

2.1 ELECTRONIC COMPONENTS, ACCESSORIES & TOOLS

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DETAILED CONTENT

1. Passive Components, accessories and tools

Resistor, capacitor, inductors, AF transformers, IF transformers, switches, connectors, relays, solenoids, visual identification and color codes, contactor, circuit breakers, Fuses, MCB, ELCB Connectors and jacks in PC, Cellphone, still camera, video Camera, Car audio/video system, Home audio/video system Electrochemical cells – Chargeable, nonrechargeable, AA, AAA, Button, Cellphone battery, Typical voltages, Amp-Hour rating, precautions during use and disposal Tools: Screw-drivers, Allen key, Automatic centre punch, files, cutters, pliers, wire-strippers, hacksaw, soft tools(chemicals for electronics) **(16 Periods)**

2. Semiconductor Devices

Concept of intrinsic and extrinsic semiconductor, P and N impurities, doping of impurity PN junction diode, mechanism of current flow in PN junction, Drift and diffusion current, V-I characteristics, Diode as half wave, full wave and bridge rectifier, Filter Circuits, Zener Diode Semiconductor device numbering, data sheets, absolute maximum rating, reading of data sheets, packages and lead information, causes and indications of failure Displays - LEDs, LCDs, 7-segment, dot matrix, bar graph, LEDs for lighting. Concept of bipolar transistor, structure, PNP and NPN transistor, their symbols and mechanism of current flow 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. **(22 Periods)**

3. Electrical wiring and Equipment enclosures/cabinets

Types of Wires, Gauges, Selection of wires, Types of cables, UTP, STP, Armoured, flat ribbon type etc with examples of common applications e.g. cables in a PC, safe voltage and current ranges Colour conventions, Wire harnessing. Typical Simple Household Wiring, Wiring of tube light, switchboard wiring, stair case wiring, fan regulator and fan wiring, Power cable wiring, grounding and shielding, Earthing – necessity and methods. Electric shock and precautions. **(22 Periods)**

LIST OF PRACTICALS

1. To acquire skills of proper use of the tools, equipment etc.
2. To acquire skills of circuit assembly and disassembly.
3. To acquire skills of referencing from data-books, operating instruction manuals and other referencing material.

4. To develop technical report writing skills by creating professional laboratory reports and PowerPoint presentations.
5. To learn to make efficient use of computers for supporting various laboratory exercises related activities.
6. To inculcate good, safe and disciplined work practices.
7. To be aware of the importance of cost effective work practices by avoiding wastages and by recycling of material

Recommended Books:

1. Student Reference Manual for Electronic Instrumentation Laboratories by Stanley Wolf, and Richard F.M. Smith, Prentice Hall of India Pvt. Ltd. New Delhi
2. Electronics Shop Practices, Equipment and Materials By Clyde N. Herrick Prentice Hall Inc
3. Electronic Instruments and Systems: Principles, Maintenance and Troubleshooting by R. G. Gupta Tata McGraw Hill Edition 2001
4. Modern Electronic Equipment: Troubleshooting, Repair and Maintenance by Khandpur, TMH
5. Electronic Testing and Fault Diagnosis by G. C. Loveday, A. H. Wheeler Publishing

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted for Lecturers and Tutorials (Period)	Marks Allotted
1.	16	20
2.	22	40
3.	22	40
TOTAL	60	100

2.2 BASICS OF INFORMATION TECHNOLOGY

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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)

LIST 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
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

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted for Lecturers and Tutorials (Period)	Marks Allotted
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

2.3 ENVIRONMENTAL SCIENCE

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RATIONALE

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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)
2. 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

1. Environmental and Pollution Awareness by Sharma BR; Satya Prakashan, New Delhi.
2. Environmental Protection Law 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.

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted for Lecturers and Tutorials (Period)	Marks Allotted
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

2.4 ELECTRONICS MEASURING INSTRUMENTS

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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 (04 period)**
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 (12 period)**
 - 2.1 Principles of operation and construction of permanent magnet moving coil (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
 - 2.3 Measurement of voltage, current and resistance using multimeter
 - 2.4 Specifications of multimeter and its applications
 - 2.5 Limitations with regard to frequency and input impedance
- 3. Cathode Ray Oscilloscope (10 period)**
 - 3.1 Construction and working of Cathode Ray Tube (CRT)
 - 3.2 Time base operation and need for blanking during fly back, synchronization
 - 3.3 Block diagram, description of a basic CRO and triggered sweep oscilloscope, front panel controls.
 - 3.4 Specifications of CRO and their explanation.
 - 3.5 Measurement of voltage, current, frequency, time period and phase using CRO.
 - 3.6 CRO probes, special features of dual beam, dual trace and delay sweep.
 - 3.7 Digital storage oscilloscope (DSO) : block diagram and working principle
- 4. Signal Generators and Analytical Instruments (06 period)**
 - 4.1 Explanation of block diagram specifications of low frequency and RF generators, pulse generator, function generator
 - 4.2 Wave analyzer, distortion measurement and spectrum analyser
- 5. Impedance Bridges and Q Meters (14 period)**
 - 5.1 Wheat stone bridge
 - 5.2 AC bridges: Maxwell's induction bridge, Hay's bridge, De-Sauty's bridge, Schering bridge and Anderson bridge
 - 5.3 Block diagram description of laboratory type RLC bridge, specifications of RLC bridge
 - 5.4 Block diagram and working principle of Q meter
- 6. Digital Instruments (14 period)**

- 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, Dhanpat Rai 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

SUGGESTED DISTRIBUTION OF MARKS

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

2.5 WORKSHOP PRACTICES & PCB FABRICATION

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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. Circuit Assembly techniques (06 Periods)

Circuit boards, Types of PCB, Single sided, Double sided and multilayer, Layout techniques (Examples of using discrete components and IC's to be used), Processes on PCB (Pattern transfer), Surface Mount Devices (SMD) packages and assembling SMDs on PCB, CAD tool for PCB design. Bread board, Internal connections of breadboard, Assembling Circuit on breadboard

2. Soldering and Desoldering Techniques (04 Periods)

Solder joint, dry solder joint, cold solder joint, Good and bad solder, solder material soldering tools, soldering gun, soldering station, ultrasonic soldering station soldering techniques, tools for desoldering, desoldering techniques, testing of soldering joints, Precautions during soldering and desoldering

3. 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
- 4. Soldering the PCB**
 - 5.1 Soldering practice for PCB
 - 5.2 Soldering the PCB design in layout topic.
 - 5.3 Desoldering practice
- 5. Testing of PCB**
 - 6.1 Continuity testing
 - 6.2 Input/output testing
 - 6.3 Test method of PCB's
 - 6.4 Awareness of test
 - 6.5 Measuring equipment used in PCB manufacturing process
 - 6.6 Necessary Documentation
- 6. Fault finding of electronic circuit**
 - 7.1 Basic idea of fault finding procedure
 - 7.2 Fault finding techniques
 - 7.3 Circuit synthesis & analysis
- 7. PCB Manufacturing Process**
 - 8.1 Auto insertion process
 - 8.2 Radial component insertion process
 - 8.3 SMT process
 - 8.4 Manual Insertion process
- 8. 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
- 9. 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
- 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