

PROGRAMME NAME : DIPLOMA ENGINEERING (COMMON TO ALL ENGINEERING BRANCHES)

COURSE TITLE : GENERAL WORKSHOP PRACTICE – I

COURSE CODE :

I. RATIONALE:

II. 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.

III. INDUSTRY / EMPLOYER EXPECTED OUTCOME:

Use different engineering tools for performing shop floor activities.

IV. COURSE LEVEL LEARNING OUTCOMES (COS):

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

CO1 - Use firefighting tools and equipment. Follow safety procedures and precautionary measures.

Use safety equipment and Personal Protection Equipment.

CO2 - Identify different types of materials and their basic properties. (fitting, carpentry, smithy, plumbing etc.)

CO3 - Use and take measurements with the help of basic measuring tools/equipment. (all shop)

CO4 - Select proper tools for a particular operation shop wise.

CO5 - Select materials, tools, and sequence of operations to make a job as per given specification/drawing

CO6 - Prepare job using different tools in Fitting and Assembly Shop and inspect the same.

CO7 - Perform various operations and prepare jobs in Carpentry shop.

CO8 - Perform various operations and prepare jobs in Plumbing shop.

CO9 - Produce simple job using different smithy tools in Black smithy shop.

CO10 - Perform various operations in Electric and Electronics shop.

V. LAB LEARNING OUTCOMES AND ALIGNED COURSE CONTENT:

Sr. No.	Lab Learning Outcomes(LLOs) aligned to COs.	Learning content mapped with Lab Learning Outcomes (LLOs) and COs.	Suggested Learning Pedagogies
1	LLO 1.1 Follow safety practices LLO 1.2 Explain the different types of fire extinguisher and their uses LLO 1.3 Use firefighting equipment LLO 1.4 Locate various machines and equipment in workshop LLO 1.5 Follow good Housekeeping practice. LLO 1.6 Use, requirement and	UNIT - I General Workshop Practice Measures 1.1 Safety Practices, Causes of accidents, General safety rules, Safety signs and symbols, First Aid. 1.2 Fire, Causes of Fire, Basic ways of extinguishing the fire, Classification of fire, Class A, B, C, D, Firefighting equipment, fire extinguishers, and their uses. 1.3 Workshop Layout. 1.4 Issue and return system of tools, equipment and consumables. 1.5 Different types of metals and non-metals,	Demonstration Collaborative learning Role Play.

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	identification of correct material /metal for product. LLO 1.7 Inventory control	ferrous and non- ferrous (e.g. iron, steel, Aluminium, brass etc.) with their alloys. 1.6 Basic inventory control and material management.	
2	LLO 2.1 Identify different type of raw material, different fitting tools. LLO 2.2 Use fitting tools LLO 2.3 Explain operation of fitting shop machines LLO 2.4 Operate different machines. LLO 2.5 Perform various fitting operation. LLO 2.6 Maintain tools, Equipment and machineries.	UNIT - II Fitting and Assembly shop 2.1 Introduction of fitting shop tools, marking and measuring devices/equipment. Identification of materials (Iron, Copper, Stainless Steel, Aluminium etc.), their composition, various steel sections (flat, angle, channel, bar etc.). 2.2 Demonstration and familiarization with Fitting shop tools like bench vice, hammers, chisels, files, hacksaw, surface plate, punch, V- block, angle plate, try square, marking block, steel rule, twist drills,reamers, tap set, die set and their Specifications. 2.3 Hands-on practice on fitting shops machineries e.g. Drilling machine, Power saw, grinder, tapping gun, Know their specifications and basic maintenance method. 2.4 Basic knowledge and practice of sawing, marking, punching, chipping, filling, scraping, grinding, drilling, tapping, dyeing, and reaming etc. operations. 2.5 Job Practice: Job I Marking of job, use of marking tools, filing and use of measuring instruments. (Vernier caliper, Micrometer and Vernier height gauge). Job II Filing a rectangular/square piece to maintain dimensions within an accuracy of $\pm .25$ mm. and check it by vernier caliper. Job III Making a cut-out from a square piece of MS flat using hand hacksaw and chipping. Job IV Drilling and tapping practice on MS Flat. Job V Tapping practice on MS Flat. Job VI Making a fitting joint like male-female joint and check/inspect it by vernier and feeler gauge. Job VII Performing basic maintenance of bench-vice, machines used in shops and after that assembles in proper sequence.	Model Demonstration and job preparation.
3	LLO 3.1 Identify plumbing needs, condition, material (GI/PVC/CPVC) and tools. LLO 3.2 Understand operations of plumbing shop machines, fittings and tools. LLO 3.3 Perform plumbing operations. LLO 3.4 Prepare a plumbing/water supply layout of building. LLO 3.5 Prepare bill of material for a layout of plumbing.	UNIT - III Plumbing Shop 3.1. Introduction and demonstration of Plumbing hand tools, pipe vice, pipe bending equipment, pipe wrenches, dies and their specifications. Selection of pipe material as per condition and liquid or gas temperature flow through it e.g. GI/PVC/CPVC or hydraulic hose pipe. 3.2 Pipe fittings- bends, elbows, tees, cross, coupler,socket, reducer, cap, plug, nipple and their Specifications. 3.3 Understand and perform operation on Machineries in plumbing shops-e.g. pipe bending machine, pipe cutting machine, die handling and threading, know their specifications and maintenance.	Model Demonstration and making job.

		3.4 Job Practice Job 1: Preparation of job using elbow, bend and nipple. Job II: Preparation of job using Union, Tap, Plug and Socket. Job III: Threading practice on pipe with die. Job-IV: Preparation of water supply layout and bill of material. Minor Project: Assign maintenance of water supply line of particular area of institute in minor project. (group wise)	
4	LLO 4.1 Select proper wood for a job and tools as per job requirement. LLO 4.2 Use of furniture making tools. LLO 4.3 Use of wood working machines and operate machine. LLO 4.4 Perform wood working operations. LLO 4.5 Maintain tools, equipment and machineries.	UNIT -IV Carpentry and pattern making Shop 4.1 Different types of Timbers, their properties, uses & defects. Types of artificial woods such as plywood, blockboard, hardboard, laminated boards, Veneer, fiber Boards and their applications. Seasoning of wood. 4.2 Wood working hand tools: carpentry vice, marking and measuring tools, saws, claw hammer, mallet, chisels, planes, squares, and their specifications. 4.3 Operation of wood working machineries - Wood turning lathe, circular saw, their specifications and maintenance. 4.4 Understand and practice of basic process- marking, sawing, planning, chiseling, turning, grooving, boring. 4.5 Names, uses, care and maintenance of hand tools such as different types of Saws, C-Clamp, Chisels, Mallets, Carpenter's vices, marking gauges, Try-squares, Rulers and other commonly used tools and materials used in carpentry shop by segregating as cutting tools, supporting tools, holding tools, measuring tools etc. Specification of tools used in carpentry shop. 4.6 Job Practice Job-I Practices for Basic Carpentry Work Sawing practice using different types of saws and method of sharpening various saws. Job-II Assembling jack plane — Planning practice including sharpening of jack plane cutter. Job-III Chiseling practice using different types of chisels including sharpening of chisel. Job-IV Making of different types of wooden pin and fixing methods. Job V Marking, sawing, planning and chiseling and their practice and make half lap joint (cross, L or T – any one). Job VI Mortise and Tenon joint (T-Joint) Job VII Dove tail Joint (Lap or Bridle Joint). Minor Project: -Prepare a utility item e.g. Box, table, chair or another item, which can be used in institute or commercially. (Activity done in group and a group has 10 students).	Demonstration and job preparation.

5	LLO 5.1 Operate open hearth / open furnace. LLO 5.2 Identify and selection of holding tools for particular job. LLO 5.3 Perform/operate manual hammer/power hammer, upsetting operation. LLO 5.4 Perform basic smithy operations. LLO 5.5 Performing simple heat treatment operation.	<u>UNIT - V Black Smithy Shop</u> 5.1 Understand the function of black smithy. Sketch & Label Detail of Shop layout. Know the different jobs produced in smithy shop like j- hooks' -hook, circle, chain, chisel etc. Purpose of Smithy shop Different types of Hearths used in Smithy shop Types of fuel used and maximum temperature obtained, Types of raw materials used in Smithy shop Uses of Fire Bricks & Clays. 5.2 Purpose, specifications, uses, care and maintenance of various tools and equipment's used in hand forging by segregating as cutting tools, supporting tools, holding tools, measuring tools etc. 5.3 Job Practice Job-I Practice of firing of open-hearth Furnace, Cleaning of Clinkers and Temperature Control of Fire. Job-II Practice of different basic Smithy operations such as Cutting, Upsetting, setting down, Necking, Bending, Fullering, Swaging, Punching and Drifting. Job-III Practice of making J-hook/s-hook. Job-IV Practice of making chisel. Job-V Practice of Simple Heat treatment processes like, quenching, Tempering, Normalizing Hardening etc.	Demonstration and job preparation.
6	LLO 6.1 Electrical safety regulations, identify hazards, implement safety protocols, respond to electrical shocks & first aid. LLO 6.2 Identification and understanding of electric component and accessories like wire, switch, MCB etc. and their specification. LLO 6.3 Use of multimeter. LLO 6.4 Phase testing. LLO 6.5 Practice of house wiring. LLO 6.6 Design basic electric layout of a room.	<u>UNIT - VI Electric & Electronic shop-I</u> 6.1 Study of electrical safety measures and protective devices. 6.2 Demonstration and identification of common electrical materials with standard ratings and specifications such as wires, cables, switches, fuses, cleats, clamps and allied items, tools and accessories. 6.3 Job Practice Job -1 Identification of phase, Neutral and Earth wires for connection to domestic electrical appliances and their connections to three pin plugs. Job -II Carrying out house wiring circuits using fuse, switches, sockets, ceiling rose etc. in batten or P.V.C. casing-caping. Job-III Prepare basic electric layout of a room with bill of material (BOM).	Demonstration / video/ job preparation.

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	job and tools as per job requirement. LLO 4.2 Use of furniture making tools. LLO 4.3 Use of wood working machines and operate machine. LLO 4.4 Perform wood working operations. LLO 4.5 Maintain tools, equipment and machineries.	Job-II Assembling jack plane — Planning practice including sharpening of jack plane cutter.	2	CO5 CO7
		Job-III Chiseling practice using different types of chisels including sharpening of chisel	2	
		Job-IV Making of different types of wooden pin and fixing methods.	2	
		Job V Marking, sawing, planning and chiseling and their practice and make half lap joint (cross, L or T – any one)	2	
		Job VI Mortise and Tenon joint (T-Joint)	2	
		Job VII Dove tail Joint (Lap or Bridle Joint)	2	
		Minor Project: - Prepare a utility item eg. Box, table, chair or another item, which can be used in institute or commercially. (Activity done in group and a group has 10 students.	4	
5	Plumbing Shop LLO 5.1 Identify plumbing needs, condition, material (GI/PVC/CPVC) and tools. LLO 5.2 Understand operations of plumbing shop machines, fittings and tools. LLO 5.3 Perform plumbing operations. LLO 5.4 Prepare a plumbing/water supply layout of building. LLO 5.5 Prepare bill of material for a layout of plumbing.	5.1 Job-I: Preparation of job using elbow, bend and nipple.	2	CO2 CO3 CO4 CO5 CO8
		Job II: Preparation of job using Union, Tap, Plug and Socket.	2	
		Job III: Threading practice on pipe with die.	2	
		Job-IV: Preparation of water supply line layout and bill of material.	2	
		Minor Project: Assign maintenance of water supply line of particular area of institute in minor project. (group wise)	4	
6	Black Smithy Shop LLO 6.1 Operate open hearth /open furnace. LLO 6.2- Identify and selection of holding tools for particular job. LLO 6.3 Perform/operate manual hammer/power hammer, upsetting operation. LLO 6.4 Perform basic smithy operations. LLO 6.5 Performing simple heat treatment operation processes.	6.1 Job-I Practice of firing of open-hearth Furnace, Cleaning of Clinkers and Temperature Control of Fire.	4	CO2 CO3 CO4 CO5 CO9
		Job-II Practice of different basic Smithy operations such as Cutting, Upsetting, setting down, Necking, Bending, Fullering, Swaging, Punching and Drifting.	4	
		Job-III Practice of making J-hook/s-hook.	2	
		Job-IV Practice of making chisel.	2	
		Job-V Practice of Simple Heat treatment processes like, quenching, Tempering, Normalizing Hardening etc.	2	
7	Electric and Electronics Shop-I LLO 7.1 Electrical safety regulations, identify hazards, implement safety protocols, respond to electrical shocks & first aid LLO 7.2 Identification, understanding and selection of electric component and accessories like wire, switch,	7.1 Demonstration and understanding of electrical safety measures and protective devices.	2	CO2 CO3 CO4 CO5 CO10
		7.2 Demonstration and identification of common electrical materials with standard ratings and specifications such as wires, cables, switches, fuses, cleats, clamps and allied items, tools and accessories.	2	

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	MCB etc. and their specification. LLO 7.3 Use of multimeter. LLO 7.4 Phase testing LLO 7.5 Practice of house wiring. LLO 7.6 Design basic electric layout of a room.	7.3 Job –I Identification of phase, Neutral and Earth wires for connection to domestic electrical appliances and their connections to three pin plugs.	2	
		Job -II Practice of house wiring circuits using fuse, switches, sockets, ceiling rose etc. in batten or P.V.C. casing-caping. (at least two power socket, four switches, one indicator, one MCB, one fan regulator)	4	
		Job-III Preparing of basic electrical layout of a room and BOM.	2	

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

Sr. No.	Equipment Name with Broad Specifications	Relevant LLO Number
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	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	Fitting tools - hammers, chisels, files, hacksaw, surface plate, punch, v block, angle plate, try square, marking block, steel rule, twist drills, reamers, tap set, die set.	3,4

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25	Plumbing tools- pipe vice, pipe bending equipment, pipe wrenches, dies.	3,5,6
26	Gas welding hand tools- welding torch, welding tip, pressure regulator, oxygen and acetylene cylinders, spark lighter	8,9,10,11
27	Arc welding hand tools- electrode holder, cable connector, cable lugs, chipping hammer, earthing clamp, wire brush.	8,9,10,11
28	Sheet metal hand tools- snip, shears sheet gauge, straight edge, L square, scribe, divider, tram, punches, pliers, stakes, groovers, limit set	12
29	Open hearth furnace with blower	9

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 Lifelong Learning
CO1	3	-	2	2	3	-	1
CO2	3	-	2	3	2	-	1
CO3	3	-	2	3	2	-	1
CO4	3	-	2	3	2	-	1
CO5	3	-	2	3	2	2	1
CO6	3	-	2	3	2	2	2
CO7	3	-	2	3	2	2	2
CO8	3	-	2	3	2	2	2
CO9	3	-	2	3	2	2	2
CO10	3	-	2	3	2	2	2
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-12.5: 978-0070671195
2	Gupta, J.K.; Khurmi, R.S.	A Textbook of Manufacturing Process (Workshop Tech.)	S. Chand and Co. New Delhi ISBN:81-219-2.5092-8
3	Hegde, R.K.	Workshop Practice Manual for Engineering Diploma & ITI Students	Sapna Book House, 2012, ISBN:12.5: 979812800582.50
4	Singh, Rajender	Introduction to Basic Manufacturing Process & Workshop Technology	New Age International, New Delhi; 2014, ISBN: 978-81-224-2.5070-7
5	Hajra; Choudhary	Elements of Workshop Technology	Media Promoters and Publishers Mumbai, 2009, ISBN: 10-8185099146
6	Sarathe, A. K.	Engineering Workshop Practice	Khanna Book Publishing CO(P) LTD, New Delhi, ISBN No. 978-92.5-91505-51-6
7	Raghuwanshi, B.S.	Workshop Technology	Dhanpat Rai and Sons, New Delhi
8	John Willey and Sons	Kent Mechanical Engineering Handbook	New York

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
2.5	http://www.weldingtechnology.org	Welding techniques
4	http://www.newagepublishers.com/samplechapter/001469.pdf	Basic engineering tools.
5	http://www.youtube.com/watch?v=TeBX6cKKHWY	Welding techniques
6	http://www.youtube.com/watch?v=QHF0sNHttw&feature=related	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.