AREA MOTORISED WITH TAPPING ATTACHMENT	1
9	SILICON CARBIDE GRINDER FOR CARBIDE TIPPER TOOLS	1
10	MILLING MACHINE UNIVERSAL HORIZONTAL (MOTORISED) NO. 1 WITH ALL ATTACHMENTS SUCH AS- (A) UNIVERSAL HEAD (B) VERTICAL HEAD (C) SLOOTTING ATTACHMENT (D) RACK CUTTING ATTACHMENT (E) ROTARY TABLE (F) DIVIDING HEAD (G) ADAPTORS, ARBORS AND COLLECTS ECT. FOR STRAIGHT SHANK AND	1



	MILL FROM 3 MM TO 30 MM	
11	MILLING MACHINE UNIVERSAL HORIZONTAL NO. ZERO WITH ALL ATTACHMENTS	1
12	MILLING MACHINE PLAIN TYPE HORIZONTAL (MOTORISED) NO. 2 WITH ALL ATTACHMENTS	1
13	MILLING MACHINE VERTICAL NO. 1 (MOTORISED) WITH ALL ATTACHMENTS	1
14	SURFACE GRINDING MACHINE WHEEL DIA 180 MM (OR NEAR) RECIPROCATING TABLE, LONGITUDINAL TABLE TRAVERSE 200 MM (OR NEAR) FITTER WITH ADJUSTABLE TRAVERSE STOP. FULL MOTORISED SUPPLIED WITH MAGNETIC CHUCK 250 MM*120 MM DIAMOND TOOL HOLDER SET OF SPANNER, GREASE GUN ECT.	1
15	CYLINDRICAL GRINDER	1
16	C.N.C. MILLING TRAINER	1
17	C.N.C. CUTTING TOOL	2
18	VOLTAGE STABILISER	1
19	V.C.P.	1
20	COLOUR +'1' MONITOR	1
21	CASSETTE TAPERECORDER	1