

Gujarat Technological University

COURSE NAME: MECHATRONICS WORKSHOP

1. RATIONALE: -

Workshop practice is the backbone of the real industrial work situation, which helps in development and enhancement of relevant skill required by the technician working in engineering industries and workshops.

The workshop experiences would also help them to understand the complexity of industrial working in relative shorter duration of time. Moreover the contents of these curricula form a basis and link for study of manufacturing processes and basic electronics engineering courses in successive semesters.

The Electronic Workshop is aimed at providing knowledge of working of simple circuits & fabrication of PCBs, drilling of holes, soldering technique and Simulation of simple experiments using electronic workbench.

The students are advised to undergo each skill experience with an understanding of know-how with special emphasis on know-why for the various instructions/ practices imparted to them in each shop.

2. (A) MECHANICAL WORKSHOP

SCHEME OF TEACHING:

Sr. No.	Name of Topics	Theory Hours	Practical Hours
1.	Introduction to workshop	-	02
2.	Fitting	-	06
3.	Tin Smithy	-	04
4.	Carpentry	-	06
5.	Metal Joining	-	04
6.	Turning	-	04
	Total	-	28

3. OBJECTIVES :

1. Comprehend the need of various sections in a workshop.
2. Demonstrate observance of the safety consciousness and good housekeeping in workshop.
3. Follow the standard procedure for workshop practice
4. Select and use appropriate material for various sections of workshop.
5. Use various tools, instruments and machines for different operations in fitting, tin smithy, carpentry and material joining shop.
6. Prepare the required jobs correctly according to given specification in various of workshop as mentioned in 5.
7. Demonstrate turning operations on lathe machine such as facing centering and taper turning.

4. TOPICS AND SUB –TOPICS:

1. INTRODUCTION TO WORKSHOP

- 1.1 Workshop layout
- 1.2 Importance of various sections of workshop

Gujarat Technological University

- 1.3 Types of jobs done in each shop
- 1.4 General safety rules and work-procedure of workshop

2. FITTING

- 2.1 Fitting tools like-files, vice chisels, punch, scriber, hammers surface plate, Calipers etc.
- 2.2 Fitting operations such as chipping, filing, scraping, grinding, sawing, marking, drilling, reaming, tapping
- 2.3 Safety precautions.
- 2.4 Demonstration of various operations.
- 2.5 Preparation of male-female joints.

3. TIN SMITHY

- 3.1 Tin smithy tools like-hammers. Stakes, scissors etc.
- 3.2 Sheet metal operations such as shearing, bending, joining
- 3.3 Safety precautions
- 3.4 Demonstration of various operations.

4. CARPENTRY

- 4.1 Carpentry tools like- saws, planner, chisels, hammers, pallet, marking gauge, vice, try square, rule etc.
- 4.2 Carpentry operations such as marking, sawing, planning, chiseling, grooving, boring, joining.
- 4.3 Types of woods and carpentry hardware
- 4.4 Safety precautions
- 4.5 Demonstration of various operations using hardware.

5. METAL JOINING

- 5.1 Metal joining hand tools and equipment
- 5.2 Metal joining temporary and permanent method such as screw, nuts bolts and washers, rivets, keys, pins and welding, soldering, brazing
- 5.3 Demonstrations of metal joining operations.
- 5.4 Safety precautions.

6. TURNING

- 6.1 Turning operations such as facing, centering and turning
- 6.2 Demonstration of different laths parts and demonstration of above operations.

5. LIST OF EXPERIENCES :

(1) FITTING

- Prepare one job on marking, drilling and taping generating different profiles such as pentagon, hexagon etc.
- Prepare one job on male female fitting

(2) TIN SMITHY

- Prepare one job on sheet metal marking, shearing, flattening bending and joining (with solder)

Gujarat Technological University

(3) CARPENTRY

- Prepare one job on marking, planning, sawing, chiseling and joining
- Prepare one job on marking, sawing, planning, nailing and screwing using plywood/ packing wood.

(4) WELDING

- Prepare one job using arc welding

(5) TURNING

- Demonstration of different parts of lathe demonstration of centering and turning operation in a group of 10 students.

6. REFERENCES:

Sr. No.	Name of Books	Authors
1.	Workshop Familiarization	E. Wilkinson
2.	Workshop Technology-I	Hazra and Chaudhary
3.	Workshop Technology –I	W.A.J.Chapman
4.	Engineering industry training Board Instruction Manual (1) Inspection and measurements (2) Mechanical Fitting	Engineering industry Training Board
5.	I.T.B. Hand Book	Engineering Industry Training Board
6.	Sheet metal shop practice	Bruce & Meyer
7.	Workshop Technology Vol. I & II	Gupta & Kaushik

(B) ELECTRONIC WORKSHOP

1. SCHEME OF TEACHING:

Sr. No.	TOPICS	Theory Hours	Practical Hours
1.	Introduction to Electronic Workshop	--	02
2.	Study of Electronic Test Equipment	--	02
3.	Study of Electronic Components	--	02
4.	Wiring of Electronic circuits	--	06
5.	Designing of a PCB	--	06
6.	Mounting & Soldering	--	04
7.	Introduction to electronic workbench	--	04
8.	Use of Data Book	--	02
	TOTAL	--	28 Hrs.

2. OBJECTIVES

1. Comprehend the need of various sections in a workshop
2. Select appropriate test equipment & power supply
3. Identification of various electronic components

Gujarat Technological University

4. Designing of PCB and Soldering practice on the PCB
5. Study of Simulation Software like Electronic Workbench

3. TOPICS AND SUB-TOPICS

1. INTRODUCTION TO ELECTRONIC WORKSHOP

- 1.1 Importance of various electronics circuits & Types of jobs done in the workshop
- 1.2 General rules for electronic wiring and assembling practice
- 1.3 Selection of Electronic Project

2. ELECTRONIC TEST EQUIPMENT

- 2.1 Study the types of Test Equipment
- 2.2 Study the front panel operation of Power Supply, CRO, Function Generator, Multi meter, etc.

3. ELECTRONIC COMPONENT

- 3.1 Demonstration and testing of various electronic component
- 3.2 Identification & Testing of Resistor, Capacitor, Diode, Transistors, LED, Relays, Switches, along with their circuit symbols.

4. WIRING OF ELECTRONIC CIRCUITS

- 4.1 Wiring of simple electronic circuits like a amplifiers, Oscillator Power supply on a bread board
- 4.2 Testing of various outputs of the circuit

5. DESIGNING OF A PCB

- 5.1 Study of Printed Circuit Boards (PCB)
- 5.2 Designing the layouts for a PCB
- 5.3 Preparing the artwork
- 5.4 Fabrication PCB making negative of the artwork
- 5.5 Fabrication using photo resist method

6. MOUNTING & SOLDERING

- 6.1 Soldering practice on the general purpose PCB's
- 6.2 Use of SMD rework station (surface Mounting device)
- 6.3 Mounting of the component on the prepared Printed Circuit Board
- 6.4 Testing of the complete job

7. INTRODUCTION TO ELECTRONIC WORKBENCH

- 7.1 Introduction to software like circuit maker, electronic workbench, orcad etc.
- 7.2 Study the basic circuit simulation on the software

8. USE OF DATABOOK

- 8.1 Use of Data book for component specifications.

4. LIST OF EXPERIENCES

(1) ELECTRONIC TEST EQUIPMENT

- Prepare the report on Front panel controls of the CRO, Function Generator and Millimeter

(2) ELECTRONIC COMPONENT

Gujarat Technological University

- Identification of terminal & types of various electronic components
- Find value of Resistors, Capacitors using Colour code method
- Use of Data book for component specifications.

(3) **WIRING OF ELECTRONIC CIRCUITS**

- wiring of simple electronic circuits like amplifiers, Oscillator, Power supply on a bread board

(4) **DESIGNING OF PCB**

- Prepare design, artwork, etching on printed circuit board

(5) **MOUNTING WORKBENCH**

- Prepare Mounting & soldering on the selected PCB

(6) **ELECTRONIC WORKBENCH**

- design simple circuit using software on computer
- Test circuit simulation using electronic work bench

5. REFERENCES:

Sr. No.	Name of Books	Authors
1.	Principles of Electronics	V.K.Mehta
2.	Electronics Devices & Circuits	Robert Boylested
3.	Electronics Devices & Circuits	V.N.Bhargav
4.	Electronics Devices & Circuits	L.N.Motorshead