# **Course Plan**

# MEBT100 :: Manufacturing Practices Workshop (L-T-P-Cr-CH: 0-0-2-2-4)

#### **Course Objectives:**

- 1. To provide hands-on experience on basic machining and welding operations.
- 2. To provide hands-on experience on basic Carpentry operations.
- 3. To have a practice on Fittings and power tools.
- 4. To develop the ability for basic electrical wireman operations.
- 5. To provide exposure to the practice of plastic molding.

## **Modulewise Laboratory Plan**

## Module I: Machine Shop (6 lab classes)

- 1. Introduction and demonstration to the Lathe and Power hacksaw machines (<u>1 lab class</u>)
- 2. Pracice on Lathe machine (2 lab class)
- 3. Job title: Step and taper turning (3 *lab classes*)
  - Measuring and marking of the metal pieces by steel ruler
  - Cutting the raw materials using power hack saw
  - Measuring of the cut metal pieces by precision tools like vernier caliper and micrometers
  - Explaining the job drawing
  - Centering the metal pieces in the lathe machine
  - Setting the machining parameters for operations
  - Carrying out machining operations: facing, plain turning, step turning, champering and taper turning
    - Measureing and checking of the job dimensions
    - Centering of the job in reverse end
    - Facing operations
    - Calculation of the taper angle of the job and setting the taper angle in taper attachment
    - Carrying out the tapering operations
    - Final measuring and inspection of all dimensions of the job
    - Submission of the job for the final evaluation
    - Viva of the completed practical job

## Module II: Fitting Shop (6 lab classes)

- 1. Introduction and demonstration to the drilling and grinding machines (*<u>1 lab class</u>*)
- 2. Introducntion to the all handtools of the workshop (<u>1 lab classes</u>)
- 3. Job title: Cutting, hacksawing, drilling and taping (4 lab classes)
  - Measuring and marking of the metal pieces by steel ruler
    - Cutting the raw materials using power hack saw
    - Measuring of the cut metal pieces by precision tools
    - Explaining the job drawing
    - Carrying out machining operations: filing, marking, punching, drilling and taping
      - Filing operation as per the dimensions
      - Measuring all the dimesions
      - Checking and inspection of flatness, straightness and orthogonality of the adjacent surfaces and edges
      - Marking for handsawing and drilling operations by vernier height gauge
      - Permanent marking by dot punch and ball peen hammer
      - Carrying out the punching operations by centre punch and ball peen hammer
      - Calculation of tap drill size
      - Carrying out drilling operations by pillar type drilling machine

- Preparation of the edges by filing operation
- Carrying out taping operation by 1<sup>st</sup> tap, intermediate tap and bottoming tap
- Carrying out handsawing on marked dimensions
- Carrying out draw filing for finishing
- Inspection and testing the final job by surface plate and vernier caliper.
- Submission of the job for the final evaluation
- Viva of the completed practical job

### Module III: Welding Shop (6 lab classes)

- 1. Introduction to welding tools and equipements (<u>1 lab class</u>)
- 2. Welding practice with arc-welding equipment (<u>1 lab class</u>)
- 3. Job title: Butt joint and Lap joint (<u>4 lab classes</u>)
  - Measuring and marking of the metal pieces by steel ruler
    - Cutting the raw materials using power hack saw
    - Edge preparations using files and grinding machines
    - Cleaning the metal pieces by wire brushes
    - Setting the welding transformer parameters for practice job
    - Carrying out the tacking operations
    - Performing the welding operation for butt and lap joint
    - Carrying out chipping operations on anvil by using tongs and chipping hammer
    - Cleaning the weld bead using wired wires
    - Removing the spatter from the job surfaces by hand grinding operations
    - Inspection and tesing the job piece
    - Submission of the job for the final evaluation
    - Viva of the completed practical job

## Module IV: Wireman Shop (5 lab classes)

- **1.** Introduction to wireman tools and equipements (<u>1 lab class</u>)
- **2. First Job title**: Make an extension board using 5 pin sockets control by 2 switches independently with 1 fuse and 1 indicator. (*2 lab classes*)
  - Collect the materials and place all items on the mica sheet in sequence.
    - Measure all position of the electrical items and mark it by pencil.
    - Cut all marking position by using chisel and hammer.
    - File the rough position of cut portions.
    - Insert the electrical items in the cutting position.
    - Mark the hole position of electrical items for screw.
    - Drill the mark position of the hole by using drill machine.
    - Tied the screw by the screwdriver.
    - After completing the screwing go for the connect of board wiring.
    - Take wires as per required.
    - Cut the wires as necessary using a wire stripper.
    - Connect the electrical wires as per circuit diagram.
    - Go for testing after completion of wiring.
    - Take a line tester and check the phase line is coming in the proper place.
    - Take the lamp tester or voltmeter and check the conductivity of neutral and earthing.
    - After all, testing of the mentioned job is completed.
    - Viva of the completed practical job
- **3. Second Job title**: Make a board wiring using 2 lamps, 1 tube light, and 1 socket control by 4 switches independently with PVC casing capping. (*2 lab classes*)

- Collect the materials and place all items on the mica sheet in sequence.
  - Measure all position of the electrical items and mark it by pencil.
  - Cut all marking position by using chisel and hammer.
  - File the rough position of cut portions.
  - Insert the electrical items in the cutting position.
  - Mark the hole position of electrical items for screw.
  - Drill the mark position of the hole by using drill machine.
  - Tighten the screw with a screwdriver.
  - Once the screwing is complete, go for the board wiring..
  - Take wires as per required.
  - Cut the wires as necessary using a wire stripper.
  - Connect the electrical wires as per circuit diagram.
  - After completing the wiring, go for domestic wiring.
  - Take the PVC pipe and cut it according to the required distance using a hacksaw.
  - Make hole in the required position by using drill machine.
  - Place the PVC casing as per circuit diagram on the working board.
  - Screw the wooden box and PVC box in the correct position using screws.
  - Take the electrical wires and cut it as per required length.
  - Insert the electrical wires as per circuit diagram and cover the electrical wires by using PVC caping.
  - After completing, fix the PVC box and connect the holder and ceiling rose.
  - Take the switch board, connect it to all components and fix the switch board using screws.
  - After completing, connect the main lines (Phase, Neutral and Earthing) from the main switch.
  - After all, go for testing.
  - Take a line tester and check the phase line is coming in the proper place.
  - Take the lamp tester or voltmeter and check the conductivity of neutral and earthing.
  - Switch on to the lamps.
  - After all, testing the mentioned job is completed.
  - Viva of the completed practical job

### Module V: Carpentary Shop (2 lab classes)

- 1. Introduction and demonstration to the Wood Turning Lathe machine, circular sawing machine, Jig Saw machine and Belt & Disc sander machine (*<u>1 lab class</u>*)
- **2.** Introduction to the all carpentary handtools (<u>*1 lab class*</u>)

#### Module VI: Plastic Molding Shop (1 lab class)

1. Introduction and demonstration to the vertical injection molding machine and horizontal twin extruder plastic molding machine (*1 lab class*)

### Module VII: CNC Shop (2 lab classes)

- 1. Introduction and demonstration to the CNC lathe machine and CNC milling machine (<u>1 lab class</u>)
- 2. Programming demonstartion (<u>1 lab class</u>)

#### **Textbooks:**

- 1. Hazra Choudhury, S.K., Hazra Choudhury, A.K. and Roy, N. (2012). Elements of Workshop Technology Vol I. Media Promoters and Publishers Pvt. Ltd., Mumbai, 15<sup>th</sup> edition.
- 2. Hazra Choudhury, S.K., Hazra Choudhury, A.K. and Roy, N (2014). Elements of Workshop Technology Vol II. Media Promoters and Publishers Pvt. Ltd., Mumbai, 14<sup>th</sup> edition.
- 3. Gupta, J. B. (2012). Course in Electrical Installation Estimating & Costing, S. K. Kataria and Sons, New Delhi, 9<sup>th</sup> edition.

#### **Course Outcomes (COs):**

- CO1: Perform machining operations using various manufacturing techniques.
- CO2: Perform fitting practices using various types of hand tool and fitting techniques.
- CO3: Perform Oxy-acetylene gas welding and manual metal arc welding on jobs.
- CO4: Select appropriate electrical hand tools and circuits for the required application and making jobs (such as House Wiring, Switch Board etc.) as per specification
- CO5: Make basic wooden joints using carpentry hand-tools.

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