

1.6 GENERAL WORKSHOP PRACTICE - I

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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 hand on experience about use of different tools and basic manufacturing practices.

This course aims at developing general manual and machining skills in the students. Besides above, the development of dignity of labour, precision, safety at work place, team working and development of right attitude are the other objectives.

DETAILED CONTENTS (PRACTICALS)

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.

The following shops are included in the syllabus:

1. Carpentry and Painting Shop-1
2. Fitting Shop
3. Welding Shop-I
4. Electric Shop -I
5. Smithy Shop or Electronic Shop-I
6. Sheet Metal Shop-I

Note:

1. The branches e.g. Civil Engineering, Electrical Engineering, Mechanical Engineering, Automobile Engineering, Wood Technology, Leather Technology, Food Technology, Quantity Surveying and Public Health Engineering will do **Smithy Shop** instead of Electronic Shop- I
2. The branches e.g. Electronics and Communication Engineering, Instrumentation and Control, Computer Engineering, Information Technology, and Medical Electronics will do **Electronic Shop-I** instead of Smithy Shop.

1. Carpentry and Painting Shop

- 1.1 Introduction to various types of wood such as Deodar, Kail, Partal, Teak, Mango, Sheesham, etc. (Demonstration and their identification).
- 1.2 Demonstration, function and use of commonly used hand tools. Care, maintenance of tools and safety measures to be observed.
Job I Marking, sawing, planning and chiseling & their practice
- 1.3 Introduction to various types of wooden joints, their relative advantages and uses.
Job II Preparation of half lap joint
Job III Preparation of Mortise and Tenon Joint
- 1.4 Demonstration of various methods of painting wooden items.
Job IV Preparation of surface before painting including primar coat
Job V Painting Practice by brush/roller/spray

2. Fitting Shop

- 2.1 Introduction to fitting shop tools, common materials used in fitting shop, Identification of materials. (e.g. Steel, Brass, Copper, Aluminium etc.).Identification of various sections of steel such as Flat, Angle, Tee, Channel, Bar Girder, Square, Z-Section, etc.
- 2.2 Description and demonstration of various types of work benches. holding devices and files. Precautions while filling.
- 2.3 Description and demonstration of simple operation of hack-sawing, demonstration and description of various types of blades and their specifications, uses and method of fitting the blade.

Job I Marking of job, use of marking tools and measuring instruments.
Job II Filing a dimensioned rectangular or Square piece of an accuracy of $\pm 0.5\text{mm}$
Job III Filing practice (Production of flat surfaces) Checking by straight edge.

Job IV Making a cutout from a square piece of MS Flat using Hand hacksaw.
- 2.4 Care and maintenance of measuring tools like calipers, steel rule, try square, vernier calipers, micrometer, height gauge, combination set. Handling of measuring instruments, checking of zero error, finding of least count.

3. Welding Shop – I

- 3.1 Introduction to welding and its importance in engineering practice; types of welding; common materials that can be welded, introduction to welding equipment e.g. a.c. welding set, d.c. rectifier, Electrode holder, electrodes and their specifications, welding screens and other welding related equipment and accessories.

- 3.2 Electric arc welding, (ac. and dc.) precautions while using electric arc welding, Practice in setting current and voltage for striking proper arc.
 - Job I Practice of striking arc while using electric arc welding set.
 - Job II Welding practice on electric arc welding for making uniform and Straight weld beads
- 3.3 Various types of joints and end preparation.
 - Job III Preparation of butt joint by electric arc welding.
 - Job IV Preparation of lap joint by electric arc welding.
 - Job V Preparation of corner joint by using electric arc welding.
 - Job VI Preparation of Tee joint by electric arc welding.

4. Electric Shop – I

- 4.1 Study, demonstration and identification of common electrical materials such as wires, cables, switches, fuses, ceiling roses, PVC Conduits, PVC Channels and allied items, tools and accessories.
- 4.2 Study of electrical safety measures and demonstration about use of protective devices. Such as fuses, MCBs and relays
 - Job I Identification of phase, neutral and earth of domestic appliances and their connection to two pin/three pin, plugs.
 - Job II Preparation of a house wiring circuit on wooden board using fuse, Switches, socket, holder, ceiling rose etc. by PVC Conduit and PVC casing and capping.
- 4.3 Study of common electrical appliances such as electric iron, electric kettle, ceiling fan, table fan, electric mixer, electric Geyser, gas geyser, desert cooler, refrigerator, water purifier
- 4.4 Introduction to the construction of a Lead-acid battery and its working.
 - Job III Installation of inverter with battery and to connect two or more batteries in series and in parallel
 - Job IV Charging of a battery and testing it with the help of hydrometer and Cell Tester

5. Smithy Shop

- 5.1 Demonstration and detailed explanation of tools and equipment used. Forging operations in Smithy shop. Safety measures to be observed in the smithy shop.
- 5.2 Demonstration and description of bending operation, upsetting operation, description and specification of anvils, swage blocks, hammers etc.
- 5.3 Demonstration and description of tongs, fullers, swages etc.
 - Job I To forge a L-Hook.
 - Job II To prepare a job involving upsetting process
 - Job III To forge a chisel
 - Job IV To prepare a cube from a M.S. round by forging method.

OR

5. Electronic Shop – I

- 5.1 Identification and familiarization with the following tools used in electronic shop: Tweezers, Screw drivers (different sizes), Insulated Pliers, Cutter, Sniper, Philips Screw Driver (Star Screw Driver), L- Keys, Soldering Iron, soldering wire, flux and their demonstration and uses.
- 5.2 Identification and familiarization with Multimeter analog and digital (Three and half digit)
Job I Practice in the use of above-mentioned equipment. For this small experimental as set up may be done
- 5.3 Various types of protective devices such as : Wire fuse, cartridge fuse etc. ,
- 5.4 Identification and familiarization with ear phone speaker connector, telephone jacks and similar male and female connectors (Audio, Video)
- 5.5 Safety precautions to be observed in the electronic shop
- 5.6 Identification and familiarization with soldering and desoldering practice.

NOTE: Demonstration boards for the electronics components such as resistor, capacitor, diodes, transistors, FETs, IFT Coils, ICs should be made.

- Job II Cut, strip, join an insulated wire with the help of soldering iron (repeat with different types of wires)
- Job III Cut, strip, connect/solder/crimp different kinds of wires/ cables (including co-axial and shielded cable) to different types of power/general purpose/Audio Video/Telephone plugs, sockets, jacks, terminals, binding posts, terminal strips, connectors. The tasks should include making complete recording/ playback/ antenna/ speaker leads for common electronic products such as Radio, TV, CD Players, VCD/DVD Players, Cassette Recorder and Players, Hi-Fi equipment, Hand- set, microphone

6. Sheet Metal Shop –I

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.

- 6.1 Introduction and demonstration of hand tools used in sheet metal shop.
- 6.2 Introduction and demonstration of various machines and equipment used in sheet metal shop e.g. Shearing Machine, Bar Folder, Burring Machine, power press, sheet bending machine.
- 6.3 Introduction and demonstration of various raw materials used in sheet metal shop e.g. M.S. sheet, galvanized-iron plain sheet, galvanised corrugated sheet, aluminium sheets etc.

6.4 Study of various types of Rivets, Steel Screw etc.

Job I Shearing practice on a sheet using hand shears.

- a) Practice on making Single riveted lap joint/Double riveted lap Joint.
- b) Practice on making Single cover plate chain type, rivetted Butt Joint

RECOMMENDED BOOKS

1. Workshop Technology I,II,III, by S K Hajra, Choudhary and A K Chaoudhary. Media Promoters and Publishers Pvt. Ltd., Bombay
2. Workshop Technology by Manchanda Vol. I,II,III India Publishing House, Jalandhar.
3. Manual on Workshop Practice by K Venkata Reddy, KL Narayana et al; MacMillan India Ltd. New Delhi
4. Basic Workshop Practice Manual by T Jeyapoovan; Vikas Publishing House (P) Ltd., New Delhi
5. Workshop Technoogy by B.S. Raghuwanshi, Dhanpat Rai and Co., New Delhi
6. Workshop Technology by HS Bawa, Tata McGraw Hill Publishers, New Delhi