

## 1.1 ENGLISH & COMMUNICATION SKILLS – I

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<b>2</b>	<b>2</b>

### RATIONALE

Language as the most commonly used medium of self-expression remains indispensable in all spheres of human life –personal, social and professional. This course is intended to break fresh ground in teaching of Communicative English as per the requirements of National Skill Quality Framework. This course is designed to help students to acquire the concept of communication and develop ability or skills to use them effectively to communicate with the individuals and community.

### COURSE OUTCOMES

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

- CO1: Identify the nuances of Communication, both Oral and Written.
- CO2: Acquire knowledge of the meaning of communication, communication process and speaking skills.
- CO3: Acquire enhanced vocabulary and in-depth understanding of Grammatical Structures and their usage in the communication.
- CO4: Communicate effectively with an increased confidence to read, write and speak in English language fluently.

### DETAILED CONTENTS

#### UNIT I

##### Reading

- 1.1 Techniques of reading: Skimming and Scanning
- 1.2 Extensive and Intensive Reading: Textual Study
- 1.3 Homecoming – R.N. Tagore
- 1.4 Life Sketch of Sir Mokshagundam Visvesvarayya
- 1.5 Life Sketch of Dr. Abdul Kalam
- 1.6 Narayan Murthy's speech at LBSNA, Dehradun

**UNIT II****Fundamentals of Communication**

- 2.1 Concept and Process of Communication,
- 2.2 Types of Communication (Verbal Communication)
- 2.3 Barriers to Communication
- 2.4 Speaking Skill: Significance and essentials of Spoken Communication
- 2.5 Listening Skill: Significance and essentials of Listening

**UNIT III****Grammar and Usage**

- 3.1 Nouns
- 3.2 Pronouns
- 3.3 Articles
- 3.4 Verbs(Main and Auxiliary)
- 3.5 Tenses

**UNIT IV****Writing Skills**

- 4.1 Significance, essentials and effectiveness of Written Communication
- 4.2 Notice Writing
- 4.3 Official Letters and E-mails.
- 4.4 Frequently-used Abbreviations used in Letter-Writing
- 4.5 Paragraph Writing
- 4.6 Netiquettes

**PRACTICAL EXERCISES****1 Reading**

Reading Practice of lessons in the Lab Activity classes.

- i. Comprehension exercises of unseen passages along with the lessons prescribed.
- ii. Vocabulary enrichment and grammar exercises based on the selected readings.
- iii. Reading aloud Newspaper headlines and important articles.

**2 Fundamentals of Communication**

- i. Introducing oneself, others and leave- taking(talking about yourself)
- ii. Just a minute (JAM) sessions: Speaking extempore for one minute on given topics

- iii. Situational Conversation: Offering-Responding to offers; Congratulating; Apologising and Forgiving; Complaining; Talking about likes and dislikes, Self-introduction Mock Interviews.

### **3 Grammar and Usage**

- i. Written and Oral Drills will be undertaken in the class to facilitate holistic linguistic competency among learners.
- ii. Exercises on the prescribed grammar topics.

### **4 Writing Skills**

- i. Students should be given Written Practice in groups so as to inculcate team-spirit and collaborative learning .
- ii. Group exercises on writing paragraphs on given topics.
- iii. Opening an e-mail account, receiving and sending emails

### **RECOMMENDED BOOKS**

1. Alvinder Dhillon and Parmod Kumar Singla, “Text Book of English and Communication Skills Vol – 2”, M/S Abhishek Publications, Chandigarh.
2. V Sasikumar & PV Dhamija, “Spoken English”, Tata MC Graw Hills, New Delhi, Second Edition.
3. JK Gangal, “A Practical Course in Spoken English”, PHI Learning Pvt. Ltd., New Delhi.
4. NK Aggarwal and FT Wood, “English Grammar, Composition and Usage”, Macmillan Publishers India Ltd., New Delhi.
5. RC Sharma and Krishna Mohan, “Business Correspondence & Report writing”, Tata MC Graw Hills, New Delhi, Fourth Edition.
6. Kavita Tyagi & Padma Misra, “Professional Communication”, PHI Learning Pvt. Ltd., New Delhi.
7. Nira Konar, “Communication Skills for professionals”, PHI Learning Pvt. Ltd., New Delhi.
8. Krishna Mohan & Meera Banerji, “Developing Communication Skills”, Macmillan Publishers India Ltd., New Delhi, Second Edition
9. M. Ashraf Rizwi, “Effective Technical Communication”, Tata MC Graw Hills, New Delhi.
10. Andrea J Rutherford, “Basic Communication Skills for Technology”, Pearson Education, New Delhi.

## **INSTRUCTIONAL STRATEGY**

This is practice based subject and topics taught in the class should be practiced in the Lab regularly for development of required communication skills in the students. This subject contains four units of equal weight age.

## 1.2 APPLIED MATHEMATICS – I

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### RATIONALE

Contents of this course provide fundamental base for understanding engineering problems and their solution algorithms. Contents of this course will enable students to use basic tools like logarithm, binomial theorem, matrices, t-ratios and co-ordinates for solving complex engineering problems with exact solutions in a way which involve less computational task. By understanding the logarithm, they will be able to make long calculations in short time and it is also a pre-requisite for understanding Calculus.

### COURSE OUTCOMES

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

- CO1: Understand the geometric shapes used in engineering problems by Co-ordinate Geometry and Trigonometry.
- CO2: Formulate engineering problems into mathematical formats with the use matrices, co-ordinate geometry and trigonometry
- CO3: Calculate the approximate value of roots of certain expressions in engineering problems by application of binomial theorem.
- CO4: Explore the idea of location, graph, and linear relationships between two variables.
- CO5: Learn about basic fundamentals about MATLAB/ SciLab and mathematical calculation with MATLAB/ SciLab software.

### DETAILED CONTENTS

#### UNIT I

##### Algebra

- 1.1 Complex Numbers: definition of complex number, real and imaginary parts of a complex number, Polar and Cartesian Form and their inter conversion, Conjugate of a complex number, modulus and amplitude, addition subtraction, multiplication and division of complex numb
- 1.2 Logarithms and its basic properties

**UNIT II****Binomial Theorem, Determinants and Matrices**

- 2.1 Meaning of  ${}^n P_r$  &  ${}^n C_r$  (mathematical expression). Binomial theorem (without proof) for positive integral index (expansion and general form); binomial theorem for any index (expansion up to 3 terms - without proof), first binomial approximation with application to engineering problems.
- 2.2 Determinants and Matrices – Evaluation of determinants (upto 2<sup>nd</sup> order), solution of equations (upto 2 unknowns) by Cramer's rule, definition of Matrices and its types, addition, subtraction and multiplication of matrices (upto 2<sup>nd</sup> order).

**UNIT III****Trigonometry**

- 3.1 Concept of angle, measurement of angle in degrees, grades, radians and their conversions.
- 3.2 T-Ratios of Allied angles (without proof), Sum, Difference formulae and their applications (without proof). Product formulae (Transformation of product to sum, difference and vice versa)
- 3.3 Applications of Trigonometric terms in engineering problems such as to find an angle of elevation, height, distance etc.

**UNIT IV****Co-ordinate Geometry**

- 4.1 Cartesian and Polar co-ordinates (two dimensional), Distance between two points, mid-point, centroid of vertices of a triangle.
- 4.2 Slope of a line, equation of straight line in various standard forms (without proof); (slope intercept form, intercept form, one-point form, two-point form, symmetric form, normal form, general form), intersection of two straight lines, concurrency of lines, angle between straight lines, parallel and perpendicular lines, perpendicular distance formula, conversion of general form of equation to the various forms.

**UNIT V****Geometry of Circle and Software****Circle**

- 5.1 General equation of a circle and its characteristics. To find the equation of a circle, given:
  - I. Centre and radius
  - II. Three points lying on it
  - III. Coordinates of end points of a diameter

**Software**

- 5.2 **MATLAB Or SciLab software** – Theoretical Introduction, MATLAB or Scilab as Simple Calculator (Addition and subtraction of values –Trigonometric and Inverse Trigonometric functions) – General Practice

**RECOMMENDED BOOKS**

1. R. D. Sharma, “Applied Mathematics – I & II for Diploma Courses”, Dhanpat Rai Publications.
2. “Mathematics for Class XI”, NCERT Publication, New Delhi.
3. “Mathematics for Class XII”, NCERT Publication, New Delhi.
4. H. K Dass, “Applied Mathematics for Polytechnics”, CBS Publishers & Distributers.
5. A Ganesh and G Balasubramanian, “Textbook of Engineering Mathematics – I”, CBS Publisher, New Delhi.
6. A Ganesh and G Balasubramanian, “Textbook of Engineering Mathematics –II”, CBS Publisher, New Delhi.
7. G. B. Thomas, R. L. Finney, “Calculus and Analytic Geometry”, Addison Wesley, Ninth Edition.
8. B S Grewal, “Elementary Engineering Mathematics”, Khanna Publishers, Delhi, Thirty-fifth edition.
9. R.K. Jain and S.R.K. Iyengar, “Advanced Engineering Mathematics”, Narosa Publishing House, New Delhi, Second Edition, 2003.
10. SS Sabharwal & Dr Sunita Jain, “Applied Mathematics Vol. I & II”, Eagle Parkashan, Jalandhar.
11. S Kohli, “Engineering Mathematics Vol. I & II”, IPH, Jalandhar.
12. Reena Garg & Chandrika Prasad, “Advanced Engineering Mathematics”, Khanna Publishing House, New Delhi
13. R. Pratap, “Getting Started with MATLAB 7”, Oxford University Press, Seventh Edition.
14. E-books/e-tools/relevant software to be used as recommended by AICTE/HSBTE/NITTTR.

**SUGGESTED WEBSITES**

1. <http://swayam.gov.in>
2. <https://www.scilab.org>

## INSTRUCTIONAL STRATEGY

This is theoretical subject and contains five units of equal weight age. Basic elements of algebra, trigonometry and co-ordinate geometry can be taught in the light of their applications in the field of engineering and technology. By laying more emphasis on applied part, teacher can also help in providing a good continuing education base to the students. Students need to be taught the skills needed to use software tools built by experts through multiple problem solving based on the topics related to Algebra, Trigonometry and Coordinate Geometry that the industry requires. Examples to be used should be related to engineering. Useful software MATLAB or open source software SciLab can be taught theoretically by books/online literatures and basic operations can be shown practically with practical software laboratory or small mobile apps of these software or authentic Trial version of MATLAB/ SciLab software. Students should be able to relate to the actual use of these examples and the way mathematical calculations will help them in doing their job.



## 1.3 APLIED PHYSICS-I

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<b>2</b>	<b>2</b>

### RATIONALE

Applied physics includes the study of a large number of diverse topics all related to things that go on in the world around us. It aims to give an understanding of this world both by observation and by prediction of the way in which objects will behave. Concrete use of physical principles and analysis in various technical fields are given prominence in the course content.

### COURSE OUTCOMES

After completing this subject, student should be able to:

- CO1: Identify physical quantities, select their units and make measurements with accuracy.
- CO2: Represent physical quantities as scalar and vector and identify type of motions, various forms of energy, their conversion and applications.
- CO3: Elaborate scientific work, energy and power, forms of friction and solve problems related to them.
- CO4: Comprehend properties of matter and effect of temperature on various matter and phenomenon.
- CO5: Demonstrate the use of physical principles and analysis in various technical fields.

### DETAILED CONTENTS

#### UNIT I

##### Unit and Dimensions

- 1.1 Definition of Physics, physical quantities- fundamental and derived
- 1.2 Units: fundamental and derived
- 1.3 System of units: CGS, FPS, MKS, SI
- 1.4 Dimension, dimensional formulae and SI units of physical quantities-distance, displacement, area, volume, density, velocity, acceleration, linear momentum, force, impulse, work, power, energy, pressure, surface tension, stress, strain)
- 1.5 Dimensional equations, principle of homogeneity of dimensional equation
- 1.6 Application of dimensional analysis: checking the correctness of physical equation, conversion of system of unit (force, work, acceleration)

**UNIT II****Force and Motion**

- 2.1 Scalar and vector quantities– definition and examples, representation of vector, types of vector (unit vector, position vector, co-initial vector, collinear vector, co-planar vector)
- 2.2 Vector algebra- addition of vectors, Triangle & Parallelogram law (statement and formula only),
- 2.3 Scalar and vector product (statement and formula only)
- 2.4 Force and its units, resolution of force (statement and formula only)
- 2.5 Newton’s laws of motion (statement and examples)
- 2.6 Linear momentum, Law of conservation of linear momentum (statement and examples), Impulse
- 2.7 Circular motion: definition of angular displacement, angular velocity, angular acceleration, frequency, time period; Relation between linear and angular velocity, centripetal and centrifugal forces (definition and formula only), application of centripetal force in banking of road
- 2.8 Rotational motion: definition with examples
- 2.9 Definition of torque, angular momentum, moment of inertia and its physical significance

**UNIT III****Work, Power and Energy**

- 3.1 Work- definition, symbol, formula and SI unit, types of work (zero work, positive work and negative work) with example
- 3.2 Friction– definition and its simple daily life applications
- 3.3 Power- definition, formula and units
- 3.4 Energy- definition and its SI unit, examples of transformation of energy.
- 3.5 Kinetic energy- definition, examples, formula and its derivation
- 3.6 Potential energy- definition, examples, formula and its derivation
- 3.7 Law of conservation of mechanical energy for freely falling bodies (with derivation)
- 3.8 Simple numerical problems based on formula of Power and Energy

**UNIT IV****Properties of Matter**

- 4.1 Elasticity and plasticity- definition, deforming force, restoring force, example of elastic and plastic body
- 4.2 Definition of stress and strain, Hooke’s law, modulus of elasticity

- 4.3 Pressure- definition, atmospheric pressure, gauge pressure, absolute pressure, Pascal's law
- 4.4 Surface tension- definition, SI unit, applications of surface tension, effect of temperature on surface tension
- 4.5 Viscosity: definition, unit, examples, effect of temperature on viscosity

## **UNIT V**

### **Heat and Temperature**

- 5.1 Definition of heat and temperature (on the basis of kinetic theory)
- 5.2 Difference between heat and temperature
- 5.3 Principle and working of mercury thermometer
- 5.4 Modes of transfer of heat- conduction, convection and radiation with examples.
- 5.5 Properties of heat radiation
- 5.6 Different scales of temperature and their relationship

### **PRACTICAL EXERCISES**

- 1. Familiarization of measurement instruments and their parts (for example - vernier calliper, screw gauge, spherometer, travelling microscope etc.), and taking a reading. (compulsory to all students)
- 2. To find diameter of solid cylinder using a vernier calliper
- 3. To find internal diameter and depth of a beaker using a vernier calliper and hence find its volume.
- 4. To find the diameter of wire using screw gauge
- 5. To find thickness of paper using screw gauge.
- 6. To determine the thickness of glass strip using a spherometer
- 7. To determine radius of curvature of a given spherical surface by a spherometer.
- 8. To verify parallelogram law of force
- 9. To determine the atmospheric pressure at a place using Fortin's Barometer
- 10. To determine force constant of spring using Hooke's law
- 11. Measuring room temperature with the help of thermometer and its conversion in different scale.

### **RECOMMENDED BOOKS**

- 1. "Text Book of Physics for Class XI (Part-I, Part-II)", N.C.E.R.T., Delhi.
- 2. Dr. HH Lal, "Applied Physics, Vol. I and Vol. II", TTTI Publications, Tata McGraw

Hill, Delhi.

3. AS Vasudeva, “Applied Physics – I”, Modern Publishers, Jalandhar.
4. R A Banwait, “Applied Physics – I”, Eagle Prakashan, Jalandhar.
5. E-books/e-tools/relevant software to be used as recommended by AICTE/ HSBTE/ NITTTR.
6. C. L. Arora, “Practical Physics”, S Chand Publication.

### **SUGGESTED WEBSITES**

1. <http://swayam.gov.in>
2. The Physics Classroom
3. <https://www.khanacademy.org/science/physics>

### **INSTRUCTIONAL STRATEGY**

This is hands-on practice based subject and topics taught in the class should be practiced in the Lab regularly for development of required skills in the students. This subject contains five units of equal weight age. Teacher may use various teaching aids like models, charts, graphs and experimental kits etc. for imparting effective instructions in the subject. Students need to be exposed to use of different sets of units and conversion from one unit type to another. Software may be used to solve problems involving conversion of units. The teacher should explain about field applications before teaching the basics of mechanics, work, power and energy, rotational motion, properties of matter etc. to develop proper understanding of the physical phenomenon. Use of demonstration can make the subject interesting and develop scientific temper in the students. Teachers should give examples of engineering/technology applications of various concepts and principles in each topic so that students are able to appreciate learning of these concepts and principles. In all contents, SI units should be followed. Working in different sets of units can be taught through relevant software.

## 1.4 FUNDAMENTALS OF IT

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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 concepts of information technology and its scope, operating a computer: use of various office management tools, using internet and mobile applications etc. This course is intended to make new students comfortable with computing environment - Learning basic computer skills, learning basic application software tools, Understanding Computer Hardware, Cyber security awareness.

### COURSE OUTCOMES

At the end of the course student will be able to

- CO1: Explain the basic components of Computers, Internet and issues of abuses/ attacks on information and computers.
- CO2: Handle the Computer / Laptop / Mobiles / Internet Utilities and Install/Configure OS.
- CO3: Assemble a PC and connect it to external devices.
- CO4: Manage and Use Office practiced Automation Tools.
- CO5: Develop worksheets and Prepare presentations.

### DETAILED CONTENTS

#### UNIT I

##### Basics of Computer

Brief history of development of computers, Definition of Computer, Block diagram of a Computer, Hardware, Software, Booting: Cold and Hot Booting, Interaction between the CPU and Memory with Input/Output devices, Function of CPU and major functional parts of CPU. Memory, Bit, Nibble, Byte, KB, MB, GB, TB, PB, Functions of memory, Use of storage devices in a Computer, List types of memory used in a Computer, Importance of cache memory, CPU speed and CPU word length

## **UNIT II**

### **Basic Internet Skills**

Understanding browser, Introduction to WWW, efficient use of search engines, awareness about Digital India portals (state and national portals) and college portals. Advantages of Email, Various email service providers, Creation of email id, sending and receiving emails, attaching documents with email and drive.

Effective use of Gmail, G-Drive, Google Calendar, Google Sites, Google Sheets, Online mode of communication using Google Meet & WebEx.

## **Unit III**

### **Basic Logic building**

Introduction to Programming, Steps involved in problem solving, Definition of Algorithm, Definition of Flowchart, Steps involved in algorithm development, differentiate algorithm and flowchart, symbols used in flowcharts, algorithms for simple problems, flowcharts for simple problems, Practice logic building using flowchart/algorithms

## **Unit IV**

### **Office Tools**

Office Tools like LibreOffice/OpenOffice/MSOffice.

OpenOffice Writer – Typesetting Text and Basic Formatting, Inserting Images, Hyperlinks, Bookmarks, Tables and Table Properties in Writer

Introducing LibreOffice/OpenOffice *Calc*, Working with Cells, Sheets, data, tables, using formulae and functions, using charts and graphics.

OpenOffice Impress – Creating and Viewing Presentations, Inserting Pictures and Tables, Slide Master and Slide Design, Custom Animation.

## **Unit V**

### **Use of Social Media**

Introduction to Digital Marketing – Why Digital Marketing, Characteristics of Digital Marketing, Tools for Digital Marketing, , Effective use of Social Media like LinkedIn, Google+, Facebook, Twitter, etc.: Features of Social media, Advantages and Disadvantages of Social Media.

## **PRACTICAL EXERCISES**

1. Browser features, browsing, using various search engines, writing search queries
2. Visit various e-governance/Digital India portals, understand their features, services offered

3. Read Wikipedia pages on computer hardware components, look at those components in lab, identify them, recognize various ports/interfaces and related cables, etc.
4. Using Administrative Tools/Control Panel Settings of Operating Systems
5. Connect various peripherals (printer, scanner, etc.) to computer, explore various features of peripheral and their device driver software.
6. Explore features of Open Office tools and MS-Office, create documents, create presentation, create spread sheet, using these features, do it multiple times
7. Working with Conversion Software like pdf To Word, Word To PPT, etc.
8. Working with Mobile Applications – Searching for Authentic Mobile app, Installation and Settings, Govt. of India Mobile Applications
9. Creating email id, sending and receiving mails with attachments.
10. Using Google drive, Google calendar
11. Create Flow chart and Algorithm for the following:
  - a. Addition of n numbers and display result
  - b. To convert temperature from Celsius to Fahrenheit
  - c. To find Area and Perimeter of Square
  - d. Swap Two Numbers
  - e. find the smallest of two numbers
  - f. Find whether given number is Even or Odd
  - g. To print first n even Numbers
  - h. find sum of series  $1+2+3+\dots+N$
  - i. print multiplication Table of a number
  - j. generate first n Fibonacci terms  $0,1,1,2,3,5\dots n$  ( $n>2$ )
  - k. sum and average of given series of numbers
  - l. Factorial of number n ( $n!=1\times 2\times 3\times\dots n$ )
  - m. Armstrong Number
  - n. Find whether given number is Prime or not

## RECOMMENDED BOOKS

1. R.S. Salaria, “Computer Fundamentals” Khanna Publishing House
2. Ramesh Bangia, “PC Software Made Easy – The PC Course Kit” Khanna Publishing House
3. Online Resources, Linux man pages, Wikipedia
4. Mastering Linux Shell Scripting: A practical guide to Linux command-line, Bash scripting, and Shell programming, by Mokhtar Ebrahim, Andrew Mallett

5. Vikas Gupta, “Comdex Hardware and Networking Course Kit” Dream Tech press, New Delhi, 2008
6. Sumitabha Das, “UNIX concepts and applications” Tata McGraw Hill, New Delhi, 4<sup>th</sup> Edition, 2008

### **SUGGESTED WEBSITES**

1. <https://nptel.ac.in/courses/106/106/106106222/> - NPTEL Course on Modern Application Development
2. [https://onlinecourses.swayam2.ac.in/aic19\\_de01/preview](https://onlinecourses.swayam2.ac.in/aic19_de01/preview) -
3. <https://spoken-tutorial.org/> - Tutorials on Introduction to Computers, HTML, LibreOffice Tools, etc.
4. NOTEPAD++
5. <https://tms-outsource.com/blog/posts/web-development-ide/>

### **INSTRUCTIONAL STRATEGY**

This is a skill based subject and topics taught in the class should be practiced in the Lab regularly for development of required skills in the students. This subject contains five units of equal weight age.



## 1.5 COMPUTER WORKSHOP

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### RATIONALE

The diploma holder needs to understand computer fundamentals and information technology. They should be able to operate basic software related to computer. This course is to provide the students a clear exposure of types of computers, computer components and interfaces, input/output devices and Installation/assembly.

### COURSE OUTCOMES

At the end of the course student will be able to

- CO1: Identify and Handle various hardware components
- CO2: Install different types of software and use them appropriately
- CO3: Assemble computer components
- CO4: Interface various devices to PC/Laptop
- CO5: Troubleshoot and Maintain PC/Laptop

### PRACTICAL EXERCISES

#### UNIT I

##### Introduction

Anatomy of a Computer, Foundations of Modern Information Technology, The Central Processing Unit, How Microprocessors and Memory Chips are Made, Memory, Buses for Input and Output, communication With Peripherals.

Desktop: Identification of desktop and its parts, Hardware, Software and Firmware

Introduction to Mother board, IO and memory expansion slots, Drives, front panel and rear panel

Processors& Bus: Introduction and types of Processor, Introduction to BUS

Laptop: Introduction to Laptop, advantages over Desktops

Laptop components: Adapter – types, Battery – types, Laptop Keyboard and Touchpad

Power Supply: Introduction to online and offline UPS, Difference between online and offline UPS

SMPS: Introduction to SMPS, Study of SMPS Connectors

## **UNIT II**

### **Memory Storage Devices**

Primary Memory: Introduction and types of primary memory (SDRAM, DDR RAM)

Secondary Storage: Hard Disk –Working Principle of IDE, HDD Partition – Formatting, Introduction to SATA and Solid-State Drives (SSD)

Removable Storage: Introduction to CD, DVD, reading & writing operations; Introduction to Blue-ray devices

Flash memory: Flash drives (pen drives), Memory cards and its types

## **UNIT III**

### **I/O Devices and Interfacing**

Inputting Text and Graphics, State of the Art, Input and Output, Pointing Devices, Foundations of Modern Output, Display Screens, Printers, Foundations of Modern Storage, Storage Media, Increasing Data Storage Capacity, Backing up your Data, The Smart Card

Keyboard: Types of keyboards (wired and wireless Keyboard), keyboards connectors, troubleshooting

Mouse: types, connectors, operation of Optical mouse and Troubleshooting.

Printers: Introduction – Types of printers- Dot Matrix, Inkjet, LaserJet, MFP (Multi-Function Printer), advantages, disadvantages, cables and connectors, Troubleshooting.

I/O Ports: Introduction and identification of Serial, Parallel, USB, HDMI.

Displays: Introduction to LED, LCD and TFT Displays, cables and connectors

Graphic Cards: Introduction to different types of Graphics cards

## **UNIT IV**

### **Maintenance and Trouble Shooting of Desktop and Laptops**

Bios-setup: Standard CMOS setup, Advanced BIOS setup, advanced chipset features, PC Bios communication, upgrading BIOS, Flash BIOS -setup.

POST and BOOTING: Definition, POST Test sequence – beep codes.

Diagnostic Software and Viruses: Computer Viruses, Precautions, Anti-virus Software, Working of Antivirus software's

General troubleshooting of various peripheral devices (printer, pc, laptop, keyboard, mouse, monitor, hard disk)

## **UNIT V**

### **Assembling and Installation of Hardware/Software**

Assembling and Disassembling of PC

Installation and Troubleshooting: Formatting, Partitioning and Installation of OS: Windows and Linux

Installation of peripheral devices: Printers, scanner

Installation of software's: application software, systems software

### **RECOMMENDED BOOKS**

1. Stephen J, Bigelow, "Trouble shooting, maintaining and repairing PCs", Tata McGraw-Hill, New Delhi, 2005.
2. Stanley & Hall, "PC Data Handbook, BPB Publications, New Delhi, 2007.
3. Govindarajulu, "IBM PC and clones Hardware trouble shooting and maintenance, Tata McGraw-Hill, New Delhi, 2007.
4. Scott Muller, "Upgrading and Repairing PCs", Microtech Publications, Dubai, 2006.
5. Ronald L.Krutz, "Interfacing Techniques in Digital Design with Emphasis on Microprocessors", John Wiley & Sons New York, 2004.

### **SUGGESTED WEBSITES**

1. PC Hardware — Open & Free – OLI (cmu.edu)
2. <https://www.classcentral.com/course/build-a-computer-3234> : Free Online Course: Build a Modern Computer from First Principles: From Nand to Tetris (Project-Centered Course) from Coursera/Class Central

### **INSTRUCTIONAL STRATEGY**

This is hands on practice based workshop and topics taught in the class should be practiced in the workshop regularly for development of required skills in the students. This workshop contains five units of equal weight age.

## 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](http://www.electronics.wisc-online.com)
- 2. [www.electronicsforu.com](http://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.