

2.7 GENERAL WORKSHOP PRACTICE - II

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RATIONALE

As we know that, the psychomotor skills are mastered through practice, an opportunity therefore, has been extended to students through this course to refine their skills in different trades. The basic skills developed during first semester will be refined during this course by doing higher order skills jobs. In addition to developing general manual and machining skills in the students, the objective of development of sense of dignity of labour, precision, safety at work places, team working and right attitude among the students will also be met.

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-II
2. Plumbing Shop
3. Welding shop -II
4. Electric shop -II
5. Machine shop or Electronic shop-II
6. Sheet Metal Shop -II

Note:

1. The branches e.g. Civil Engineering, Electrical Engineering, Mechanical Engineering, Automobile Engineering, Wood Technology, Food Technology, Quantity Surveying and Public Health Engineering will do **Machine Shop** instead of Electronic shop- II
2. The branches e.g. Electronics and Communication Engineering, Instrumentation and Control, Computer Engineering, Information Technology, and Medical Electronics will do **Electronic shop-II** instead of Machine shop.
3. The instructor is to first explain the introductory part given at the beginning under each shop followed by demonstration and practice by students.

1. **Carpentry and Painting Shop-II**

- 1.1 Introduction to joints, their relative advantages and uses.
Job I Preparation of Dovetail joint and glued joint.
Job II Preparation of Mitre Joint
Job III Preparation of a lengthening Joint
Job IV Preparation of at least one utility job with and without lamination.

- 1.2 Demonstration of job showing use of Rip Saw, Bow saw and Tenon saw, method of sharpening various saws.
- 1.3 Demonstration of job on Band Saw and Circular Saw, Chain and Chisel, Universal wood working machine, Saw re-sharpening machine, Saw Brazing unit.
- 1.4 Importance and need of polishing wooden items, Introduction to polishing materials.

Job V Polishing on wooden items.

2. Plumbing Shop

- 2.1 Introduction to various types of threads (internal, external)-single start, multi-start, left hand and right hand threads.
- 2.2 Description and demonstration of various types of drills, taps and dies Selection of dyes for threading, selection of drills, taps and reamers for tapping operations.
 - Job I Making internal and external threads on a job by tapping and dieing operations (manually)
- 2.3 Precautions while drilling soft metals, e.g. Copper, Brass, Aluminium etc.
 - Job II Drilling practice on soft metals (Aluminum, Brass and Copper)
 - Job III Preparation of a job by filing on non- ferrous metal up to an accuracy of $\pm 0.2\text{mm}$
 - Job IV Preparation of job involving thread on GI pipe/ PVC pipe and fixing of different types of elbow, tee, union, socket, stopcock, taps, etc

3. Welding Shop – II

- 3.1 Introduction to gas welding, spot welding and seam welding and welding techniques. Adjustments of different types of flames in gas welding, demonstration and precautions about handling welding equipment.
 - Job I Practice in handling gas welding equipment (Low pressure and High pressure) and welding practice on simple jobs.
- 3.2 Common welding joints generally made by gas welding.
 - Job II Preparation Butt joint by gas welding.
 - Job III Preparation of small cot frame from conduit pipe by electric arc welding/gas welding.
 - Job IV Preparation of square pyramid from MS rods by welding (type of welding to be decided by students themselves).
 - Job V Exercise of preparing a job on spot/seam welding machine.
- 3.3 Demonstration and use of TIG and MIG Welding equipment

4. Electric Shop – II

- 4.1 Importance of three-phase wiring and its effectiveness.
 - Job I Laying out 3 phase wiring for an electric motor or any other 3 phase machine.
- 4.2 Estimating and costing of power connection.
 - Job II Connecting single-phase energy meter and testing it. Reading and working out the power consumption and the cost of energy.
 - Job III Checking continuity of connection (with tester and series lamp) location of faults with a multimeter) and their rectification in simple machines and/or other electric circuits fitted with earthing.

- 4.3 Demonstration of dismantling, servicing and reassembling a table fan/ceiling fan/air cooler/mixer/electric iron, Electric heater, geyser, electric oven, air conditioner etc.
 Job IV Testing Single phase/three phase electrical motor by using voltmeters, ammeter, clip on meter, tachometer etc.
 Job V Reversing the rotation of a motor.

5. Machine Shop

Introduction to various machines used in machine shop. Demonstration of Lathe, Milling Machine Shaper, Slotter, Radial drilling machine, Surface grinder and CNC machine

Job-1 Exercise on simple turning and facing

Job-II Exercise on taper turning

Job-III Marking and drilling practice on mild steel piece

OR

5. Electronic Shop- II

- 5.1 Demonstrate the jointing methods on general purpose PCB boards mounting and dismantling as well as uses of the items mentioned below:
- Various types of single, multi-cored insulated screened power, audio video, co-axial, general purpose wires/cables
 - Various types of plugs, sockets connectors suitable for general purpose audio and video use, 2 and 3 pin mains plug and sockets, RF Plugs and Sockets.
 Banana-plugs, and sockets, BNG, RCA, DIN, UHF, Ear phone speaker connector, telephone jacks and similar male and female connectors and terminal strips.
 - Various types of switches such as: normal/ miniature toggle, slide, push button, piano key, rotary, micro switches, SPST, SPDT, DPST, DPDT, band selector, multi way Master Mains Switch.
 - Various types of protective devices such as : Wire fuse, cartridge fuse, slow acting/fast acting fuse, HRC fuse, thermal fuse, single/multiple circuit breakers, over and under current relays.
 - Materials: Conducting, insulating and magnetic materials.
 - Single beam simple CRO, Single Generator and function-Generator, function of energy knob on the front panel.
 - Regulated power supply-fixed and variable voltage, single output as well as dual output.
- 5.2 Identification and familiarization with active and passive components; colour code and types of resistor, capacitors and potentiometers (including VDR, LDR, and thermistor). Identification of components including LED, LCD, UJT, FET, Coils, relays, reed relays, transformers, Linear and Digital ICs, Thyristors, etc.

5.3 Demonstrate the following:

1. To make perfect solder joints and soldering on PCBs
2. To remove components/wires by unsoldering.
3. To assemble components on boards, chassis, tape strips.
4. Various laying methods of cables
5. Exposure to modern soldering and de-soldering processes
6. Field visits to relevant work-places
7. Identification of active and passive components
8. Use of Multimeter and testing of active and passive components.

Job I Cut, bend, tin components, leads, inserts and solder components (capacitor, diodes, transistor, IFT, ICs etc) on a PCB.

Job II De-solder, remove and clean all the components, wires from a given equipment, a PCB or a tap strip using the following:

Job III Soldering Iron

Job IV Temperature Control Soldering Iron

Job V De-soldering Pump

Job VI De-soldering Strip

Job VII Wiring of a small circuit on a PCB/tag strip involving lacking, sleeving and use of identifier tags

6. Sheet Metal Shop-II

6.1 Introduction to various metal forming processes e.g. Spinning, Punching, Blanking, cup drawing

6.2 Introduction to soldering and brazing.

6.3 Introduction to metal spinning process.

Job I Preparation of job involving shearing, circular shearing, rolling, folding, beading and soldering process e.g. Funnel or any other job involving above operations.

Job II Exercise on job involving brazing process

Job III Spinning a bowl/cup/saucer

Job IV Visit to a sheet metal industry e.g. coach builders etc.

RECOMMENDED BOOKS

1. Workshop Technology I,II,III, by S K Hajra, Choudhary and A K Choudhary. 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; 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