

MAHARASHTRA STATE BOARD OF VOCATIONAL EDUCATION EXAMINATION, MUMBAI - 51

1	Name of Course	Diploma Course in Draughtsman Mechanical									
2	Course Code	303401									
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	S.S.C.									
10	Objective of syllabus	To prepare working drawing of machine parts and components. complete project drawing. To reproduce the drawing by making tracing and taking prints. To record and preserve the drawing. To make simple design of machine parts and simple jigs and fixtures. To calculate the weight and cost of simple machine components. To Prepare Drawing by using CAD.									
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	Engineering Drawing and CAD	30340002	3 Hrs	8 Hrs			11 Hrs			
	6	Mechanical Drafting	30340010	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	Engineering Drawing and CAD	30340002	3 Hrs	100	35	3 Hrs	100	50	200	85
	6	Mechanical Drafting	30340010	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						b) For Elective II – Student can choose any one subject				
	Code	Subject Name					Code	Subject Name			
	90000011	Applied Mathematics					90000021	Applied Sciences (Physics & Chemistry)			
	90000012	Business Economics					90000022	Computer Application			
	90000013	Physical Biology (Botany & Zoology)					90000023	Business Mathematics			
	90000014	Entrepreneurship									
	90000015	Psychology									

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

Subject Code - 30340001

Theory – 1 st year	Practical – 1 st year
1] Fundamental of material <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 <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 Introduction to non ferrous alloys <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 <input type="checkbox"/> Metal for nuclear energy 4 Crystal Structures <input type="checkbox"/> Fundamental concept <input type="checkbox"/> Unit Cells <input type="checkbox"/> Metallic crystal structures <input type="checkbox"/> FCC Structure <input type="checkbox"/> BCC Structure <input type="checkbox"/> HCP Structure <input type="checkbox"/> Weld ability 5 Properties of Metal <input type="checkbox"/> Mechanical properties of Metal Elasticity, ductility, malleability, brittleness, Toughness, Stress strain behavior, Elastic limit, hooks Law, UTS, poissons ratio, factor of safety, hardness and hardness tests shear strength, resistance. <input type="checkbox"/> Electrical properties of Metal Electrical conductivity, resistivity, electrical Characteristic of commercial alloys	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 <input type="checkbox"/> Brinell Hardness test <input type="checkbox"/> Rockwell hardness test

Theory – 1 st year	Practical – 1 st year
<p><input type="checkbox"/> Thermal properties of metal Heat capacity, thermal expansion, thermal Conductivity, thermal stress</p> <p>6 <input type="checkbox"/> Magnetic Properties of metal 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 <input type="checkbox"/> Normalizing <input type="checkbox"/> Hardening <input type="checkbox"/> Quenching and tempering <input type="checkbox"/> Annealing <input type="checkbox"/> Stress Relieving <input type="checkbox"/> Case carburizing and case hardening. <input type="checkbox"/> Toughening 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 <input type="checkbox"/> Cold crack due to hydrogen <input type="checkbox"/> Hydrogen cracking <input type="checkbox"/> Measurement and control of hydrogen in the deposited weld metal <input type="checkbox"/> Cracking mechanism in the weld metal and HAZ <input type="checkbox"/> Weld decay <input type="checkbox"/> Lamellar tearing <input type="checkbox"/> Hot cracking <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 Introduction- Vices – Hammers- Chisels- Chipping- Files- Filing- Scraper-Scraping- Grinding and Polishing- Hacksaw sawing- Marking tools – Surface plate- Scriber – Punch- V block- Angle plate- Try square – Marking out – Drill- Drilling- Reamer- Reaming- Taps- Tap drill size-Tapping – Dies and stock- Dieing.</p> <p>2 Sheet Metal Work Introduction – Metal used in sheet metal work- Sheet metal hand tools- Sheet metal operation-Sheet metal joint- Hems and Sems – Sheet metal allowance- Sheet Metal working machine-Laying out a pattern</p> <p>3 Plumbing, Threading, Fasteners & joints Plumbing- Specifications of pipes- Material used for pipes-Pipe fitting & Joints-Taps & valves – Plumber tools – Threaded fasteners- screw threads and their uses- Indian standard 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 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 Welding Welding introduction to different 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) 6.1 Function of lathe, Types of lathe, the size of lathe, Descriptions & function of lathe parts, 6.2 Lathe accessories and attachments. 6.3 Operation on Lathe 6.4 Cutting Tools, Classification , Influence of tool angles. 6.5 Types of tools, cutting speed, Feed, Depth of cut, 6.6 Machining time. Cutting tool signature.</p>	<p>Fitting 1. Filing Flat surfaces: Checking flatness and square ness using a try square – Types of filing – Cleaning files. 2. Chipping: Hints on chipping 3. Hack sawing: Selection of blades for different metal sections - Fix hack sawing the material for the job blades maintaining. Correct tension and direction – Hack sawing. Filing 'V groove and complex profile by file & check with profile gauge.</p> <p>4. Filing radius –check with radius gauge 5. Check profile with profile gauges. 6. Drill plate, Drilling, counter sinking, counter boring. Operations on job 7. Drilling and Tapping: Internal threading of holes by using hand taps – determine the tap drill size, drilling, counter-sinking and tapping – precautions with tapping a blind hole. 8. External thread cutting using die.</p>

Theory – 2 nd year	Practical – 2 nd year
7 DRILLING 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. 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	Basic Workshop Practice 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.
8 SHAPER 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.	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)
9 SLOTTING Introduction. Types of slotting machine; Slotter size; Slotting machine parts; Work holding devices; Slotter operation; Slotter tools; Cutting speed, feed and depth of cut.	
Powder Metallurgy 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	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 INSTALLATOIN /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

Theory – 1 st year	Practical – 1 st year
<p>1 INTRODUCTION OF DRAWING 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 To draw an ellipse by 1. Arcs of circle method 2. Concentric circle Method 3. Rectangle / oblong method; To draw a parabola by 1. Dircetrix focus method 2. Rectangle method; To draw hyperbola 1. Transverse axis and focus Method 2. Passing Through a given point; To draw an Involute of 1. A polygon (up to Hexagon) 2. A circle. To draw a cycloid, epic cycloid & hypocycloid.</p> <p>3 ORTHOGRAPHIC PROJECTIONS Introduction to orthographic projections, first and third angle Method of projection, conversion of simple pictorial view into Orthographic view Dimensioning technique</p> <p>4 SECTIONAL VIEWS Conversion of given pictorial view into sectional orthographic views.</p> <p>5 ORTHOGRAPHIC VIEWS 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 Projections of solids- prism, prism, cone, cylinder, Tetrahedron; axis Inclined to one reference plane only.</p> <p>7 SECTION OF SOLIDS 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>PRACTICAL 1. Practice: Layout of drawing sheet Types of lines – Thickness, shade of lines and its General applications. Practice: Draw type of lines as per IS-70714-1983 Type of Angle, Triangles and their types. Dimensioning- Types of dimension, elements of dimensions, Methods of indicating Values, Arrangement and indication of dimensions. 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 Geometrical construction using drawing instruments-Lines, Angles, patterns, Circle, Arc, Tangents, Triangles, Quadrilaterals, Regular Polygons. Different type of Tapers, Related Exercise on this topic. 1. Practice: Construct square, rectangle, parallelogram, rhombus, trapezium and quadrilateral 2. Practice: Draw a regular pentagon by circum scribing & inscribing 3. Practice: Draw a regular hexagon by arc method 4. Practice: Draw a regular pentagon, octagon and various types of tapers 5. Free hand sketching of straight lines, rectangular, circles, squares, Polygons, ellipse. 6. Practice: Prepare proportionate free hand sketches of plane figures 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 Orthographic projection I and III angle – Simple machine elements, Procedure for preparing a scale drawing. 8. Practice: Draw a plan, elevation and side view of prism and cylinder, cone and pyramids 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 10. Practice: Construct an isometric scales to a given length</p>

<p>8 CONVENTIONAL REPRESENTATION Introduction; Conventional Representation of Material; Conventional breaks, Machine components such as splined shaft; bearings, slotted heads, rased & 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 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 12. Practice: Draw the isometric view of the objects/blocks/solids with curved surfaces Missing lines and views. 13. Practice: Visualize the shape of the object from the given two views and add the third views – simple machine elements 14. Practice: Identify the lines missed in multi views and supply them. Identify at least five shapes satisfying a given view. One problem on each projection of lines and plane are to be drawn in A-3 size sketch book. 15. Identify the third view for the given two views of similar in shapes and size. Development of regular objects bounded by plane surfaces-cube, prisms, cylinder and cones. 16. Practice: Draw the development of surfaces of a cube and prism 17. Practice: Draw the development of surfaces of a cylinder and cones Explanations of full – sectional view, half-sectional view, aligned sections.</p>
<p>10 PRODUCTION DRAWING 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. 19. Practice: Draw surface finish symbols, Welding symbols and Annotations. 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, Blue print reading of various Engineering drawing and Machine drawing. 20. Practice: Blue print reading of Engineering Drawings and Machine drawing. Introduction to free hand sketching of machine parts. Tracing and printing of drawing. Introduction to Auto CAD, 3D modeling concept. 21. Practice: Draw the elevation, plan and the side view of Nut & Bolt, Spur gear, and Fly cotter joint Wheel, V belt pulley.</p>

Engineering 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 Presentation Working With PowerPoint and Presentation	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 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

Engineering 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 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 Creating a mailing group, Addressing a message, Finding an e-mail address</p> <p>28. Using electronic mail, Starting Outlook Express 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,</p> <p>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 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>	<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>

Engineering Drawing and CAD – 2nd Year

Theory	Practical
<p>Object Snapping – Dialog box, Toolbar, Tracking, snap 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>

Engineering Drawing and CAD – 2nd Year

Theory	Practical
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. 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. Applying material effect to solid object. Using material library. Mapping background. Using background images Printing the 3D rendered view / drawing.	<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. Introduction to Pro-Engineer, CATIA Software.</p>

List of Books

Engineering Drawing

- 1] N.D.Bhatt Elements of Engineering Drawing 49th 2005 Charotar publishing house, opposite Amul dairy, court road Anand India
- 2] N.D.Bhatt Machine Drawing 40th 2005 Charotar publishing house, opposite Amul dairy, court road 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 - Mechanical Drafting**Subject Code - 30340010****First Year**

Theory	Practical
Units of dimension, system of dimensioning, method of dimensioning and common feature	Dimensioning technique, symbols for machining and surface finishes.
Tolerance dimensioning. Indication of symbols for machining and surface finishes on drawing	1 st & 3 rd angle projection with dimension of machine parts.
Screw thread , terms & nomenclatures , types of screw threads proportion and their uses, thread conventions	Screw threads with IS conventions (freehand sketching as well as with instruments)
Types of bolts & nuts their proportion uses different types of locking devices	Nuts, bolts, washers & locking devices with is conventions (freehand sketching as well as with instruments)
Different types of machine screws, cap screws and their specifications, different types of foundation bolt.	Machine screw, cap screws, studs and set screws. Foundation bolts with IS conventions (freehand sketching as well as with instruments)
Purpose , terms , different types of keys and proportions , use of cotters pins and circlips.	Keys , cotters ,circlips , and pins with IS conventions
Types of fastener material, types of rivets their proportional uses, types riveted joints, terms and proportion of riveted joints. Conventional representation.	Types of rivets, types of riveted joints with IS conventions
Causes of failure of riveted joints, efficiency of riveted joints	To prepare working drawing of a riveted structure, from a conventional one
Description of welding joints and their representation. Indication of welding symbols on drawings	Welding joints. Use of welding symbols. Working drawings of welded structures
Description and uses of drafting machine. Different sizes of drawing sheets as per ISI.	Drafting practice with the help of the drafting machine. Layout of drawing sheets with title block and reversionary panel for A0 , A1,A2 ,A3,A4, sizes of sheet
Safety precaution description , uses and care of hand tools including contraction rule	: PATTERN MAKER Uses of saws, chisels, rasps, planes, etc. use of steel rules, squares scribes and dividers for making out from drawing
Safety precautions , hand tools used for molding. Description of the use and care of hand tools. Description of different types of molding. Description of different types of core, sand, dressing material. Description of cupola	: MOULDING Different types of mould, cores and core dressing , use of molding tools simple core making floor and box molding using to part patterns
Description of measuring tools and hand tools used in forge work. Description and use of the mechanical hammer. Color coding of different metals and identification.	: BLACKSMITHY Use of different types of blacksmithy hand tools, hand forging of different types of jobs.
Description and application of simple measuring tools, Description of vices, hammers, cold chisel, files etc. and proper method of using them.	FITTING Use of different types of fitters hand tools, use center punch different types of files, calipers, hack saws and hack sawing chisels, hammers.
Safety precaution for Lathes. Description of parts of Lathe & its accessories.	: TURNING Plain parallel turning, stepped turning, Taper turning with offset stock method.

Method of using precision measuring instrument such as inside and outside micrometers, depth gauges, verniers, dial indicators, slip gauges, sine bars, universal bevel protector etc.	: MACHINIST Use of jigs and fixtures. Simple operations on milling M/C such as plain milling and key way cutting.
Brief description of milling shaping, slotting and planing machines. Quick return mechanism of these machines.	Marking out castings and forgings. Setting up & operation of shaping, slotting and planing machines.
Names and brief description of common equipment necessary for sheet metal work. Different types and uses of joints employed in sheet metal work.	: SHEET METAL Use of hand tools such as planishing hammers, stakes, mallet, bricks prick punch etc. Development of surfaces from blue print.
Names and brief description of the hand tools. Identification of gas cylinders. Different types of welded joints and necessary preparation required for these. Welding symbols as applied to drawing.	: WELDING Use of hand tools used in Gas and in electric welding. Welding of object by gas and electric according to drawing.
A.C. & D.C. Motors, Generators of common types and their uses.	: ELECTRICIAN Familiarization with the measuring instruments, machinery and panels used in Electrical.
Brief description of internal combustion engines, such as cylinder block, piston, carburetor spark plug, camshaft, crank shaft, injector fuel pump etc.	: I.C. ENGINE Familiarization & Identification of different parts of i.e. Engines (Both spark ignition and compression/ignition-2 stroke & 4 stroke engines).
Types of Ferro-printing papers. Specification of Sensatised. Ammonia Papers- Expiry- precautions in Ammonia Printing.	Tracing Exercises on tracing paper and Tracing cloth. Ammonia printing with the help of machine.

Second Year

Theory	Practical
Brief description of production of cast iron, wrought iron, steel and alloy steels.	Handling of Inking instruments.
Procedure of inking a drawing. Conventional colours used for different metals as per ISI materials and equipment for colouring procedure of colouring.	Drawing of Rams bottom & safety valve in pencil. Inking and colouring the same. (Hand made paper should be used).
Necessities of training, equipment and materials (both conventional and modern like rotoring pen etc.) required for training procedure for tracing specification of Tracing paper.	Drawing of screw jack (Details and assembly) Preparation of tracing from the drawing on tracing paper by ink.
Procedure of tracing on tracing cloth and specification of tracing cloth.	Drawing of plummer block (Details and assembly). Preparation of tracing from the drawing on tracing cloth.
Types of assembly drawing. Different types of detailed drawings and preparation of bill of materials.	Working drawing of a simple bearing and a Foot step bearing.
Use of bearing types of bearing and materials used.	Details and assembly drawing of a angular plummer block.
Difference between frictional and anti frictional bearing. Advantages of anti frictional bearing over frictional bearing. Materials and proportion of parts for drawing purpose.	Details and assembly drawing of Roller and Ball bearing including tapered roller bearing.
Belts-power transmitted by belt. Materials of belt slip and creep Velocity of belt. Arc of contact.	Pulleys-solid, stepped and built up pulleys.
Simple exercise in calculation of belt speeds, nos. of belt needed in V-belt drive, velocity, pulley ratio etc. standard pulleys width of pulley face, velocity ratio chain drive.	Pulleys-pulley with different types of arms, rope pulleys, belt pulleys and drive.
Necessity of coupling. Types uses and proportion of different types of couplings. Materials used for couplings.	Working drawing of coupling (Muff coupling , flange coupling, friction grip coupling).
Heat treatment of steel.	Working drawing of coupling (claw coupling, universal coupling, knuckle joint).
Shade lines & their use on machine drawings. Conventional method for drawings shade lines, surface shading by means of lines.	Application of shade lines on machine drawings.
Piping materials and specifications of W.I. & Steel pipes. Pipe thread pipe fittings. Specifications of fittings.	Pipe fittings flanges, unions, valves etc.
Brief description of different types of pipe joints.	Different types of pipes layout systems. Different types of pipe joints.
Use of gears in transmission of power. Different types of gears. Cast gears and machined gears. Use of odontograph for drawing profile of gears etc.	Working drawings of gears such as spur, helical, bevel & worm, worm and worm wheel.
Use of cams in industry. Types of cam, kinds of motion, displacement diagrams. Terms used in cam. Types of followers.	Cams with different motions to followers, different types of followers.
Steam engine, important parts such as cylinder, piston, piston rod, crank shaft etc.	Working drawings of Eccentrics. Piston (I.C.C. Engines,) steam with the application of tolerances.
Brief description of petrol, diesel and gas engines.	Working drawings of connecting rods (I.C. Engine) with the application of tolerances.
Working principles of valves and their description.	Valve : such as lever safety valve, dead wt. Safety valve.
Brief description and function of reciprocating & centrifugal pump and water turbines.	Assembly drawing of a reciprocating pump.
Brief description, working principle and function of	Sketching and drawing of a tail stock. On the spot

hydraulic jack, press accumulator, ram etc.	sketching to be done.
Electrical units and quantities. Laws of electricity. Simple examples of calculation of current voltage, resistance in series and parallel connection (D.C. Circuit).	Electrical and Electronic symbols and simple wiring diagrams.
Structural Steel I.S. Specification for rolled sections. Structural steel roof trusses, truss joints and supports.	Detailed drawing of a built up and north light roof truss elevated gallery for a workshop.
Use of Jigs and Fixtures. Principle of selecting standard bushing.	Detailed drawing of a milling fixture.
Different locating methods clamping devices.	Drawing of a fixture for drilling hole.
Machine foundations. Brief treatment of the principle involved and the precaution to be observed.	Practice in designing a simple drilling Jig for drilling holes in a given component.
Function of gauges, different types of gauges and their uses. Use of templates in industry.	Different types of gauges, such as plug, snap, thread, taper etc.
Limits and limit systems. Types of fit and tolerance IS-919.	Sketching of a Press Tool giving nomenclature of each part. Drawing of dies & punches for the production of simple work pieces.
Working of Blow off cock & simple carburetor.	Blow off cock & simple carburetor.
Drg. Office practice, general arrangements of drawing, standard method of drawing.	Making foundation drawing for machinery section of R.S.I. and beams. Simple plate girder and built up trusses.
Numbering of drawings and standard parts. Familiarization with I.S. 696.	Sketching & Assembly Drg. Of Machine Swivel vice & pipe vice.
<ol style="list-style-type: none"> 1. What is Computer? General terms used in Computer. 2. Elementary DOS commands. 3. Word processor commands and their uses. 4. Window command and their uses. 5. Auto CAD commands and use of different Menus of AUTO CAD. 	<ol style="list-style-type: none"> 1. Elementary DOS 2. Knowledge of Editor 3. How to install Auto CAD 4. How to load Auto CAD 5. Elementary command of Auto CAD. 6. Knowledge window software. 7. Free hand working practice on Auto CAD.
Production of interchangeable parts, Fits Limits, tolerance & familiarization with IS-919 & IS-2709. Different methods of showing machine surfaces on drawings.	Preparation of Detailed drawings from Assembly. Drawings of simple Machine parts such as : Tool Post of Shaping machine, head stock etc. Valves- Non-return and safety valves.
Familiarization with : IS-1444(Drg. Board) IS-1360 (T-Sqr.) IS-1561(Set Sqr.) IS-696 (Code of Engg.Drg.)	Making working drawing of projects.

Reference Book :

NIMI – D'man Mechanical Theory & Practical Book

N.D.Bhatt - Elements of Engineering Drawing.

N.D.Bhatt - Machine Drawing

LIST OF TOOLS & EQUIPMENT

S.NO.	DESCRIPTION	QUANTITY
	TRAINEES KIT	
1	Draughtsman drawing instrument Box containing compasses with pencil point , point divider, interchangeable, divider penpoint interchangeable, divider spring bow, pen spring bow lengthening bar, pen drawing liner, screw driver instrument, tube with leads	5 sets
2	Scale set card board in case (Metric)	5 sets
3	Set square celluloid 45 degree 9250 x 1.5 mm) IS: 1561	5 sets
4	-----do-----60 degree (do) IS : 1561	5 sets
5	French –curves (set of 12 celluloid)	5 sets
6	Drawing Board (700 x 500) IS :1444	5 Nos.,
7	Tee –square (700 mm blade) IS : 1360	5 nos.
8	Steel Rule 300 mm (inches and millimeters)	5 nos.
	GENERAL OUTFIT	
1.	Mini drafter	5 Nos.
2.	Rotoring Pens (0.1 to 0.7)	2 Nos.
3.	Plastic models for development and geometrical solids	2 sets
4.	Universal drafting Machine 1500 x 1000 mm	2 nos.
5.	PC-AT for Auto –CAD with plotter & Dot –Matrix Printer	2 nos.
6.	Wooden Geometry Box for Black- Board work	1 set
7.	Ammonia Printing Machine (continuous Type)	1 nos.
8.	Caliper Outside 150 mm (spring)	5 nos.
9.	Caliper Inside 150 mm (spring)	5 nos.
10.	Stencil set complete in box	2 set
11.	Steel tape 2 meters (pull type)	1 no.
12.	Radius and Fillet templates	1 set
13.	Drawing Table	5 nos.
14.	Steels	5 nos.
15.	Print trimmer 1050 mm cutting edge	1 no.
16.	Chalk Board (roll type)	1 no.

Importance of safety & general precautions observed in the institute & in the section. Importance of the course in the development of industrial economy of the country. Related instruction. Subject to be taught-achievement to be made. Recreational, medical facilities & other extra curricular activities of the institute. (all necessary guidance to be provided to the new comers to become familiar with working of industrial training institute. System including stores procedures etc.)

Nomenclature, description & use of drawing instruments & various equipment in drawing office. Their care and maintenance. Lay out of drawing sheets.

Type of lettering proportion & spacing of letters & words.

Terms and definitions – polygons and circles.

Definition of ellipse, parabola, hyperbola, different methods of their construction definition and method of drawing involute cycloidal curves, helix & spiral.

Planes and their normal, projections, projection and orthographic projection, first angle & 3rd angle projection.

Principle of orthographic projection of solids like prisms, cones, pyramids & frustums in various positions.

Solutions of problems to find out the true shape of surfaces when solids are cut by different cutting planes.

Lines and their meaning, section lines of different material, conventional signs, symbols & abbreviations, hatching tinting and shading, norms of dimensioning.

Construction of different types of scales, their appropriate uses, RF principle of diagonal and vernier scale.

Importance of freehand sketching in machine drawing. Material equipment required in sketching.

Importance of sectional views. Types of sectional views & their uses of parts not shown in section.

Definition of inter-penetration and interpenetration curves. Common methods to find out the curves of inter-penetration.

Solution of problems on inter-penetration of prisms cones and pyramids with their axes intersecting at an angle.
Theory of projection as specified in SP:46-1938
Definition of development it's need in industry and different methods of developing the surfaces.
Principal of isometric projection, difference b/n isometric drawing & isometric projection. Isometric scale. Dimensioning an isometric drawing.
Different methods of drawing isometric views.
Principals and types of oblique projections. Advantage of oblique projection over isometric projection
Types of perspective projection. Fundamental concept, definition, location of a station point.
Terminology-feature, functional feature, functional dimension, datum dimension.
Induction Training Familiarization with the institute importance of course training, machinery used in the course, type of work done by the trainees in the institute, types of jobs made by the trainees in the course introduction to safety including fire fighting equipment and their uses etc.
Practice in using instruments. Drawing of straight and curved lines, drawing angles, circles etc.
Letters, block letters, italics etc. & numerals
Plane geometrical construction triangles, polygons, circles.
Construction of ellipse parabola, & hyperbola construction of involute, cycloidal curves, helix & spiral.
Projection of points and lines. Projection of plane figures.
Projection of solids-prisma, cones , pyramids and frustums.
Projections of solids, finding out the true shape surfaces cut by the oblique planes. Intensive freehand sketching of m/c. parts along with projection of simple machine parts-1 st angle projection, projection of machines parts drawn in the above exercise 3 rd angle projection.
Conventional signs and symbols. Different types of section lines and abbreviations as per ISI. Different types of lines and their uses in drawing . Norms of dimensions
Scales-plain scales, diagonal scales. Comparative scales, vernier scale & chord scale.
Free hand sketching, practice in drawing freehand straight lines, curved lines polygons, circles, elliptical figures, figures with irregular contour and freehand sketch of a machine part such as tool post of a lathe.
Sectional views different types of sections.
Inter-penetration of two prisms with their axes intersecting at right angles and inter-penetration of cone and pyramids intersecting each other.
Inter-penetration of Prisms with their axes intersecting at an angle and inter-penetration of cone and pyramids with their axes intersecting at an angle.
General principles of presentation that is orthographic projections in 1 st & 3 rd angle.
Development of surfaces bounded by plane development of surface bounded by plane revolution.
Development of an oblique cone with elliptical base etc. development of solids intersecting each other. Isometric projection of geometrical solids.
Isometric projection of a machine part with irregular curves. Freehand isometric drawing of actual objects.
