

# **Ramgarhia Polytechnic College, Phagwara**



## **Mechanical Engineering Department**

Head of Department:	Er. Gaurav Kumar
Name of the Faculty:	SH. Manjit Singh (W Supdt) All Workshop Staff
Discipline:	Mechanical Engineering Department
Semester:	1 <sup>st</sup>
Subject:	GENERAL WORKSHOP PRACTICE-I
Lesson Plan Duration:	16 Weeks

### **RATIONALE**

In order to have a balanced overall development of diploma engineers, it is necessary to integrate theory with practice. General workshop practices are included in the curriculum in order to provide hands-on experience about use of different tools and basic manufacturing practices. This subject aims at developing general manual and machining skills in the

students. In addition, the development of dignity of labour, safety at work place, team working and development of right attitude are the other objectives.

### COURSE OUTCOMES

CO1. After completing the course the students will be able to: Identify tools and equipment used and their respective functions.

CO2. Identify different types of materials and their basic properties.



















CO3. Use and take measurements with the help of basic measuring tools/equipment.

CO4. Select proper tools for a particular operation.

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

CO6. Prepare simple jobs independently and inspect the same.

CO7. Follow safety procedures and measures. Use safety equipment.

PO 	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO 							
CO1							
CO2							
CO3							
CO4							
CO5							

## Syllabus

**Note:** The students are supposed to come in proper workshop dress prescribed by the institute. Wearing shoes in the workshop(s) is compulsory. Importance of safety and cleanliness, safety measures and upkeep of tools, equipment and environment in each of the following shops should be explained and practiced. The students should prepare sketches of various tools/jobs in their practical Notebook

WORKSHOP	Details	HOURS
Welding Shop – I	<p>1.1 Introduction and importance of welding as compared to other material joining processes. Specifications and type of welding machines, classification and coding of electrodes, welding parameters, welding joints and welding positions. Materials to be welded, safety precautions.</p> <p>1.2 Jobs to be prepared Job I Practice of striking arc (Minimum 4 beads on 100 mm long M.S. flat). 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). Job III Preparation of lap joint using arc welding process. Job IV Preparation of butt joint using arc welding process. (100 mm long). Job V Preparation of T Joint using gas or arc welding (100mm x 6 mm M.S. Flat).</p>	15 HRS
Fitting Shop – I	<p>2.1 Use of personal protective equipment and safety precautions while working. 2.2 Basic deburring processes. 2.3 Introduction to fitting shop tools, marking and measuring devices/equipment. 2.4 Identification of materials. (Iron, Copper, Stainless Steel, Aluminium etc.) 2.5 Identification of various steel sections (flat, angle, channel, bar etc.). 2.6 Introduction to various fitting shop operations/processes (Hacksawing, Drilling, Chipping and Filing). 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 .25 mm.</p>	15 HRS

	Job III Making a cut-out from a square piece of MS flat using hand hacksaw and chipping.	
Sheet Metal Shop – I	<p>3.1. Introduction to sheet metal shop, 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.</p> <p>3.2 Introduction and demonstration of hand tools used in sheet metal shop.</p> <p>3.3 Introduction and demonstration of various machines and equipment used in sheet metal shop e.g. Shearing Machine, Bar Folder, Burring Machine, 48 Turning Machine, Wiring Machine, Setting Down Machine, Forming Machine, Brake etc.</p> <p>3.4 Introduction and demonstration of various raw materials used in sheet metal shop e.g. black-plain sheet, galvanized-iron plain sheet, galvanized corrugated sheet, aluminum sheet etc.</p> <p>3.5 Study of various types of nuts, bolts, rivets, screws etc.</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 on making Single cover plate chain type, zig-zag type and single rivetted Butt Joint.</p>	15 HRS
Electric Shop-I	<p>4.1 Study, 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.</p> <p>4.2 Study of electrical safety measures and protective devices.</p> <p>Job I 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.</p> <p>4.3 Study of common electrical appliances such as auto electric iron, electric kettle, ceiling/table fan, desert cooler etc.</p> <p>4.4 Introduction to the construction of lead acid battery and its working.</p> <p>Job III Installation of battery and connecting two or three batteries in series and parallel.</p> <p>4.5 Introduction to battery charger and its functioning.</p> <p>Job IV Charging a battery and testing with hydrometer and cell tester</p>	15 HRS
Carpentry Shop – I	<p>5.1 General Shop Talk</p> <p>5.1.1 Name and use of raw materials used in carpentry shop : wood &amp; alternative materials</p> <p>5.1.2 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</p>	

	<p>as cutting tools, supporting tools, holding tools , measuring tools etc.</p> <p>5.1.3 Specification of tools used in carpentry shop.</p> <p>5.1.4 Different types of Timbers, their properties, uses &amp; defects.</p> <p>5.1.5 Seasoning of wood.</p> <p>5.1.6 Estimation.</p> <p>5.2 Practice</p> <p>5.2.1 Practices for Basic Carpentry Work</p> <p>5.2.2 Sawing practice using different types of saws</p> <p>5.2.3 Assembling jack plane — Planning practice including sharpening of jack plane cutter</p> <p>5.2.4 Chiselling practice using different types of chisels including sharpening of chisel</p> <p>5.2.5 Making of different types of wooden pin and fixing methods. Marking measuring and inspection of jobs.</p> <p>5.3 Job Practice</p> <p>Job 1 Marking, sawing, planning and chiselling and their practice</p> <p>Job II Half Lap Joint (cross, L or T – any one)</p> <p>Job III Mortise and Tenon joint (T-Joint) Job IV Dove tail Joint (Lap or Bridle Joint)</p>	15 HRS
Smithy Shop – I	<p>6.1 General Shop Talk</p> <p>6.1.1 Purpose of Smithy shop</p> <p>6.1.2 Different types of Hearths used in Smithy shop</p> <p>6.1.3 Purpose, specifications, uses, care and maintenance of various tools and equipments used in hand forging by segregating as cutting tools, supporting tools, holding tools, measuring tools etc.</p> <p>6.1.4 Types of fuel used and maximum temperature obtained</p> <p>6.1.5 Types of raw materials used in Smithy shop</p> <p>6.1.6 Uses of Fire Bricks &amp; Clays in Forging workshop.</p> <p>6.2 Practice</p> <p>6.2.1 Practice of firing of hearth/Furnace, Cleaning of Clinkers and Temperature Control of Fire.</p> <p>6.2.2 Practice on different basic Smithy/Forging operations such as Cutting, Upsetting, Drawing down, Setting down, Necking, Bending, Fullering, Swaging, Punching and Drifting a) Demonstration — Making cube, hexagonal cube, hexagonal bar from round bar</p> <p>6.2.3 Practice of Simple Heat treatment processes like Tempering, Normalizing Hardening etc Job Practice:</p> <p>Job Preparation</p> <p>Job I Making a cold / hot, hexagonal / octagonal flat chisel including tempering of edges.</p> <p>Job II Production of utility goods e.g. hexagonal bolt / square shank boring tool, fan hook (long S-type) [Two jobs are to be done by the students].</p> <p>Job III To prepare a cube from a M.S. round by forging method</p>	15 HRS

## Reference Books:

- 1 Machine Drawing by P.S. Gill; S.K. Kataria and Sons; Ludhiana
2. A Text Book of Machine Drawing by R.K.Dhawan; S. Chand and Co. Ltd New Delhi.
3. Machine Drawing by N.D. Bhatt; Charotar Book Depot. Anand

## Delivery/Instructional Methodologies

Sr.No.	Description
1.	Chalk and Talk
2.	Performing Practical and Demonstartion

## Assessment Methodologies

Sr. No.	Description	Type
1.	Student Assignment	Direct
2.	Viva-Voice	Direct
3.	Board Examination	Direct
4.	Student Feedback	Direct

## Gaps in the syllabus - to meet industry/profession requirements

S.NO.	DESCRIPTION	PROPOSED	PO MAPPING
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		ACTIONS	
	N/A	N/A	N/A

### Topics beyond syllabus/advanced topics

Units	Details	Hours
N/A	N/A	N/A

### Web Source References

Sr. No.	URL
1.	<a href="https://nptel.ac.in/">https://nptel.ac.in/</a>

### Lesson Plan

Week	Practical	
	HOURS	6 Hrs a week
1 <sup>ST</sup>	1-3	<p><b>WELDING SHOP – I</b> Introduction and importance of welding as compared to other material joining processes. Specifications and type of welding machines, classification and coding of electrodes, welding parameters, welding joints and welding positions. Materials to be welded, safety precautions.</p> <p><b>Job I</b> Practice of striking arc (Minimum 4 beads on 100 mm long M.S. flat).</p>

	4-6	<b>Job II</b> Practice of depositing beads on plate at different current levels. (Minimum 4 beads on M.S. plate at four setting of current level).
2 <sup>ND</sup>	7-9	<b>Job III</b> Preparation of lap joint using arc welding process
	10-12	<b>Job IV</b> Preparation of butt joint using arc welding process. (100 mm long).
3 <sup>RD</sup>	13-15	<b>Job V</b> Preparation of T Joint using gas or arc welding (100mm x 6 mm M.S. Flat).
	16-18	<b>FITTING SHOP – I</b> Use of personal protective equipment and safety precautions while working. Basic deburring processes. Introduction to fitting shop tools, marking and measuring devices/equipment.
4 <sup>TH</sup>	19-21	Identification of materials. (Iron, Copper, Stainless Steel, Aluminium etc.) Identification of various steel sections (flat, angle, channel, bar etc.). Introduction to various fitting shop operations/processes (Hacksawing, Drilling, Chipping and Filing).
	22-24	<b>Job I</b> Marking of job, use of marking tools, filing and use of measuring instruments. (Vernier caliper, Micrometer and Vernier height gauge).
5 <sup>TH</sup>	25-27	<b>Job II</b> Filing a rectangular/square piece to maintain dimensions within an accuracy of .25 mm
	28-30	<b>Job III</b> Making a cut-out from a square piece of MS flat using hand hacksaw and chipping.
6 <sup>TH</sup>	31-33	<b>SHEET METAL SHOP – I</b> Introduction to sheet metal shop, 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. Introduction and demonstration of hand tools used in sheet metal shop.
	34-36	Introduction and demonstration of various machines and equipment used in sheet metal shop e.g. Shearing Machine, Bar Folder, Burring Machine, 48 Turning Machine, Wiring Machine, Setting Down Machine, Forming Machine, Brake etc. Introduction and demonstration of various raw materials used in sheet metal shop e.g. black-plain sheet,



		galvanized-iron plain sheet, galvanized corrugated sheet, aluminium sheet etc. Study of various types of nuts, bolts, rivets, screws etc
7 <sup>TH</sup>	37-39	<b>Job I</b> Shearing practice on a sheet using hand shears
	40-42	<b>Job II</b> Practice on making Single riveted lap joint/Double riveted lap Joint.
8 <sup>th</sup>	43-45	<b>Job III</b> Practice on making Single cover plate chain type, zig-zag type and single riveted Butt Joint.
	46-48	<b>ELECTRIC SHOP – I</b> Study, 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. Study of electrical safety measures and protective devices.
9 <sup>th</sup>	49-51	<b>Job I</b> Identification of phase, Neutral and Earth wires for connection to domestic electrical appliances and their connections to three pin plugs.
	52-54	<b>Job II</b> Carrying out house wiring circuits using fuse, switches, sockets, ceiling rose etc. in batten or P.V.C. casing-capping.
10 <sup>th</sup>	55-57	Study of common electrical appliances such as auto electric iron, electric kettle, ceiling/table fan, desert cooler etc. Introduction to the construction of lead acid battery and its working. <b>Job III</b> Installation of battery and connecting two or three batteries in series and parallel.
	58-60	Introduction to battery charger and its functioning. <b>Job IV</b> Charging a battery and testing with hydrometer and cell tester
11 <sup>th</sup>	61-63	<b>CARPENTRY SHOP - I</b> <b>General Shop Talk</b> 1 Name and use of raw materials used in carpentry shop : wood & alternative materials 2 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. 3 Specification of tools used in carpentry shop.

		<p>4 Different types of Timbers, their properties, uses &amp; defects.  5 Seasoning of wood.  6 Estimation. 49</p> <p><b>Practice</b></p> <p>1 Practices for Basic Carpentry Work  2 Sawing practice using different types of saws  3 Assembling jack plane — Planning practice including sharpening of jack plane cutter  4 Chiseling practice using different types of chisels including sharpening of chisel  5 Making of different types of wooden pin and fixing methods. Marking measuring and inspection of jobs.</p>
	64-66	<p><b>Job 1</b>  Marking, sawing, planning and chiseling and their practice</p>
12 <sup>th</sup>	67-69	<p><b>Job II</b>  Half Lap Joint (cross, L or T – any one)</p>
	70-72	<p><b>Job III</b>  Mortise and Tendon joint (T-Joint)</p>
13 <sup>th</sup>	73-75	<p><b>Job IV</b>  Dove tail Joint (Lap or Bridle Joint)</p>
	76-78	<p><b>SMITHY SHOP – I</b></p> <p>1 Purpose of Smithy shop  2 Different types of Hearths used in Smithy shop  3 Purpose, specifications, uses, care and maintenance of various tools and equipments used in hand forging by segregating as cutting tools, supporting tools, holding tools, measuring tools etc.  4 Types of fuel used and maximum temperature obtained  5 Types of raw materials used in Smithy shop  6 Uses of Fire Bricks &amp; Clays in Forging workshop.</p>
14 <sup>th</sup>	79-81	<p><b>Practice</b></p> <p>1 Practice of firing of hearth/Furnace, Cleaning of Clinkers and Temperature Control of Fire.  2 Practice on different basic Smithy/Forging operations such as Cutting, Upsetting, Drawing down, Setting down, Necking, Bending, Fullering, Swaging, Punching and Drifting a) Demonstration — Making cube, hexagonal cube, hexagonal bar from round bar  3 Practice of Simple Heat treatment processes like Tempering, Normalizing Hardening etc</p>
	82-84	<p><b>Job I</b>  Making a cold / hot, hexagonal / octagonal flat chisel including tempering of edges.</p>
15 <sup>th</sup>	85-87	<p><b>Job II</b>  Production of utility goods e.g. hexagonal bolt / square shank boring tool, fan hook (long S-type) [Two jobs are to be done by the students].</p>
	88-90	<p><b>Job III</b></p>

		To prepare a cube from a M.S. round by forging method
16 <sup>th</sup>	91-93	<b>PTM</b>
	94-96	<b>Viva-Voice</b>