

MAHARASHTRA STATE BOARD OF VOCATIONAL EDUCATION EXAMINATION, MUMBAI - 51

1	Name of Course	Diploma Course in Turner									
2	Course Code	303412									
3	Max no. of Students	25									
4	Duration	2 Year									
5	Course Type	Full Time									
6	No. of Days per week	6 days									
7	No. of hours per day	7 Hrs									
8	Space require	Theory Class Room – 200 sqft, Lab Sub.– 1500 sqft, Lab Elective - 400 sqft Total = 2100 Sq.Ft.									
9	Entry qualification	SSC Pass									
10	Objective of syllabus	Able to perform the lathe tool grinding , parallel turning, Stepped turning and boring , threads cutting , gear calculation, thread fitting operation etc. Able to perform the Taper matching tungsten carbide tool grinding, stepped boring and fillings, boring with tool makers’s button, different thread cutting, crank shaft turning , angle and face plate work, taper thread cutting – simple capstan operation etc.To Understanding m/c Drawing, To Prepare Drawing using CAD, Awareness of Safety precautions									
11	Employment opportunities	The student can get jobs in industries or with working experience will be in a position to start his own independent Business.									
12	Teachers Qualification	1) For Vocational subject - B.E.Mech. 2) For Non Vocational Subject - Master Degree in Concern subject									
13	Teaching Scheme –										
	Sr.	Subject	Subject Code	Clock Hours / Week				Total			
				Theory	Practical						
	1	English (Communication Skill)	90000001	2 Hrs	1 Hrs			3 Hrs			
	2	Elective – I		2 Hrs	1 Hrs			3 Hrs			
	3	Elective – II		2 Hrs	1 Hrs			3 Hrs			
	4	Mechanical Technology and Material Science	30340001	3 Hrs	8 Hrs			11 Hrs			
	5	Machine Drawing and CAD	30340004	3 Hrs	8 Hrs			11 Hrs			
	6	Theory & practice of Turning	30340021	3 Hrs	8 Hrs			11 Hrs			
	Total								42 Hrs		
14	Internship	Two Months Summer Internship from 1 st May to 30 th June is Compulsory.									
15	Examination Scheme – Final Examination will be based on syllabus of both years.										
	Paper	Subject	Subject Code	Theory			Practical		Total		
				Duration	Max	Min	Duration	Max	Min	Max	Min
	1	English (Communication Skill)	90000001	3 Hrs	70	25	3 Hrs	30	15	100	40
	2	Elective – I		3 Hrs	70	25	3 Hrs	30	15	100	40
	3	Elective – II		3 Hrs	70	25	3 Hrs	30	15	100	40
	4	Mechanical Technology and Material Science	30340001	3 Hrs	100	35	3 Hrs	100	50	200	85
	5	Machine Drawing and CAD	30340004	3 Hrs	100	35	3 Hrs	100	50	200	85
	6	Theory & practice of Turning	30340021	3 Hrs	100	35	3 Hrs	100	50	200	85
										900	375
16	Teachers – Three Teachers per batch for vocational component. For English, Elective-I & II guest faculty on clock hour basis.										
17	a) For Elective I – Student can choose any one subject Code Subject Name 90000011 Applied Mathematics 90000012 Business Economics 90000013 Physical Biology (Botany & Zoology) 90000014 Entrepreneurship 90000015 Psychology						b) For Elective II – Student can choose any one subject Code Subject Name 90000021 Applied Sciences (Physics & Chemistry) 90000022 Computer Application 90000023 Business Mathematics				

Subject Name - **Mechanical Technology and Material Science**

Subject Code - 30340001

Theory – 1st year	Practical – 1st year
1] Fundamental of material <ul style="list-style-type: none"><input type="checkbox"/> Introduction of metals and non metals<input type="checkbox"/> Structure of metal<input type="checkbox"/> Formation of grain<input type="checkbox"/> Imperfection in crystals<input type="checkbox"/> Deformation in metal and change in properties<input type="checkbox"/> Fracture<input type="checkbox"/> Equilibrium diagram<input type="checkbox"/> Iron, carbon equilibrium diagram<input type="checkbox"/> Time temperature transformation diagrams	1. Take the tensile test of M.S. specimen & Draw stress strain diagram, yield pts.
2 Ferrous metals and alloys <ul style="list-style-type: none"><input type="checkbox"/> Pig iron and cast iron<input type="checkbox"/> Effect of chemical elements on iron<input type="checkbox"/> Classification of steel and its application<input type="checkbox"/> Alloy steel and special alloy steel 3 Non Ferrous metals and alloys <p>Introduction to non ferrous alloys</p> <ul style="list-style-type: none"><input type="checkbox"/> Aluminum and its alloys<input type="checkbox"/> Copper and its alloys<input type="checkbox"/> Lead and its alloys<input type="checkbox"/> Nickel and its alloys<input type="checkbox"/> Alloys for high temperature service	2. Study the mechanical properties like Elasticity, ductility, malleability, Brittleness, toughness of Different materials – M.S., C.S. Bronze, Copper, Aluminum Study the Hardness test <ul style="list-style-type: none"><input type="checkbox"/> Brinell Hardness test<input type="checkbox"/> Rockwell hardness test

<p><input type="checkbox"/> Metal for nuclear energy</p> <p>4 Crystal Structures</p> <p><input type="checkbox"/> Fundamental concept</p> <p><input type="checkbox"/> Unit Cells</p> <p><input type="checkbox"/> Metallic crystal structures</p> <p><input type="checkbox"/> FCC Structure</p> <p><input type="checkbox"/> BCC Structure</p> <p><input type="checkbox"/> HCP Structure</p> <p><input type="checkbox"/> Weld ability</p> <p>5 Properties of Metal</p> <p><input type="checkbox"/> Mechanical properties of Metal</p> <p>Elasticity, ductility, malleability, brittleness, Toughness, Stress strain behavior, Elastic limit, hooks Law, UTS, poisons ratio, factor of safety, hardness and hardness tests shear strength, resistance.</p> <p><input type="checkbox"/> Electrical properties of Metal</p> <p>Electrical conductivity, resistivity, electrical Characteristic of commercial alloys</p>	
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Theory – 1 st year	Practical – 1 st year
<p><input type="checkbox"/> Thermal properties of metal</p> <p>Heat capacity, thermal expansion, thermal Conductivity, thermal stress</p> <p>6 <input type="checkbox"/> Magnetic Properties of metal</p> <p>Basic concepts, diamagnetism and Para magnetism, ferromagnetism, influence of temperature on magnetic behavior, domain and hysteresis, soft and hard magnetic material.</p> <p>7 Heat Treatment of material</p> <p><input type="checkbox"/> Normalizing</p> <p><input type="checkbox"/> Hardening</p> <p><input type="checkbox"/> Quenching and tempering</p> <p><input type="checkbox"/> Annealing</p> <p><input type="checkbox"/> Stress Relieving</p> <p><input type="checkbox"/> Case carburizing and case hardening.</p> <p><input type="checkbox"/> Toughening</p> <p>Weld ability of Metal definition and concept Effect of alloying elements on weld ability Purpose and types of weld ability tests</p>	<p>3. Study the Electrical Properties of some conductors (conductivity, Resistivity) Aluminum, Copper, Brass, Tungsten</p>
<p>8 Cracking phenomena in steel</p> <p><input type="checkbox"/> Cold crack due to hydrogen</p> <p><input type="checkbox"/> Hydrogen cracking</p> <p><input type="checkbox"/> Measurement and control of hydrogen in the deposited weld metal</p> <p><input type="checkbox"/> Cracking mechanism in the weld metal and HAZ</p> <p><input type="checkbox"/> Weld decay</p> <p><input type="checkbox"/> Lamellar tearing</p> <p><input type="checkbox"/> Hot cracking</p> <p><input type="checkbox"/> Reheat cracking</p>	<p>4. Study the effect on materials with heat treatment Normalizing, Hardening, Quenching & Tempering Annealing, Stress Relieving, Case Hardening, Toughening For Different Material's M.S., C.S., Nickel, Copper</p>

Theory – 2 nd year	Practical – 2 nd year
<p>1 Bench work and fitting</p> <p>Introduction- Vices – Hammers- Chisels-</p> <p>Chipping- Files- Filing- Scraper-Scraping- Grinding and Polishing- Hacksaw sawing- Marking tools – Surface plate- Scriber – Punch- V block- Angle plate- Try square – Marking out –</p> <p>Drill- Drilling- Reamer- Reaming- Taps- Tap drill size-Tapping – Dies and stock- Dieing.</p> <p>2 Sheet Metal Work</p> <p>Introduction – Metal used in sheet metal work-</p> <p>Sheet metal hand tools- Sheet metal operation-Sheet metal joint- Hems and Sems – Sheet metal allowance- Sheet Metal working</p> <p>machine-Laying out a pattern</p> <p>3 Plumbing, Threading, Fasteners & joints</p> <p>Plumbing- Specifications of pipes- Material used</p> <p>for pipes-Pipe fitting & Joints-Taps & valves – Plumber tools – Threaded fasteners- screw threads and their uses- Indian standard</p> <p>threads-Cap screw and machine screw-Set screw- Methods of producing screw threads- Bolts- Studs- Forms of nuts- Riveting joints.</p> <p>4 Smithy and Forging</p> <p>Maintenance and application of smith health- Anvil- Swage block-Tongs-Hammer-Flatters- Measuring tools e.g.-Try square- Steel rules- Calipers-Operations e.g. up setting- drawing down- bending setting- forge welding.</p> <p>5 Welding Technology</p> <p>Welding Welding introduction to different</p>	<p>Fitting</p> <p>1. Filing Flat surfaces:</p> <p>Checking flatness and square ness using a try square –</p> <p>Types of filing – Cleaning files.</p> <p>2. Chipping: Hints on chipping</p> <p>3. Hack sawing: Selection of blades for different metal sections - Fix hack</p> <p>sawing the material for the job blades maintaining. Correct tension and</p> <p>direction – Hack sawing. Filing ‘V groove and complex profile by file &</p> <p>check with profile gauge.</p> <p>4. Filing radius –check with radius gauge</p> <p>5. Check profile with profile gauges.</p> <p>6. Drill plate, Drilling, counter sinking, counter boring. Operations on job</p> <p>7. Drilling and Tapping: Internal threading of holes by using hand taps –</p> <p>determine the tap drill size, drilling, counter-sinking and tapping –</p> <p>precautions with tapping a blind hole.</p> <p>8. External thread cutting using die.</p>

<p>welding processes, like gas Welding, ARC welding TIG, MIG, submerged arc welding, spot Welding, electrodes etc. Brazing methods & application, Knowledge of welding skills.</p> <p>6 Metal Turning (Lathe)</p> <p>6.1 Function of lathe, Types of lathe, the size of lathe, Descriptions & function of lathe parts,</p> <p>6.2 Lathe accessories and attachments.</p> <p>6.3 Operation on Lathe</p> <p>6.4 Cutting Tools, Classification , Influence of tool angles.</p> <p>6.5 Types of tools, cutting speed, Feed, Depth of cut,</p> <p>6.6 Machining time. Cutting tool signature.</p>	
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Theory – 2 nd year	Practical – 2 nd year
<p>7 DRILLING</p> <p>Introduction Types of drilling machine, Portable drilling machine, Sensitive drilling machine. Upright drilling machine, Radial Drilling Machine; Gang drilling machine, Multiple spindle drilling machine Automatic drilling machine, Deep hole drilling machine; The size of a drilling machine, Upright drilling machine parts. Radial drilling machine parts, Work holding devices, Tool holding devices, Drilling machine operation, Drilling machine tools.</p> <p>Twist drill nomenclature. Drill size Designation of drill material Reamer, reamer nomenclatures. Counter bore, Countersinks and spot face, Taps. Tap nomenclatures. Cutting speed Feed, Depth of cut, Machining time in drilling</p>	<p>Basic Workshop Practice</p> <ol style="list-style-type: none"> 1. Step turning and Radius forming: Free hand form turning – by using form tool. 2. Drilling and Boring-Use of inside caliper and outside Micrometer for bore measurement. 3. Drilling and reaming: by hand-Method of checking the bore With a plug gauge. 4. Drilling and step Boring: Boring blind hole with a boring tool.
<p>8 SHAPER</p> <p>Introduction. Types of shapers. Principal parts. Shaper size; Shaper mechanism; Work holding devices. Shaper operations. Shaper tools; Cutting speed, feed and depth of cut; Machining time.</p> <p>9 SLOTTING</p> <p>Introduction. Types of slotting machine; Slotter size; Slotting machine parts; Work holding devices; Slotter operation; Slotter tools; Cutting speed, feed and depth of cut.</p>	<ol style="list-style-type: none"> 5. Drilling, Boring and Recessing: Internal recessing to a size broader than the width tool – Form a recess. 6. Shaping blind & open keyways on shaping machine 7. Shaping irregular surfaces.(Concave / Convex)
<p>Powder Metallurgy</p> <p>Introduction- Process Description- Manufacture of metal powder- Blending of powders- competing profiteering- Sintering- Secondary operation –ISO Static pressing – Product of powder metallurgy-Advantages of process – Disadvantages and limitation-Design considerations Introduction to CNC</p>	<ol style="list-style-type: none"> 8. Slotting internal grooves on slotting machine 9. Welding Practical-fusion run with/without filler rod on MS Sheet – squire butt joint on MS sheet LAP,T& Edge joint on M.S. Sheet

List of Books

- 1 M. N. Uppal A Text - book of engineering Chemistry
- 2 V. P. Mehta A Text - book of polytechnic Chemistry
- 3 Banswal, Mahajan and Mehta A Text - book of, Applied Chemistry
- 4 Hazra Choudhary Elements, of workshop technology
- 5 S.K.Hajra Choudhary Elements of workshop technology Vol-I First 1964 Media promoters & Publisher pvt. Ltd.
- 6 Mahajan Mechanical Technology Third 1989 Vrinda publication

Sr. No. Name of the equipment/ machinery NOS.

1	TRAINEES TOOL KIT	5
2	Try Square 10 cm Blade	5
3	Calipers outside 15 cm spring	5
4	Caliper inside 15 cm spring	5
5	Dividers 15 cm Spring	5
6	Calipers 15 cm Hermaphrodite	5
7	Scriber 15 cm	5
8	Punch center 10 cm	5
9	Screw driver 15 cm	5
10	Chisel cold 20 cm	5
11	Trammel 30 cm	5
12	Hammer ball peen 0.5 kg with handle	5
13	Hammer Mallet	5
14	Hammer Plastic	5
15	Hammer ball peen 0.5 kg with handle	5
16	File flat 25 cm second cut	5
17	File flat 25 cm second cut	5
18	Hacksaw frame adjustable 20-30 cm	5
19	Dot slot punch	5
20	Steel rule 15 cm English and metric	5

21	Steel rule 30 cm English and metric	5
22	Try square 20 cm Blade	5
23	Steel tool box	5
24	Scriber	5
25	Lock and keys	5
26	Combination plier	5
27	Jenny calipers	5
28	Aluminum tray 15 cm X 10 cm	5
29	Fellow polish cloth standard size	5

	SHOP OUTFIT & MEASURING INSTRUMENTS	
30	Straight edge 45 cm X 45 cm	1
31	Marking table 90X90 cm	1
32	Surface plate 45 cm X 45 cm	1
33	Vee Block pair 7 cm and 15 cm with clamps	1
34	Angle plate 10 X 20cm	1
35	Number Punch 3 mm set	2
36	letter Punch 3 mm set	2
37	Round punch 3 mm X 4 mm set of 2	2
38	File flat 20 cm bastard	2
39	Oil Stone 15 X 5 cm X 2.5 cm	
40	Spanner adjustable 10 cm	1
41	Chisel cold 20 cm cross cut	2
42	Chisel 10 cm flat	2
43	Drill twist 1.5 mm to 15mm (various sizes) by 0.5	2
44	Files assorted sizes and type including safe edge	10
45	Micrometer inside 50-150 mm with screen	2
46	Bench Vice 12 cm jaw	5
47	Work Bench 240 X 120 60 mm with screen	3
48	Drill point angle gauge	1
49	Vernier Calipers 20 cm	2
50	Vernier height gauge 30 cm	1
51	Huntington and diamond dresser	1
52	Taps and dies complete set (metric)	2 set
53	Hacksaw frame	5
54	Fire buckets with stand	1
55	Thread pitch gauge metric, BSX, BSF, MC, MF & SAE	1 each
56	D.E. spanner ser of 12 metric 6 mm to 32 mm	1 set
57	Ring spanner set at 12 metric 6 mm to 32	1 set

58	Stud extractor set of 3	1 set
59	Universal puller for removing pulleys, bearings	1 set
60	Unserviceable engine/gear box rear axle	1
61	Stud remover with socket handle	1
62	Combination pliers 15 cm	5
63	Depth guage (inch and metric	1
64	Screw pinch gauge (inch and metric)	1 set
65	Feeler gauge 20 blades (inch and metric)	1
66	Aluminum tray 45 X 30 mm	5
67	Oil can 0.5 liter capacity	1
68	Surface gauge	1
69	Cylinder bore gauge (mercer)	1
70	Telescopic gauge	1
71	Steel measuring tape 10 meter in a case	2
72	Sets of Morse socket MT 0-1,1-2,and 2-3	1 set
73	Blow lamp	1
74	Torque wrenches 5-35 Nm,12-68 Nm&50-225 Nm.	1 each
75	Outside micrometer English 0-1,1-2,2-3,3-4,4-5,And 5-6 inches	1 each
76	Micrometer outside 1 to 25 mm,25mmto 50mm ,50 to75 mm,75 to100mm,100 to 125mm,125 to 150mm.	1
77	Surface gauge with dial test indicator plunger type i.e. 0.01 mm	1
78	Printed wall chart framed for display showing measuring instruments.	10
79	Inside micrometer English 2" to 6" with extension road	1
80	Vernier bevel protractor (metric and inch)	1
81	Vernier calipers (inch and metric) 6"x12"	1
82	Vernier micrometers(inch and metric)	1
83	Vernier height gauge 150 mm height (inch and metric)	1
84	Dial micrometer (inch and metric)	1
85	Small bore gauge (standard)	1
86	Dial test indicator to read (inch an metric)0.02mm	1

	GENERAL INSTALLATION /MACHINERIES	
87	Radial Drilling Machine 25mm capacity	1
88	Power Hacksaw	1
89	Rotary Cut off Machine	1
90	Shaping machine	1
91	Hydraulic Press 2 ton capacity	1
92	Surface plate (small)	1
93	Surface plate (big)	1
94	Standard Arc Welding machine	1
95	Horizontal milling machine	1
96	Bench Drilling machine 6-12mm cap Motorized with chuck and key	1
97	Grinding machine (general purpose)D.E. pedestal with 300mm dia wheels rough and smooth	1
98	Hydraulic Trainer with Power pack	1
99	Pneumatic Trainer	1
	Workshop furniture	
100	Suitable Work Tables with vices As required	1
101	Stools 25 Nos	25
102	Tool Cabinet 2 nos	2
103	Trainees locker 2 nos	2
104	Fire fighting equipment , first aid box etc As required	1
105	Book shelf (glass panel) 1 nos	1
106	Storage Rack As required	2
107	Storage shelf As required	2

Subject Name - Machine Drawing and CAD

Subject Code - 30340004

Theory – 1 st year	Practical – 1 st year
<p>1 INTRODUCTION OF DRAWING</p> <p>Use of different drawing instruments, equipments & Drafting Techniques, Types of letters, conventions of line, Scales; plane scale and diagonal scales.</p> <p>2 CURVES & TANGENTIAL EXERCISES</p> <p>To draw an ellipse by</p> <ol style="list-style-type: none">1. Arcs of circle method2. Concentric circle Method3. Rectangle / oblong method; <p>To draw a parabola by</p> <ol style="list-style-type: none">1. Director focus method2. Rectangle method; <p>To draw hyperbola</p> <ol style="list-style-type: none">1. Transverse axis and focus Method2. Passing Through a given point; <p>To draw an Involute of</p> <ol style="list-style-type: none">1. A polygon (up to Hexagon)2. A circle. To draw a cycloid, epicycloid & hypocycloid. <p>3 ORTHOGRAPHIC PROJECTIONS</p> <p>Introduction to orthographic projections, first and third angle Method of projection, conversion of simple pictorial view into Orthographic view Dimensioning technique</p>	<p>PRACTICAL</p> <p>1. Practice: Layout of drawing sheet</p> <p>Types of lines – Thickness, shade of lines and its General applications. Practice: Draw type of lines as per IS-70714-1983</p> <p>Type of Angle, Triangles and their types.</p> <p>Dimensioning- Types of dimension, elements of dimensions, Methods of indicating</p> <p>Values, Arrangement and indication of dimensions.</p> <p>Place dimensions in the drawing by aligned system and unidirectional system, Give dimension to the given drawing by following dimensioning principles as per BIS Method of dimension common features</p> <p>Geometrical construction using drawing instruments-Lines, Angles, patterns, Circle, Arc, Tangents, Triangles, Quadrilaterals, Regular Polygons. Different type of Tapers, Related Exercise on this topic.</p> <p>1. Practice: Construct square, rectangle, parallelogram, rhombus, trapezium and quadrilateral</p> <p>2. Practice: Draw a regular pentagon by circumscribing & inscribing</p> <p>3. Practice: Draw a regular hexagon by arc method</p> <p>4. Practice: Draw a regular pentagon, octagon and various types of tapers</p> <p>5. Free hand sketching of straight lines, rectangular, circles, squares, Polygons,</p>

<p>4 SECTIONAL VIEWS</p> <p>Conversion of given pictorial view into sectional orthographic views.</p> <p>5 ORTHOGRAPHIC VIEWS</p> <p>Isometric scale and views of simple objects; isometric views of Rectangular, cylindrical objects and Representations of slots on Sloping faces.</p> <p>6 PROJECTIONS OF LINES</p> <p>Projections of solids- prism, prism, cone, cylinder, Tetrahedron; axis Inclined to one reference plane only.</p> <p>7 SECTION OF SOLIDS</p> <p>Sections of the solids-prism, pyramid, cone, cylinder, Solids resting on their bases on the Ground Section plane is inclined to one Reference plane and perpendicular to other</p>	<p>ellipse.</p> <p>6. Practice: Prepare proportionate free hand sketches of plane figures</p> <p>7. Practice: Sketch horizontal, vertical and inclined line by free hand, Draw circles by free hand using square and radial line method, Draw arcs and ellipse by free hand</p> <p>Orthographic projection I and III angle – Simple machine elements, Procedure for preparing a scale drawing.</p> <p>8. Practice: Draw a plan, elevation and side view of prism and cylinder, cone and pyramids</p> <p>9. Practice: Draw 1st angle and 3rd angle projection (i) Front View (ii) Top view and (iii) side view of object having stepped blocks with curved surfaces – simple machine elements. Drawing Isometric views out of orthographic views – Simple Machine Elements</p> <p>10. Practice: Construct an isometric scales to a given length</p>
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<p>8 CONVENTIONAL REPRESENTATION</p> <p>Introduction; Conventional Representation of Material; Conventional breaks, Machine components such as splined shaft; bearings, slotted heads, raced & pinion, Internal & External Threading, Springs, Gears, Pipe fitting & pipe joint, Welded joint; Practice Drawing of all type of Conventions in the sketch book.</p> <p>9 LIMIT FITS & TOLERANCES</p> <p>Process Tolerance, Machining symbol, Induction of machining Symbol, Indication of surface roughness characteristics, symbol for direction of lay; Induction of machine allowance, position of Specification of surface roughness, Indication of drawing, Introduction of dimensional; Tolerances Element of Interchangeable system, Tolerance; Fundamental tolerance, Calculation of limit size, Method of specifying dimensions of fit, limit & Tolerance, Geometrical Tolerance, form tolerance, Position Tolerance, Indication of Geometrical Tolerance; types of geometrical Tolerance.</p>	<p>11. Practice: Draw the isometric projection of cube, hexagonal prism, cylinder and cone</p> <p>12. Practice: Draw the isometric view of the objects/blocks/solids with curved surfaces</p> <p>Missing lines and views.</p> <p>13. Practice: Visualize the shape of the object from the given two views and add the third</p> <p>views – simple machine elements</p> <p>14. Practice: Identify the lines missed in multi views and supply them. Identify at least five shapes satisfying a given view.</p> <p>One problem on each projection of lines and plane are to be drawn in A-3 size sketch book.</p> <p>15. Identify the third view for the given two views of similar in shapes and size.</p> <p>Development of regular objects bounded by plane surfaces-cube, prisms, cylinder and cones.</p> <p>16. Practice: Draw the development of surfaces of a cube and prism</p> <p>17. Practice: Draw the development of surfaces of a cylinder and cones</p> <p>Explanations of full – sectional view, half-sectional view, aligned sections.</p>
<p>10</p> <p>PRODUCTION DRAWING</p> <p>Introduction, need, scope; Production drawing procedure,</p> <p>Production drawing for, Nut & Bolt, Spur gear, Fly – cotter joint Wheel, V belt pulley.</p>	<p>18. Practice: Draw full and half sectional view of simple machine elements. Conventions and symbols used in drawing, Abbreviations used in engineering drawing, surface finish symbols, Welding symbols and Annotations.</p> <p>19. Practice: Draw surface finish symbols, Welding symbols and Annotations.</p> <p>Machining symbol, Induction of machining Symbol, Indication of surface roughness characteristics,</p> <p>symbol for direction of lay; Induction of machine allowance, position of Specification</p>

	<p>of</p> <p>surface roughness, Indication of drawing, Blue print reading of various Engineering drawing and Machine drawing.</p> <p>20. Practice: Blue print reading of Engineering Drawings and Machine drawing.</p> <p>Introduction to free hand sketching of machine parts. Tracing and printing of drawing.</p> <p>Introduction to Auto CAD, 3D modeling concept.</p> <p>21. Practice: Draw the elevation, plan and the side view of Nut & Bolt, Spur gear, and Fly cotter joint Wheel, V belt pulley.</p>
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Machine Drawing and CAD – 2nd Year

Theory	Practical
A] Computer Fundamental	
1] Fundamentals Of Computer Introduction Components of PC The system Unit Front part of system Unit Back part of system Unit CPU Memory of computer Monitor Mouse, Keyboard Disk, Printer, Scanner, Modem, Video, Sound cards, Speakers	List of Practical 1. Working with Windows 2000 desktop ,start icon, taskbar, Recycle Bin, My Computer icon ,The Recycle Bin and deleted files Creating shortcuts on the desktop 2. The Windows 2000 accessories, WordPad – editing an existing document, Use of Paint – drawing tools The Calculator, Clock 3. The Windows Explorer window, concept of drives, folders and files? Folder selection techniques, Switching drives, Folder creation, Moving or copying files, Renaming, Deleting files ,and folders 4. Printing, Installing a printer driver, Setting up a printer, Default and installed printers, Controlling print queues, Viewing installed fonts, The clipboard and 'drag and drop', Basic clipboard concepts Linking vs. embedding,
2] Introduction To Windows 2000/Xp Working with window Desktop Components of window Menu bar option Starting window Getting familiar with desktop Moving from one window to another Reverting windows to its previous size Opening task bar buttons into a windows Creating shortcut of program Quitting windows	5. Moving through a Word document menu bar and drop down menus toolbars 6. Entering text into a Word 2000 document, selection techniques Deleting text 7. Font formatting keyboard shortcuts 8. Paragraph formatting Bullets and numbering 9. Page formatting What is page formatting? Page margins Page size and orientation Page breaks, Headers and footers 10. Introducing tables and columns
3] GUI Based Editing, Spreadsheets, Tables & Presentation Application Using MS Office 2000 & Open Office.Org Menus Opening, menus, Toolbars, standard toolbars, formatting toolbars & closing Quitting Document , Editing & designing your document Spreadsheets Working & Manipulating data with Excel Changing the layout Working with simple graphs	11. Printing within Word 2000 Print setup Printing options Print preview 12. Development of application using mail merge Mail merging addresses for envelopes Printing an addressed envelope and letter 13. Creating and using macros in a document 14. Creating and opening workbooks Entering data 15. Navigating in the worksheet Selecting items

Presentation Working With PowerPoint and Presentation	within Excel 2000 Inserting and deleting cells, rows and column Moving between worksheets, saving worksheet, workbook
4] Introduction To Internet What is Internet Equipment Required for Internet connection Sending &receiving Emails Browsing the WWW Creating own Email Account Internet chatting	16. Formatting and customizing data 17. Formulas, functions and named ranges 18. Creating, manipulating & changing the chart type 19. Printing, Page setup, Margins Sheet printing options, Printing a worksheet 20. * Preparing presentations with Microsoft Power Point. Slides and presentations, Opening an existing presentation , Saving a presentation
5] Usage of Computer System in various Domains Computer application in Offices, books publication data analysis ,accounting , investment, inventory control, graphics, database management, Instrumentation, Airline and railway ticket reservation, robotics, artificial intelligence, military, banks, design and research work, real-time, point of sale terminals, financial transaction terminals.	21. Using the AutoContent wizard ,Starting the AutoContent wizard, Selecting a presentation type within the AutoContent wizard Presentation type Presentation titles, footers and slide number 22. Creating a simple text slide, Selecting a slide layout Manipulating slide information within normal and outline view, Formatting and proofing text, Pictures and backgrounds, drawing toolbar, AutoShapes, Using clipart, Selecting objects, Grouping and un-grouping objects, The format painter

Machine Drawing and CAD – 2nd Year

Theory	Practical
	<p>23. Creating and running a slide show, Navigating through a slide show, Slide show transitions, Slide show timings. Animation effects</p> <p>24. Microsoft Internet Explorer 5 & the Internet</p> <p>Connecting to the Internet The Internet Explorer program window, The on-line web tutorial Using hyper links, Responding to an email link on a web page</p> <p>25. Searching the Internet, Searching the web via Microsoft Internet Explorer, Searching the Internet using Web Crawler, Searching the Internet using Yahoo, Commonly used search engines</p>
<p>6] Information technology for benefits of community</p> <p>Impact of computer on society</p> <p>Social responsibilities</p> <p>Applications of IT</p> <p>Impact of IT</p> <p>Ethics and information technology</p> <p>Future with information technology</p>	<p>26. Favorites, security & customizing Explorer Organizing Favorite web sites Customizing options – general, security, contents, connection, programs, advanced</p> <p>27. * Using the Address Book Adding a new contact</p> <p>Creating a mailing group, Addressing a message, Finding an e-mail address</p> <p>28. Using electronic mail, Starting Outlook Express</p> <p>Using the Outlook Express window, Changing the window layout, Reading file attachment, Taking action on message-deleting, forwarding, replying</p> <p>29. Email & newsgroups, Creating and sending emails</p> <p>Attached files, Receiving emails, Locating and subscribing to newsgroups, Posting a message to a newsgroup</p> <p>30. Chatting on internet, Understating Microsoft chat environment, Chat toolbar</p>
<p>Minimum system requirement for AutoCAD</p> <p>Starting AutoCAD – Use a Wizard, Use a Template, Start from Scratch, Open a Drawing, Quick Setup method, Advanced Setup method, Types of Units, AutoCAD Window Details – Menus, Toolbars, Command line area, Drawing area, WCS icon etc, Use of Function keys,</p> <p>Modes in AutoCAD – Snap, Grid, Ortho, Osnap, Polar, Otrack, Model</p> <p>Using various Toolbars, Creating new drawing, Saving</p>	<p>Practical related Creating New file, Closing Drawing, Saving Drawing, Startup Methods, Modes in AutoCAD,</p> <p>Use of Function Keys, Use of Keyboard and Mouse in AutoCAD Practice.</p> <p>CAD Command Practice on small objects</p>

<p>a drawing, Closing a drawing, Opening a drawing, Use of mouse in AutoCAD, Use of Keyboard,</p> <p>Coordinate system – Types of Coordinate, Absolute, relative, polar coordinate</p> <p>Draw commands – Line, Ray, Construction line, Spline, rectangle, Polygon, circle, ellipse, Arc, Donut, Polyline, Multiline, Multiline Style, Point, Point Style, Divide, measure</p> <p>Zoom commands – Real-time zoom, pan real-time, zoom window, zoom all, zoom in, zoom out, zoom center, zoom dynamic. Zoom scale, zoom previous.</p>	
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Machine Drawing and CAD – 2nd Year

Theory	Practical
<p>Object Snapping – Dialog box, Toolbar, Tracking, snap p from, end point, mid point, center, intersection, apparent intersection, insertion, quadrant, tangent, perpendicular, node etc.</p> <p>Editing commands – Setting drawing limit, setting units, drawing area parameter, Copy, move, erases, opps, scale, rotate, stretch, lengthen, break, trim, extend, chamfer, fillet, mirror, offset, align, explode, array – rectangular & polar, editing using grips, edit Polly line, edit multiline, using property dialog box., Match property, using single line text, using multiline text, editing text, creating text style.</p> <p>Dimensioning technique – Linear, Aligned, Radius, Diameter, Angular, Baseline, Continuous, Leader, Center mark, creating dimensioning style.</p> <p>Block, Wblock, Attribute.</p> <p>Hatch, Boundary, Region.</p> <p>Object property toolbar – layer control, color control, Line type control, line weight control, working with layers, (freeze, thaw, lock, unlock, plot etc.)</p> <p>Printing and using scale in the drawing.</p>	<p>Practice on Small Drawing Objects using Commands in</p> <p>Draw Menu Practice of Editing command on above drawing objects, Dimensioning Drawing</p> <p>Creating Title block, Creating Part List, Material List using Text in AutoCAD,</p> <p>Drawing Plan, Elevation, Section, in AutoCAD for various mechanical objects, machine part etc.</p>
<p>Viewing Orthographic projections, Viewing Isometric projections, Plan View, Aerial View Window, Using Named Views, Using multiple Tiled View ports – New view ports, Polygonal View ports, object viewports, named view ports, joining viewports, Floating viewports in paper space, Region, Redraw, Regen all command.</p> <p>Shading the model – 2D wireframe, 3D wireframe, Flat shaded, Gauged shaded, hidden view Region, Redraw, Regen all command.</p> <p>Interacting Viewing in 3D – 3D orbit command, panning, zooming, adjusting the view, Adjusting the camera distance, swiveling the camera, Continuous orbit, using Visual aids – Compass, Grid, UCS icon etc Concept of Wire frame modeling, Surface modeling, Solid modeling, Concept of Thickness & Elevation</p>	<p>Suitable CAD Practical (Command Practice) based on the Theory.</p> <p>Creating Simple 3D Model of Machine assemblies required 3D view from all sides.</p> <p>Practice of using AutoCAD Mechanical Desktop package for creating various 3D Machine Elements.</p>
<p>Surface modeling – Ruled surface, Edge surface, Revolve surface, Tabulated surface, 2D solid, 3D face, Using Predefined 3D surface objects – Box, pyramid, Wedge, dome, sphere, cone, tours, dish, mesh.</p> <p>Solid modeling – Extruding solid, Revolving solid, Slicing & Interfering solid, using predefined 3D solid objects - Box, pyramid, Wedge, Cylinder, Cone, Torus</p> <p>Modifying 3D Solid object – 3D array, 3D mirror, 3D Rotate, Trim, Extend, Fillet, Chamfer etc.</p> <p>Boolean operation – Union, Subtract, intersect.</p>	<p>Creating, Rendering, and Viewing Various Machine parts and assemblies Elements like different types of</p> <p>Screws, bolt, nut, nail, rivet, keys, cotter, locking devices, stud, plates, angle, channel, sockets, cover, packings, gasket, belt, wheels, gear, grooved parts, casting, supports base plates, pipe joints, I section joints etc.</p>

Machine Drawing and CAD – 2nd Year

Theory	Practical
<p>Solid Editing – Extrude face, move face, offset face, delete face, rotate face, taper face, color face, copy face, color edge, copy edge, imprinting the object, Cleaning, separating objects, shelling the solid Checking validity of solid object.</p> <p>Rendering 3D solid – Rendering options / Rendering procedure – query, crop window, skip dialog box method, Rendering, using light effects in rendering – Distance light, point light, spot light, using Sun angle calculator for shaded model, modifying lights parameter, using lights in scene.</p> <p>Applying material effect to solid object. Using material library. Mapping background. Using background images Printing the 3D rendered view / drawing.</p>	<p>Creating, Rendering, Viewing, Generating JPEG images for Complete assembly model, Printing Photo with various View of machine assemblies,</p> <p>Creating Slide show presentation of such views of assembly model including All four side view, 3D view from four corner, Isometric View, Perspective View etc.</p> <p>Introduction to 3DS Max Software Package for animation Purpose.</p> <p>Introduction to Pro-Engineer, CATIA Software.</p>

List of Books

Machine Drawing

- 1] N.D.Bhatt Elements of Engineering Drawing 49TH 2005 Charotar publishing house,opposite Amuldairy, court road Anand India
- 2] N.D.Bhatt Machine Drawing 40TH 2005 Charotar publishing house,opposite Amul dairy, courtroad Anand India

Computer Fundamental

- 1] Vikas Gupta Comdex Computer Course Kit First Dreamtech
- 2] Henry Lucas Information Technology for management 7Th Tata Mc-Graw Hills
- 3] B.Ram Computer Fundamentals Architecture and Organisation Revised 3rd New Age International Publisher

CAD Books

- 1] Reference Manual of AutoCAD AutoDesk
- 2] Reference Manual of Felix cad Felix CAD
- 3] Reference Manual of Intel CAD
- 4] Reference Manual of Auto Civil
- 5] Reference Manual of 3D-Max

List of Tools and Equipment

A] General Class room

Sr	Name of Item	No.
1	Steel lockers 8 compartments with individual lockers (1980 x 910 x 480 mm)	4
2	Chair with writing pad	25
3	Steel almari with self 6.5' x 3' (18 gauge)	2
4	Steel table 4' x 3'	2
5	Teacher chair	2

B] For Computer Fundamental and CAD Practical

Sr	Name of Item	No.
1	Computer System P4 with accessories Complete with license OS. Compatible for- to run AutoCAD 2010 and Windows 7 OS.	5+1
2	Plotter- HP Design Jet 500 latest model	1
3	Scanner	1
4	Computer table	5+2
5	Chair for computer	10+2
6	Laser Printer	1
7	AutoCAD 2010 or above Software	1
8	M. S. Office Software	1
9	Pro- Engineering –V-4 Student Version	1
10	CATIA R-17 – Evolution Student Version	1

Subject Name - **Theory & Practice of Turning**

Subject Code - 30340021

First Year

THEORY	PRACTICAL
Importance of safety and precaution to be observed in the section as well as in the institute, causes of accident and its remedies	Familiarization with the institute Importance of the course training. Machinery used in the course. Types of the work done by trainees in the course .
Importance of the course in the industrial development of the country, Subjects to be taught and standard of proficiency to be attained . Awareness of recreational medical , leave and other facilities- necessary guidance to be provided to become familiar with the working of the institute including stores procedures	Introduction of safety rules in shop floor and to the fire fighting equipment etc.
Measurment , line standard and end standard, steel rule- different types , graduation and limitation Hammer and chisel, materials types and uses, Prick, punch, scribe	Practice on hammering marking out, chipping chisel grinding
Vice- types and uses . Files- different types and uses, cut grade , shape material etc. Try square- different types, parts, material used etc. Calipers- types and uses (Firm Joints)	Filing practice on plain surfaces, right angle by filing , Use of calipers and scale measurement
VEE-block , scribing block straight edge and its uses. Hacksaw –their types & uses	Filing at right angle , marking & hacksawing
Center punch- material construction & uses material uses. Drill machine –different parts, Hacksaw blades –sizes , different pitch for different materials	Marking operation on flat & round job , drilling operation
Surface plate its necessity and use	Threading with the help of taps and dies
Tap-different types (taper 2 nd and plug) care while tapping , Dies different types and uses. Calculation involved to find out drill size (Metric and inch)	Getting to know the lathe with its main components lever position and various lubrication points as well
Definition of machine and machine tool –and its classification , History and gradual development of lathe`	Mounting of chuck on machine spindle and unloading in various system
Classification of lathe in function and construction of different parts of lathe	Truing of round stock on 4 jaw independent chuck, use of 3 Jaw self centering chuck as well
Types of lathe drives, merit & demerit , description in details-head stock-cone pulley type- all geared type – construction and function, tumbler gear set	Grinding of R.H. and L.H. side cutting tools checking of angles with tool angles gauge.

Reducing speed-necessary & uses Back gear unit – its construction and speed calculation	Setting of lathe tools in different types of tool post following correct procedure
Orthogonal & oblique cutting , lathe , cutting tool –different types shapes and different angles (clearances & rakes) specification of lathe tools	Facing operation to correct length centre drilling operation Grinding of “V” tools
Different types of lathe tool posts , Function of quick change gear box feed shaft, lead screw etc.	Parallel turning practice- measurement with scale and caliper
Combination drill –appropriate selection of size from chart of combination drill , drill chuck – its uses	Step turning within q 0.08 mm measurement with vernier caliper
Cutting speed feed depth of cut calculation involved – speed feed, R.P.M. etc. Recommended for different materials	Parallel turning practice-measurement with micrometer within q 0.08mm accuracy
Vernier caliper –its construction, principle graduation and reading, least count etc.	Step turning practice with in a 0.08 with sq. Shoulder , U/cut feel of micrometer sources of error with micrometer
Outside micrometer- different parts principle, graduation, reading construction	Drilling of lathe-step drilling – drill grinding practice
Different types of micrometer Outside micrometer, vernier scale graduation and reading sources of error with micrometer & how to avoid them, Use of digital measuring instruments	Boring Practice- plain & step , use of inside micrometer- with 0.08 mm accuracy
Lathe accessories- chuck =independent, self centering, collet , magnetic etc, its function , construction and uses	Boring (plain) measurement with I/S micrometer 0.08 mm
Drills- different parts, types sizes etc. Different cutting angles, cutting speed for different material . Boring tool , counter sinking and counter boring	Boring & internal recessing
Letter & number drill core drill etc.	Checking alignment of lathe centres, Mounting job in between centre
Driving plate, face plate , fixed and travelling steadies construction and use . Transfer caliper- its construction and uses	Reaming in lathe using solid and adjustable reamer
Lathe centres-different types and their uses, Lathe carrier- its function , types and uses	Knurling practice in lathe (diamond , straight helical & square)
Reamers- types and uses, lubricants and coolant –types necessity system of distribution . Selection of coolant for different material, Handling & care.	Turning practice – between centres on mandrel (gear blanks)

Knurling meaning, necessity , types , grade, cutting speed for knurling	Fitting of dis-similar materials-, M.S. in brass Al, in cast iron etc.
LATHE mandrel- different types and their uses	Taper turning by offsetting tailstock method
Concept on interchangaity limit , fit and tolerance as per IS :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	Taper turning by offsetting tailstock method
Taper- necessity, different method of expressing tapers. Different standard tapers. Method of taper turning,. Important dimensions of taper, Principles of setting the work and the tailstock. Calculation involving the tailstock offset method	Taper tuning by compound slide swiveling (Ext. E'Int.)
Advantages and disadvantages	(Bevel gear blanks)
Taper turning by swivelling compound slide its calculation advantages & disadvantages	Taper turning by taper turning attachment (Male & female practice)
Vernier bevel protractor- its function , construction & reading	Taper turning by form tool (Int. & Ext.) (taper matching).
Taper turning by taper turning /attachment – principle setting , advantages & disadvantage, calculation involved	Eccentric marking Practice - Eccentric turning – external use of Vernier height gauge
Different types of form tool & their uses.	Eccentric turning practice (external and internal)
Combination set square head, centre head, protractor head – its function, construction and uses	Eccentric boring, position boring
Gauge- definition – different types of plug and ring gauge, filler gauge, enso gauge , radius gauge	Grinding of threading external tool
Vernier height gauge, fuction , description and uses , tamplate – its function & construction	Screw- thread cutting whitworth thread (external)
Screw thread- definition , purpose and its different elements Fundamentals of thread cutting on lathe	Screw cutting – threading practice
Different types of screw thread – their forms and elements	Screw thread cutting whitworth (Internal)
Different methods of forming threads, calculation involved in finding out core dia.	L/H threading practice
Difference between lead and pitch , gear train (simple gearing) calculation	Fitting of male & female threaded components
Calculation involving driver, driven, lead screw pitch & thread to be cut , thread cheeing dial function , construction and use	Screw thread cutting (external) thread- tool grinding

Calculation involving pitch related to ISO profile	Use of hand chaser practice on threads (ext. & Int.) Non- ferrous materials.
Hand chaser- types , uses etc, Dies – different – Die stock	Screw thread (Internal) metric & tool (Internal threading) grinding
Conventional chart for different, profile – metric BA , Whitworth, pipe etc.	Fitting of male and female thread components (Metric)
Calculation involving gear ratios and gearing (compound gearing)	Tool grinding for sp. Thread (external) Sq. (external) thread practice`
Calculation involving tool size , core dia. Pitch proportion, depth of cut etc. Of sq. Thread etc.	Tool grinding for sp. Thread (Internal) sq. (Internal) thread cutting practice
Basic processes of soldering brazing, butt welding of tool etc..	Fitting of male and female square threaded components

Second Year

THEORY	PRACTICAL
Introduction to the course- its importance and role in the industry review of lathe machine its classification for productivity	Introduction to various components produced on lathes place
Cutting tool material .H.C. steel , H.S. Steel , stellite tungsten, carbide ceramic etc. Constituents and their percentage, tool-life required quality of cutting material	Forging l (lathe tools) practice different shapes, heat treatment of tools
Form tools –function types and uses, template-purpose and use, Dial test indicator- construction , use etc.	Form turning practice (off hand)
Calculation involving modified rake and clearance angles of lathe tool at above and below the centre height, Subsequent effect of tool setting	Grinding and setting of parting off tool on tool post
Jig & fixture- definition type and use, Chip breaker on tool – purpose and type	Grinding up of various shape of chip breaker on tool –face breaker, of chip breakup on tool face
Sinebar – construction , types and use, Slip gauges type uses and selection	Taper turning by taper turning attachment- Morse taper-different number(lathe centre_)
Checking of taper with sine bar and roller- calculation involved	Internal taper turning by taper turning attachment . Taper matching exercise (application of precision_blue) (Plug and Ring Gauge)
Method of brazing solder, flux used for tip tools	Turning and boring practice on C.I. block & tip brazing on shank
Cutting speed , feed Turing time calculation , cutting , speed chart (Tungsten carbide tool)etc.	Turning at high speed using Tungsten carbide tools including throw-away
Tool life, negative top rake-its application and performance with respect to positive top rake	Practice of negative rake tool on non-ferrous metal
Lubricant- function types source of lubricant etc. Method of lubrication. Dial test indicator, use for parallelism & concentricity etc. In respect of lathe work Grinding wheel; abrasive, grit, grade bond etc.	Balancing , mounting & dressing of grinding wheel (Pedestal) Adjustment of tool rest
Preventive maintenance, its necessity, frequency of lubrication, preventive maintenance schedule`	Periodical lubrication procedure on lathe, testing of accuracy of alignment
Different industries (to gather knowledge about the machinery , operation etc. Which are not available /performed in the Institute i.e. Special purpose lathe programme control m/c etc	Procedure of checking accuracy of lathe. Preventive maintenance of lathe

Calculation involved – depth core dia. Pitch proportion etc. Of Acme thread	Acme thread cutting (male & female) & tool grinding
Depth micrometer (Metric- Inch) purpose construction, uses etc, limit gauges their uses	Fitting of male and female threaded component
Marking table construction and function . Angle plate- construction eccentricity checking	Pipe thread cutting (male & female)
Roller and revolving steadies Necessity construction , uses etc	Crank shaft-single throw (Desirable)
Calculation involving gear ratios metric threads cutting on inch L/S lathe and vice-versa	Turning of long shaft (using steadies) (with in q 0.03 mm)
Different types of attachments used on lathe	Cutting metric threads on inch, lead screw and inch threads on metric lead screw
Various procedures of thread measurement thread screw pitch gauge	Use of attachments on lathe for different operations
Screw thread micrometer, tool maker's microscope etc.	Thread cutting on non-ferrous metals-copper , aluminum , brass etc.
Tool maker's button and its parts, construction and uses. Telescopic gauge its construction and uses	Advanced eccentric boring (position boring using tool maker's button)
Inside micrometer principles, construction graduation reading use etc. (metric & inches)	Boring and stepped boring (within q 0.05mm)
Calculation involving fractional threads, odd & even threads	Continuation of thread cutting fractional odd & even threads.
Multiple thread function, use,,difference between pitch & lead formula to find out start pitch lead gear ratio etc.	Multiple thread cutting – 2 starts (external) BSW
Indexing of start different methods tool shape for multistart thread.	Multiple thread cutting BSW (internal) fitting of male & female threads.
Setting of a lathe calculation for required change wheels.	Multiple thread cutting 60 deg. (external & internal)
Calculation involving shape of tool change wheel core dia etc.	Multiple thread cutting acme form (male & female)
Calculation involving shape, size, pitch, core dia etc.	Multiple thread cutting square form (male & female)
Helix angle leading & following angles.	Multiple thread cutting work (external)
Thread dimensions- tool shape, gear calculation pitch depth lead etc.	Cutting of helical grooves in bearing and bushes (oil groove)

Heat treatment - meaning & procedure hardening, tempering carburising etc.	Setting & operation involving face and angle plate.
Setting & operation involving face and angle plate.	Turning & boring of split bearing (using boring bar and fixture.)
Turning & boring of split bearing (using boring bar and fixture.)	Thread on taper surface (Vee form)
Thread on taper surface (Vee form)	Practice on turret lathe
Practice on turret lathe	Threading with self-opening die head
Threading with self-opening die head	Internal threading with collapsible tap
Internal threading with collapsible tap	Project work
Project work	Project work- useful articles different type fittings
Project work- useful articles different type fittings	Project work- useful articles different type fittings
Work order from local industries (production type)	Work order from local industries (production type)

Reference Books

AUTHOR	TITLE	Publisher & Address
NIMI,MADRAS	Turner I& II Year Trade Practicals	Wily Estern Ltd,Pune.
S.K.Hajra Choudhary	Elements of workshop technology Vol I	Media promoters & Publisher pvt. Ltd.
Mahajan	Mechanical Technology	Vrinda publication
W.A.J Chapman	workshop technology Vol I & II	CBS Publisher,New Delhi.
R.S. Khurmi & J.K.Gupta.	Workshop Technology	S.CHAND .New Delhi.
P.N.Rao	Manufacturing Technology	Tata McGraw Hill New Delhi.

LIST OF TOOLS & EQUIPMENT

S.No.	Description	Qty.
1	Caliper outside firm and spring joint 150 mm	5 Nos. Each
2	Caliper inside firm and spring joint 150mm	5 Nos
3	Caliper odd leg firm joint 150 mm	5 Nos
4	Steel rule 150 mm to read metric	5
5	Scriber 150 mm x 3 mm	5
6	Hammer ball pein 250 gm . With handle	5
7	Centre punch 100 mm	5
8	Prick punch 100 mm	5
9	Divider spring joint 150 mm	5
10	Safety goggles clear glass (good quality)	5
11	Surface plate 60 x 60 cm on metal stand	1
12	Work bench 240 x 120 x 75 cm` (high)	1
13	Marking table (C.I.) 120 X 120 CM	1
14	BENCH vice 125 mm jaw	4
15	Vee- block 75 and 150 mm with clamp	1 pairs (one pair each)
16	Surface gauge 250 mm arm	1 Nos.
17	Hammer ball pein 750 gm , with handle	4 Nos
18	Chisel flat 20 mm	4 Nos
19	Hammer copper/brass 500 gm with handle	5Nos.
20	Hacksaw adjustable 200 to 300 mm (Pistal grip)	5
21	File flat 300 mm rough	4 Nos.
22	File flat 250 mm 2 nd cut.	4 Nos
23	File flat 250 mm smooth.	4 Nos.

24	File half round 250 mm 2 nd cut	4 Nos.
25	File round 250 mm smooth	4 Nos.
26	File half round 150 mm smooth	5 Nos.
27	Knuring tool revolving head (Rough, med. Fine) diamond and straight	1 Nos.
28	Combination set 300 mm rule.	1 Sets
29	Screw driver 200 & 300 blade heavy duty	1 Nos.
30	Spanner double ended 6 mm to 24 mm.	1 Sets
31	Spanner adjustable 200 mm	1 Nos.
32	Pliers flat nose 150 mm side cutting	1 Nos.
33	Caliper transfer inside 150 mm	1 Nos.
34	Micrometer inside 0-25 mm.	4 Nos.
35	Micrometer outside 25-50 ,mm.	4 Nos
36	Micrometer outside 50-75 mm. Dial	1 Nos.
37	Micrometer inside upto 25 mm.	1 Sets
38	Micrometer inside 25-150 mm. With extension rod.	1 Sets
39	Depth gauge micrometer 0-150 mm. –do-	1 Sets
40	Vernier caliper outside, inside and depth 200 mm/8” with metric and inch scale	4 Nos.
41	Vernier bevel protractor 150 mm blade	1 Sets
42	Feeler gauge 100 mm blade metric set	1 Sets
43	Radius gauge 1-12 mm by 0.05 mm.	1 Sets
44	Centre gauge com. 60 deg. And 55 deg.	4 Nos.
45	Screw pitch gauge whitworth and metric.	1 Sets each
46	Angle gauge 29 deg.	1 Nos.
47	Dial test indicator 0.01 mm with magnetic base.	1 No.
48	Dial test indicator 0.01 mm with vernier height gauge 300 mm.	1 No.
49	Try square 150 blade	1 No.s
50	Magnifying glass 75 mm dia.	1 No.
51	Plain ring and plug gauge 12-50 mm.	1 Set
52	Wheel dresser huntington type with star cutter.	1 Nos.

53	Wheel dresser diamond (inserted).	1 Nos
54	Morse taper plug & ring gauge No. 0-7 MT.	1 Set
55	Sine bar with centres 200 mm.	1 No.
56	Slip gauge metric set.	1 Set (Box)
57	Morse taper sleeves No. 0-1, 1-2, 2-3, 3-4, 4-5, 1-3	1 Sets
58	Drift	1 Nos.
59	Twist drill st. Shank 1 to 12 mm by 1 mm.	1 Sets
60	Twist drill taper shank 12 to 40 mm by 0.05 mm.	1 Sets
61	Drill chuck 6-12 mm. Cap. With key.	1 Nos.
62	Drill chuck 6-12 mm cap. With key	1 No.
63	Tap & Die B.A. No. 0 to 10 in a box.	1 Set
64	Tap & Die metric set upto 25 mm.	1 Sets
65	Tap & Die B.S.F. upto 1"	1 Set
66	Tap & Die B.S.W. upto 1"	1 Sets
67	Reamer machine st. Flute 6 to 25 mm by 1 mm	1 Set
68	Reamer adjustable 10 to 20 mm.	1 No.
69	Tool holder RII & straight for 6 mm sq. Tool bit.	5 Nos.
70	Parting tool holder with H.S.S. blade,.	5 Nos.
71	Tool bits 12 mm sq. X 150 assorted shaped.	5 Nos.
72	Boring tool holder for 6 mm sq. Tool bit.	5 Nos.
73	Steel rule 300 mm with Metric and Inch.	5 Nos.
74	Oil can ½ pint (pressure feed system).	5 Nos.
75	Dog carrier 235, 50 and 75 mm.	5 Nos. Each.
76	Angle plate with slots 200% 200 mm.	1 Nos.
77	Spirit level 0.05 meter 200 mm.	1 No.
78	Tool maker's button	1 Set.
79	Combination drill A-2.5 and A-4	1 Doz.
80	Oil stone 12 mm sq. X 100 long fine	5 Nos.
81	Tap wrench (adjustable).	1 Nos.

82	Die handle	1 Nos.
83	Tool Bit assorted sizes on holder.	5 Nos.
84	Machine vice 100 jaw (For drill Machine)	1 No.
85	Chalk board on mobile stand.	1 No.
86	Spare Grinding wheel ajax type for carbide tool.	1 Nos.
87	Angle gauge for tool grinding	4 Nos.
88	Hand chaser M-12 & M-16 (External)	1 Nos. (each)
89	Hand chaser M-12 & M-16 (Internal)	1 Nos. (each)
90	Revolving centre (to suit lathe tailstock.)	4 Nos.
91	Tool cemented carbide assorted shaped (External) for steel turning – set of 12 Nos.	1 Nos.
92	Thread plug. Gauge M-20 & M-24.	1 No. Each
93	Thread ring gauge M-20 & M-24.	1 No. Each
94	Machine chase M-12 to M-24 (Std. Series) to suit on conventry Die head.	1 Set
95	Gauge drill grinding	1 Nos.
96	Magnetic chuck 150 mm dia.	1 No.
97	Lathe mandrels (Diff. Types).	1 Set
98	Coventry type die head (Self opening).	1 No.
99	Collapsible tap with attachment	1 Set
100	Combination drill.	1
101	Fire Extinguisher and buckets.	2 each

LIST OF MACHINERIES AND EQUIPMENT

Sl. No.	Machinery and Equipment	Quantity
1.	Lathe S.S. & S.C. (all geared head stock 15' cm centre height, to admit 120 cm between centres. Machine to be motorised and supplied with coolant installation. 4-jaw independent chuck 250 mm 3-jaw self-centering chuck 150 mm fixed steady, travelling steady, face plate, driving plate, 4-way tool post, quick change gear box for metric / eng. Threads, live and dead centres with T/attachments.	1 no.
2.	Lathe S.S. & S.C. (all geared type) 20 cm height 150 cm. Between centres. Gap bed machine to be motorised and supplied with coolant installation, 4-jaw independent chuck 300 mm, 3-jaw self centering chuck 200 mm. Fixed steady face plate, driving plate, 4-way tool post, quick change gear box metric / eng. Threads, live and dead centres with taper attachments.	1 no.
3.	Lathe tool room S.S. & S.C. (all geared type) 15 cm centre height, 120 cm between centre machine to be motorised and fitted with coolant installation and taper attachment and also to be supplied with 4 jaw in dependent chuck 250 mm, 3 jaw self centering chuck, fixed steady, travelling steady, driving plate face plate, live and dead centres 4 way tool post, draw in type collet set upto 25 mm. 0.5 mm. Relieving attachment.	1 no.
4.	Lathe S.S. & S.C. (Cone pulley type) 15 cm heigh 90 cm. Between centre. Machine to be motorised 4 jaw independent chuck 250 mm. 3 jaw self centering chuck, 150 mm Single tool post.	1 no.
5.	Grinding machine pedestal type D.E. 250 mm dia. Wheel with wheel guard and vision.	1 no.
6.	Grinding machine bench type D.F. 150 mm. Dia wheel with wheel and vision guard.	1 no.
7.	Drill machine pillar type – motorised upto 12 mm. Cap.	1 no.
8.	Power saw machine – hydraulic feed system – 400 mm blade size.	1 no.
9.	Capstan lathe 250 mm. Sawing, 25 mm spindle bore with all accessories and attachment including collect chucks and sets.	1 no.
10.	Turret lathe 300 mm sawing, over bed, 40 mm spindle bore with all accessories and set of collet (for round and hexagon bar).	1 no.
11.	Mandrel press (Hand operated.)	1 no.
12.	Tool Maker's Microscope – lens (Eye piece) 10x30x50 stage : 125 x 125 mm longitudinal and traverse movements. Micrometer Head – Traverse movement 0-25 mm with gauge blocks. Understage illumination : Green filtered, adjustable intensity.	1 no.