

Jawaharlal Nehru Engineering College

Laboratory Manual

ELECTRONIC WORKSHOP I

For

Second Year Students

Manual made by

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MGM'S

Jawaharlal Nehru Engineering College

N-6, CIDCO, Aurangabad

Department of Electronics & Telecommunication

Vision of the Department:

To develop **GREAT** technocrats and to establish centre of excellence in the field of **Electronics and Telecommunications**.

- ▶ **Global** technocrats with human values
- ▶ **Research** and lifelong learning attitude,
- ▶ **Excellent** ability to tackle challenges
- ▶ **Awareness** of the needs of society
- ▶ **Technical** expertise

Mission of the Department:

1. To provide good technical education and enhance technical competency by providing good infrastructure, resources, effective teaching learning process and competent, caring and committed faculty.
2. To provide various platforms to students for cultivating professional attitude and ethical values.
3. Creating a strong foundation among students which will enable them to pursue their career choice.

Jawaharlal Nehru Engineering College

Technical Document

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FOREWORD

It is my great pleasure to present this laboratory manual for second year engineering students for the subject of electronic hardware and software workshop keeping in view the vast coverage required for visualization of concepts of basic equipments.

As a student, many of you may be wondering with some of the questions in your mind regarding the subject and exactly that has been tried to answer through this manual.

Faculty members are also advised that covering these aspects in initial stage itself will greatly relieve them in future, as much of the load will be taken care by the enthusiastic energies of the students, once they are conceptually clear. Students are advised to thoroughly go through this manual rather than only topics mentioned in the syllabus as practical aspects are the key to understanding and conceptual visualization of theoretical aspects covered in the books.

Good Luck for your Enjoyable Laboratory Sessions.

Prof.N.S.HUSSAIN

LABORATORY MANUAL CONTENTS

This manual is intended for the second year students of ECT/IE branches in the subject of Electronic workshop. This manual typically contains practical/Lab Sessions related to Electronic workshop , covering various aspects, related to the subject to enhance understanding.

Students are advised to thoroughly go through this manual rather than only topics mentioned in the syllabus, as practical aspects are the key to understanding and conceptual visualization of theoretical aspects covered in the books.

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Experiment no:1

Aim: Study of basic electronics components

Components: Different types of Resistors, Capacitors, Inductors, Diodes, Transistors, Relays,
Data sheet

Theory:

Resistor: What is function of resistors?

What is Color code system?

What are types of resistors?

What are specifications of resistors?

Capacitor: What is function of capacitors?

What is Color code system?

What are types of capacitors?

What are specifications of capacitors?

Inductors: What is function of inductors?

What is Color code system?

What are types of inductors?

What are specifications of inductors?

Diodes: What is function of diodes?

What are types of diodes?

What are specifications of diodes?

Transistors: What is function of transistors?

What are types of transistors?

What are specifications of transistors?

Procedure : Handle basic electronics components,
Identify their specifications by referring data sheets .
Understand their applications.

Conclusion: Basic electronic component are studied.

Experiment no:2

Aim: Study of CRO, function generator, multimeter, D.C. Power supply.

Apparatus: CRO, function generator, multimeter, D.C. Power supply, CRO probes , connecting wires. Apparatus manuals.

Theory:

- Cathode ray oscilloscope (CRO):
- What is function of CRO?
 - What are specifications of CRO?
 - What are the controls on front panel and their significance?
- Function Generators:
- What is function of Function Generators?
 - What are specifications of Function Generators?
 - What are the controls on front panel and their significance?
- Multimeter:
- What is function of Multimeter?
 - What are specifications of Multimeter?
 - What are the controls on front panel and their significance?
- D.C. Power supply:
- What is function D.C. Power supply:?
 - What are specifications D.C. Power supply:?
 - What are the controls on front panel and their significance?

Procedure: Handle above instruments,
Identify their specifications by referring their manuals and understand their usage.
Learn different controls on the front panel and their significance.

Conclusion: Function specification and usage of CRO, function generator, multimeter, D.C. Power supply are studied.

Experiment no:3

Aim: Study of (PCB) Printed Circuit Board and PCB lay-out design .

Apparatus: different types of Printed Circuit Boards, ferric chloride

Theory:

What is function PCB?

What are different types of PCB?

How a PCB lay out is drawn?

How this layout is transferred on PCB?

Procedure: Understand function of PCB.

Make a manual PCB layout of a simple electronic circuit.

Transfer this lay out on PCB.

Conclusion: Function of PCB and PCB lay-out is studied.

Experiment no:4

Aim: Survey of Optoelectronics devices (LED, Photo diode, Photo transistor, LDR, Opto-isolator)

Apparatus: different types of optoelectronics devices , data sheets.

Theory :

LED: What is function of LEDs?

What are types of LEDs?

What are specifications of LEDs?

Photo diode: What is function of PHOTO DIODEs?

What are types of PHOTO DIODEs?

What are specifications of PHOTO DIODEs?

Photo transistor: What is function of PHOTO TRANSISTORs?

What are types of PHOTO TRANSISTORs?

What are specifications of PHOTO TRANSISTORs?

LDR: What is function of LDRs?

What are types of LDRs?

What are specifications of LDRs?

Opto-isolator: What is function of OPTO-ISOLATORs?

What are types of OPTO-ISOLATORs?

What are specifications of OPTO-ISOLATORS?

Procedure: Handle these devices.

Refer their data sheet and gather all required information about them.

Understand their applications.

Conclusion: An extensive survey of above optoelectronic devices is carried out and their application is understood

Experiment no:5

Aim: How an industry works? A Survey.

Apparatus: literature on industrial management, a physical visit to industry ,
interaction with people working in industry.

Theory :

Industry:

What is role of an industry in society?

What are different types of industries?

What are the different departments in an industry?

How these departments coordinate with each other to convert a raw material into final product of industry?

What is the hierarchy system in an industry?

Procedure:

Try to visit your nearest industry.

Understand different department in an industry and their role.

Understand how these departments coordinates with each other.

Refer literature on industrial management.

Interact with people working in industry to get an clear picture of industry

Conclusion: An extensive survey of Electromagnetic spectrum and applications of individual bands in electronic field is carried out.

Experiment no:6

Aim: Study of electromagnetic spectrum and a survey of their applications.

Apparatus: Literature on electromagnetic spectrum and its application.

Theory :

Electromagnetic Spectrum:

What is meant by Electromagnetic wave?

What is meant by Electromagnetic spectrum and its significance?

What are different bands in Electromagnetic spectrum and their frequency ranges?

What are the applications of these bands in electronic field?

Procedure:

Understand electromagnetic wave concept.

Refer online and off line literature on this topic.

Gather above mentioned information.

Enlist applications. of individual bands in electromagnetic spectrum

Conclusion: An extensive survey of Electromagnetic spectrum and applications of individual bands in electronic field is carried out.

Experiment no:7

Aim: Build and test an electronic circuit on PCB.

Apparatus: Electronic circuit design , Electronic components, PCB , FERRIC CHLORIDE, butter paper, drilling machine, soldering gun, soldering wire, flux

Theory :

Building an Electronic circuit on PCB:

How the electronic circuit (that you have chosen as a mini project) works?

What is the function of your mini project and its application?

How do you make a manual PCB lay out?

How do you transfer the PCB layout on PCB(copper clad).

How do you carry out PCB etching?

Explain drilling, component mounting and soldering procedure.

How do you test your mini project?

Procedure:

Choose a simple direct/IC- based electronic circuit as your mini project

Understand function of your electronic circuit.

Collect all required components and their data sheet.

Make a manual PCB layout.

Transfer this pattern on PCB.

Carry out etching using ferric chloride.

Carry out drilling using drilling machine.

Mount all components at their respective positions.

Solder components to complete the circuit.

Test your circuit and verify its function.

Conclusion: An Electronic Circuit was assembled on PCB. It was tested to verify its function.

Experiment no:8

Aim: Simulate an electronic circuit using pspice/ multisim /simulink.

Apparatus: Electronic circuit, simulation software, PC

Theory :

- What do you mean by simulation?
- How a simulation software is used?
- How do you draw your circuit and simulate it?
- How do you see the results?

Procedure:

- Choose a circuit to simulate.
- Draw the circuit in simulation software using built in functions and components in the software.
- Run simulation tool.
- See results in scope or meters.
- Verify results.

Conclusion: A electronic circuit was successfully simulated using simulation software and results were verified

4. Quiz on the subject:

1. The depletion region with in a pn junction is reduced when the junction has :
 - a) Zero bias.
 - b) Reverse bias.
 - c) All of these.
 - B) Forward bias
2. For a reverse biased pn- junction, the electric current through the junction increases abruptly at
 - a) Breakdown voltage
 - b) 0 V.
 - c) 0.2 eV.
 - d) 7.2 eV.
3. The leakage electric current of a pn junction is caused by
 - a) heat energy
 - b) chemical energy.
 - c) barrier potential.
 - d) Majority carriers.
4. Field effect transistor (FET) operates on
 - a) Majority carriers only
 - b) Minority carries only.
 - c) Positive charged ions only.
 - d) On both majority and minority carriers.
5. What is the input impedance of a common-gate configured JFET?
 - a) Very low
 - b) Low.
 - c) High.
 - d) Very high
6. Primary battery is such a battery
 - a) Which can be recharged?
 - b) Which cannot be reconditioned by replacing chemical?
 - c) Which cannot be reused?
 - d) Which cannot be recharged
7. Negative electrode or anode of simple voltaic cell is made of
 - a) Copper.
 - b) Zinc
 - c) Lead.
 - d) Carbon.

8. The instantaneous power in an inductor is proportional to the
- Inductance, instantaneous current, rate of change of current.
 - Inductance, rate of change of current.
 - Inductance, instantaneous current.
 - Only rate of change of current.
9. The voltage divider biasing circuit is used in amplifiers quite often because it
- Reduces the DC base electric current
 - Reduces the cost of the circuit.
 - Makes the operating point almost independent of β .
 - Limits the AC signal going to base.
10. The material to be used in the manufacture of a standard resistance should be of
- High resistivity and low temperature coefficient.
 - Low resistivity.
 - High temperature coefficient.
 - Low resistivity and high temperature coefficient.
11. If 1A current flows in a circuit, the number of electron flowing through this circuit is
- 0.625×10^{19}
 - 1.6×10^{19}
 - 1.6×10^{-19}
 - 0.625×10^{-19}
- The charge of one electron is 1.6×10^{-19} coulomb. Again 1 A current means transferring of 1 Coulomb charge per one second. Hence 1 A current means $1 / 1.6 \times 10^{-19} = 0.625 \times 10^{19}$ number of electrons.
12. When AC supply is given to the transformer, the flux will depend on
- Current.
 - Voltage.
 - Frequency.
 - Both voltage and frequency

13. If the supply frequency of a transformer increases then output voltage of the transformer will
- a) Decrease.
 - b) Increase proportionately.
 - c) Remain same.
 - d) Increases very rapidly.

14. Which among the following does not belong to India's major large scale industries?

- a) Cotton textile industry
- b) Iron and steel industry
- c) Jute industry
- d) Khadi and village industry.....

Under the chairmanship of K.C. Pant, Deputy Chairman of Planning Commission, a committee was set up on strengthening the khadi and village industries sector.

15. When did India globally become the 7th largest vehicle manufacturer?

- a) 2007
- b) 2008
- c) 2009
- d) 2010

The government claimed that India has become the seventh largest vehicle producing nation in the world in 2009 which was six years ahead of the set target by auto mission plan.

16. When was the 'Policy Package for Setting up Credit to Small and Medium Enterprises' announced?

- a) August 2005.....
- b) February 2007
- c) March 2009
- d) November 2010

17. MOU stands for.....Memo Random of understanding

18. CFO stands for.....Chief financial Officer

19. GDP stands for...Gross Domestic Product.... Economical growth of industry , India=7.9, china= 8.2, in 2016 India will lead because investment in India is increasing

20. A capacitor

- a) Passes AC but blocks DC.....
- b) Passes DC but blocks AC.
- c) Passes both AC and DC.
- d) Blocks both AC and DC.

5. Conduction of Viva-Voce Examinations:

Teacher should conduct oral exams of the students with full preparation. Normally, the objective questions with guess are to be avoided. To make it meaningful, the questions should be such that depth of the students in the subject is tested. Oral examinations are to be conducted in co-cordial environment amongst the teachers taking the examination. Teachers taking such examinations should not have ill thoughts about each other and courtesies should be offered to each other in case of difference of opinion, which should be critically suppressed in front of the students.

6. Evaluation and marking system:

Basic honesty in the evaluation and marking system is absolutely essential and in the process, impartial nature of the evaluator is required in the examination system. It is a wrong approach or concept to award the students by way of easy marking to get cheap popularity among the students, which they do not deserve. It is a primary responsibility of the teacher that right students who are really putting up lot of hard work with right kind of intelligence are correctly awarded.

The marking patterns should be justifiable to the students without any ambiguity and teacher should see that students are faced with just circumstances.