

GENERAL WORKSHOP PRACTICE – II

Subject Code :

No. of Credits : 3 (TH:0,T:0,P:5)

I. RATIONALE:

Workshop Practice is a basic engineering course. In order to have a balanced overall development of diploma engineers, the knowledge of basic workshops such as welding, sheet metal, foundry and plastic moulding and painting, polishing is essential to perform his/her duties in industries. General workshop practices are included in the curriculum to provide hands-on practice and experience in the use of different tools and basic manufacturing practices in various shops. Working in a workshop develops the attitude of teamwork and safety awareness. This course provides industrial environment in the educational institute.

II. INDUSTRY / EMPLOYER EXPECTED OUTCOME:

Use various Engineering tools for performing shop floor activities.

III. COURSE LEVEL LEARNING OUTCOMES (COS):

Students will be able to achieve & demonstrate the following COs on completion of course based learning:

CO1: Identify different types of materials and their basic properties. (Shop wise)

CO2: Use and take measurements with the help of basic measuring tools/equipment. (Shop wise)

CO3: Select proper tools for a particular operation. (shop wise)

CO4: Select materials, tools, and sequence of operations to make a job as per given specification / drawing.

CO5: Prepare job using different tools in Welding and Fabrication Shop.

CO6: Prepare job using different tools in Sheet metal Shop.

CO7: Prepare job using different tools in Foundry and Plastic moulding shop.

CO8: Prepare job using different mould in Painting and Polishing shop.

CO9: Perform various operations in Electric and Electronics shop-II.

CO10: Elective shop (SR.NO.6/7/8).

IV. LAB LEARNING OUTCOMES AND ALIGNED COURSE CONTENT:

S. N.	Theory Learning Outcomes (TLOs) aligned to COs	Learning content mapped with Theory Learning Outcomes (TLOs) and COs.	Suggested Learning Pedagogies.
1	<p>LLO 1.1 Identify metal joining tools.</p> <p>LLO 1.2 Know arc welding and practice.</p> <p>LLO 1.3 Knowledge of welding terms- parameter, position etc.</p> <p>LLO 1.4 Maintain arc and practice.</p> <p>LLO 1.5 Prepare joint by arc welding.</p> <p>LLO 1.6 Practice of spot welding.</p>	<p>UNIT- I: Welding and Fabrication Shop</p> <p>1.1 Introduction of metal joining process. Types of welding, Arc welding hand tools- electrode holder, cable connector, cable lugs, chipping hammer, earthing clamp, wire brush and their Specifications. Welding Electrode, filler rod, fluxes, and solders classification and coding of electrodes.</p> <p>1.2 Operation and practice on machineries in welding shops- arc welding transformer, spot welding machine and their specifications and maintenance.</p> <p>1.3 Welding parameters, welding joints and welding positions. Materials to be welded, safety precautions.</p> <p>1.4 Job Practice</p> <p>Job I Practice of striking arc (Minimum 4 beads on 100 mm long M.S. flat).</p> <p>Job II Practice of depositing beads on plate at different current levels. (Minimum 4 beads on M.S. plate at four setting of current level).</p> <p>Job III Preparation of lap joint using arc welding process.</p> <p>Job IV Preparation of T-joint using arc welding.</p> <p>Job V Preparation of lap joint on spot welding machine.</p>	<p>Demonstrations and job practice.</p>
2	<p>LLO 2.1 Identify sheet metal tool and different types of sheets.</p> <p>LLO 2.2 Explain operation of sheet metal machineries.</p> <p>LLO 2.3 Use sheet metal tools and perform basic operation.</p>	<p>UNIT- II: Sheet Metal Shop</p> <p>2.1 Introduction and demonstration of sheet metal shop. Sheet metal hand tools snip, shears sheet gauge, straight edge, L square, scribe, divider, trammel, punches, pliers, stakes, groovers, limit set and their Specifications</p> <p>2.2 Operation of machineries in sheet metal shops- sheet cutting and bending machine their specifications and maintenance.</p> <p>2.3 Practice of basic sheet metal process- marking, bending, folding, edging, seaming, staking,</p>	<p>Demonstration / video / job preparation.</p>

	<p>LLO 2.4 Operate sheet metal machineries.</p> <p>LLO 2.5 Perform different bending operations and prepare job. Maintain tools, equipment and machineries.</p>	<p>riveting. Use of hand tools and accessories e.g. different types of hammers, hard and soft mallet, sheet and wire gauge, necessary allowance required during job fabrication, selection of material e.g. black-plain sheet, galvanized-iron plain sheet, galvanized corrugated sheet, aluminium sheet.</p> <p>2.4 Demonstration and practice on various machines and equipment used in sheet metal shop e.g. Shearing Machine, Bar Folder, Burring Machine, circular sheet cutting machine etc.</p> <p>2.5 Job Practice</p> <p>Job I Shearing practice on a sheet using hand shears.</p> <p>Job II Practice on making Single riveted lap joint/ Double riveted lap Joint.</p> <p>Job III Practice of making Single/double seam joint.</p> <p>Job IV Prepare a cylindrical job.</p> <p>Job V Making a tray/box or any utility item compulsory.</p>	
3	<p>LLO 3.1 Introduction of foundry shop, foundry tools.</p> <p>LLO 3.2 Preparation of solid pattern.</p> <p>LLO 3.3 Preparation of mould using solid pattern.</p> <p>LLO 3.4 Prepare casting sample.</p> <p>LLO 3.5 Introduction and demonstration of plastic moulding process, Thermosetting and thermoplastic etc.</p> <p>LLO 3.6 Demonstration and practice on bench moulding machine.</p>	<p>UNIT- III: Foundry shop and Plastic Moulding Shop:</p> <p>3.1 Introduction of foundry shop, foundry tools. Cupola and pit furnace.</p> <p>3.2 Preparation of solid pattern.</p> <p>3.3 To prepare green moulding sand and to prepare moulds (single piece and double piece pattern sweep mould).</p> <p>3.4. Casting of non ferrous (lead or aluminium).</p> <p>3.5 Introduction and demonstration of plastic moulding process, Thermosetting and thermoplastic etc Know the commonly used plastic material i.e. Thermosetting, Thermoplastic, PVC, CPVC.</p> <p>3.6 Sketch & Label various parts of bench moulding m/c.</p> <p>3.7 Prepare utility job by bench moulding machine.</p>	<p>Demonstration / video / job preparation.</p>

	LLO 3.7 Prepare job on bench moulding machine and Maintenance of equipment and machineries.		
4	<p>LLO 4.1 Selection of Painting process</p> <p>LLO 4.2 Perform surface preparation operation. (cleaning, grinding, etc.)</p> <p>LLO 4.3 Perform material filling operation.</p> <p>LLO 4.4 Perform buffing and priming operation</p> <p>LLO 4.5 Use of paints, enamel on wood /metal</p>	<p>UNIT- IV: Painting and Polishing Shop</p> <p>4.1 Introduction of paints, varnishes, Reason for surface preparation, Advantages of Painting, other method of surface coating i.e. Electroplating etc.</p> <p>4.2 Job Practice</p> <p>Job 1 To prepare a wooden surface for painting apply primer on one side and to paint the same side. To prepare French polish for wooden surface and polish the other side.</p> <p>Job II To prepare metal surface for painting, apply primer and paint the same.</p> <p>Job III To prepare a metal surface for spray painting,</p> <p>4.3 Spray primer and paint the same by spray painting gun and compressor system.</p> <p>The sequence of polishing will be as follows:</p> <ol style="list-style-type: none"> i) Abrasive cutting by leather wheel ii) Polishing with hard cotton wheel and with polishing material iii) Buffing with cotton wheel or buff wheel. <p>Introduction of paints, varnishes, Reason for surface preparation, Advantages of Painting, other method of surface coating i.e. Electroplating</p>	Demonstration / video / job preparation.
5	<p>LLO 5.1 Maintenance of common electrical appliances.</p> <p>LLO 5.2 Performing types of wiring (casing and capping, PVC, batten).</p> <p>LLO 5.3 Demonstration the construction of lead acid battery.</p>	<p>UNIT- V: Electric & Electronic Shop-II</p> <p>5.1 Demonstration and maintenance of common electrical appliances such as auto electric iron, electric kettle, ceiling/table fan, desert cooler etc.</p> <p>5.2 Job Practice</p> <p>Job –I Construction of distribution and extension board with two 5A sockets and two I5A Sockets, a fuse. Types of wiring and to make different light control circuits in the following types of wiring Casing and capping, (PVC) conduct, batten wiring</p> <p>Job –II Demonstration the construction of lead acid battery and its working.</p>	Demonstration / video / job preparation

	<p>LLO 5.4 Connection of two or three batteries in series and parallel.</p> <p>LLO 5.5 Testing of battery with hydrometer.</p> <p>LLO 5.6 Demonstration of various tools used in electronic shop.</p> <p>LLO 5.7 Soldering and de-soldering.</p> <p>LLO 5.8 Fitments of electronics components.</p>	<p>Job –III Installation of battery and connecting two or three batteries in series and parallel. Introduction to battery charger and its functioning.</p> <p>Job –IV Charging a battery and testing with hydrometer and cell tester.</p> <p>5.3 Demonstration and familiarization with the following tools used in electronic shop: Such as Tweezers, Screw drivers (different sizes), Insulated Pliers, Cutter, Sniper, L- Keys, Screw Driver (Star Screw Driver), Soldering Iron, soldering wire, flux. Their demonstration and uses.</p> <p>5.4 Demonstration and practice of soldering and de-soldering.</p> <p>5.5 Demonstration and practice of fitting thimbles and crimping tools. Cut, strip, join an insulated wire with the help of soldering iron with different types of wires.</p>	
6	<p>LLO 6.1 Introduction of Civil Engineering construction materials.</p> <p>LLO 6.2 Masonary work and masonry mixture.</p> <p>LLO 6.3 Prepare a beam/column of steel bar.</p> <p>LLO 6.4 Field testing of brick.</p> <p>LLO 6.5 Laying practice of inter lock tile/ tile / brick</p>	<p style="text-align: center;">Elective Shop Civil Engineering –Masonry Shop (Only for Civil Engg. students)</p> <p>6.1 Introduction of construction material used in civil works.</p> <p>a) Stones- classification of rocks, quarrying of stones by wedging and blasting.</p> <p>b) Brick-composition of good brick earth and harmful ingredients. classification of bricks as per IS. Test on bricks (field test, sound test, absorption test, shape and size test etc.) Substitute of brick -cement concrete blocks, fire clay/refractory bricks, calcium silicate bricks</p> <p>c) Cement-ordinary Portland cement, types of cement and field testing</p> <p>d) Ferrous metals- TMT bar, bar sizes, uses, size and strength parameter selection as per load on structure. Sand, silica etc.</p> <p>e) Practical’s-</p> <p>6.2 Prepare a masonry mixture of sand, blast stone, cement etc. for making a cement floor.</p> <p>6.3 Prepare a beam structure of iron bar for 9”x12” size beam.</p> <p>6.4 Size, sound and water absorption testing of brick.</p> <p>6.5 Laying practice of inter lock tiles/ bricks/ tiles.</p>	Demonstration / video

7	<p>LLO 7.1 Introduction of machine shop, shop layout.</p> <p>LLO 7.2 Demonstration of Centre Lathe machine.</p> <p>LLO 7.3 Tools used on Lathe machine, grinding of tool.</p> <p>LLO 7.4 Lathe machine operations(basic).</p> <p>LLO 7.5 Drill machine and operation.</p> <p>LLO 7.6 Preventive maintenance of machines.</p>	<p style="text-align: center;">Basic Machine Shop (Only for ME,AE,PE students)</p> <p>7.1 Introduction of machine shop, Machine shop layout.</p> <p>7.2 Demonstration of Centre Lathe machine, types of lathe machine, specification, parts description and their functioning details.</p> <p>7.3 Tools used on Lathe machine, grinding of tool, tool's material, clamping of tool, clamping of job in lathe machine.</p> <p>7.4 Perform basic operation on lathe machine –</p> <ol style="list-style-type: none"> 1) Clamping of job in machine chuck and setting of its centre. 2) Fixing of tool in tool post as per operation. 3) Facing of round bar job. 4) Plain turning of round bar job. <p>7.5 Demonstration of Drill machine, types of drill machine and practice on drilling operation.</p> <p>7.6 preventive maintenance of machines</p>	Demonstration
8	<p>LLO 8.1 Demonstration of computer's basic function</p> <p>LLO 8.2. Different ports in a CPU/ Monitor, their nomenclature, specification and function.</p> <p>LLO 8.3 Types of cables used in a computer network system.</p> <p>LLO 8.4 Networking cable connectors, installation and crimping.</p> <p>LLO 8.5 Application of network interface cards (NIC), HUB, Switches, modem, routers etc.</p>	<p style="text-align: center;">Basic Computer and IT Shop (Only for CSE, IT, EE, ECE students)</p> <p>8.1 Demonstrate basic function of computer, various computer hardware components, ports/interface and related cables.</p> <p>8.2 Different ports in a CPU/Monitor, their nomenclature, specification and functions.</p> <p>8.3 Types of cables used in a computer network system</p> <p>8.4 Networking cable connectors, installation and crimping.</p> <p>8.5 Application of network interface cards (NIC), HUB, Switches, modem, routers, cross over and straight cable, RJ-45 connectors, Characteristics CAT5, CAT6, fibre optic cable, SC, ST, FC, LC type fibre connectors</p>	Demonstration / video

V. LABORATORY LEARNING OUTCOME AND ALIGNED PRACTICAL / TUTORIAL EXPERIENCES:

Sr. No.	Practical / Tutorial /Laboratory Learning Outcome (LLO)	Laboratory Experiment/ Practical Titles/ Tutorial Titles	No. of Hrs.	Relevant Cos
1	Welding and Fabrication Shop LLO 1.1 Demonstration of metal joining tools. LLO 1.2 Know arc welding and practice. LLO 1.3 Knowledge of welding terms- parameter, position etc. LLO 1.4 Maintain arc and practice. LLO 1.5 Prepare joint by arc welding. LLO 1.6 Practice of spot welding.	1.1 Introduction of metal joining process. Types of welding, Arc welding hand tools- electrode holder, cable connector, cable lugs, chipping hammer, earthing clamp, wire brush and their Specifications. Knowledge of welding Electrode, filler rod, fluxes, and solders classification and coding of electrodes.	3	CO1 CO2 CO3 CO4 CO5
		1.2 Operation and practice on machines in welding shops- arc welding transformer, spot welding machine and their specifications and maintenance.	3	
		1.3 Understanding welding parameters, welding joints and welding positions. Materials to be welded, safety precautions.	1	
		Job I Practice of striking arc (Minimum 4 beads on 100 mm long M.S. flat).	1	
		Job II Practice of depositing beads on plate at different current levels. (Minimum 4 beads on M.S. plate at four setting of current level).	1	
		Job III Preparation of lap joint using arc welding process.	1	
		Job IV Preparation of T-joint using arc welding.	1	
		Job V Preparation of lap joint on spot welding machine.	1	
		* Minor project:- Prepare utility job (like stool, benches, tables or similar jobs) involving arc welding and artificial wood as per given drawing (in group of 4 to 5 students) Fabrication operation involve measuring, marking, cutting, edge preparation, welding	3	

2	Sheet Metal Shop LLO 2.1 Identify sheet metal tools and different types of sheets. LLO 2.2 Explain operation of sheet metal machineries. LLO 2.3 Use sheet metal tools and perform basic operation. LLO 2.4 Operate sheet metal machineries. LLO 2.5 Perform different bending operations and prepare job. Maintain tools, equipment and machineries.	2.1 Introduction and demonstration of sheet metal shop. Sheet metal hand tools snip, shears sheet gauge, straight edge, L square, scribe, divider, trammel, punches, pliers, stakes, groovers, limit set and their Specifications	2	CO1 CO2 CO3 CO4 CO6
		2.2 Operation of machineries in sheet metal shops- sheet cutting and bending machine their specifications and maintenance.	2	
		2.3 Practice of basic sheet metal process-marking, bending, folding, edging, seaming, staking, riveting. Use of hand tools and accessories e.g. different types of hammers, hard and soft mallet, sheet and wire gauge, necessary allowance required during job fabrication, selection of material e.g. black-plain sheet, galvanized-iron plain sheet, galvanized corrugated sheet, aluminium sheet.	3	
		2.4 Demonstration and practice on various machines and equipment used in sheet metal shop e.g. Shearing Machine, Bar Folder, Burring Machine, circular sheet cutting machine etc.	2	
		Job I Shearing practice on a sheet using hand shears.	1	
		Job II Practice on making Single riveted lap joint/Double riveted lap Joint. To prepare a cylinder/cube as per given drawing. To prepare a tray/dust pan as per given drawing. To prepare funnel as per given drawing.	1	
		Minor Project: - A class is divided into group and every group will made a utility item. Like –first aid box, trolley, box, dust bin, small almirah etc.		

3	Foundry shop and Plastic Moulding Shop LLO 3.1 Introduction of foundry shop, foundry tools. LLO 3.2 Preparation of solid pattern. LLO 3.3 Preparation of mould using solid pattern. LLO 3.4 Prepare casting sample. LLO 3.5 Introduction and demonstration of plastic moulding process, Thermosetting and thermoplastic etc. LLO 3.6 Demonstration and practice on bench moulding machine. LLO 3.7 Prepare job on bench moulding machine and Maintenance of equipment and machineries.	3.1 Introduction of foundry shop, foundry tools. Firing of Cupola and pit furnace, heating process	3	CO1 CO2 CO3 CO4 CO7
		3.2 Preparation of solid pattern.	2	
		3.3 To prepare green moulding sand and to prepare moulds (single piece and double piece pattern sweep mould).	2	
		3.4 Casting of non-ferrous (lead or aluminium).	3	
		3.5 Introduction and demonstration of plastic moulding process, Thermosetting and thermoplastic etc Know the commonly used plastic material ie. Thermosetting, Thermoplastic, PVC, CPVC	2	
		3.6 Demonstration and operate bench moulding machine.	2	
		3.7 Prepare utility job by bench moulding machine	2	
4	Painting and polishing shop LLO 4.1 Selection of Painting process. LLO 4.2 Perform surface preparation operation. (cleaning, grinding, etc.) LLO 4.3 Perform material filling operation. LLO 4.4 Perform buffing and priming operation. LLO 4.5 Use of paints, enamel on wood /metal.	4.1 Introduction of paints, varnishes, Reason for surface preparation, Advantages of Painting, other method of surface coating i.e.. Electroplating etc.	2	CO1 CO2 CO3 CO4 CO8
		4.2 Job Practice Job 1: To prepare a wooden surface for painting. Apply primer on one side and to paint the same side.	2	
		Job II To prepare French polish for wooden surface and polish the other side.	2	
		Job III: To prepare metal surface for painting, apply primer and paint the same.	2	
		Job IV: To prepare a metal surface for spray painting.	1	
		4.3 Painting of a wood surface, initially with primer and paint the same by spray painting gun and compressor system	2	

		The sequence of polishing will be as follows: i) Abrasive cutting by leather wheel ii) Polishing with hard cotton wheel and with polishing material iii) Buffing with cotton wheel or buff wheel.	1 1 1	
5	Electric & Electronic shop- II LLO 5.1 Maintenance of common electrical appliances. LLO 5.2 Performing types of wiring. (casing and capping, PVC, batten) LLO 5.3 Demonstration the construction of lead acid battery. LLO 5.4 Connection of two or three batteries in series and parallel. LLO 5.5 Testing of battery with hydrometer. LLO 5.6 Demonstration of various tools used in Electronic shop. LLO 5.7 Soldering and de-soldering. LLO 5.8 Fitments of electronics components	5.1 Demonstration and maintenance of common electrical appliances such as auto electric iron, electric kettle, ceiling/table fan, desert cooler etc.	3	CO1 CO2 CO3 CO4 CO9
		5.2 Job –I Construction of distribution and extension board with two 5A sockets and two I5A Sockets, a fuse. Types of wiring and to make different light control circuits in the following types of wiring Casing and capping, (PVC) conduct, batten wiring.	3	
		Job –II Demonstration the construction of lead acid battery and its working.	1	
		Job –III Installation of battery and connecting two or three batteries in series and parallel. Introduction to battery charger and its functioning.	1	
		Job –IV Charging a battery and testing with hydrometer and cell tester.	1	
		5.3 Demonstration and familiarization with the following tools used in Electronic shop: Such as Tweezers, Screw drivers (different sizes), Insulated Pliers, Cutter, Sniper, L- Keys, Screw Driver (Star Screw Driver), Soldering Iron, soldering wire, flux. Their demonstration and uses.	1	
		5.4 Demonstration and practice of soldering and de-soldering.	1	
		5.5 Demonstration and practice of fitting thimbles and crimping tools. Cut, strip, join an insulated wire with the help of soldering iron with different types of wires.	1	

6	Civil Engineering – Masonary Shop (only for Civil Engg. students) LLO 6.1 Introduction of civil Engg. construction materials. LLO 6.2 Masonary work and masonary mixture. LLO 6.3 Prepare a beam/column of steel bar. LLO 6.4 Field testing of brick. LLO 6.5 Laying practice of interlock tile/ tile / brick.	6.1 Introduction of construction material used in civil works.	1	
		6.2 Stones- classification of rocks, quarrying of stones by wedging and blasting.	1	
		6.3 Brick-composition of good brick earth and harmful ingredients. classification of bricks as per IS. Test on bricks (field test, sound test, absorption test, shape and size test etc.) Substitute of brick-cement concrete blocks, fire clay/refractory bricks, calcium silicate bricks Cement-ordinary Portland cement, types of cement and field testing. Ferrous metals- TMT bar, bar sizes, uses, size and strength parameter selection as per load on structure. Sand, silica etc.	3	
		6.4 Prepare a masonary mixture of sand, blast stone, cement etc for making a cement floor.	2	
		6.5 Prepare a beam structure of iron bar for 9”x12” size beam.	2	
		6.6 Size, sound and water absorption testing of brick.	2	
		6.7 Laying practice of inter lock tiles/bricks/tiles.	1	
		7	Basic Machine Shop (for ME, AE, PE students only) LLO 7.1 Introduction of machine shop, shop layout. LLO 7.2 Demonstration of Centre Lathe machine LLO 7.3 Tools used on Lathe machine, grinding of tool. LLO 7.4 lathe machine operations(basic) LLO 7.5 Drill machine and operation.	7.1 Introduction of machine shop, Machine shop layout.
7.2 Demonstration of Centre Lathe machine, types of lathe machine, specification, parts description and their functioning details.	2			
7.3 Tools used on Lathe machine, grinding of tool, tool’s material, clamping of tool, clamping of job in lathe machine.	2			
7.4 Perform basic operation on lathe machine – 1) Clamping of job in machine chuck and setting of its centre.	4			

	LLO 7.6 Preventive maintenance of machines.	2) Fixing of tool in tool post as per operation. 3) Facing of round bar job. 4) Plain turning of round bar job.		
		7.5 Demonstration of Drill machine, types of drill machine and practice on drilling operation.	2	
		7.6 preventive maintenance of machines	1	
8	Basic Computer and IT Shop (for CSE, IT, EE, ECE students only) LLO 8.1 Demonstration of computer's basic function LLO 8.2 Different ports in a CPU/Monitor, their nomenclature, specification and function. LLO 8.3 Types of cables used in a computer network system LLO 8.4 Networking cable connectors, installation and crimping. LLO 8.5 Application of network interface cards (NIC), HUB, switches, Routers, Modem etc.	8.1 Demonstrate basic function of computer, various computer hardware components, ports/interface and related cables. 8.2 Different ports in a CPU/Monitor, their nomenclature, specification and functions. 8.3 Types of cables used in a computer network system. 8.4 Networking cable connectors, installation and crimping. 8.5 Application of network interface (NIC), HUB cards, switches, Routers, Modem. Characteristics of CAT5, CAT6, fibre optic cable, use of crossover and straight cable, RJ-45 connectors, SC, ST, FC, LC type fibre connectors.	3 2 2 2 3	CO10

VI. LABORATORY EQUIPMENT / INSTRUMENTS / TOOLS / SOFTWARE REQUIRED:

Sr. No.	Equipment Name with Broad Specification	Relevance LLO No.
1	Fire buckets of standard size.	1,2
2	Fire extinguisher A, B and C types	1,2
3	Wood Turning Lathe Machine, Height of Centre: 200mm, Distance between Centers: 1200mm, Spindle Bore: 20mm with Taper, Range of Speeds: 425 to 2800 with suitable Motor Drive. with all accessories	11
4	Circular Saw Machine, Diameter of saw blade 200 mm, Maximum Depth of Cut 50 mm, Table Size -350 x 450 mm, Table Tilting - 450	11

5	Wood working tools- marking and measuring tools, saws, claw hammer, mallet, chisels, plans, squares	11
6	Carpentry Vice 200 mm	11
7	Work Benches- size:1800 x 900 x 750 mm	4
8	Bench Drilling machine (upto 13 mm drill cap.) with ½ H.P. Motor, 1000 mm height.	4
9	Power Saw machine 350 mm mechanical with 1 HP Motor & all Accessories.	4
10	Bench Grinder 200 mm Grinding Disc diameter 200 mm. with 25 mm. bore 32 mm. with ½ HP/1HP Motor.	4
11	Vernier height Gauge 450 mm	4,5,6,8
12	Surface Plate 600 x 900 mm Grade I	4,5
13	Angle Plate 450 x 450 mm	4,5
14	Welding machine 20 KVA 400A welding current 300A at 50, 100, 200, 250, 300 with std. Accessories and Welding Cable 400 amp. ISI with holder	8,9,10,11
15	Spot welding machine (portable) /Oxygen and acetylene gas welding and cutting kit with cylinders and regulators.	8,9,10,11
16	Pipe Bending Machine	5,6
17	Pipe Vice – 100 mm	5,6
18	Pipe Cutter- 50 mm	5,6
19	Bench Vice 100 mm	5,6
20	Portable Hammer Drill Machine 0-13 mm A.C. 230 V, 2.5Amp, Pistol type, having different types of bits	4
21	Sheet Bending Machine	12
22	Sheet Cutting Machine	12
23	Brazing Equipment	12
24	Civil engineering construction material e.g. Bricks, cement, aggregates, iron bar of different size 6mm,8mm,10mm	5 each
25	Modem, different types of HUB, interface (NIC), HUB cards, switches, Routers. Characteristics of CAT5, CAT6, fibre optic cable, use of crossover and straight cable, RJ-45 connectors, SC, ST, FC, LC type fibre connectors.	2 each
26	Centre Lathe machine,1200mm distance between dead centre, 2 HP motor, with self-centric chuck	05
27	Radial drill machine, 1HP motor, with machine vice.	01
28	Sheet metal hand tools- snip, shears sheet gauge, straight edge, L square, scriber, divider, trammel, punches, pliers, stakes, groovers, limit set	12

VII. SUGGESTED COS - POS MATRIX FORM:

Course Outcomes (COs)	Programme Outcomes (POs)						
	PO-1 Basic and Discipline Specific Knowledge	PO-2 Problem Analysis	PO-3 Design/ Development of Solutions	PO-4 Engineering Tools	PO-5 Engineering Practices for Society, Sustainability and Environment	PO-6 Project Management	PO-7 Life long Learning
CO1	3	-	-	2	3	3	1
CO2	3	-	-	3	2	3	-
CO3	3	-	-	3	2	3	1
CO4	3	-	-	3	2	3	1
CO5	3	-	-	3	2	3	1

Legends: - High: 03, Medium: 02, Low: 01

VIII. SUGGESTED LEARNING MATERIALS / BOOKS:

Sr. No.	Author	Title	Publisher with ISBN Number
1	Bawa, H.S.	Workshop Practice	McGraw Hill Education, Noida; ISBN-10: 0070671192 ISBN-13: 978-0070671195
2	Gupta, J.K.; Khurmi, R.S.	A Textbook of Manufacturing Process (Workshop Tech.)	S.Chand and Co. New Delhi ISBN:81-219- 3092-8
3	Hegde, R.K.	Workshop Practice Manual for Engineering Diploma & ITI Students	Sapna Book House, 2012, ISBN:13: 9798128005830
4	Singh, Rajender	Introduction to Basic Manufacturing Process & Workshop Technology	New Age International, New Delhi; 2014, ISBN: 978-81-224-3070-7
5	Hajra; Choudhary	Elements of Workshop Technology	Media Promoters and Publishers Mumbai, 2009, ISBN: 10-8185099146

IX. LEARNING WEBSITES & PORTALS:

Sr. No.	Link / Portal	Description
1	http://www.asnu.com.au	Basic engineering tools.
2	http://www.abmtools.com/downloads/Woodworking%20Carpentry%20Tools.pdf	Wood working
3	http://www.weldingtechnology.org	Welding techniques

3	http://www.weldingtechnology.org	Welding techniques
4	http://www.newagepublishers.com/samplechapter/001469.pdf	Basic engineering tools.
5	http://www.youtube.com/watch?v=TeBX6cKHWY	Welding techniques
6	http://www.youtube.com/watch?v=QHF0sNHnttw&feature=rrelated	Welding techniques
7	http://www.youtube.com/watch?v=Kv1zo9CAxt4&feature=relmfu	Wood working
8	http://www.piehtoolco.com	Basic engineering tools.
9	http://sourcing.indiamart.com/engineering/articles/materials-used-hand-tools/	Basic engineering tools.
10	https://www.youtube.com/watch?v=9_cnkaAbtCM	Basic engineering tools.
