#### 2.1 **ELECTRONICS DEVICES & CIRCUITS**

#### RATIONALE

This subject will enable the student to have conceptual understanding of conductors, semiconductors and insulators, extrinsic and intrinsic semi-conductors, p-n junction, need of rectifiers in electronics, understanding of filters in rectifiers, tunnel diodes, LEDs, varactor diodes, LCD, understanding the working of transistors in various configuration; understanding of FETs and MOSFET etc. For effective functioning in the field of electronics service industry. The teacher should give emphasis on understanding of concepts and explanation of various terms used in the subject. Practical exercises will reinforce various concepts. Industrial/field exposures must be given by organizing visit to local electronic industries.

#### **DETAILED CONTENTS**

#### 1. Semi conductor Physics

- 1.1 Review of basic atomic structure and energy level, concept of insulator, conductors and semi conductors, atomic structure of Ge and Si, covalent bonds
- **1.2** Concept of intrinsic and extrinsic semiconductor, P and N impurities, doping of impurity
- **1.3** P and N type semiconductors and their conductivity. Effect of temperature on conductivity of intrinsic semi conductor
- **1.4** Energy level diagram of conductors, insulators and semi conductors, minority and majority carriers
- **1.5** Basic idea of Hall Effect and its uses

#### 2. Semi Conductor Diode

- 2.1 PN junction diode, mechanism of current flow in PN junction, Drift and diffusion current, depletion layer, forward and reverse biased PN junction, potential barrier, concept of junction capacitance in forward and reverse bias condition
- 2.2 V-I characteristics, static and dynamic resistance and their calculation from diode characteristics
- 2.3 Diode as half wave, full wave and bridge rectifier. PIV, rectification efficiencies and ripple factor calculations, shunt capacitor filter, series inductor filter, LC filter and  $\Box$  filter
- 2.4 Type of diodes, characteristics and applications of Zener diode. Zener and avalanche breakdown, use of Zener diode as a voltage regulator

#### 3. Introduction to Bipolar Transistor

- 3.1 Concept of bipolar transistor, structure, PNP and NPN transistor, their symbols and mechanism of current flow:
- **3.2** Current relations in transistor, concept of leakage current, current amplification factors.

#### (08 Period)

(10 Period)

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### (06 Period)

- 3.3 CB, CE, CC configuration of the transistor, input and output characteristics in CB and CE configurations; input and output dynamic resistance in CB and CE configurations.
- 3.4 Comparison of CB, CE and CC Configurations,
- **3.5** Power rating of Transistor.

#### 4. Transistor Biasing Circuits

Concept of transistor biasing and selection of operating point. Need for stabilization of operating point. Different types of biasing circuits, Load line Analysis, Concept of AC load Line, Stability Factor

#### 5. Single Stage Transistor Amplifier

- **5.1** Classification of Amplifier
- 5.2 Single stage transistor amplifier circuits, a.c load line and its use in calculation of currents and voltage gain of a single stage amplifier circuit. Explanation of phase reversal of output voltage with respect to input voltage. H-parameters and their significance. Calculation of current gain, voltage gain, input impedance and output impedance using h- parameter

#### 6. FET, MOSFET & UJT

- 6.1 Construction, operation and characteristics of FET and its application
- 6.2 Construction, operation and characteristics of MOSFET in depletion and enhancement modes and its applications
- **6.3** C-MOS advantages and applications
- 6.4 Comparison of JFET, MOSFET and BJT
- **6.5** FET amplifier circuit and its working principle. (No analysis)
- 6.6 Construction, operations and application of UJT.

#### 7. Operational Amplifiers

- 7.1 Characteristics of an ideal operational amplifier and its block diagram
- 7.2 Definition of differential voltage gain, CMRR, PSRR, slew rate & input offset current.
- 7.3 Operational amplifiers as an inverter, scale changer, adder, subtractor, differentiator and integrator.
- 7.4 Concept of Schmitt triggers circuit & sample/ hold circuit using OP-Amp & their application.
- 7.5 Op-Amp use as a different Bibrator circuit.

#### LIST OF PRACTICALS

- 1. Familiarization, identification and testing of active and passive components.
- 2. Familiarization with operations of different Electronics instruments like analog & digital Multi-meter, CRO, Signal generator, Regulated Power Supply
- 3. To plot V-I characteristics of PN junction diode
- 4. To plot V-I characteristics of a zener diode & observe its use as voltage regulator
- 5. To observe the wave shape of following rectifier circuit
  - ➢ Half wave rectifier
  - ➢ Full wave rectifier
  - Bridge rectifier
- 6. To plot the wave shape of full wave rectifier with

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- Shunt capacitor filter
- Series capacitor filter
- $\succ \pi$  filter
- 7. To plot input and output characteristics and calculate parameter of transistor in CE configuration
- 8. To plot input and output characteristics and calculate parameter of transistor in CB configuration
- 9. To plot V-I characteristics of FET Transistor
- 10. To measure the Q-point and note the variation of Q- point
  - > By increasing the base resistance in fixed biased circuit
  - > By changing out of bias resistance in potential driver circuit
- 11. To measure voltage gain, input, output impedance in single stage CE amplifier circuits
- **12.** To Use IC 741 OP –Amp as
- a) Inverter b) Adder c) Subtractor d)Integrator
  - **13.** To study of operational amplifier as a different types of Bibrator.
  - 14. To study of Op-Amp As Schmitt trigger.

### **RECOMMENDED BOOKS**

- 1. Basic Electronics and Linear circuit by NN Bhargava and Kulshreshta, Tata McGraw Hill, New Delhi.
- 2. Electronics Devices and circuits by D.C. Kulshereshtha; New Age Publishers, New Delhi.
- **3.** Principle of Electrical and Electronics Engineering by VK Mehta; S Chand and Co. New Delhi.
- 4. Electronics Components and Materials by SM Dhi, Tata McGraw Hill, New Delhi.
- 5. Electronics Device and circuits by Millman and Halkias; McGraw Hill.
- 6. Principle of Electronics by Albert Paul Malvino; Tata McGraw Hill.
- 7. Electronics Devices and circuits-I by Naresh Gupta, JyoteshMalhotra and Harish CSaini, Eagle Prakashan, Jalandhar.
- 8. Electronics Devices .and circuits by Rama Reddy, Narosa Publishing House Pvt.Ltd. New Delhi.

Topic No.	Time Allotted for	Marks Allotted
	Lecturers and Tutorials (Period)	
1.	06	08
2.	08	06
3.	10	08
4.	10	06
5.	10	08
6.	10	08
7.	06	06
TOTAL	60	50

#### 2.2 BASICS OF INFORMATION TECHNOLOGY

#### RATIONALE

Information technology has great influence on all aspects of life. Almost all work places and living environment are being computerized. In order to prepare diploma holders to work in these environments, it is essential that they are exposed to various aspects of information technology such as understanding the concept of information technology and its scope; operating a computer; use of various tools of MS office; using internet etc. form the broad competency profile of diploma holders. This exposure will enable the students to enter their professions with confidence, live in a harmonious way and contribute to the productivity.

#### **DETAILED CONTENTS**

1.	Information Technology – its concept and scope	(04 Period)
2.	Elements of a computer system, its usefulness and applications, block diagram of a computer, CPU, memory, data – numeric data, alpha numeric data; contents of a program, processing of data	(12 Period)
3.	Computer organization, computer hardware and software; primary and secondary memory: RAM, ROM, PROM etc.	(10 Period)
4.	Input devices; keyboard, scanner, mouse etc ; output devices ; VDU and Printer, Plotter	(06 Period)
5.	Primary and Secondary Storage (Auxiliary Storage), Secondary storage; magnetic disks – tracks and sectors, optical disk (CD, CD-RW and DVD Memory)	(10 Period)
6.	Introduction to Operating Systems such as MS-DOS and Windows	(06 Period)
7.	Introduction to internet, browsing using search engine (like Google etc.)	(06 Period)
8.	Basics of Networking – LAN, WAN, Topologies	(06 Period)
ST (	OF PRACTICALS	
1.	Given a PC, name its various components and list their functions	
2.	Identification of various parts of a computer and peripherals	
3.	Practice in installing a computer system by giving connection	
	1. 2. 3. 4. 5. 6. 7. 8. 5T ( 1. 2. 3.	<ol> <li>Information Technology – its concept and scope</li> <li>Elements of a computer system, its usefulness and applications, block diagram of a computer, CPU, memory, data – numeric data, alpha numeric data; contents of a program, processing of data</li> <li>Computer organization, computer hardware and software; primary and secondary memory: RAM, ROM, PROM etc.</li> <li>Input devices; keyboard, scanner, mouse etc ; output devices ; VDU and Printer, Plotter</li> <li>Primary and Secondary Storage (Auxiliary Storage), Secondary storage; magnetic disks – tracks and sectors, optical disk (CD, CD-RW and DVD Memory)</li> <li>Introduction to Operating Systems such as MS-DOS and Windows</li> <li>Introduction to internet, browsing using search engine (like Google etc.)</li> <li>Basics of Networking – LAN, WAN, Topologies</li> <li>Given a PC, name its various components and list their functions</li> <li>Identification of various parts of a computer and peripherals</li> <li>Practice in installing a computer system by giving connection</li> </ol>

- 4. DOS Commands (internal / external) e.g. TYPE, REN, DEL, CD, MD, COPY, TREE, BACKUP
- 5. Exercises on entering text and data (Typing Practice using any tutor)
- 6. Features of Windows as an operating system
  - ➢ Start
  - Shutdown and restore
  - Creating and operating on the icons
  - Opening closing and sizing the windows
  - Using elementary job commands like creating, saving, modifying, renaming, finding and deleting a file
  - Creating and operating on a folder
  - > Changing setting like, date, time color (back ground and fore ground)

- Using short cuts
- Using on line help
- 7. MS-Word
  - ➢ File Management:
  - Opening, creating and saving a document, locating files, copying contents in some different file(s), protecting files, Giving password protection for a file
  - > Page Set up: Setting margins, tab setting, ruler, indenting
  - Editing a document: Entering text, Cut, copy, paste using tool- bars
  - Formatting a document: Using different fonts, changing font size and colour, changing the appearance through bold/ italic/ underlined, highlighting a text, changing case, using subscript and superscript, using different underline methods
  - Aligning of text in a document, justification of document, Inserting bullets and numbering
  - > Formatting paragraph, inserting page breaks and column breaks, line spacing
  - > Use of headers, footers: Inserting footnote, end note, use of comments
  - > Inserting date, time, special symbols, importing graphic images, drawing tools
  - Tables and Borders: Creating a table, formatting cells, use of different border styles, shading in tables, merging of cells, partition of cells, inserting and deleting a row in a table
  - Print preview, zoom, page set up, printing options
  - Using Find, Replace options
  - Using Tools like: Spell checker, help, use of macros, mail merge, thesaurus word content Statistics, printing envelops and labels
  - Using shapes and drawing toolbar,
  - ➢ Working with more than one window in MS Word,
  - ▶ How to change the version of the document from one window OS to another
  - Conversion between different text editors, software and MS word
- 8. MS-Excel
  - Starting excel, open worksheet, enter, edit, data, formulae to calculate values, format data, create chart, printing chart, save worksheet, switching between different spread sheets
  - Menu commands: Create, format charts, organize, manage data, solving problem by analyzing data, and exchange with other applications. Programming with MS Excel, getting information while working
  - ➢ Work books: Managing workbooks (create, open, close, save), working in work books,
  - selecting the cells, choosing commands, data entry techniques, formula creation and links, controlling calculations, working with arrays
  - Editing a worksheet, copying, moving cells, pasting, inserting, deletion cells, rows, columns, find and replace text, numbers of cells, formatting worksheet
  - Creating a chart:
  - Working with chart types, changing data in chart, formatting a chart, use chart to analyze data
  - Using a list to organize data, sorting and filtering data in list

#### 9. MS PowerPoint

- a) Introduction to PowerPoint
  - How to start PowerPoint
  - > Working environment: concept of toolbars, slide layout, templates etc.
  - Opening a new/existing presentation
  - > Different views for viewing slides in a presentation: normal, slide sorter etc.

- b) Addition, deletion and saving of slides
- c) How to view the slide show?
  - Viewing the presentation using slide navigator
  - ➢ Slide transition
  - Animation effects etc.
- **10.** Internet and its Applications
  - a) Log-in to internet
  - b) Navigation for information seeking on internet
  - c) Browsing and down loading of information from internet
  - d) Sending and receiving e-mail
    - Creating a message
    - Creating an address book
    - ➢ Attaching a file with e-mail message
    - Receiving a message
    - Deleting a message

#### **RECOMMENDED BOOKS**

- 1. Fundamentals of Computer by V. Rajaraman; Prentice Hall of India Pvt. Ltd., New Delhi
- 2. Computers Today by SK Basandara, Galgotia Publication Pvt ltd. Daryaganj, New Delhi.
- **3.** MS-Office 2000 for Everyone by Sanjay Saxena; Vikas Publishing House Pvt. Ltd., New Delhi
- **4.** Internet for Every One by Alexis Leon and Mathews Leon; Vikas Publishing House Pvt. Ltd., Jungpura, New Delhi
- 5. A First Course in Computer by Sanjay Saxena; Vikas Publishing House Pvt. Ltd., Jungpura, New Delhi
- 6. Mastering Windows 95, BPB Publication, New Delhi
- 7. Computer Fundamentals by PK Sinha; BPB Publication, New Delhi
- **8.** Fundamentals of Information Technology by Leon and Leon;Vikas Publishing House Pvt. Ltd., Jungpura, New Delhi
- 9. On Your Marks Net...Set...Go... Surviving in an e-world by Anushka Wirasinha, Prentice Hall of India Pvt. Ltd., New Delhi
- 10. Learning MS Office XP by Ramesh Bangia, Khanna Book Publishing Co. (P) Ltd., New Delhi.
- **11.** Fundamentals of Information Technology by Vipin Arora, Eagle Parkashan, Jalandhar

Topic No.	Time Allotted for	Marks Allotted
	Lecturers and Tutorials (Period)	
1.	04	06
2.	12	10
3.	10	09
4.	06	04
5.	10	09
6.	06	04
7.	06	04
8.	06	04
TOTAL	60	50

SUGGESTED DISTRIBUTION OF MARKS

#### 2.3 SIGNAL SENSING AND CONDITIONING

#### L T P

#### RATIONALE

This subject provides knowledge about signals, sensing of signals, signal transmission, conditioning and recording.

#### DETAILED CONTENTS

#### 1. Introduction

- **1.1** Signal
- **1.2** Types of Signals
- **1.3** Functional Elements of System
- 1.4 Importance of Sensing of Signals

#### 2. Sensing Elements

- **2.1** Resistive sensing elements: potentiometers, resistance thermometers, strain gauges, Load cell/Pressure cell
- 2.2 Capacitive sensing elements: variable separation, area and dielectric
- **2.3** Inductive sensing elements: variable reluctance and LVDT displacement sensors
- **2.4** Electromagnetic sensing elements: velocity sensors
- **2.5** Thermoelectric sensing elements: laws, thermocouple characteristics, installation problems
- **2.6** Elastic sensing elements : sensing elements for force, torque, acceleration, pressure
- 2.7 Piezoelectric sensing elements: static and dynamic characteristics
- **2.8** Electrochemical sensing elements: ion selective electrodes, solid state gas sensors
- **2.9** Photo Detectors : Optical detection Principles, Electro-optic effect, Integrated Optical Devices, Magneto optic effect, Acousto-optic effect Digital Transducer element, Micro sensor, smart sensors
- **2.10** Photo Detectors : Optical detection Principles, Electro-optic effect, Integrated Optical Devices, Magneto optic effect, Acousto-optic effect
- 2.11 Digital Transducer element, Micro sensor, smart sensors

#### 3. Signal Transmission

- **3.1** Introduction
- **3.2** Methods of Data Transmission
- **3.3** General Telemetry System
- **3.4** Types of Telemetry Systems
- **3.5** Land Line Telemetry System
- **3.6** Voltage Telemetry Systems
- **3.7** Current Telemetry System
- **3.8** Position Telemetry System
- **3.9** Land Line Telemetry System
- 3.10 Feed-back System
- 3.11 Radio Frequency (R.F.) Telemetry

#### (18 Period)

(06 Period)

(26 Period)

4 - 2

#### 4. Signal Conditioning

- **4.1** Basic Instrumentation Amplifier
- 4.2 Applications of Instrumentation Amplifiers (Specific Bridge)
- 4.3 Chopped and Modulated DC Amplifier

#### LIST OF PRACTICALS

- 1. Measurement of Displacement using LVDT
- 2. Measurement of Temperature using Thermocouple & Thermister
- 3. Measurement of Strain using strain gauge
- 4. Application of Load Cell/Pressure Cell
- 5. Application of capacitive transducer
- 6. Application of Potentiometer
- 7. Application and use of LDR, Photocell
- 8. Use of Telemetry System
- 9. Measurement of temperature using RTD.

#### **RECOMMENDED BOOKS**

- 1. Electronic Instrumentation; by H.S.Kalsi; McGraw-Hill Education India Pvt.Ltd.
- 2. Principles of Measurement Systems by John P.Bently (Pearson)
- **3.** Electrical and Electronic Measurements and Instrumentation by A.K.Sawhney; DhanpatRai& Co.
- 4. Instrumentation measurement and Analysis by B.C. Nakra, K.K.Chaudhary
- 5. Optoelectronics An Introduction to Materials and Devices by Singh Jasprit;McGraw Hill
- 6. Instrumentation Devices and Systems by C.S.Ranjan; Tata McGraw Hill

Topic No.	Time Allotted for	Marks Allotted
_	Lecturers and Tutorials (Period)	
1.	06	04
2.	26	25
3.	18	15
4.	10	06
TOTAL	60	50

#### 2.4 **ELECTRONICS MEASURING INSTRUMENTS**

#### **RATIONALE**

In the real world of work the technician is required to handle wide variety of instruments while testing, trouble shooting, calibration etc. the study of this subject will help students to gain the knowledge of working principles and operation of different instruments. During practical sessions, he will acquire the requisite skills.

#### **DETAILED CONTENTS**

#### 1. Basics of Measurements

Measurement, method of measurement, types of instruments

Specifications of instruments: Accuracy, precision, sensitivity, resolution, range, errors in measurement, sources of errors, limiting errors, loading effect, importance and applications of standards and calibration

#### 2. Voltage, Current and Resistance Measurement

- Principles of operation and construction of permanent magnet moving coil 2.1 (PMMC) instruments
- 2.2 Moving iron type instruments, measurement of d.c voltage and current, measurement of d.c voltage and current, milli-volt measurement
- Measurement of voltage, current and resistance using multimeter 2.3
- Specifications of multimeter and its applications 2.4
- 2.5 Limitations with regard to frequency and input impedance

#### 3. Cathode Ray Oscilloscope

- Construction and working of Cathode Ray Tube (CRT) 3.1
- 3.2 Time base operation and need for blanking during fly back, synchronization
- Block diagram, description of a basic CRO and triggered sweep oscilloscope, 3.3 front panel controls.
- 3.4 Specifications of CRO and their explanation.
- Measurement of voltage, current, frequency, time period and phase using CRO. 3.5
- CRO probes, special features of dual beam, dual trace and delay sweep. 3.6
- 3.7 Digital storage oscilloscope (DSO) : block diagram and working principle

#### 4. Signal Generators and Analytical Instruments

- Explanation of block diagram specifications of low frequency and RF 4.1 generators, pulse generator, function generator
- Wave analyzer, distortion measurement and spectrum analyser 4.2

#### 5. Impedance Bridges and Q Meters

- Wheat stone bridge 5.1
- AC bridges: Maxwell's induction bridge, Hay's bridge, De-Sauty's bridge, 5.2 Schering bridge and Anderson bridge
- Block diagram description of laboratory type RLC bridge, specifications of 5.3 RLC bridge
- 5.4 Block diagram and working principle of Q meter

# (10 period)

(04 period)

# (14 period)

(06 period)

#### LTP

#### 4 - 2

(12 period)

#### 6. Digital Instruments

- 6.1 Comparison of analog and digital instruments
- 6.2 Working principle of ramp, dual slope and integration type digital voltmeter
- 6.3 Block diagram and working of a digital multimeter
- **6.4** Measurement of time interval, time period and frequency using universal counter/frequency counter
- **6.5** Working principle of logic probe, logic pulser, logic analyzer, logic comparator, signature analyzer

#### LIST OF PRACTICALS

- **1.** To observe the loading effect of a multimeter while measuring voltage across a low resistance and high resistance
- 2. To observe the limitations of a multimeter for measuring high frequency voltage
- 3. Measurement of voltage, frequency, time period and phase using CRO
- 4. Measurement of rise time and fall time using CRO
- 5. Measurement of Q of a coil and its dependence on frequency
- 6. Measurement of voltage, frequency, time and phase using DSO
- 7. Measurement of resistance and inductance of coil using RLC Bridge
- 8. Use of logic pulser and logic probe
- **9.** Measurement of time period, frequency, average period using universal counter/ frequency counter

#### **RECOMMENDED BOOKS**

- 1. Electronics Measurement and Instrumentation by AK Sawhney, DhanpatRai and Sons, New Delhi
- 2. Electronics Measurement and Instrumentation by Oliver, Tata McGraw Hill Education Pvt Ltd, New Delhi
- 3. Electronics Instrumentation by Cooper, Prentice Hall of India, New Delhi
- 4. Electronics Test and Instrumentation by Rajiv Sapra, Ishan Publications, Ambala
- 5. Electronics Instrumentation by JB Gupta, Satya Prakashan, New Delhi

Topic No.	Time Allotted for Lecturers and Tutorials (Period)	Marks Allotted
1.	04	04
2.	12	09
3.	10	07
4.	06	06
5.	14	12
6.	14	12
TOTAL	60	50

#### RATIONALE

In electronics, with theoretical knowledge the practice is also very important. Starting from identification of components to testing of different circuit the practice must be there. To identify components, To use data book, To identify leads, Use of test equipment such as multi-meter to oscilloscope, To learn the technique of soldering and de-soldering are the areas where practice is required and it makes perfect electronics engineer. Minor project work aims at exposing the students to various developments taking place in the field of electronics and related areas in addition to developing interest in the students about working and fabrication of electronics devices. The project may be selected from utility items pertain to their laboratories or homes. It would enable first hand experience of components, their purchase, assembly, testing and trouble shooting. It would also boost up confidence of the students in repairing and maintenance of electronics gadgets. There should not be more than 2-3 students for each project. A report must be prepared with a hard and soft copy. The purpose of this subject is also to give practice to the students in elementary design and fabrication of simple electronic circuits. The topics of assembly, soldering, testing, and documentation have been included to give overall picture of the process of manufacturing of electronic devices. The teacher may guide/ help students to identify their minor project work and chalk out their plan of action well in advance preferably at the beginning of 2nd semester For this purpose, the concerned teachers must identify curriculum related industrial problems which should be expository in nature and ask students (individual/group) to carry out their investigation/activity such that enough industrial exposure is gained by them during this process.

#### **DETAILED CONTENTS**

#### 1. Information about Basic Tools used in Electronics

#### (08 period) Identification and familiarization with the following tools used in electronic 1.1 shop: Such as Tweezers, Screw drivers (different sizes), Insulated Pliers, Cutter, Sniper, Philips Screw Driver (Star Screw Driver), L- Keys, Soldering Iron, soldering wire, flux. Their demonstration and uses.

- 1.2 Identification and familiarization with Multimeter (analog and digital) Job I Practice in the use of above mentioned tools and instruments. For this a small experimental set up may be done
- Various types of protective devices such as : wire fuse, cartridge fuse etc., 1.3
- Identification and familiarization with ear phone speaker connector, telephone 1.4 jacks and similar male and female connectors (audio, video)
- Safety precautions to be observed in the electronic shop 1.5
- Identification and familiarization with soldering and desoldering practice 1.6
- 1.7 Introduction to thimbles and crimping tools
- Uses of the items mentioned below: 1.8
  - a) Various types of single, multi-cored insulated screened wire and cables power, audio video, co axial, general purpose wires/cables
  - **b**) Various types of plugs, sockets, connectors suitable for general purpose audio and video use, 2 and 3 pin mains plugs and sockets, RF plugs and

#### LTP 06

sockets. Banana-plugs, and sockets, BNG, RCA, DIN, UHF, ear phone speaker connector, telephone jacks and similar male and female connectors and terminal strips.

- c) 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.
- **d**) 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.
- e) Materials: Conducting, insulating and magnetic materials.

#### 2. Laboratory Experiences

- **2.1** Identification of components
- **2.2** Practice for color coding of resistance
- **2.3** Practice for identification of various components such as diode, capacitors, transistors, SCR, Triac and different ICs
- 2.4 Understand the use of data book for transistors, Diodes, SCR and triac
- **2.5** Understand the use of data book for TTL and CMOS ICs
- 2.6 Testing of different components using multi-meter

#### 3. Use of electronic instruments

- **3.1** Practice for the use of multi-meter
- **3.2** Practice for the use of signal generator
- **3.3** Practice for the use of power supply
- **3.4** Practice for the use of oscilloscope
- **3.5** Practice for the use of clamp meter
- **3.6** Practice for the use of volt meter
- **3.7** Practice for the use of ammeter
- **3.8** Practice for the use of watt meter
- **3.9** Practice for the use of energy meter

#### 4. Designing the PCB layout using computer software

- **4.1** Understanding the use of printed circuit board in electronics.
- **4.2** Designing practice of PCB layout for a simple electronics circuit such as rectifier, transistor, amplifier etc.
- 4.3 Use of software -Work bench and PSPICE

#### 5. Soldering the PCB

- **5.1** Soldering practice for PCB
- **5.2** Soldering the PCB design in layout topic.
- **5.3** Desoldering practice

#### 6. Testing of PCB

- **6.1** Continuity testing
- **6.2** Input/output testing
- **6.3** Test method of PCB's
- 6.4 Awareness of test

#### (10 period)

### (10 period)

### (08 period)

# (04 period)

# (08 period)

- 6.5 Measuring equipment used in PCB manufacturing process
- 6.6 Necessary Documentation

## 7. Fault finding of electronic circuit

- 7.1 Basic idea of fault finding procedure
- **7.2** Fault finding techniques
- 7.3 Circuit synthesis & analysis

### 8. PCB Manufacturing Process

- **8.1** Auto insertion process
- 8.2 Radial component insertion process
- 8.3 SMT process
- **8.4** Manual Insertion process

## 9. Soldering Process For PCB's

- 9.1 Hand/Manual Soldering
- 9.2 Machine Soldering
- 9.3 Critical process parameters for soldering process
- 9.4 Impact on soldering due to variation in process parameter
- 9.5 Awareness of soldering defects

## 10. Minor Project Work

Minimum 04 Project to be fabricated by each student

Students can also select any other project with the help of any resources like his teachers, family member, internet, from magazines and etc.

- **10.1** Regulated power supply
- **10.2** Timers using 555 and other oscillators
- **10.3** Touch plate switches transistorized or 555 based
- **10.4** Door bell/cordless bell
- **10.5** Clapping switch and IR switch
- 10.6 Blinkers
- **10.7** Sirens and hooters
- **10.8** FM Transmitter and Receiver
- **10.9** Electronic toy gun, walker, blinkers
- **10.10** Electronic dice
- 10.11 Cell charger, battery charger, mobile charger
- 10.12 Fire/smoke/intruder alarm
- **10.13** Liquid level controller
- 10.14 Counters
- **10.15** Combination locks
- **10.16** Electronics musical instruments
- **10.17** Telephone handset
- **10.18** Audio amplifiers
- **10.19** Tape recorders
- **10.20** Automatic stabilizer/CVT
- 10.21 Emergency light
- 10.22 Design and manufacture of transformer
- **10.23** Fan regulator
- **10.24** Triac using Fan Regulator

### (18 Period)

(08 period)

(08 period)

(08 period)

- **10.25** 555 using lighting delay Circuits
- **10.26** Temperature sensor based fabrication
- **10.27** Design and fabricate transistor switch to operate an LED.
- **10.28** Design and Fabricate a single stage Amplifier for 1 KHz

#### **RECOMMENDED BOOKS**

- 1. Data books for transistors Diodes & SCR
- 2. Data book for TTL and CMOS ICs
- 3. PCB designing Books

#### 2.6 ENVIRONMENTAL SCIENCE

LTP

#### RATIONALE

Any people must have knowledge of different types of pollution caused due to industries and constructional activities so that he may help in balancing the eco system and controlling pollution by pollution control measures. He should also be aware of environmental laws related to the control of pollution.

#### **DETAILED CONTENTS**

- 1. Basics of ecology, eco system and sustainable development (03 Period)
- Conservation of land reforms, preservation of species, prevention of advancement of deserts and lowering of water table
   (03 Period)

**3.** Sources of pollution - natural and man made, their effects on living and non-living organisms, Pollution of water - causes, effects of domestic wastes and industrial effluent on living and non-living organisms, Pollution of air-causes and effects of man, animal, vegetation and non-living organisms, Sources of noise pollution and its effects

(16 Period)

- 4. Solid waste management; classification of refuse material, types, sources and properties of solid wastes, abatement methods (06 Period)
- 5. Mining, blasting, deforestation and their effects (03 Period)
- 6. Legislation to control environment (04 Period)
- 7. Environmental Impact Assessment (EIA), Elements for preparing EIA statements (04 Period)
- 8. Current issues in environmental pollution and its control, role of non-conventional sources of energy in environmental protection (06 Period)

#### **RECOMMENDED BOOKS**

#### 3 - -

- 1. Environmental and Pollution Awareness by Sharma BR; Satya Prakashan, New Delhi.
- 2. Environmental Protection Lqw and Policy in India by Thakur Kailash; Deep and Deep Publications, New Delhi.
- **3.** Environmental Engineering and Management by Suresh K Dhamija; SK Kataria and Sons, New Delhi.
- 4. Environmental Science by Deswal and Deswal; Dhanpat Rai and Co. (P) Ltd. Delhi.

Topic No.	Time Allotted for	Marks Allotted
	Lecturers and Tutorials (Period)	
1.	03	03
2.	03	05
3.	16	20
4.	06	06
5.	03	02
6.	04	04
7.	04	04
8.	06	06
TOTAL	45	50