Curriculum for

Diploma Programme in

COMPUTER ENGINEERING

For the State of Haryana

(First Year On Annual Pattern)

Prepared by:

Curriculum Development Centre
**National Institute of Technical
Teachers Training and Research
Sector 26, Chandigarh - 160 019**

**Haryana State Board of Technical
Education
Bays 7-12, Sector 4
Panchkula-134 112**

July, 2018

FIRST YEAR (Computer Engg.)

Sr. No.	SUBJECTS	STUDY SCHEME HOURS / WEEK			CREDIT	MARKS IN EVALUATION SCHEME								Total Marks of Internal & External
						INTERNAL ASSESSMENT			EXTERNAL ASSESSMENT					
		L	T	P		Th	Pr	Tot	Th	Hrs	Pr	Hrs	Tot	
1.1*	English	2	-	2	6	40	25	65	60	3	50	3	110	175
1.2*	Applied Mathematics	3	1	-	7	40	-	40	60	3	-	-	60	100
1.3*	Applied Physics	2	1	2	7	40	25	65	60	3	50	3	110	175
1.4**	Computer Fundamentals	3	-	-	6	40	-	40	60	3	-	3	60	100
1.5***	Fundamental of Electrical and Electronics Engg.	2	-	2	6	40	25	65	60	3	50	3	110	175
1.6*	Environmental Studies	2	-	1	5	40	25	65	60	3	50	3	110	175
1.7*	Engg. Graphics	-	-	3	3	40	25	65	60	3	25 (viva)	3	85	150
1.8*	Information Technology	-	-	2	2	-	50	50	-	-	50	3	50	100
1.9*	Internet of Things & Artificial Intelligence	-	-	2	2	-	50	50	-	-	100	3	100	150
1.10*	General Workshop Practice	-	-	3	3	-	50	50	-	-	50	3	50	100
#	Student Centered Activities(SCA)	-	-	2	2	-	25	25	-	-	-	-	-	25
	Total	14	02	19	49	280	300	580	420	-	425	-	845	1425

*Common with other diploma programmes

** Common with diploma in Electronics and Communication Engineering, Instrumentation and Control Engineering, Medical Electronics

*** Common with diploma in Electrical Engg, Electrical and Electronics Engg., Electronics and Communication Engg., Instrumentation and Control Engg, Medical Electronics

SCA will comprise of co-curricular activities like extension lectures, games, hobby clubs, seminars, declamation contests, educational field visits, N.C.C., N.S.S., Cultural Activities and Disaster management etc.

<h1 style="text-align:center">1.1 ENGLISH</h1>

RATIONALE

Knowledge of English Language plays an important role in career development. This subject aims at introducing basic concepts of communication besides laying emphasis on developing listening, speaking, reading and writing skills as parts of Communication Skill.

LEARNING OUTCOMES

After undergoing the subject, the students will be able to:
.
- Understand the importance of good communication
- Describe process of communication.
- Explain, Compare and re-write the types of communication
- Identify and match the parts of speech
- Rewrite sentences correctly
- Modify sentences and relate them with real life situations.
- Reproduce and match words and sentences in a paragraph.
- Re-write the sentences according to given situation.
- Relate and use various words using proper vocabulary and grammar.
- Write the various types of paragraphs, notices and composition on picture with appropriate format.

<h2 style="text-align:center">DETAILED CONTENTS</h2>

1. Basics of Communication   **(06 Hrs)**
   1.1.   Definition and process of communication
   1.2.   Types of communication – Verbal (Listening, Speaking, Reading and Writing) and Non-verbal

2. Functional Grammar   **(22 Hrs)**
   2.1.   Noun and Pronoun
   2.2.   Punctuation
   2.3.   Preposition
   2.4.   Conjunction
   2.5.   Tenses (verb (Main verb and Auxiliary verb)

3. Reading Skills   **(12 Hrs)**

   3.1.   Unseen passage for comprehension. Based upon the passage, flowing aspects may be covered
- Questions from the passage
- One-word substitution

- Prefixes and Suffixes
- Antonyms and Synonyms etc.

4. Writing skills   (30 Hrs)

4.1. Correspondence – Business and official
4.2. Notice, including Press Releases
4.3. Memos
4.4. Circular
4.5. Basics of Report Writing
4.6. Resume Writing
4.7. Writing E-mail
4.8. Paragraph writing
4.9. Picture composition

LIST OF PRACTICALS

1. Listening Exercises
2. Self and Peer Introduction
3. Debate
4. Situational Conversations: Offering - Responding to offers; Requesting – Responding to requests; Congratulating; Expressing sympathy and condolence; Apologizing and Forgiving; Complaining; Warning; Asking and giving information; Getting and giving permission; Asking for and giving opinions; Talking about likes and dislikes
5. Just a minute sessions – Extempore
6. Group Discussion
7. Newspaper reading
8. Mock Interviews: Telephonic and Personal

INSTRUCTIONAL STRATEGY

Student should be encouraged to participate in role play and other student centered activities in class room and actively participate in listening exercises

MEANS OF ASSESSMENT

- Assignments and quiz/class tests, mid-term and end-term written tests
- Actual practical work, exercises and viva-voce
- Presentation and viva-voce

RECOMMENDED BOOKS

1. Communicating Effectively in English, Book-I by Revathi Srinivas; Abhishek Publications, Chandigarh.
2. Communication Techniques and Skills by R. K. Chadha; Dhanpat Rai Publications, New Delhi.
3. High School English Grammar and Composition by Wren & Martin; S.Chand & Company Ltd., Delhi.
4. e-books/e-tools/relevant software to be used as recommended by AICTE/HSBTE/NITTTR.

Section	Percentage of syllabus to be covered	Units to be covered	Type of assessment	Weightage of Marks	Pass Percentage
A	20%	Unit 1.1, 2.1, 4.1	1st Internal	40%	40% (Combined in internal & final assessment) with minimum 25% marks in final assessment)
B	20%	Unit 2.2, 4.2, 4.3	2nd Internal		
C	60%	Unit 1.2, 2.3 to 2.5, 3, 4.4 to 4.9	FINAL	60%	

1.2 APPLIED MATHEMATICS

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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, partial fractions, 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. Statistics is important for understanding of tolerances, quality assurance and quality control and it is also essential for data analysis.

LEARNING OUTCOMES

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

- Apply complex number in engineering problems.
- Apply permutation and combination to count without actual counting.
- Apply permutation and combination to understand binomial theorem.
- Calculate the approximate value of roots of certain expressions in engineering problems by application of binomial theorem.
- Resolve rational functions to partial fractions for the use in Integral Calculus.
- Use matrices to provide solution to engineering problems.
- Solve different problems using trigonometry.
- Understand the geometric shapes used in engineering problems by Co-ordinate Geometry.
- Explore the idea of location, graph, and linear relationships between two variables.
- Compute slope, the equation of tangent and normal to a curve at a point using differentiation.
- Find maximum and minimum values of a function by application of differential calculus..
- Calculate simple integration by using concepts of integration.
- Find the velocity from acceleration and displacement from velocity using integration.
- Evaluate area under curves by using definite integrals
- Calculate the area under a curve and axes.
- Calculate the approximate area under a curve by applying numerical integration using Trapezoidal and Simpson's rules.
- Solve engineering and industrial problems using differential equations.
- Apply differential Equations and numerical methods for higher learning of mathematics and engineering applications.

DETAILED CONTENTS

1. **Algebra** (30 Hrs)
   - Law of Indices, Formula of Factorisation and expansion i.e. $(a+b)^2$, (a^3+b^3) etc.
   - Partial fraction:- Definition of Polynomial fraction proper & improper fractions and definition of partial fractions. To resolve proper fraction into partial fraction with denominator containing non-repeated linear factors, only.
   - 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 number.
   - Logarithms and its basic properties
   - Determinants and Matrices – Evaluation of determinants (up to 3 order) by laplace method. Solution of equations (up to 3 unknowns) by Cramer's Rule. Definition of Matrices and types, addition subtraction and multiplication of Matrices (up to 2 order).
   - Permutation, combination formula, Values of ^nP_r and ^nC_r.
   - Binomial theorem for positive integral index , General term, simple problems

2. **Trigonometry** (14 Hrs)

   - Concept of angle: measurement of angle in degrees, grades, radians and their conversions.
   - T-Ratios of standard angle $(0^0, 30^0, 45^0$ etc) and fundamental Identities, Allied angles (without proof) Sum, Difference formulae and their applications (without proof). Product formulae (Transformation of product to sum, difference and vice versa)
   - Applications of Trigonometric terms in engineering problems such as to find an angle of elevation, height, distance etc.

3. **Co-ordinate Geometry** (12 Hrs)

   - Point: Distance Formula, Mid Point Formula, Centroid of triangle and area of triangle.
   - Straight line: Slope of a line, equation of straight line in various standards forms (without proof); (slope intercept form, intercept form, one-point form, two-point form, normal form, general form), angle between two straight lines.
   - Circle: General equation of a circle and identification of centre and radius of circle. To find the equation of a circle, given:
     - * Centre and radius
     - * Coordinates of end points of a diameter

4. **Differential Calculus** (40 Hrs)
   - Definition of function; Concept of limits (Introduction only) and problems related to four standard limits only.

   - Differentiation of standard function (Only formulas), Differentiation of Algebraic function, Trigonometric functions, Exponential function, Logarithmic function

- Differentiation of sum, product and quotient of functions.
- Successive differentiation (up to 2nd order)
- Application of differential calculus in:
    - (a) Rate measures
    - (b) Maxima and minima

5. Integral Calculus (28 Hrs)

- Integration as inverse operation of differentiation with simple examples.
- Simple standard integrals, Integrations by parts and related Simple problems
- Evaluation of definite integrals with given limits.

Evaluation of $\int_{0}^{\pi/2} \sin^n x \, dx, \quad \int_{0}^{\pi/2} \cos^n x \, dx, \quad \int_{0}^{\pi/2} \sin^m x \, \cos^n x \, dx$

using formulae without proof (m and n being positive integers only) using pre-existing mathematical models.
- Applications of integration: for evaluation of area under a curve and axes (Simple problems where the limits are given).
- Numerical integration by Trapezoidal Rule and Simpson's $1/3^{rd}$ Rule using pre-existing mathematical models

6. Differential Equations (04 Hrs)

Definition, order, degree and linearity, of an ordinary differential equation. Solution of I^{st} order and I^{st} degree differential equation by variable separable method (Simple problems)

7. Statistics (12 Hrs)
- Measures of Central Tendency: Mean, Median, Mode
- Measures of Dispersion: Mean deviation from mean, Standard deviation
- Correlation coefficient and Coefficient of rank correlation (Simple problems)

INSTRUCTIONAL STATREGY

Activity based teaching and learning process using Mathematics lab consisting of physical models and computer based tools/software emphasising Practice => Theory => Practice. 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. 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.

MEANS OF ASSESSMENT

- Assignments and quiz/class tests, mid-term and end-term written tests, model/prototype making

RECOMMENDED BOOKS

1. Elementary Engineering Mathematics by BS Grewal, Khanna Publishers, New Delhi
2. Engineering Mathematics Vol. I & II by S Kohli, IPH, Jalandhar
3. Applied Mathematics, Vol. I & II by SS Sabharwal & Dr Sunita Jain, Eagle Parkashan, Jalandhar
4. Engineering Mathematics, Vol I, II & III by V Sundaram et al, Vikas Publishing   House (P) Ltd., New Delhi
5. Engineering Mathematics, Vol I & II by SS Sastry, Prentice Hall of India Pvt. Ltd.,
6. Applied Mathematics I, by Archana Sharma, Lords Publications, Jalandhar.
7. Engineering Mathematics by Srimanta Pal and Subodh C. Bhunia; Oxford University Press, New Delhi
8. e-books/e-tools/relevant   software   to   be   used   as   recommended   by AICTE/HSBTE/NITTTR.

Websites for Reference:
   http://swayam.gov.in

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B	20%	Unit 2,3	2nd Internal		
C	60%	Unit 4,5,6,7	FINAL	60%	

1.3 APPLIED PHYSICS

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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 fields of engineering and technology are given prominence in the course content.

Note: 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.

LEARNING OUTCOMES

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

- Identify physical quantities, parameters and select their units for use in engineering solutions.
- Find units and dimensions of different physical quantities.
- Represent physical quantities as scalar and vectors.
- Use basic laws of motions,
- Analyse and design banking of roads and apply conservation of momentum principle to explain recoil of gun etc.
- Define work, energy and power and their units. Solve problems about work and power
  - State the principle of conservation of energy.
  - Identify forms of energy, conversion from one form to another.
  - Compare and contrast the physical properties associated with linear motion and rotational motion and give examples of conservation of angular momentum.
  - Describe the surface tension phenomenon and its units, applications, effects of temperature on surface tension.
  - Describe the viscosity of liquids.
  - Define stress and strain, modulus of elasticity.
  - State Hooke's law.
  - Measure temperature in various processes on different scales.
  - Distinguish between conduction, convection and radiation.
  - Use equipments like Vernier calliper, screw gauge, Spherometer.
- Differentiate between Transverse and Longitudinal, Periodic and Simple Harmonic Motion.
- Explain the terms: frequency, amplitude, wavelength, wave velocity, frequency and relation between them.

- Explain various engineering and industrial applications of ultrasonics.
- Apply acoustics principles to various types of buildings to get best sound effect.
- Explain the laws of reflection and refraction of light.
- Explain total internal reflection as applied to optical fibers.
- Define capacitance and its unit and solve simple problems using C=Q/V
- Explain the role of free electrons in insulators, conductors and semiconductors.
- Application of semiconductors as diode, rectifiers, concept of transistors
- Explain electric current as flow of charge, the concept of resistance, heating effect of current.
- State and apply Ohm's law.
- Calculate the equivalent resistance of a variety of resistor combinations.
- Apply the concept of light amplification in designing of various LASER based instruments and optical sources.
- Apply the use of optical fibre in medical field and optical fibre communication.

DETAILED CONTENTS

1.   Units and Dimensions   (11Hrs)
    1.1   Definition of Physics, Physical quantities (Fundamental and derived),
    1.2   Units: fundamental and derived units,
    1.3   Systems of units: CGS, FPS, MKS, SI
    1.4   Definition of Dimensions;
    1.5   Dimensional formulae and SI units of physical quantities (distance, displacement, area, volume, velocity, acceleration, momentum, force, impulse, work, power, energy, pressure, surface tension, stress, strain)
    1.6   Principle of homogeneity of dimensions
    1.7   Dimensional equations, Applications of dimensional equations; checking of correctness of equation, Conversion of system of unit (force, work)

2.   Force and Motion   (14 Hrs)
    2.1   Scalar and vector quantities –(Definition and examples),
    2.2   Addition of Vectors, Triangle & Parallelogram Law (Statement only),
    2.3   Scalar and Vector Product (statement and formula only)
    2.4   Definition of Distance, displacement, speed, velocity, acceleration
    2.5   Force and its units, concept of Resolution of force
    2.6   Newton's Law of motion (Statement and examples),
    2.7   Linear Momentum, conservation of momentum (Statement only), Impulse
    2.8   Circular motion: definition of angular displacement, angular velocity, angular acceleration, frequency, time period; Relation between linear and angular velocity.
    2.9   Centripetal and centrifugal forces(definition and formula only)
    2.10   Application of centripetal force in Banking of roads (derivation for angle of banking)

3.   Work, Power and Energy   (08 Hrs)
   3.1   Work (Definition, Symbol, Formula and SI units)
   3.2   Energy (Definition and its SI units), Examples of transformation of energy.
   3.3   Kinetic Energy (Formula, examples and its derivation)
   3.4   Potential Energy (Formula, examples and its derivation)
   3.5   Law of conservation of mechanical energy for freely falling bodies (With . Derivation)
   3.6   Power (definition, formula and units)
   3.7   Simple Numerical problems based on formula of Power

4.   Rotational Motion   (05 Hrs)
   4.1   Rotational motion with examples
   4.2   Definition of torque and angular momentum and their examples
   4.3   Conservation of angular momentum (quantitative) and its examples
   4.4   Moment of inertia and its physical significance, radius of gyration (definition, derivation and formula).

5.   Properties of Matter   (10 Hrs)
   5.1   Definition of Elasticity, Deforming force, Restoring force, example of Elastic and plastic body,
   5.2   Definition of Stress and strain with their types,
   5.3   Hooke's law, Modulus of Elasticity (Young's, Bulk modulus and shear)
   5.4   Pressure (definition, formula, unit), Pascals Law
   5.5   Surface tension: definition, its units, applications of surface tension, effect of temperature on Surface tension
   5.6   Viscosity: definition, units, effect of temperature on viscosity
   5.7   Fluid motion, stream line and turbulent flow.

6.   Heat and temperature   (05 Hrs)
   6.1   Definition of heat and temperature (on the basis of kinetic theory),
   6.2   Difference between heat and temperature
   6.3   Principles of measurement of temperature.
   6.4   Modes of transfer of heat (Conduction, convection and radiation with examples).
   6.5   Properties of heat radiation
   6.6   Different scales of temperature and their relationship

7.   Wave motion and its applications   **(09 Hrs)**

7.1   Wave motion, transverse and longitudinal wave motion with examples, Terms used in wave motion like displacement, amplitude, time period, frequency, wavelength, wave velocity; relationship among wave velocity, frequency and wave length .

7.2   Simple Harmonic Motion (SHM): definition, examples

7.3   Cantilever (definition, formula of time period (without derivation).

7.4   Free, forced and resonant vibrations with examples

7.5   Acoustics of buildings – reverberation, reverberation time, echo, noise, coefficient of absorption of sound, methods to control reverberation time.

7.6   Ultrasonics: Introduction and their engineering applications (cold welding, drilling, SONAR)

8.   Optics   **(05 Hrs)**

8.1.   Reflection and refraction with laws, refractive index, lens formula (no derivation), power of lens (related numerical problems).

8.2.   Total internal reflection and its applications, Critical angle and conditions for total internal reflection

8.3.   Microscope, Telescope (definition)

8.4.   Uses of microscope and telescope.

9.   Electrostatics   **(09 Hrs)**

9.1.   Electric charge, unit of charge, conservation of charge.

9.2.   Coulombs law of electrostatics,

9.3.   Electric field, Electric lines of force (definition and properties), Electric field intensity due to a point charge.

9.4.   Definition of Electric flux, Gauss law (Statement and derivation)

9.5.   Capacitor and Capacitance (with formula and units), Series and parallel combination of capacitors (simple numerical problems)

10.   Current Electricity   **(08 Hrs)**

10.1   Electric Current and its Unit, Direct and alternating current,

10.2   Resistance, Specific Resistance and Conductance (definition and units)

10.3   Series and Parallel combination of Resistances.

10.4   Ohm's law (statement and formula),

10.5   Heating effect of current, Electric power and its units

10.6   Kirchhoff's laws (statement and formula)

11   Electromagnetism   **(05 Hrs)**

11.1.   Introduction to magnetism, Types of magnetic materials. Dia, para and ferromagnetic materials with examples.

11.2.   Magnetic field, magnetic intensity, magnetic lines of force, magnetic flux and their units

11.3.   Electromagnetic induction (definition)

12. Semiconductor physics (08 Hrs)

    12.1. Definition of Energy level, Energy bands,

    12.2. Types of materials (insulator, semi conductor, conductor) with examples,

    12.3. Intrinsic and extrinsic semiconductors, p-n junction diode and its V-I characteristics

    12.4. Diode as rectifier – half wave and full wave rectifier (centre tap only)

    12.5. Semiconductor transistor; pnp and npn (Introduction only), symbol.

13. Modern Physics (08 Hrs)

    13.1. Lasers: full form, principle, spontaneous emission, stimulated emission, population inversion, engineering and medical applications of lasers.

    13.2. Fibre optics: Introduction to optical fibers (definition, parts), applications of optical fibers in different fields.

    13.3. Introduction to nanotechnology (definition of nanomaterials with examples) and its applications.

LIST OF PRACTICALS (To perform minimum fourteen experiments)

1. To find diameter of solid cylinder using a vernier calliper
2. To find internal diameter and depth of a beaker using a vernier calliper and hence find its volume.
3. To find the diameter of wire using screw gauge
4. To find thickness of paper using screw gauge.
5. To determine the thickness of glass strip using a spherometer
6. To determine radius of curvature of a given spherical surface by a spherometer.
7. To verify parallelogram law of forces
8. To determine the atmospheric pressure at a place using Fortin's Barometer
9. To determine force constant of spring using Hooke's law
10. Measuring room temperature with the help of thermometer and its conversion in different scale.
11. To find the time period of a simple pendulum
12. To determine and verify the time period of Cantilever
13. To verify ohm's laws by plotting a graph between voltage and current.
14. To verify laws of resistances in series combination.
15. To verify laws of resistance in parallel combination.
16. To find resistance of galvanometer by half deflection method
17. To verify laws of reflection of light using mirror.
18. To verify laws of refraction using glass slab.
19. To find the focal length of a concave lens, using a convex lens
20. To study colour coding scheme of resistance.

INSTRUCTIONAL STATREGY

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.

MEANS OF ASSESSMENT

- Assignments and quiz/class tests, mid-term and end-term written tests, model/prototype making
- Actual laboratory and practical work, exercises and viva-voce

RECOMMENDED BOOKS

1. Text Book of Physics for Class XI (Part-I, Part-II); N.C.E.R.T., Delhi
2. Applied Physics, Vol. I and Vol. II by Dr. HH Lal; TTTI Publications, Tata McGraw Hill, Delhi
3. Concepts in Physics by HC Verma, Vol. I & Vol.II, Bharti Bhawan Ltd. New Delhi
4. Engineering Physics by PV Naik, Pearson Education Pvt. Ltd, New Delhi
5. e-books/e-tools/relevant software to be used as recommended by AICTE/ HSBTE/ NITTTR.
6. Practical Physics, by C. L. Arora, S Chand Publication

Websites for Reference:

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C	60%	Unit 6,7,8,9, 10,11, 12, 13	FINAL	60%	

1.4   COMPUTER FUNDAMENTALS

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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. Hence this subject is introduced in the curriculum.

LEARNING OUTCOMES

After undergoing the subject, students will be able to:
- Describe various component of computer system
- Draw the block diagram of computer system showing various units
- Outline various application of IT
- Differentiate between assembly and high level language
- List the features of the MS Word, MS-Excel & MS-PowerPoint
- Demonstrate the use of PowerPoint for seminar presentation
- Identify various web browser
- Use internet and create mail ID, send and receive Email

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DETAILED CONTENTS

1.   Fundamentals of Computer   (21 hrs)
    1.1   Draw the block diagram of a Computer.
    1.2.   Explain the interaction between the CPU, Memory Input/ Output devices.
    1.3.   Describe the function of CPU and major functional parts of CPU.
    1.4.   Describe the function of memory.
    1.5   Describe the function of input/output devices.
    1.6   State the relevance of speed and word length for CPU Performance.
    1.7   Recognize the current family of CPUs used in Computers
    1.8   State the use of storage devices used in a Computer.
    1.9   List types of memory used in a Computer.
    1.10   State the importance of cache memory.
    1.11   Generations of computers.
    1.12   Classification of computers –based on size, processor.
    1.13   Know importance of binary number system for use in Digital Computers.

2.   DOS & Windows Operating Systems   (40 hrs)
    2.1   Describe the need for an operating system
    2.2   List the various operating system used presently
    2.3   DOS Prompt, Types of Commands, Internal & External Commands
    2.4   Directories and files , wild cards, autoexec.bat, config.says,
    2.5   List the features of Window desktop
    2.6   List the components of Window
    2.7   State the function of each component of Window

2.8   Explain the method of starting a program using start button

2.9   Understand maximize, minimize, restore down and close button

2.10   State the meaning of a file

2.11   State the meaning of a folder

2.12   Explain the method of viewing the contents of hard disk drive using explore option

2.13   Explain the method of finding a file using search option

2.14   Explain formatting a floppy disk using explore option

2.15   Describe installing new software using control panel

2.16   Describe uninstalling software using control panel

2.17   Explain installing a new hardware using control panel

2.18   Explain uninstalling a hardware using control panel

2.19   Narrate finding out drive space using system tool option of accessories group

2.20   Explain the procedure of disk defragmentation using system tool

2.21   Narrate installing a Printer using control panel

2.22   Explain the procedure for changing resolution, colour, appearances, and screensaver option of the display

2.23   Narrate the process of charging the system date and time

3.   Fundamentals of Internet   (28 hrs)

     3.1   Explain meaning of a computer network

     3.2   Describe the concept of a local area network

     3.3   Explain the concept of wide area network

     3.4   Compare internet & intranet

     3.5   Describe the relevance of an internet service provider

     3.6   Explain the role of the modem in accessing the internet

     3.7   Explain the installation procedure of a modem using control panel

     3.8   Explain the purpose of web browser software

     3.9   Explain the structure of a Universal Resources Locator(URL)

     3.10   Describe the purpose of World Wide Web, FTP, telnet and E-mail

     3.11   Explain the process of sending and receiving e-mail

     3.12   Understand different connection methods

     3.13   Describe address format and IP address

     3.14   Describe DNS

     3.15   Describe the role of search engines with examples

     3.16   Differences between search engines and directory.

     3.17   Know about social network sites

     3.18   Understand internet security

4.   Understand Programming Methodology   (16 hrs)

     4.1.   State the different steps involved in problem solving

     4.2   State the steps involved in algorithm development

     4.3   Differentiate algorithm and flowchart

4.4   Develop algorithms for simple problems
4.5   Draw the symbols used in flowcharts
4.6   Draw flowcharts for simple problems

INSTRUCTIONAL STRATEGY

Since this subject is practice oriented, the teacher should demonstrate the capabilities of computers to students while doing practical exercises. The students should be made familiar with computer parts, peripherals, connectors etc. and proficient in making use of MS Office/Open Office in addition to working on internet. The student should be made capable of working on computers independently

MEANS OF ASSESSMENT
- Assignments and quiz/class tests, mid-term and end-term written tests
- Actual laboratory and practical work, exercises and viva-voce
- Software installation, operation and viva-voce

RECOMMENDED BOOKS

1.   Fundamentals of Computer by E Balagurusamy,Tata McGraw Hill EducationPvt. Ltd, New Delhi
2.   Fundamentals of Computer by V Rajaraman; Prentice Hall of India Pvt. Ltd., New Delhi
3.   Computer Fundamentals by RS Salaria; Khanna Book Publishing Co. (P) Ltd., New Delhi
4.   Computers Fundamentals Architecture and Organisation by B Ram, revised Edition, New Age International Publishers, New Delhi
5.   Computers Today by SK Basandara, Galgotia publication Pvt ltd. Daryaganj, New Delhi.
6.   A First Course in Computer by Sanjay Saxena; Vikas Publishing House Pvt. Ltd., Jungpura, New Delhi
7.   Computer Fundamentals and Programming in C by ReemaThareja; Oxford University Press, New Delhi
8.   Computer Fundamentals by PK Sinha; BPB Publication, New Delhi
9.   Computer Fundamentals and Information Technology by Preeti Shrivastav, Ishan publication
10.   Fundamentals of Information Technology by Vipin Arora, Eagle Parkashan, Jalandhar.
11.   e-books/e-tools/relevant   software   to   be   used   as   recommended   by AICTE/HSBTE/NITTTR.

Websites for Reference:
        http://swayam.gov.in

Section	Percentage of syllabus to be covered	Units to be covered	Type of assessment	Weightage of Marks	Pass Percentage
A	20%	Unit 1	1st Internal	40%	40%(Combined in internal & final assessment)with minimum 25% marks in final assessment)
B	20%	Unit 2.1 to 2.11	2nd Internal		
C	60%	Unit 2.12 to 2.23, 3,4	FINAL	60%	

1.5 FUNDAMENTAL OF ELECTRICAL & ELECTRONICS ENGG

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RATIONALE

A diploma holder may be involved in various jobs ranging from preventive maintenance of electrical installation to fault location. In addition, he/she may be working in testing laboratories where he/she uses measuring instruments. To carry out these and similar jobs effectively, knowledge of basic concepts, principles and their applications is very essential. This course will enable the students to understand the basic concepts and principles of DC and AC fundamental, ac circuits, batteries, electromagnetic induction, voltage and current sources etc. This subject gives the knowledge of fundamental concepts and principles of basic electronics and aims at providing the students with basic understanding of various types of materials such as conductors, semiconductors and insulators, extrinsic and intrinsic semi-conductors, p-n junction, need of rectifiers, significance and use of filters in rectifiers, basic structure and working principle of LEDs, LCD; working of Transistors in various configurations; fundamental knowledge of FETs and MOSFETs etc. and their applications. The teacher should give emphasis on understanding of concepts by explaining the various terms used in the subject. Practical exercises have been included in order to reinforce various concepts

LEARNING OUTCOMES

After undergoing the subject, the students will be able to:
- Identify and able to take readings on various electrical equipments(voltmeter, ammeter, CRO, wattmeter, multi-meter)
- Determination of voltage-current relationship in a DC circuit under specific physical conditions
- Measure resistance of an ammeter and a voltmeter
- Verify DC circuits (Thevenin and Norton's Theorem), Superposition nodal analysis, Maximum Power Transfer Theorem
- Verify Kirchhoff's Current and Voltage Laws in a dc circuit
- Find the ratio of inductance of a coil having air-core and iron-core respectively and to observe the effect of introduction of a magnetic core on coil inductance
- Measure power and power factor in a single phase R-.L-.C. Circuit and calculation of active and reactive powers in the circuit. After undergoing the subject, the students will be able to take readings on various electronics equipments(multimeter, CRO, signal generator, LCR meter)
- Plot the VI characteristics of pn junction diode and Zener diode
- Measure voltage gain, input and output impedance in a single state CE amplifier circuit.
- Fabricate half wave, full wave and bridge rectifier and observe waveforms of each
- Plot the waveforms of the rectifier circuit with different filters
- Plot input and output characteristics of transistor in CB and CE mode
- Plot the characteristics of FET based amplifier

- Measure voltage gain, input and output impedance in a single state CE amplifier circuit.
  take readings on various electronics equipments(multi meter, CRO, signal generator, LCR meter)

DETAILED CONTENTS

1. Overview of DC Circuits   (05 hrs)

   1.1   Simple problems on series and parallel combination of resistors and capacitors
          with their wattage consideration,
   1.2   Application of Kirchhoff's current law and Kirchhoff's voltage law to simple
          circuits. Star – Delta connections and their conversion.

2. DC Circuit Theorems   (05 hrs)
   Thevenin's theorem, Norton's theorem, application of network theorems in solving D.C.
   circuit problems. Superposition nodal analysis, Mesh analysis, Maximum Power Transfer
   Theorem.

3. Voltage and Current Sources   (04 hrs)
   3.1   Concept of voltage source, symbol and graphical representation characteristics of
          ideal and practical sources.
   3.2   Concept of current sources, symbol, characteristics and graphical representation of
          ideal and practical current sources.

4. Semiconductor Physics   (06 hrs)
   4.1   Review of basic atomic structure and energy levels, concept of insulators, conductors
          and semi conductors, atomic structure of Germanium (Ge) and Silicon (Si), covalent
          bonds
   4.2   Concept of intrinsic and extrinsic semi conductor, process of doping.
   4.3   Energy level diagram of conductors, insulators and semi conductors; minority and
          majority charge carriers.
   4.4   P and N type semiconductors and their conductivity, effect of temperature on
          conductivity of intrinsic semi conductors.

5. Semiconductor Diode   (08 hrs)
   5.1   PN junction diode, mechanism of current flow in PN junction, forward and reverse
          biased PN junction, potential barrier, drift and diffusion currents, depletion layer,
          concept of junction capacitance in forward and reverse biased condition.
   5.2   V-I characteristics, static and dynamic resistance and their value calculation
          from the characteristics.
   5.3   Application of diode as half-wave, full wave and bridge rectifiers. Peak Inverse
          Voltage, rectification efficiencies and ripple factor calculations, shunt capacitor filter,
          series inductor filter, LC and π filters.
   5.4   Types of diodes, characteristics and applications of Zener diodes. Zener and
          avalanche breakdown

6. Electro Magnetic Induction   (06 hrs)
   6.1   Concept of electro-magnetic field produced by flow of electric current, magnetic circuit, concept of magneto-motive force (MMF), flux, reluctance, permeability, analogy between electric and magnetic circuit.
   6.2   Faraday's laws of electro-magnetic induction, principles of self and mutual induction, self and mutually induced e.m.f, simple numerical problems.
   6.3   Concept of current growth, decay and time constant in an inductive (RL) circuit.
   6.4   Energy stored in an inductor, series and parallel combination of inductors.

7. Batteries   (05 hrs)
   7.1   Basic idea of primary and secondary cells
   7.2   Construction, working principle and applications of Lead-Acid, Nickel-Cadmium and Silver-Oxide batteries
   7.3   Charging methods used for lead-acid battery (accumulator)
   7.4   Care and maintenance of lead-acid battery
   7.5   Series and parallel connections of batteries
   7.6   General idea of solar cells, solar panels and their applications
   7.7   Introduction to maintenance free batteries

8. AC Fundamentals   (05 hrs)
   8.1   Concept of alternating quantities
   8.2   Difference between ac and dc
   8.3   Concepts of: cycle, frequency, time period, amplitude, instantaneous value, average value, r.m.s. value, maximum value, form factor and peak factor.
   8.4   Representation of sinusoidal quantities by phasor diagrams.
   8.5   Equation of sinusoidal wave form for an alternating quantity and its derivation
   8.6   Effect of alternating voltage applied to a pure resistance, pure inductance and pure capacitance.

9. AC Circuits   (06 hrs)
   9.1   Concept of inductive and capacitive reactance
   9.2   Alternating voltage applied to resistance and inductance in series.
   9.3   Alternating voltage applied to resistance and capacitance in series.
   9.4   Introduction to series and parallel resonance and its conditions
   9.5   Power in pure resistance, inductance and capacitance, power in combined RLC circuits. Power factor, active and reactive power and their significance, definition and significance of power factor.
   9.6   Definition of conductance, susceptance, admittance, impedance and their units

10. Introduction to Bipolar-Transistors   (06 hrs)
   10.1   Concept of a bipolar transistor, its structure, PNP and NPN transistors, their symbols
           and mechanism of current flow; Current relations in a transistor; concept of leakage
           current;
   10.2   CB, CE, CC configurations of a transistor; Input and output characteristics in CB and
           CE configurations; input and output dynamic resistance in CB and CE
           configurations; Current amplification factors. Comparison of CB, CE and CC
           Configurations;
   10.3   Transistor as an amplifier in CE Configuration; concept of DC load line and
           calculation of current gain and voltage gain using DC load line.

11. Transistor Biasing Circuits   (04 hrs)
   Concept of transistor biasing and selection of operating point. Need for stabilization of
   operating point. Different types of biasing circuits.

12. Field Effect Transistors   (05 hrs)
   Construction, operation and characteristics of FETs and their applications.
   12.1   Construction, operation and characteristics of a MOSFET in depletion and
           enhancement modes and its applications.
   12.2   CMOS - advantages and applications
   12.3   Comparison of JFET, MOSFET and BJT.

13. Introduction to Electrical Machines   (05 hrs)
   13.1   Transformers : Principal of operation, construction detail of single phase transformer,
           turns ratio , efficiency, loses in a transformer.
   13.2   DC machine : principal of operation, construction of DC motor and generator,
           Characteristics of different types of DC machines , Starter .
   13.3   AC machines : Principal and working of synchronous machines, single phase
           induction motor

LIST OF PRACTICALS

   1. Operation and use of measuring instruments viz voltmeter, ammeter, CRO, Wattmeter,
      multi-meter and other accessories
   2. Measurement of resistance of an ammeter and a voltmeter
   3. Verification of following Theorems:-
      a. Thevenin's theorem,
      b. Norton's theorem,
   4. Observation of change in resistance of a bulb in hot and cold conditions, using voltmeter
      and ammeter.
   5. Verification of Krichhoff's Current and Voltage Laws in a dc circuit
   6. To find the ratio of inductance of a coil having air-core and iron-core respectively and
      to observe the effect of introduction of a magnetic core on coil inductance

7. Charging and testing of a lead - acid storage battery.
8. Measurement of power and power factor in a single phase R-.L-.C. circuit and calculation of active and reactive powers in the circuit.
9. Plotting of V-I characteristics of a PN junction diode & Zener diode

10. Observe the output of waveform using
   a. Half-wave rectifier circuit using one diode
   b. Full-wave rectifier circuit using two diodes
   c. Bridge-rectifier circuit using four diodes
11. Plotting of the wave shape of full wave rectifier with
   a. Shunt capacitor filter
   b. Series inductor filter
12. Plotting of input and output characteristics and calculation of parameters of transistors in CE configuration.
13. Plotting of input and output characteristics and calculation of parameters of transistors in CB configuration.
14. Plotting of V-I characteristics of a FET.
15. To determine the efficiency of single phase Transformer

RECOMMENDED BOOKS

1. Electrical Technology by BL Theraja, S Chand and Co, New Delhi
2. Basic Electrical and Electronics Engineering by SK Sahdev; Dhanpat Rai and Sons, New Delhi
3. Experiments in Basic Electrical Engineering by SK Bhattacharya, KM Rastogi; New Age
   International (P) Ltd.; Publishers New Delhi
4. Principles of Electrical Engineering by BR Gupta, S Chand and Co, New Delhi
5. Basic Electrical Engineering by JB Gupta; SK Kataria and Sons, New Delhi
6. Basic Electrical Engineering by D.R Arora, Ishan Publications
7. Basic Electronics and Linear Circuit by NN Bhargava and Kulshreshta, Tata McGraw Hill Publishing Co, New Delhi.
8. Principles of Electrical and Electronics Engineering by VK Mehta; S Chand and Co., New Delhi
9. Electronic Components and Materials by SM Dhir, Tata McGraw Hill Publishing Co, New Delhi
10. Electronic Devices and Circuits by Bhupinder Jit Kaur; Modern Publishers, Jalandhar
11. Electronics – I by DR Arora, North Publications, Jalandhar

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A	20%	Unit 1to 3	1st Internal	40%	40%(Combined in internal & final assessment)with minimum 25% marks in final assessment)
B	20%	Unit 4 ,5	2nd Internal		
C	60%	Unit 6 to 13	FINAL	60%	

1.6   ENVIRONMENTAL STUDIES

RATIONALE

A diploma holder must have knowledge of different types of pollution caused due to industries and constructional activities so that he may help in balancing the ecosystem and controlling pollution by various control measures. He should also be aware of environmental laws related to the control of pollution. He should know how to manage the waste. Energy conservation is the need of hour. He should know the concept of energy management and its conservation.

LEARNING OUTCOMES

After undergoing the subject, the student will be able to:
- Comprehend the importance of ecosystem and sustainable
- Demonstrate interdisciplinary nature of environmental issues
- Identify different types of environmental pollution and control measures.
- Take corrective measures for the abetment of pollution.
- Explain environmental legislation acts.
- Define energy management, energy conservation and energy efficiency
- Demonstrate positive attitude towards judicious use of energy and environmental protection
- Practice energy efficient techniques in day-to-day life and industrial processes.
- Adopt cleaner productive technologies
- Identify the role of non-conventional energy resources in environmental protection.
- Analyze the impact of human activities on the environment

DETAILED CONTENTS

1.   Introduction   (4 Hrs)
- Basics of ecology, eco system- concept, and sustainable development, Resources renewable and non renewable.

2.   Air Pollution   (12 Hrs)
- Source of air pollution. Effect of air pollution on human health, economy, plant, animals. Air pollution control methods.

3.   Water Pollution   (12 Hrs)
- Impurities in water, Cause of water pollution, Source of water pollution. Effect of water pollution on human health, Concept of dissolved O_2, BOD, COD. Prevention of water pollution- Water treatment processes, Sewage treatment. Water quality standard.

4.   Soil Pollution   (12 Hrs)
- Sources of soil pollution
- Types of Solid waste- House hold, Hospital, From Agriculture, Biomedical, Animal and human, excreta, sediments and E-waste

- Effect of Solid waste
- Disposal of Solid Waste- Solid Waste Management

5. Noise pollution   (5 Hrs)
   - Source of noise pollution, Unit of noise, Effect of noise pollution, Acceptable noise level, Different method of minimize noise pollution.

6. Environmental Legislation   (5 Hrs)
   - Introduction to Water (Prevention and Control of Pollution) Act 1974, Introduction to Air (Prevention and Control of Pollution) Act 1981 and Environmental Protection Act 1986, Role and Function of State Pollution Control Board and National Green Tribunal (NGT), Environmental Impact Assessment (EIA).

7. Impact of Energy Usage on Environment   (5 Hrs)
   - Global Warming, Green House Effect, Depletion of Ozone Layer, Acid Rain. Eco-friendly Material, Recycling of Material, Concept of Green Buildings.

LIST OF PRACTICALS

1. Visit to Green House
2. Visit to effluent treatment plant of any industry
3. Determination of pH of Drinking Water
4. Determination of TDS in Drinking Water
5. Determination of TSS in Drinking Water
6. Determination of Hardness in Drinking Water
7. Determination of Oil & Grease in Drinking Water
8. Determination of Alkalinity in Drinking Water
9. Determination of Acidity in Drinking Water
10. Determination of Organic/inorganic solid in Drinking Water
11. Determination of Moisture in Soil in Drinking Water
12. Determination of pH of soil
13. Determination of N&P of soil
14. To measure the noise level in classroom and industry.
15. To segregate the various types of solid waste in a locality.
16. To visit the rain water harvesting plant.
17. To recycle the scrap aluminum foil.
18. To study the waste management plan of different solid waste
19. To study the effect of melting of floating ice in water due to global warming

INSTRUCTIONAL STRATEGY
In addition to theoretical instructions, different activities pertaining to Environmental Studies like expert lectures, seminars, visits etc. may also be organized.

MEANS OF ASSESSMENT
- Assignments and quiz/class tests, mid-term and end-term written tests

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 Pollution by Dr. RK Khitoliya; S Chand Publishing, New Delhi
4. Environmental Science by Deswal and Deswal; Dhanpat Rai and Co. (P) Ltd. Delhi.
5. Engineering Chemistry by Jain and Jain; Dhanpat Rai and Co. (P) Ltd. Delhi.
6. Environmental Studies by Erach Bharucha; University Press (India) Private Ltd., Hyderabad.
7. Environmental Engineering and Management by Suresh K Dhamija; S K Kataria and Sons, New Delhi.

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B	20%	Unit 3	2nd Internal		
C	60%	Unit 4,5,6,7	FINAL	60%	

1.7 ENGINEERING GRAPHICS

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RATIONALE

Drawing is the language of engineers and technicians. Reading and interpreting engineering drawing is their day to day responsibility. The subject is aimed at developing basic graphic skills in the students so as to enable them to use these skills in preparation of engineering drawings, their reading and interpretation. The emphasis, while imparting instructions, should be to develop conceptual skills in the students following BIS SP 46 – 1988.

Note:
i)   First angle projection is to be followed
ii)   Minimum of 30 sheets to be prepared
iii)   Instructions relevant to various drawings may be given along with appropriate demonstrations, before assigning drawing practice to students
iv)   For better understanding, students should be encouraged to use engineering graph book, and computer based software like AutoCAD for free hand and orthographic projection practice.

LEARNING OUTCOMES

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

- Identify and use of different grades of pencils and other drafting instruments hich are used in engineering field
- Draw free hand sketches of various kinds of objects.
- Utilize various types of lines used in engineering drawing.
- Read and apply different dimensioning methods on drawing of objects.
- Use different types of scales and their utilization in reading and reproducing drawings of objects and maps.
- Draw 2 - dimensional view of different objects viewed from different angles (orthographic views)
- Draw and interpret complete inner hidden details of an object which are otherwise not visible in normal view
- Generate isometric (3D) drawing from different 2D (orthographic) views/sketches
- Identify conventions for different engineering materials, symbols, sections of regular objects and general fittings used in Civil and Electrical household appliances
- Use AutoCAD or other drafting software for making fast engineering drawings   and even animating the assembly drawings.

DETAILED CONTENTS

1. Introduction to Engineering Drawing   (6 sheets)
    1.1   Definition of Engineering Drawing, Introduction to drawing instruments, materials, layout and sizes of drawing sheets and drawing boards, engineering graph book, different grades of pencils to be used.
    1.2   Different types of lines in engineering drawing as per BIS specifications

1.3   Practice of vertical, horizontal and inclined lines

1.4   Principles of dimensioning: Types, elements, placing, different methods of dimensioning

1.5   Practice of geometrical figures such as –triangles, rectangles, circles, ellipses and parabola, hexagonal, pentagon with the help of drawing instruments.

1.6   Definition and classification of lettering, single stroke vertical and inclined lettering at 75^0 (alphabet and numerals)

1.7   Freehand letter writing and sketches of various kind of objects in graph Sketch book/graph paper.

2   Graphics using CAD   (6 sheets)

2.1   Meaning, requirement of computer graphics, CAD, screen structure and toolbars in AutoCAD, coordinate system, Drawing Limits, Units.

2.2   Practice of LINE command, coordinates-Absolute, incremental, polar. POLYLINE, CIRCLE(3P,2P, TTR), ARC, ELLIPSE

2.3   Using above geometrical commands for making figure e.g. triangle, rectangle, hexagon, pentagon, parabola.

2.4   Editing commands-Scale, erase, copy, stretch, lengthen and explode.

2.5   Use of SNAP, GRID and ORTHO mode for selection of points quickly. Use of these modes while picking points in LINE, CIRCLE, PLINE, ARC, ELLIPSE etc commands.

3   Scales   (1 sheet)

3.1   Scales-their needs and importance(theoretical instructions), types of scales, definition of Representative Fraction(R.F.) and length of scale.

3.2   Construction of Plain and diagonal scale.

4   Orthographic Projection   (8 sheets)

4.1   Theory of orthographic projections (Elaborate theoretical instructions)

4.2   Projections of points in different quadrants

4.3   Projection of line (1st angle and 3rd angle)

        4.3.1   Line parallel to both planes

        4.3.2   Line perpendicular to any one of the principal plane

        4.3.3   Line inclined to any one of the principal plane and parallel to other

4.4   Projection of Solid-Cube, Cuboid, Cone, Prism, pyramid

4.5   Three views of orthographic projections of different objects (At least one sheet in 3rd angle)

4.6   Making above sheets in AutoCAD of:- point line solids and two objects

5   Sectioning and Identification of surfaces   (2 sheets)

 5. 1   Identifications of surfaces, Importance and salient features of sectioning of objects.

5. 2   Description of full section, half section partial or broken out sections, Offset Sections, revolved sections and removed sections.

6   Isometric Views   (3 sheets)
6.1   Fundamental of isometric projections and isometric scale
6.2   Isometric views of different objects
6.3   AutoCAD for the isometric views sheets. Making single computer sheet showing all the three views and an isometric (in single split screen view) of any object showing understanding of use of AutoCAD in making isometric views – at least 1 sheet

7   Common Symbols and conventions used in Engineering   (1 sheet)
7.1   Civil Engineering sanitary fitting symbols
7.2   Electrical fitting symbols for domestic interior installations
7.3   Safety symbols used in engineering works

8   Development of surfaces (cylinder, cuboid, cone)   (1 sheet)
8.1   Parallel line, radial line method
        The teacher may explain both methods but will use one method in sheet in classroom and other method on sketchbook

9   Detailed and assembly drawing   (5 sheets)
9.1   Principle and utility of detailed and assembly drawings
9.2   Wooden joints i.e. corner mortise and tenon joint, Tee Halving joint, Mitre faced corner joint, Tee bridle joint , crossed wooden joint, cogged joint, dovetail joint, through Mortise and tenon joint, furniture drawing – freehand and with the help of drawing instruments
9.3   Making Wooden Joint sheets in AutoCAD, rendering & showing assembly animation at least 1 sheet

10   Screw threads and threaded fasteners   (3 sheets)
10.1   Thread Terms and Nomenclature
        10.1.1   Type of threads-external and internal threads, right and left hand threads (actual conventional representation), Single and multiple start thread.
        10.1.2   Different forms of screw threads –V threads (B.S.W. threads, B.A thread, American National and Metric thread), Square threads (Square, Acme, buttress and Knuckle thread)

10.2.   Nuts and Bolts
        10.2.1   Different views of hexagonal and square nuts. Square and hexagonal headed bolt.

| 10. 2. 2 | Assembly of Hexagonal ended bolt and Hexagonal nut with washer. |
| 10. 2. 3 | Assembly of square headed bolt with hexagonal and with washer. |

10. 3. Locking Devices

10. 3. 1	Different types of locking devices-Lock nut, castle nut, split pin nut, locking plate, slotted nut and spring washer.
10. 3. 2	Foundations bolts-Rag bolt, Lewis bolt, Curved bolt and eye bolt.
10. 3. 3	Drawing of various types of studs

11 Keys and Cotters   (3 sheets)

| 11. 1 | Various types of keys and cotters-weir practical application, drawings of various keys and cotters showing keys and cotters in position. |
| 11. 2 | Various types of Joints
-Spigot and Socket Joints
-Gib and cotter joint
-Knuckle joint |

12 Couplings   (2 sheets)

12.1	Introduction to coupling, their use and types
12.2	Muff coupling
12.3	Flange coupling (protected)
12.4	Flexible Coupling

MEANS OF ASSESSMENT

- Drawing sheets
- Assignments and quiz/class tests
- First sessional test will be on paper drawing sheets as per first chapter syllabus and second sessional test will be completely on making computer based AutoCAD drawing, as per second chapter syllabus

RECOMMENDED BOOKS

1.   A Text Book of Engineering Drawing by Surjit Singh; Dhanpat Rai & Co., Delhi
2.   Engineering Drawing by PS Gill; SK Kataria & Sons, New Delhi
3.   Elementary Engineering Drawing in First Angle Projection by ND Bhatt; Charotar Publishing House Pvt. Ltd., Anand
4.   Engineering Drawing I & II by JS Layall; Eagle Parkashan, Jalandhar
5.   Engineering Drawing I by DK Goel, GBD Publication.
6.   CAD/CAM by J.S.Narang, Dhanpat Rai & Sons Publishers, New Delhi.
7.   e-books/e-tools/relevant software to be used as recommended by AICTE/HSBTE/NITTTR.
8.   Engineering Drawing with AutoCAD 2000 by T. Jeyapooran, Vikas Publishing House, Delhi
9.   AutoCAD for Engineering Drawing Made Easy by P. Nageswara Rao; Tata McGraw Hill;, New Delhi.

Websites for Reference:
  http://swayam.gov.in

Section	Percentage of syllabus to be covered	Units to be covered	Type of assessment	Weightage of Marks	Pass Percentage
A	20%	Unit 1	1st Internal	40%	40%(Combined in internal & final assessment)with minimum 25% marks in final assessment)
B	20%	Unit 2,	2nd Internal		
C	60%	Unit 3, 4, 5, 6, 7, 8, 9, 10, 11, 12	FINAL	60%	

1.8   INFORMATION TECHNOLOGY

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RATIONALE

Information technology has great influence on all aspects of life. Primary purpose of using computer is to make the life easier. Almost all work places and living environment are being computerized. The subject introduces the fundamentals of computer system for using various hardware and software components. 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 using MS Office/Open Office/Libre Office using internet etc.,. This exposure will enable the students to enter their professions with confidence, live in a harmonious way and contribute to the productivity.

Note:
Explanation of Introductory part should be demonstrated with practical work. Following topics may be explained in the laboratory along with the practical exercises. There will not be any theory examination.

LEARNING OUTCOMES

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

- Identify Computer hardware components, network components and peripherals.
- Explain the role of an operating System.
- Install system and application software.
- Explain the function of the system components including processor, motherboard and input-output devices.
- Use Word Processing software to prepare document.
- Use spreadsheet software to create workbooks and automate calculation.
- Use presentation software to create interactive presentation.
- Perform fundamental tasks common to most application software including print, save, edit, cut, copy, paste, format, spell and grammar check.
- Find and evaluate information on the Web.
- Install antivirus.
- Safeguard against online frauds, threats and crimes.

TOPICS TO BE EXPLAINED THROUGH DEMONSTRATION

1.   Basic Concepts of IT and Its Application

Information Technology concept and scope, applications of IT. in office, Air and Railway Ticket reservation, Banks financial transactions, E-Commerce and E- Governance applications etc., Ethics of IT, concept of online frauds, threats of IT crimes.

2.   Computer Hardware:

Block diagram of a computer, components of computer system, CPU, Memory, Input devices; keyboard, Scanner, mouse etc; Output devices; VDU, LCD, Printers etc. Primary and Secondary Memory: RAM, ROM, magnetic disks – tracks and sectors, optical disk (CD, DVD & Blue Ray Disk.), USB/Flash Drive.

3.   Software Concepts:

System software, Application software, Virtualization software and Utility software, Introduction of Operating System, Installation of Window / linux, Features of OPEN OFFICE/MS_OFFICE(MS word, Excel, PowerPoint) .

4.   Internet Concepts:

Basics of Networking – LAN, WAN, Wi-Fi technologies and sharing of printers and other resources, Concept of IP addresses, DNS, introduction of internet, applications of internet like: e-mail and browsing, concept of search engine and safe searching. Various browsers like Internet explorer/Microsoft Edge, Mozilla Firefox, use of cookies and history, WWW (World Wide Web), hyperlinks, introduction to Anti-virus.

LIST OF PRACTICAL EXERCISES

1.   Given a PC, name its various components and peripherals. List their functions .
2.   Installing various components of computer system and installing system software and application software
3   Installation of I/O devices, printers and installation of operating system viz. Windows/BOSS/ LINUX
4.   Features of Windows as an operating system
   - Start
   - Shut down and restore
   - Creating and operating on the icons
   - Opening, closing and sizing the windows and working with windows interfacing elements (option buttons, checkbox, scroll etc.)
   - Using elementary job commands like – creating, saving, modifying, renaming, finding and deleting a file and folders
   - Changing settings like, date, time, colour (back ground and fore ground etc.)
   - Using short cuts
   - Using on line help

5.   Word Processing (MS Office/Open Office)
   a) 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
   b) Page set up:
      - Setting margins, tab setting, ruler, indenting
   c) Editing a document:
      - Entering text, cut, copy, paste using tool- bars
   d) 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, autotext
      - Inserting date, time, special symbols, importing graphic images, drawing tools
   e) 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
   f) Using Tools like:
      - Spell checker, help, use of macros, mail merge, thesaurus word content and statistics, printing envelops and lables
      - Using shapes and drawing toolbar,
      - Working with more than one window .

6.   Spread Sheet Processing (MS Office/Open Office)

   a) Starting excel, open worksheet, enter, edit, data, formulae to calculate values, format data, save worksheet, switching between different spread sheets
   b) Menu commands:
      Create, format charts, organise, manage data, solving problem by analyzing data. Programming with Excel Work Sheet, getting information while working
   c) 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
      Editing a worksheet, copying, moving cells, pasting, inserting, deletion cells, rows, columns, find and replace text, numbers of cells, formatting worksheet, conditional formatting
   d) 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

e) Retrieve data with query:

Create a pivot table, customizing a pivot table. Statistical analysis of data

f) Exchange data with other application:

Embedding objects, linking to other applications, import, export document.

7. PowerPoint Presentation (MS Office/Open Office)

a) Introduction to PowerPoint
   - How to start PowerPoint
   - Working environment: concept of toolbars, slide layout & templates.
   - Opening a new/existing presentation
   - Different views for viewing slides in a presentation: normal, slide sorter.
b) Addition, deletion and saving of slides
c) Insertion of multimedia elements
   - Adding text boxes
   - Adding/importing pictures
   - Adding movies and sound
   - Adding tables and charts etc.
   - Adding organizational chart
   - Editing objects
   - Working with Clip Art
d) Formatting slides
   - Using slide master
   - Text formatting
   - Changing slide layout
   - Changing slide colour scheme
   - Changing background
   - Applying design template
e) How to view the slide show?
   - Viewing the presentation using slide navigator
   - Slide transition
   - Animation effects, timing, order etc.
f) Use of Pack and Go Options.

8. Internet and its Applications

a) Establishing an internet connection.
b) Browsing and down loading of information from internet.
c) 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
d)		Assigning IP Addresses to computers and use of domain names.

9.   Functioning of Antivirus

      a)   Installation and updation of an antivirus.
      b)   How to scan and remove the virus.

INSTRUCTIONAL STRATEGY

Since this subject is practice oriented, the teacher should demonstrate the capabilities of computers to students while doing practical exercises. The students should be made familiar with computer parts, peripherals, connections and proficient in making use of MS Office/Open Office in addition to working on internet. The student should be made capable of working on computers independently.

RECOMMENDED BOOKS

1.   Fundamentals of Computer by V Rajaraman; Prentice Hall of India Pvt. Ltd., New Delhi
2.   Computers Fundamentals Architecture and Organisation by B Ram, revised Edition, New Age International Publishers, New Delhi
3.   Computers Today by SK Basandara, Galgotia publication Pvt Ltd. Daryaganj, New Delhi.
4.   A First Course in Computer by Sanjay Saxena; Vikas Publishing House Pvt. Ltd., Jungpura, New Delhi
5.   Computer Fundamentals by PK Sinha; BPB Publication, New Delhi
6.   Fundamentals of Information Technology by Leon and Leon; Vikas Publishing House Pvt. Ltd., Jungpura, New Delhi
7.   Fundamentals of Information Technology by Vipin Arora, Eagle Parkashan, Jalandhar

1.9   INTERNET OF THINGS AND ARTIFICIAL INTELLIGENCE

L T P
- - 2

LEARNING OUTCOMES

At the end of this course, the students will be able to:
- Understand the concepts of Internet of Things
- Build small IoT applications
- Understand and analysing sensor generated data using analytic techniques in Excel

DETAILED CONTENTS

1.   Introduction to Internet of Things (IoT)   (8 hrs)
- Applications, architecture, protocols
- Characteristics of IoT
- Physical Design/Logical Design of IoT
- Functional blocks of IoT, Communication Models.

2.   Basics of C language using Arduino IDE   (14 hrs)
- Understating basics of Arduino IDE
- Variables, datatype, loops, control statement, function

3   Practical using Arduino-interfacing sensors   (28 hrs)
  i.   Interfacing Light Emitting Diode(LED)- Blinking LED
  ii.   Interfacing Button and LED – LED blinking when button is pressed
  iii.   Interfacing Light Dependent Resistor (LDR) and LED, displaying automatic night lamp
  iv.   Interfacing Temperature Sensor(LM35) and/or humidity sensor (e.g. DHT11)
  v.   Interfacing Liquid Crystal Display(LCD) – display data generated by sensor on LCD
  vi.   Interfacing Air Quality Sensor-pollution (e.g. MQ135) - display data on LCD , switch on LED when data sensed is higher than specified value.
  vii.   Interfacing Bluetooth module (e.g. HC05)- receiving data from mobile phone on Arduino and display on LCD
  viii.   Interfacing Relay module to demonstrate Bluetooth based home automation application. (using Bluetooth and relay).

4   Introduction to Artificial Intelligence (AI), Machine Learning (ML), Deep   (20 hrs)
       Learning (DL).
- Role of AI in IoT and its applications
- Managing and Analysing data generated by IoT devices – Big Data
- Machine learning (ML) Techniques e.g. classification, linear regression, etc.
- Numerical based on above techniques.
- Understanding excel for analysing data

INSTRUCTIONAL STRATEGY

Since this subject is practical oriented, the teacher should demonstrate functioning of various sensors and demonstrate building of IoT applications. Solution to various regression and classification problems should also be built.

LIST OF REFERENCE BOOKS:

1. Vijay Madisetti, Arshdeep Bahga, "Internet of Things: A Hands On Approach, University Press
2. Yashavant Kanetkar, Shrirang Korde, "21 Internet Of Things (IOT) Experiments"
3. Neerparaj Rai , "Arduino Projects For Engineers"
4. Chandra S.S.V, "Artificial Intelligence and Machine Learning"

LIST OF COMPONENTS
1. One kit for 3-4 students : Arduino Uno, sensors(Bluetooth module(HC05), MQ135, DHT11, breadboard , LCD, 2-relay module etc)
2. Consumables : LED, button, connecting wires, LDR, LM35, battery, etc

1.10 GENERAL WORKSHOP PRACTICE

(Common for   Mechatronics Engineering, Medical Electronics, Electrical Engineering, Electronics and Communication Engineering,   Electrical & Electronics Engineering, , Instrumentation & Control Engineering, Computer Engineering, Food Technology, Chemical Engineering, Chemical Engineering (Pulp & Paper), Ceramic Engineering)

L T P
-   -   3

SCHEDULING

The students will visit the different workshops in two major rounds in a year. In 1st round, they will learn basic skills of each workshop and in 2nd round, they will refine their skills further**.**

RATIONALE

In order to have a balanced overall development of diploma engineers, it is necessary to integrate theory with practice. General workshop practices are included in the curriculum in order to provide hands-on experience about use of different tools and basic manufacturing practices. This subject aims at developing general manual and machining skills in the students. In addition, the development of dignity of labour, safety at work place, team working and development of right attitude are the other objectives.

LEARNING OUTCOMES

After completing the course, the students will be able to:

- Identify tools and equipment used and their respective functions.
- Identify different types of materials and their basic properties.
- Use and take measurements with the help of basic measuring tools/equipment.
- Select materials, tools, and sequence of operations to make a job as per given specification/drawing.
- Prepare simple jobs independently and inspect the same.
- Inspect visually to identify various types of defects in different type of materials.
- Follow safety procedures and precautionary measures.
- Use safety equipment and Personal Protection Equipment(PPE).
- Maintain good housekeeping practices.

DETAILED CONTENTS (PRACTICAL EXERCISES)

1st ROUND

Workshop Safety Induction Session:

First turn of each shop shall be dedicated to safety practices and the contribution of safety to quality. The safety aspects should be categorised into 3 categories
- PSS (Process Safety System)
- SSS (Safety Shutdown System)
- ESD (Emergency Shutdown) or Emergency Depressurisation System.
The following practices should be included:

- Use of PPE (Personal Protection Equipment)
- Use of Safety Equipment like fire extinguishers etc.)
- Paramedic teaching suite, First –Aid
- Reports to be prepared for the damages
- At the end of this session, the student must sign "Student Safety Declaration form".

Note: The students are supposed to come in proper workshop dress prescribed by the institute. Wearing shoes in the workshop(s) is compulsory. Importance of safety and cleanliness, safety measures and upkeep of tools, equipment and environment in each of the following shops should be explained and practiced. The students should prepare sketches of various tools/jobs in their practical Notebook.

The following shops are included in the syllabus:
1. Welding Shop – I
2. Fitting Shop – I
3. Sheet Metal Shop – I
4. Electric Shop – I
5. Electronic Shop – I

1. WELDING SHOP - I

1.1 Introduction and importance of welding process as compared to other material joining processes. Specifications and type of ARC welding machines, parts identification, classification, selection and coding of electrodes, welding parameters, welding joints and welding positions. Common weldable Materials, safety precautions, use of PPEs, welding screens, Hazards and remedies during welding, Elementary symbolic representations, demo of types of welding defects.

1.2 Jobs to be prepared

Job I Practice of striking arc (Minimum 4 continuous beads on 100 mm long M.S. flat).

Job II Practice of depositing beads on plate at different current levels. (Minimum 4 beads on M.S. plate at four setting of current level and differentiating their characteristics).

Types of joints and their edge preparations:

Job III Preparation of lap joint using arc welding process.

Job IV Preparation of butt joint using arc welding process. (100 mm long).

Job V Preparation of T Joint using arc or gas welding (100mm x 6 mm M.S. Flat).

2. FITTING SHOP – I

2.1 Introduction and Practical Importance of fitting jobs
2.2 Basic deburring processes.
2.3 Introduction to fitting shop tools, marking and measuring devices/equipment.
2.4 Identification of materials. (Iron, Copper, Stainless Steel, Aluminium etc.)
2.5 Identification of various steel sections (flat, angle, channel, bar etc.).
2.6 Introduction to various fitting shop operations/processes (Hacksawing, Drilling, Chipping and Filing). Demonstration of wrong fitting practices causing damage to filed surfaces (outsized, out angled etc.) and tool/blade breakages.

2.7   Jobs to be prepared:
        Job I   Marking of job, use of marking tools and various types of files, use of
                    tri square, surface plate, filing and use of measuring instruments.
                    (zero error and least count of Vernier calliper, Micrometer and
                    Vernier height gauge).
        Job II   Filing a rectangular/square piece to maintain dimensions within an
                    accuracy of ±0.5 mm.
        Job III   Making a cut-out from a square piece of MS flat using hand hacksaw
                    and chipping.

3.   SHEET METAL SHOP – I

3.1.   Introduction and practical importance of sheet metal jobs, use of hand tools and
        accessories e.g. different types of hammers, hard and soft mallet, sheet and wire
        gauge, necessary allowance required during job fabrication, selection of material.
3.2   Introduction and demonstration of hand tools used in sheet metal shop.
3.3   Introduction and demonstration of various machines and equipment used in sheet
        metal shop e.g. Shearing Machine, Bar Folder, Burring Machine, Turning
        Machine, Wiring Machine, Setting Down Machine, Forming Machine, Brake etc.
3.4   Introduction and demonstration of various raw materials used in sheet metal shop
        e.g. black-plain sheet, galvanized-iron plain sheet, galvanised corrugated sheet,
        aluminium sheet etc.
3.5   Study of various types of nuts, bolts, rivets, screws etc.
        Job I   Shearing practice on a sheet using hand shears.
        Job II   Prepare a seam joint of G.I. Sheet
        Job III   Practice on making Single riveted lap joint/Double riveted lap
                        Joint.
        Job IV   Development of sheet for preparation of cubical container
                        (300x150x25 mm)

4.   ELECTRIC SHOP – I

4.1   Study, demonstration and identification of common electrical materials with
        standard ratings and specifications such as wires, cables, switches, MCB &
        ELCB, fuses, cleats, clamps and allied items, tools and accessories.
4.2   Study of electrical safety measures and protective devices.
        Job I   Identification of phase, Neutral and Earth wires for connection to
                        domestic electrical appliances and their connections to three pin
                        plugs. Difference between series and parallel wiring.
        Job II   Carrying out house wiring circuits using fuse, switches, sockets,
                        ceiling rose etc. in batten or P.V.C. casing-caping. Demo of
                        conduit wiring through junctions

        Job III   To prepare a three level Godown wiring circuit with PVC conduit
                        wiring system.
4.3   Introduction to the construction of lead acid battery, its working and its
        specification parameters(maH, sp gravity), precautions while handling battery,
        Introduction to battery charger and its functioning. Types of charging

Job IV   Installation of battery and connecting two or three batteries in series and parallel and its effect. Charging a battery and testing with hydrometer and cell tester

4.4   Introduction to solar energised lighting or water heater system and their defects.

Job V   Installation of Solar cells, costing according to capacity

5.   ELECTRONIC SHOP – I

Safety precautions to be observed in the Electronics Shop:
Identification and familiarization with the following tools used in electronic shop such as Tweezers, Screw drivers (different sizes), Insulated Pliers, Cutter, Sniper, Screw Driver (Star Screw Driver), L- Keys, Soldering Iron, soldering wire, flux . Their demonstration and uses.
Identification, familiarization and uses of commonly used components; active and passive components; colour code and types of resistor and potentiometers, Diode, Transistor, LED, LDR, SCR, TRIAC,DIAC, Thermistor etc.
Identification, familiarization, demonstration and use of the following electronic instruments:
a)   Analog multimeter
b)   Digital multimeter

Identification, familiarization, demonstration and use of the following electronic instruments:
a) Simple CRO, function of every knob on the front panel
b) Power supply, fixed voltage and variable voltage, single output as well as dual output.
 c) Function generator
Job I   Practice in the use of above mentioned tools and instruments. For this a small experimental set up may be done

2ND ROUND

LEARNING OUTCOMES

After undergoing the subject, the students will be able to:
- Follow safety procedures and measures.
- Maintain good housekeeping practices.
- Select materials, sequence of operations, select tools to make a given job based on interpretation of drawing as per given specification with close tolerances using at least the resources of three shops.
- Prepare a job using resources of shops and compare the job with the specifications given.
- Specify and read/understand specifications of different types of tools, equipment and machines used in various shops.
- Inspect visually to identify various types of defects in different type of materials.
- Analyze a given job and identify various operations required to make it.

DETAILED CONTENTS (PRACTICAL EXERCISES)

Note: The students are supposed to come in proper workshop dress prescribed by the institute. Wearing shoes in the workshop(s) is compulsory. Importance of safety and cleanliness, safety measures and upkeep of tools, equipment and environment in each of the following shops should be explained and practiced. The students should prepare sketches of various tools/jobs in their practical Notebook.

The following shops are included in the syllabus.
1.   Electric Shop – II
2.   Electronic Shop – II
3.   Computer Shop

1.   ELECTRIC SHOP- II

1.1   Introduction to single phase and three phase supply and wiring system. Importance of three phase supply (RYB)& its sequence and wiring system.

Job I   Connecting Generator and 3 phase wiring through Change over Switch.

1.2   Estimating and costing of power consumption

Job II   Connecting single phase energy meter with supply and load. Reading and working out power consumption and cost of energy.

1.3   Study of internal wiring diagram of common electrical appliances such as auto electric iron, electric kettle, ceiling/table fan, desert cooler etc. Demonstration of dismantling, servicing and reassembling of table/ceiling fan, air-cooler, auto electric iron, heater etc.

Job III   Dismantling, servicing and reassembling of any of the above electrical appliances, finding faults with series testing lamp and multimeter.

1.4   Testing and reversing direction of rotation of single phase and three phase motors.

Job IV   Acceptance Testing of single phase/three phase motors by using voltmeter, ammeter and tachometer.

Job V   Reversing direction of rotation of single phase and three phase motors.

1.5   Identification and familiarisation with the following tools:
Tweezers, Screw Drivers (Different sizes), Insulated pliers, Cutters, Sniper, Philips Screw driver (star screw driver), L-Keys, Soldering Iron and their demonstration and uses.

Job VI   Practice on joining using soldering flux and removing components/wires by desoldering

2.   ELECTRONIC SHOP - II

Various types of protective devices such as : wire fuse, cartridge fuse etc. ,
Demonstrate the joining (or connecting) methods/mounting and dismantling method, as well as uses of the items mentioned below:

a) Various types of plugs, sockets, connectors suitable for general purpose audio video use. Connectors, Banana plugs, sockets and similar male and female connectors and terminal strips.

b) Various types of switches such as: normal/miniature toggle, slide, push button piano key, rotary, SPST, SPDT, DPST, DPDT, band selector, multi-way Master Mains Switch.

Job-I   Cut, bend, tin component, leads, inserts. Solder components e.g. resistor, capacitor, diodes, transistors on a PCB

Job-II Wiring of a small circuit on a PCB/tag strip involving laying, sleeving and use of identifier tags

Job-III De-soldering practice with de-soldering pump and with de-soldering wick.

Job-IV Cut, strip, join and insulate two lengths of wires/cables (repeat with different types of cables/ wires)

3.   COMPUTER SHOP
EXERCISE– I

3.1   Keyboard
- Types of Keyboards
- Interfacing (PS2, USB port, DIN connector)
- Working
- Repairing

3.2   Mouse
- Types of Mouse
- Interfacing (serial, PS2, USB)
- Working

EXERCISE – II

3.3   Printers
- Types (Dot matrix, Inkjet, Laserjet)
- Interfacing (parallel port, USB port, Networking)
- Working
- Maintenance (cartridge change etc)
- Installation of printers

- Troubleshooting (Driver compatibility, Paper jam, printing problems due to uncleaned drum in laserjet printers, belt related problems in inkjet printer, jets choking problem in inkjet printer, color alignment problem).
- Tracing network printer and sharing it.

EXERCISE – III

3.4   Scanner
- Types
- Interfacing
- Scanning a document

3.5   Monitor
- Types and Interfacing
- Fault finding and repairing

EXERCISE – IV
3.6   CPU

- Motherboard connection (dimensions, processor, chipset, BIOS, EFI (Extended Firmware Interfacing), UFI (Unified Firmware Interfacing).
- SMPS-AT
  - Working
  - Voltage levels
  - Fault finding and repair

EXERCISE - V
3.7   Optical Devices
- CD-R, DVD, CD-W
- Working
- Copying
- CD/DVD drives
- Pen drive (copying data, formatting scanning)

3.8   Microphones and Speakers
- Types and Interfacing

EXERCISE – VI
3.9   Projectors
- Types
- Settings
- Interfacing
3.10   Hard disks
- Different makes of Hard disks
- Retrieval of Hard disk data

3.11   Graphic Card connection

3.12   Sound Card Connection

EXERCISE – VII

3.13   Different types of network interface cards, cables such as data cables, printer cables, network cables, power cables etc.

3.14   Networking tools such as cutter, connector (RJ45)

3.15   Network Cable

- Straight Cable
- Cross Cable
- Roll Cable

EXERCISE – VIII

3.16   Types of cables

- UTP Cables: CAT3, CAT5, CAT6, CAT7
- Fibre optic cable
- Structured cabling

MEANS OF ASSESSMENT

- Workshop jobs
- Report writing, presentation and viva voce

RECOMMENDED BOOKS

1. Workshop Technology I,II,III, by SK Hajra, Choudhary and AK Choudhary; Media Promoters and Publishers Pvt. Ltd. Mumbai.
2. Workshop Technology Vol. I, II, III by Manchanda; India Publishing House, Jalandhar.
3. Workshop Training Manual Vol. I, II by S.S. Ubhi; Katson Publishers, Ludhiana.
4. Manual on Workshop Practice by K Venkata Reddy; MacMillan India Ltd., New Delhi
5. Basic Workshop Practice Manual by T Jeyapoovan; Vikas Publishing House (P) Ltd., New Delhi
6. Workshop Technology by B.S. Raghuwanshi; Dhanpat Rai and Co., New Delhi
7. Workshop Technology by HS Bawa; Tata McGraw Hill Publishers, New Delhi
8. e-books/e-tools/relevant software to be used as recommended by AICTE/HSBTE/NITTTR.

Websites for Reference:

 http://swayam.gov.in