

1.6 ELECTRONICS WORKSHOP

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RATIONALE

Electronic practice is the backbone of the real work situation, which helps in development and enhancement of relevant skill required in engineering. The main objective of this course is to impart knowledge of different electronics components used in electronic circuits and develop the ability to understand datasheets. The course also describes various electronic components for different applications.

COURSE OUTCOMES

After undergoing the subject, the students will be able to:

- CO1: Identify electronics components like resistors, capacitors, diodes, transistors etc.
- CO2: Implement soldering and de-soldering on electronic circuit interconnections.
- CO3: Identify different active electronic components and assemble circuits on breadboard.
- CO4: Use measuring instruments like Multimeter, Function generator, Power Supply & DSO.
- CO5: Able to test various electronic circuitry and batteries.

PRACTICAL EXERCISES

UNIT I

Basic Electronic Components

- 1.1 Concept of Resistors, Color Coding, Tolerance, Maximum power rating, Application of LDR.
- 1.2 Classification of Capacitors, Coding of capacitors-using numerals, directly printed values on capacitors, Ceramic capacitor and Electrolytic capacitor.
- 1.3 Concept of Inductors
- 1.4 Testing of components using Multi meter/LCR Q-meter

UNIT II

Soldering & De-soldering

- 2.1 Identify different types of soldering guns and practice soldering of different electronic active and passive components and IC bases on lug boards and PCBs.

- 2.2 Join the broken PCB track and test
- 2.3 Practice de-soldering using pump and wick
- 2.4 Prepare component for soldering.
- 2.5 Demonstrate soldering and de-soldering using soldering and de-soldering stations.

UNIT III

Active Electronic Components

- 3.1 Identify different types of mains transformers and their testing.
- 3.2 Identify the primary and secondary transformer windings and test the polarity.
- 3.3 Identify different sizes, shapes of cores used in low capacity transformers.
- 3.4 Measure the primary and secondary voltage of different transformers.
- 3.5 PN junction diode: Terminal Identification, setting on bread board and testing.
- 3.6 Zener diode: Terminal Identification, setting on bread board and testing.
- 3.7 LED, Photo diode :Terminal Identification, setting on bread board and testing.
- 3.8 Integrated Circuits (ICs) like 7404, 7408, 7432, 7805, 555, 741: Pin diagram, Identification, setting on bread board and testing.
- 3.9 Switches, Application of Toggle, Rotary, push to on & push to off
- 3.10 Relays and application of General purpose relay

UNIT IV

Electronic Testing Equipments

- 4.1 Power Supply, DC power supply, Concept of Dual power supply
- 4.2 Cathode Ray Oscilloscope (CRO), CRO probes, Front panel controls, AC/DC voltage measurement, Frequency measurement, wave form generation.
- 4.3 Function Generator, Front panel controls, Functions: sine wave, square wave, triangular wave and Amplitude measurement.
- 4.4 Digital Multi Meter, Front panel controls of DMM
- 4.5 Study of AC and DC Waveforms
- 4.6 Construction of various electronic circuits on breadboard Circuits like: rectifiers, filter circuits, clipper, clamper, transistor amplifiers, logic gates, LED driver circuit, power supply, etc
- 4.7 Testing of outputs of various electronic circuits using test Equipment.

UNIT V

AC and Electrical Cables

- 5.1 Identify the Phase, Neutral and Earth on power Socket.
- 5.2 Construct a test lamp and use it to check mains.

- 5.3 Use a Tester to monitor AC power.
- 5.4 Measure the voltage between phase and ground and rectify earthing.
- 5.5 Identify and test different AC mains cables.
- 5.6 Skin the electrical wires /cables using the wire stripper and cutter. .
- 5.7 Prepare the mains cable for termination.
- 5.8 Measure AC and DC voltages using multi meter
- 5.9 Replace the fuse, battery for the given multimeter

RECOMMENDED BOOKS

- 1. Prof. D.Chhatopadhyay & Prof. P.C Rakshit, “Basic Electronics” New Age International (P) Ltd. Publishers, 2010.
- 2. Zber, “Basic Electronics Lab Manual”, Mc Graw Hill India, Seventh Edition, 2001.
- 3. Stan Gibilisco & Simon Monk, “Electricity & Electronics”, Mc Graw Hill Education Sixth Edition, 2016.
- 4. Marc De Vinck “Getting Started with Soldering”, Shroff/Maker Media, First Edition, 2018.

SUGGESTED WEBSITES

- 1. www.electronics.wisc-online.com
- 2. www.electronicsforu.com
- 3. <https://www.electronics-tutorials.ws/design>

INSTRUCTIONAL STRATEGY

This is hands-on practice based workshop for development of required skills in the students. There are five units of equal weightage. The teacher should also engage the students for various Hands on Practice/Training of Students during Educational Tour, Seminar/ Assignment Event, Students Quiz.