

Curriculum for

Diploma Programme in

COMPUTER ENGINEERING

For

Mahagyani Rishi Ashtavakra

Kendra

Prepared by:

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

FIRST YEAR (Computer Engg.)

Sr. No.	SUBJECTS	STUDY SCHEME HOURS / WEEK			CREDIT	MARKS IN EVALUATION SCHEME									Total Marks of Internal & External
		L	T	P		INTERNAL ASSESSMENT			EXTERNAL ASSESSMENT						
						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	

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.

THIRD SEMESTER (COMPUTER ENGINEERING)

Sr. No.	SUBJECTS	STUDY SCHEME		Credits	MARKS IN EVALUATION SCHEME								Total Marks of Internal & External
		Hours/Week			INTERNAL ASSESSMENT			EXTERNAL ASSESSMENT					
		Th	Pr		Th	Pr	Tot	Th	Hrs	Pr	Hrs	Tot	
3.1	Programming in C	3	6	6	25	25	50	100	3	50	3	150	200
3.2	Operating Systems	3	3	4	25	25	50	100	3	50	3	150	200
3.3.	*Digital Electronics	3	3	4	25	25	50	100	3	50	3	150	200
3.4	Multimedia Applications	3	6	6	25	25	50	100	3	50	3	150	200
3.5	Data Communication	3	-	3	50	-	50	100	3	-	-	100	150
	Soft Skills -I	-	2	-	-	25	25	-	-	-	-	-	25
	Total	15	20	23	150	125	275	500	-	200	-	700	975

* Common with diploma programme in Electronics and Communication Engineering

FOURTH SEMESTER (COMPUTER ENGINEERING)

Sr. No.	SUBJECTS	STUDY SCHEME		Credits	MARKS IN EVALUATION SCHEME								Total Marks of Internal & External
		Hours/Week			INTERNAL ASSESSMENT			EXTERNAL ASSESSMENT					
		Th	Pr		Th	Pr	Tot	Th	Hrs	Pr	Hrs	Tot	
4.1	Data Structures Using C	3	6	6	25	25	50	100	3	50	3	150	200
4.2	Object Oriented Programming Using JAVA	3	6	6	25	25	50	100	3	50	3	150	200
4.3	Computer Organization	3	-	3	50	-	50	100	3	-	-	100	150
4.4	*Microprocessors & Peripheral Devices	3	3	4	25	25	50	100	3	50	3	150	200
4.5	Database Management System	3	3	4	25	25	50	100	3	50	3	150	200
Soft Skills -II		-	2	-	-	25	25	-	-	-	-	-	25
Total		15	20	23	150	125	275	500	-	200	-	700	975

* Common with diploma programme in Electronics and Communication Engineering

Industrial Training

After examination of 4th Semester, the students shall go for training in a relevant industry/field organisation for a minimum period of 8 weeks and will prepare a diary. It shall be evaluated during 5th semester by his/her teacher incharge for 100 marks. The students shall also prepare a report at the end of training and shall present it in a seminar, which will be evaluated for another 100 marks. This evaluation will be done by lecturer in charge – training in the presence of one representative from Industry/Sector Skill Council/Training and Placement Officer/Subject Expert from other institution.

1.1 ENGLISH

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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.
- 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, memos, email writing & resume writing.

DETAILED CONTENTS

- 1. Basics of Communication (06 Hrs)**
 - 1.1. Definition and process of communication
- 2. Functional Grammar (22 Hrs)**
 - 2.1. Noun and Pronoun
 - 2.2. Preposition
 - 2.3. Tenses (verb (Main verb and Auxiliary verb)
- 3. Reading Skills (12 Hrs)**
 - 3.1. Unseen passage for comprehension. Based upon the passage, following 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. Resume Writing
- 4.5. Writing E-mail
- 4.6. Paragraph writing

LIST OF PRACTICALS

1. Self and Peer Introduction
2. 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
3. Newspaper reading
4. 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	1 st Internal	40%	40% (Combined in internal & final assessment) with minimum 25% marks in final assessment)
B	20%	Unit 2.2, 2.3, 4.1	2 nd Internal		
C	60%	Unit 3.1, 4.2, 4.3, 4.4, 4.5, 4.6	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 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.
- Find the velocity and acceleration from displacement using differentiation.
- Calculate simple integration by using concepts of 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** (25 periods)
 - **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, Conjugate of a complex number, modulus of a complex number, addition, subtraction, multiplication and division of complex number.
 - **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 and simple problems
 - Binomial theorem for positive integral index :Expansion and General term only
2. **Trigonometry** (10periods)
 - 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).
 - Applications of Trigonometric terms in engineering problems such as to find an angle of elevation, height, distance etc.
3. **Co-ordinate Geometry** (10periods)
 - **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)
 - **Circle:** General equation of a circle and its characteristics. To find the equation of a circle, given:
 - * Centre and radius
 - * Coordinates of end points of a diameter
4. **Differential Calculus** (25periods)
 - Definition of function

- Differentiation of standard function, Algebraic function, Trigonometric functions, Exponential function, Logarithmic differentiation
- Differentiation of sum, product and quotient of functions.
- Application of differential calculus in:
 - (a) Rate measures
 - (b) Maxima and minima

5. Integral Calculus (20 periods)

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

Evaluation of $\int_0^{\pi/2} \sin^n x \, dx$, $\int_0^{\pi/2} \cos^n x \, dx$, $\int_0^{\pi/2} \sin^m x \cos^n x \, dx$

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 1/3rd Rule using pre-existing mathematical models.

6. Differential Equations (04 periods)

Definition, order, degree and linearity of an ordinary differential equation.

7. Statistics (10 periods)

- Measures of Central Tendency: Mean, Median, Mode
- Measures of Dispersion: Mean deviation from mean
- Coefficient of rank correlation

INSTRUCTIONAL STRATEGY

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>

Section	Percentage of syllabus to be covered	Units to be covered	Type of assessment	Weightage of Marks	Pass Percentage
A	20%	Unit 1	1 st Internal	40%	40% (Combined in internal & final assessment) with minimum 25% marks in final assessment)
B	20%	Unit 2,3	2 nd 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.
- Units and dimensions of different physical quantities.
- Represent physical quantities as scalar and vectors.
- Basic laws of motions,
- Define work, energy and power and their units. Solve problems about work and power
- State the principle of conservation of energy.
- Compare and contrast the physical properties associated with linear motion and give examples.
- 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 (Celsius, Kelvin, Fahrenheit etc.)
- Distinguish between conduction, convection and radiation.
- Use equipment 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.
- 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
- 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.

DETAILED CONTENTS

Section A (20%)

- 1. Units and Dimensions (10Hrs)**
 - 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

- 2. Force and Motion (10 Hrs)**
 - 2.1 Scalar and vector quantities –(Definition and examples),
 - 2.2 Definition of Distance, displacement, speed, velocity, acceleration
 - 2.3 Force and its units, concept of Resolution of force
 - 2.4 Newton’s Law of motion (Statement and examples)
 - 2.5 Circular Motion: definition of angular displacement, angular velocity, angular acceleration, frequency, time period
 - 2.6 Centripetal and centrifugal forces(definition and formula only)

Section B (20%)

- 3. Work, Power and Energy (08 Hrs)**
 - 3.1 Work (Definition, Symbol, Formula and SI units)
 - 3.2 Energy (Definition and its SI units, Kinetic Energy (Formula, examples and its derivation)
 - 3.3 Potential Energy (Formula, examples and its derivation)

- 3.4 Law of conservation of mechanical energy for freely falling bodies (Statement Only)
- 3.5 Power (definition, formula and units)
- 3.6 Simple Numerical problems based on formula of Power

4. Properties of Matter (10 Hrs)

- 4.1 Definition of Elasticity, Deforming force, Restoring force, example of Elastic and plastic body,
- 4.2 Definition of Stress and strain with their types,
- 4.3 Hooke's law, Modulus of Elasticity (Young's, Bulk modulus and shear modulus formulas only.)
- 4.4 Pressure (definition, formula, unit)
- 4.5 Surface tension: definition, its units, applications of surface tension, effect of temperature on Surface tension
- 4.6 Viscosity: definition, units, effect of temperature on viscosity

Section C (60%)

5. Heat and temperature (06 Hrs)

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

6. Wave motion and its applications (10 Hrs)

- 6.1 Wave motion, transverse and longitudinal wave motion with examples, Terms used in wave motion like displacement, amplitude, time period, frequency, wavelength, wave velocity
- 6.2 Simple Harmonic Motion (SHM): definition, examples

- 6.3 Cantilever (definition, formula of time period (without derivation)).
- 6.4 Free, forced and resonant vibrations with examples
- 6.5 Acoustics of buildings – reverberation, reverberation time, echo, noise, coefficient of absorption of sound, methods to control reverberation time.

7. Optics (05 Hrs)

- 7.1 Reflection and refraction with laws, refractive index, lens formula (no derivation), power of lens (related numerical problems).
- 7.2 Total internal reflection and its applications, Critical angle and conditions for total internal reflection
- 7.3 Microscope, Telescope (definition)
- 7.4 Uses of microscope and telescope.

8. Electrostatics (09 Hrs)

- 8.1. Electric charge, unit of charge.
- 8.2. Coulombs law of electrostatics
- 8.3. Electric field, Electric lines of force (definition and properties),
- 8.4. Definition of Electric flux, Gauss law (Statement and derivation)
- 8.5. Capacitor and Capacitance (with formula and units), Series and parallel combination of capacitors (simple numerical problems)

9. Current Electricity (08 Hrs)

- 9.1. Electric Current and its Unit, Direct and alternating current,
- 9.2. Resistance, Specific Resistance and Conductance (definition and units)
- 9.3. Series and Parallel combination of Resistances.
- 9.4. Ohm's law (statement and formula),
- 9.5. Heating effect of current, Electric power and its units

10. Semiconductor physics (09 Hrs)

- 10.1 Definition of Energy level, Energy bands,
- 10.2 Types of materials (insulator, semi conductor, conductor) with examples,

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

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

LIST OF PRACTICALS (To perform minimum Ten experiments)

1. To find diameter of solid cylinder using a Vernier calipers.
2. To find the diameter of wire using Screw gauge
3. To find thickness of paper using Screw gauge.
4. To determine the thickness of glass strip using a Spherometer
5. To determine the atmospheric pressure at a place using Fortin's Barometer
6. Measuring room temperature with the help of thermometer and its conversion in different scale.
7. To find the time period of a simple pendulum
8. To determine and verify the time period of Cantilever
9. To verify ohm's laws by plotting a graph between voltage and current.
10. To verify laws of resistances in series combination.
11. To verify laws of resistance in parallel combination.
12. To verify laws of reflection of light using mirror.
13. To study colour coding scheme of resistance.

INSTRUCTIONAL STRATEGY

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
- 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. Applied Physics - I& II by AS Vasudeva; Modern Publishers, Jalandhar.
4. Applied Physics - I& II by R A Banwait; Eagle Prakashan, Jalandhar.
5. A text book of OPTICS by N Subrahmanyam, Brij Lal and Avadhanulu; S Chand

Publishing, New Delhi.

6. e-books/e-tools/relevant software to be used as recommended by AICTE/ HSBTE/ NITTTR.
7. Nanotechnology: Importance and Applications by M H Fulekar; IK International Publishing House (P) Ltd., New Delhi.
8. Practical Physics, by C. L. Arora, S Chand Publication

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B	20%	Unit 3,4	2 nd Internal	40%	
C	60%	Unit 5,6,7,8,9,10	External Exam	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

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 use of storage devices used in a Computer.
 - 1.7 List types of memory used in a Computer.
 - 1.8 State the importance of cache memory.
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 components of Window
 - 2.6 State the function of each component of Window
 - 2.7 Explain the method of starting a program using start button
 - 2.8 Understand maximize, minimize, restore down and close button
 - 2.9 State the meaning of a file
 - 2.10 State the meaning of a folder

- 2.11 Explain the method of viewing the contents of hard disk drive using explore option
- 2.12 Explain the method of finding a file using search option
- 2.13 Describe installing new software using control panel
- 2.14 Describe uninstalling software using control panel
- 2.15 Explain installing a new hardware using control panel
- 2.16 Explain uninstalling a hardware using control panel
- 2.17 Narrate finding out drive space using system tool option of accessories group
- 2.18 Explain the procedure of disk defragmentation using system tool
- 2.19 Narrate installing a Printer using control panel
- 2.20 Explain the procedure for changing resolution, colour, appearances, and screensaver option of the display
- 2.21 Narrate the process of changing 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 Describe the role of search engines with examples
- 3.13 Differences between search engines and directory.
- 3.14 Know about social network sites

4. Understand Programming Methodology (16 hrs)

- 4.1 State the steps involved in algorithm development
- 4.2 Differentiate algorithm and flowchart
- 4.3 Develop algorithms for simple problems
- 4.4 Draw the symbols used in flowcharts
- 4.5 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 Education Pvt. 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 Reema Thareja; 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.

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A	20%	Unit 1	1 st Internal	40%	40%(Combined in internal & final assessment)with minimum 25% marks in final assessment)
B	20%	Unit 2.1 to 2.11	2 nd Internal		
C	60%	Unit 2.12 to 2.23, 3,4	FINAL	60%	

1.5 FUNDAMENTAL OF ELECTRICAL & ELECTRONICS ENGG

L T P
2 - 2

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 stage 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. Voltage and Current Sources (04 hrs)
 - 2.1 Concept of voltage source, symbol and graphical representation characteristics of ideal and practical sources.
 - 2.2 Concept of current sources, symbol, characteristics and graphical representation of ideal and practical current sources.

3. Semiconductor Physics (06 hrs)
 - 3.1 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
 - 3.2 Concept of intrinsic and extrinsic semi conductor, process of doping.
 - 3.3 Energy level diagram of conductors, insulators and semi conductors; minority and majority charge carriers.
 - 3.4 P and N type semiconductors and their conductivity, effect of temperature on conductivity of intrinsic semi conductors.

4. Semiconductor Diode (08 hrs)
 - 3.5 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.
 - 3.6 V-I characteristics, static and dynamic resistance and their value calculation
 - 3.7 from the characteristics.
 - 3.8 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.
 - 3.9 Types of diodes, characteristics and applications of Zener diodes. Zener and avalanche breakdown

5. Electro Magnetic Induction (06 hrs)
- 3.10 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.
 - 3.11 Faraday's laws of electro-magnetic induction, principles of self and mutual induction, self and mutually induced e.m.f,
6. AC Fundamentals (05 hrs)
- 3.12 Concept of alternating quantities
 - 3.13 Difference between ac and dc
 - 3.14 Concepts of: cycle, frequency, time period, amplitude, instantaneous value, average value, r.m.s. value, maximum value, form factor and peak factor.
7. AC Circuits (06 hrs)
- 3.15 Concept of inductive and capacitive reactance
 - 3.16 Alternating voltage applied to resistance and inductance in series.
 - 3.17 Alternating voltage applied to resistance and capacitance in series.
 - 3.18 Introduction to series and parallel resonance and its conditions
 - 3.19 Definition of conductance, susceptance, admittance, impedance and their units
8. Introduction to Bipolar-Transistors (06 hrs)
- 3.20 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;
 - 3.21 CB, CE, CC configurations of a transistor; Input and output characteristics in CB and CE configurations; Current amplification factors. Comparison of CB, CE and CC Configurations;
 - 3.22 Transistor as an amplifier in CE Configuration;
9. 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.
10. Field Effect Transistors (05 hrs)
- Construction, operation and characteristics of FETs and their applications.
- 3.23 Construction, operation and characteristics of a MOSFET in depletion and enhancement modes and its applications.

- 3.24 CMOS - advantages and applications
- 3.25 Comparison of JFET, MOSFET and BJT.

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. Observation of change in resistance of a bulb in hot and cold conditions, using voltmeter and ammeter.
4. Verification of Krichhoff's Current and Voltage Laws in a dc circuit
5. 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
6. Plotting of V-I characteristics of a PN junction diode & Zener diode
7. 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
8. Plotting of the wave shape of full wave rectifier with
 - a. Shunt capacitor filter
 - b. Series inductor filter
9. Plotting of input and output characteristics and calculation of parameters of transistors in CE configuration.
10. Plotting of input and output characteristics and calculation of parameters of transistors in CB configuration.
11. Plotting of V-I characteristics of a FET.

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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B	20%	Unit 4 ,5	2 nd Internal		
C	60%	Unit 6 to 10	FINAL	60%	

1.6 ENVIRONMENTAL STUDIES

L T P
2 - 1

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 students will be able to:

- Comprehend the importance of ecosystem and sustainable development
- Demonstrate interdisciplinary nature of environmental issues
- Identify different types of environmental pollution and control measures.
- Take corrective measures for the abatement of pollution.
- Explain environmental legislation acts.
- 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, Energy Resources- renewable and non-renewable - definition, advantages and disadvantages.
- 2. Air Pollution (7 hrs.)**
Sources of air pollution, Effect of air pollution on human health, plants and animals. Control of air pollution.
- 3. Water pollution (11 hrs.)**
Impurities in water, Causes of water pollution, Effect of water pollution on human health, Concept of DO, BOD, COD, Water treatment processes, water qualities standards for domestic use, control of water pollution.
- 4. Soil Pollution (9 hrs)**
Sources of soil pollution
Types of solid waste-Household, Industrial, Agricultural, Biomedical,
Effects of solid waste
Disposal of solid waste
E- Waste

5. Noise Pollution**(4 hrs.)**

Sources of noise pollution, Unit of noise, Effects of noise pollution, Acceptable noise levels, control of noise pollution

6. Environmental Legislation**(10 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 of State Pollution Control Board and National Green Tribunal (NGT), Environmental Impact Assessment (EIA).

7. Impact of Energy Usage on Environment**(6 Hrs)**

Global Warming, Green House Effect, Depletion of Ozone Layer, Acid Rain. Recycling of Material, Concept of Green Buildings.

LIST OF PRACTICALS:

1. Determination of pH of drinking water
2. Determination of TDS in drinking water
3. Determination of TSS in drinking water
4. Determination of acidity in drinking water
5. Determination of pH of soil
6. To measure the noise level in classroom and industry.
7. To segregate the various types of solid waste in a locality.
8. To study the waste management plan of different solid waste
9. 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; SK Kataria and Sons, New Delhi.

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

1.7 ENGINEERING GRAPHICS

L T P
- - 3

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 Auto CAD 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 which 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 (4 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° (alphabet and numerals)
 - 1.7 Freehand letter writing and sketches of various kind of objects in graph Sketch book/graph paper.

- 2 Scales (2 sheets)
 - 2.1 Scales-their needs and importance(theoretical instructions), types of scales, definition of Representative Fraction(R.F.) and length of scale.
 - 2.2 Construction of Plain and diagonal scale.

- 3 Orthographic Projection (5 sheets)
 - 3.1 Theory of orthographic projections (Elaborate theoretical instructions)
 - 3.2 Projections of points in different quadrants
 - 3.3 Projection of line (1st angle and 3rd angle)
 - 3.3.1 Line parallel to both planes
 - 3.3.2 Line perpendicular to any one of the principal plane
 - 3.3.3 Line inclined to any one of the principal plane and parallel to other
 - 3.4 Projection of Solid-Cube, Cuboid, Cone, Prism, pyramid
 - 3.5 Three views of orthographic projections of different objects (At least one sheet in 3rd angle)

- 4 Sectioning and Identification of surfaces (2 sheets)
 - 4.1 Identifications of surfaces, Importance and salient features of sectioning of objects.
 - 4.2 Description of full section, half section.

- 5 Isometric Views (2 sheets)
- 5.1 Fundamental of isometric projections and isometric scale
- 5.2 Isometric views of different objects
- 6 Graphics using CAD (5 sheets)
- 6.1 Meaning, requirement of computer graphics, CAD, screen structure and toolbars in AutoCAD, coordinate system, Drawing Limits, Units.
- 6.2 Practice of LINE command, coordinates-Absolute, incremental, polar. POLYLINE, CIRCLE(3P,2P, TTR), ARC, ELLIPSE
- 6.3 Using above geometrical commands for making figure e.g. triangle, rectangle, hexagon, pentagon, parabola.
- 6.4 Editing commands-Scale, erase, copy, stretch, lengthen and explode.
- 6.5 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.
- 6.6 Drawing projections of lines and solids.
- 6.7 Drawing orthographic projections of different objects (at least 2 sheets)
- 6.8 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 (3 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 (5 sheets)
- 10.1 Type of threads-external and internal threads, right and left hand threads (actual conventional representation), Single and multiple start thread.
 - 10.2 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)
 - 10.3 Different views of hexagonal and square nuts. Square and hexagonal headed bolt.
 - 10.4 Foundations bolts-Rag bolt, Lewis bolt, Curved bolt and eye bolt.
 - 10.5 Freehand sketches of various types of screws and studs.
- 11 Keys and Cotters (3 sheets)
- 11.1 Various types of keys and cotters - their 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

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>

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

1.8 INFORMATION TECHNOLOGY

L T P
- - 2

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 envelopes and labels
 - 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 Learning (DL). (20 hrs)
 - 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 Madiseti, Arshdeep Bahga, “Internet of Things: A Hands On Approach, University Press
2. Yashavant Kanetkar, Shirang 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. Raghuvanshi; 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>

THIRD SEMESTER

3.1 PROGRAMMING IN C

L -T-P
3 - 6

RATIONAL

Computers play a vital role in present day life, more so, in the professional life of technician engineers. People working in the field of computer industry, use computers in solving problems more easily and effectively. In order to enable the students use the computers effectively in problem solving, this course offers the modern programming language C along with exposition to various applications of computers. The knowledge of C language will be reinforced by the practical exercises.

LEARNING OUTCOMES

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

- Identify the problem and formulate an algorithm for it.
- Identify various control structures and implement them.
- Identify various types of variables.
- Use pointer in an array and structure.
- Use structures and union for handling data.
- Explain the concepts of C programming language
- Explain and implement the language constructs concepts
- Install C software on the system and debug the programme
- Explain and execute member functions of C in the programme
- Describe and implement array concept in C programme
- Describe and execute pointers

DETAILED CONTENTS

1. Algorithm and Programming Development (04 Periods)
 - 1.1 Steps in development of a program
 - 1.2 Flow charts, Algorithm development
 - 1.3 Programme Debugging

2. Program Structure (08 Periods)
 - 2.1 I/O statements, assign statements
 - 2.2 Constants, variables and data types
 - 2.3 Operators and Expressions
 - 2.4 Unformatted and Formatted IOS
 - 2.5 Data Type Casting

- 3. Control Structures (10 Periods)
 - 3.1 Introduction
 - 3.2 Decision making with IF – statement
 - 3.3 IF – Else and Nested IF
 - 3.4 While and do-while, for loop
 - 3.5 Break. Continue, goto and switch statements

- 4. Functions (10 Periods)
 - 4.1 Introduction to functions
 - 4.2 Global and Local Variables
 - 4.3 Function Declaration
 - 4.4 Standard functions
 - 4.5 Parameters and Parameter Passing
 - 4.6 Call - by value/reference

- 5. Arrays and Strings (8 Periods)
 - 5.1. Introduction to Arrays
 - 5.2. Array Declaration, Length of array
 - 5.3 Single and Multidimensional Array.
 - 5.4 Arrays of characters
 - 5.5 Introduction of Strings
 - 5.6 String declaration and definition
 - 5.7 String Related function i.e. strlen, strcpy, strcmp

- 6. Structures and Unions (08 Periods)
 - 6.1 Declaration of structures
 - 6.2 Accessing structure members
 - 6.3 Structure Initialization
 - 6.4 Unions

LIST OF PRACTICALS

1. Programming exercises on executing and editing a C program.
2. Programming exercises on defining variables and assigning values to variables.
3. Programming exercises on arithmetic and relational operators.
4. Programming exercises on arithmetic expressions and their evaluation.
5. Programming exercises on formatting input/output using printf and scanf and their return type values.
6. Programming exercises using if statement.
7. Programming exercises using if – Else.
8. Programming exercises on switch statement.

9. Programming exercises on do – while, statement.
10. Programming exercises on for – statement.
11. Programs on one-dimensional array.
12. Programs on two-dimensional array.
13. (i) Programs for putting two strings together.
(ii) Programs for comparing two strings.
14. Simple programs using functions
15. Simple programs using structures.
16. Simple programs using union.

INSTRUCTIONAL STRATEGY

The subject is totally practical based. Students should be given clear idea about the basic concepts of programming. In practical session student should be asked to draw flow chart, write algorithm and then write program for the algorithm and run on computer. It is required that students should maintain records (files with printouts).

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, development and viva-voce

RECOMMENDED BOOKS

1. Let us C by Yashwant Kanetkar
2. Programming in ANSI C by E Balaguruswami, , Tata McGraw Hill Education Pvt Ltd , New Delhi
3. Problem Solving and Programming in C by RS Salaria, Khanna Book Publishing Co(P) Ltd. New Delhi
4. Programming in C by Reema Thareja; Oxford University Press, New Delhi
5. Programming in C by Gottfried, Schaum Series, , Tata McGraw Hill Education Pvt Ltd , New Delhi
6. Exploring C by Yashwant Kanetkar; BPB Publications, New Delhi
7. Programming in C by R Subburaj, Vikas Publishing House Pvt. Ltd., Jangpura, New Delhi
8. Elements of C by M.H. Lewin, Khanna Publishers, New Delhi
9. Programming in C by Stephen G Kochan
10. Programming in C by BP Mahapatra, Khanna Publishers, New Delhi
11. Programmng in C : A Practical Approach by Ajay Mittal, Pearson Publication
12. e-books/e-tools/relevant software to be used as recommended by AICTE/HSBTE/NITTTR.

Websites for Reference:

<http://swayam.gov.in>

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted	Marks Allotted (%)
1	04	08
2	08	18
3	10	18
4	10	24
5	08	16
6	08	16
Total	48	100

3.2 OPERATING SYSTEMS

L T P
3 - 4

RATIONAL

The course provides the students with an understanding of human computer interface existing in computer system and the basic concepts of operating system and its working. The students will also get hands-on experience and good working knowledge to work in windows and Linux environments. The aim is to gain proficiency in using various operating systems after undergoing this course. While imparting instructions, the teachers are expected to lay more emphasis on concepts and principles of operating systems, its features and practical utility.

LEARNING OUTCOMES

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

- Describe various types and services of operating system
- Identify the concept of process, various states in the process and their scheduling.
- Classify different types of schedulers and scheduling algorithms.
- Identify the significance of inter-process communication and synchronization.
- Describe deadlock and the various ways to recover from deadlock
- Identify memory management techniques
- Describe virtual memory and its underlying concepts.
- Describe the features and brief history of Linux
- Use General purpose commands and filters of Linux
- Use of shell scripts in Linux

DETAILED CONTENTS

1. Overview of Operating Systems (09 Periods)
Definition of Operating Systems, Types of Operating Systems, Operating System Services, User operating system interface, System Calls, Types of System Calls, System Programs, Operating System Structure, Virtual Machine, Benefits of Virtual Machine
2. Process Management (Principles and Brief Concept) (10 Periods)
Process concept, Process State, Process Control Block, Scheduling Queues, Scheduler, Job Scheduler, Process Scheduler, Context Switch, Operations on Processes, Shared Memory Systems, Message-Passing Systems, CPU Scheduler, Scheduling Criteria, Scheduling Algorithms, Preemptive and Non Preemptive, First come first serve (FCFS), Shortest Job first (SJF), Round Robin (RR)
3. Deadlocks (Principles and Brief Concept) (5 Periods)
Deadlock, Conditions for Dead lock, Methods for handling deadlocks, Dead Prevention, Deadlock Avoidance, Deadlock detection, Recovery from deadlock.

4. Memory Management Function (Principles and Brief Concept) (10 Periods)

Definition – Logical and Physical address Space, Swapping, Memory allocation, Contiguous Memory allocation, Fixed and variable partition, Internal and External fragmentation and Compaction, Paging – Principle of operation, Page allocation.

5. I/O Management Functions (Principles and Brief Concept) (04 periods)

Dedicated Devices, Shared Devices, I/O Devices, Storage Devices, Buffering,

6. Linux Operating System (10 Periods)

History of Linux and Unix, Linux Overview, Structure of Linux, Linux releases, Open Linux, Linux System Requirements, Linux Commands and Filters: mkdir, cd, rmdir, pwd, ls, who, whoami, date, cat, chmod, cp, mv, rm, pg, more, pr, tail, head, cut, paste, nl, grep, wc, sort, kill, write, talk, mseg, wall, merge, mail, news

LIST OF PRACTICALS

1. Demonstration of all the controls provided in windows control panel.
2. Exercise on Basics of windows.
3. Installation of Linux Operating System
4. Usage of directory management commands of Linux: ls, cd, pwd, mkdir, rmdir
5. Usage of File Management commands of Linux: cat, chmod, cp, mv, rm, pg, more, find
6. Use the general purpose commands of Linux: wc, od, lp, cal, date, who, whoami
7. Using the simple filters: pr, head, tail, cut, paste, nl, sort
8. Communication Commands: news, write, talk, mseg, mail, wall

INSTRUCTIONAL STRATEGY

This subject is both theory and practical oriented. Therefore, stress must be given on particulars along with theory. Laboratory must have windows as well as Linux operating system. Concepts of O.S. must be taught practically.

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, development and viva-voce

RECOMMENDED BOOKS

1. Operating System Concepts by Silberschatz, Galvin; Wiley Publication
2. Operating Systems by Stallings; Tata McGraw Hill.
3. Operating Systems- A Concept Based Approach by DhamDhare; Tata McGraw Hill Education Pvt Ltd, New Delhi
4. Operating Systems by Achyut S Godbole and AtulKahate; Tata McGraw Hill Education Pvt Ltd, New Delhi

5. Unleashed Linux by Tech Media Publishers, New Delhi
6. e-books/e-tools/relevant software to be used as recommended by AICTE/HSBTE/NITTTR.

Websites for Reference:

<http://swayam.gov.in>

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Periods)	Marks Allotted (%)
1.	09	16
2.	10	22
3.	05	12
4	10	22
5	04	10
6	10	18
Total	48	100

3.3 DIGITAL ELECTRONICS

L T P
3 - 3

RATIONALE

This course has been designed to make the students know about the fundamental principles of digital electronics and gain familiarity with the available IC chips. This subject aims to give a background in the broad field of digital systems design and microprocessors.

LEARNING OUTCOMES

After undergoing the subject, student will be able to:

- Explain the importance of digitization.
- Verify and interpret truth tables for all logic gates.
- Realize all logic functions with NAND and NOR gates
- Design half adder and full adder circuit
- Demonstrate and design 4-bit adder, 2's complement subtractor
- Verify and interpret truth tables for all flip flops.
- Verify and interpret truth tables of multiplexer, demultiplexer, encoder and decoder ICs
- Design and realize different asynchronous and synchronous counters
- Design 4-bit SISO, PISO, SIPO, PIPO shift registers
- Explain the features and applications of different memories.
- Verify performance of different A/D and D/A converters.

1. Introduction (02 Periods)
 - a) Distinction between analog and digital signal.
 - b) Applications and advantages of digital signals.
2. Number System (03 Periods)
 - a) Binary, octal and hexadecimal number system: conversion from decimal and hexadecimal to binary and vice-versa.
 - b) Binary addition and subtraction including binary points. 1's and 2's complement method of addition/subtraction.
3. Codes and Parity (03 Periods)
 - a) Concept of code, weighted and non-weighted codes, examples of 8421, BCD, excess-3 and Gray code.
 - b) Concept of parity, single and double parity and error detection
4. Logic Gates and Families (05 Periods)
 - a) Concept of negative and positive logic
 - b) Definition, symbols and truth tables of NOT, AND, OR, NAND, NOR, EXOR Gates, NAND and NOR as universal gates.
 - c) Introduction to TTL and CMOS logic families

5. Logic Simplification (6 Periods)
- Postulates of Boolean algebra, De Morgan's Theorems. Implementation of Boolean (logic) equation with gates
 - Karnaugh map (upto 4 variables) and simple application in developing combinational logic circuits
6. Arithmetic circuits (02 Periods)
- Half adder and Full adder circuit, design and implementation.
 - 4 bit adder circuit
7. Decoders, Multiplexeres, De Multiplexeres and Encoder (4 Periods)
- Four bit decoder circuits for 7 segment display
 - Basic functions and block diagram of MUX and DEMUX
 - Basic functions and block diagram of Encoder
8. Latches and flip flops (06 Periods)
- Concept and types of latch with their working and applications
 - Operation using waveforms and truth tables of RS, T, D, Master/Slave JK flip flops.
 - Difference between a latch and a flip flop
9. Counters (07 Periods)
- Introduction to Asynchronous and Synchronous counters
 - Binary counters
 - Divide by N ripple counters, Decade counter, Ring counter
10. Shift Register (07 Periods)
- Introduction and basic concepts including shift left and shift right.
- Serial in parallel out, serial in serial out, parallel in serial out, parallel in parallel out.
 - Universal shift register
11. Semiconductor Memories (03 periods)
- Memory organization, classification of semiconductor memories (RAM, ROM, PROM, EPROM, EEPROM), static and dynamic RAM

LIST OF PRACTICALS

- Verification and interpretation of truth tables for AND, OR, NOT NAND, NOR and Exclusive OR (EXOR) gates
- Realization of logic functions with the help of NAND or NOR gates
- To design a half adder using XOR and NAND gates and verification of its operation

-Construction of a full adder circuit using XOR and NAND gates and verify its operation

4. Verification of truth table for positive edge triggered, negative edge triggered, level triggered IC flip-flops (At least one IC each of D latch , D flip-flop, JK flip-flops).
5. Verification of truth table for encoder and decoder ICs, Mux and DeMux
6. To design a 4 bit SISO, SIPO, PISO, PIPO shift registers using JK/D flip flops and verification of their operation
7. To design a 4 bit ring counter and verify its operation.
8. Use of Asynchronous Counter ICs (7490 or 7493).

Note: Above experiments may preferably be done on Bread Boards

INSTRUCTIONAL STRATEGY

The digital systems in microprocessors have significant importance in the area of electronics. Adequate competency needs to be developed by giving sufficient practical knowledge in microprocessors (programming as well as interfacing), A/D, D/A Converters and other topics. Help may be taken in the form of charts, simulation packages to develop clear concepts of the subject. Programming exercises other than the tested in circulation may be given to 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, model/prototype making, assembly and disassembly exercises and viva-voce

RECOMMENDED BOOKS

1. Digital Electronics and Applications by Malvino Leach, Tata McGraw Hill Education Pvt Ltd, Delhi New
2. Digital Logic Designs by Morris Mano, Prentice Hall of India, New Delhi
3. Digital Electronics by Soumitra Kumar Mandal, Tata McGraw Hill Education Pvt Ltd,
4. Digital Electronics by V K Sangar , Raj Publishers, Jalandhar
5. Digital Electronics by Tokheim, Tata McGraw Hill Education Pvt Ltd,
6. Digital Fundamentals by Thomas Floyds, Universal Book Stall
7. Digital Electronics by RP Jain, Tata McGraw Hill Education Pvt Ltd, New Delhi
8. Digital Electronics by KS Jamwal, Dhanpat Rai and Co., New Delhi
9. Digital Electronics by Yashpal and Sanjeev Kumar; North Publication, Ambala City
10. Digital Electronics by BR Gupta, Dhanpat Rai & Co., New Delhi
11. Digital Systems: Principles and Applications by RJ Tocci, Prentice Hall of India, New Delhi
12. Digital Electronics by Rajaraman V., Prentice Hall of India, New Delhi
13. Fundamentals of Digital Electronics by Naresh Gupta, Jain Brothers, New Delhi

14. e-books/e-tools/relevant software to be used as recommended by AICTE/HSBTE/NITTTR.

Websites for Reference:

<http://swayam.gov.in>

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Periods)	Marks Allocation (%)
1.	02	04
2.	03	05
3.	03	05
4.	05	10
5.	05	12
6.	02	05
7.	04	10
8.	06	14
9	07	15
10.	07	15
11	03	05
Total	48	100

3.4 MULTIMEDIA APPLICATIONS

L T P
3 - 6

RATIONALE

This subject aims to develop a clear understanding of What is multimedia?, and how it can be used for enhancing teaching instruction methodologies, business and personal communications. It will help the students in understanding technical aspects of multimedia content creation, the processes and tools used for designing multimedia systems. This will make the students proficient in designing and developing an multimedia application.

LEARNING OUTCOMES

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

- Define and describe multimedia functions.
- Identify and explain the devices, hardware and software system.
- Operate and design in graphics.
- Use photo-shop software for drawing and editing photos.
- Identify the tools to create animations,
- Reduce the size of various file formats i.e. audio, video and text.

DETAILED CONTENTS

1. Introduction to Multimedia Systems (12 Periods)

Concept of Multimedia, History of Multimedia, Multi media hardware and software-various classes, components, Quality criteria and specifications of different capturing devices, Communication devices, Storage devices, Display devices, Elements of Multimedia and different multimedia file formats, Applications of multimedia.

2. Content and Project Planning, Designing and development (12 Periods)

Planning steps and process, Concept of data compression, Text encoding, Audio encoding techniques, Types of images, Capturing images using camera/scanner, coding techniques for Moving Images, Editing , Editing of images audio, text, video and graphics, navigation and user interface designing.

3. Using Image Processing Tools (12 Periods)

Photo-shop workshop, image editing tools, specifying and adjusting colors, using gradient tools, selection and move tools, transforming path drawing and editing tools, using channels, layers, filters and actions.

4. Multimedia Authoring Tools (12 Periods)

Types of Authoring programmes – Icon based, Time based, Story boarding/scripting and object oriented working in macromedia flash, exploring interface using selection of PEN tools. Working with drawing and painting tools.

LIST OF PRACTICALS

1. Installation of various multimedia software like Photoshop, Flash, Director or any open source software
2. Installing and use of various multimedia devices
 - Scanner
 - Digital camera, web camera
 - Mike and speakers
 - Touch screen
 - Plotter and printers
 - DVD
 - Audio CD and Video CD
3. Reading and writing of different format on CD/DVD
4. Transporting audio and video files
5. Using various features of Flash
6. Using various features of Photo-shop/GIMP
7. Making multimedia presentations combining, Flash, Photo-shop, such as department profile, lesson presentation, games and project presentations.

INSTRUCTIONAL STRATEGY

As the subject is practice oriented, more stress should be given to students to do the work practically. The features of software packages Photo-shop, Flash are to be demonstrated in class using LCD projector.

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, development and viva-voce

RECOMMENDED BOOKS

1. Principles of Multimedia by Parikh, Tata McGraw Hill Education Pvt Ltd , New Delhi
2. Multimedia Technologies by Banerji, Tata McGraw Hill Education Pvt Ltd , New Delhi
3. Multimedia An Introduction by Villam Casanova and Molina; Prentice Hall of India, New Delhi
4. Multimedia Bible by Win Rosch
5. Multimedia Making it work by Vaughan, Tay
6. Photo-shop for Windows Bible by Deke Maclelland IDG Books India Pvt. Ltd., New Delhi

7. Multimedia Technology and Application by Hillman, Galgotia Publications, New Delhi
8. Flash 5 Bible by Rein Hardit, IDG Books India Pvt. Ltd.
9. Flash 5 in easy steps by Vandome IDG Books India Pvt. Ltd.
10. Fundamentals of Multimedia by Li and Drew, Pearson Publications.
11. e-books/e-tools/relevant software to be used as recommended by AICTE/HSBTE/NITTTR.

Websites for Reference:

<http://swayam.gov.in>

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted	Marks Allotted (%)
1	12	22
2	12	28
3	12	24
4	12	26
Tota	48	100

3.5 DATA COMMUNICATION

L T P
3 - -

RATIONALE

Data Communication Course is intended to provide practical exposure and awareness of existing and upcoming Communication technologies

LEARNING OUTCOMES

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

- Identify various network
- Differentiate Analog and Digital system
- Identify various types of transmission media
- Identify slow/fast transmission media
- Identify incorrect data from various sources

DETAILED CONTENTS

1. Introduction (08 Periods)

Data Communication- Components, Data representation, Data flow
Networks- Distributed processing, Network criteria , Physical structures
Network Category- LAN, WAN, MAN

2. Data and Signals (12 Periods)

Analog and Digital data, Analog and digital signals, Periodic and Non Periodic signals,
periodic analog signals
Digital Signals- Bit rate, Bit length, Digital signal as a composite analog
signal, transmission of digital signals

3. Digital and Analog Transmission (12 Periods)

Analog transmission- Digital to Analog Conversion- ASK, PSK, FSK
Analog to Analog Conversion- AM, PM, FM(No mathematical
treatment) Digital transmission- Digital to digital conversion- coding
and schemes Analog to digital conversion- PCM and Delta Modulation
(DM) Transmission modes- Serial and parallel transmission

4. Transmission media (08 Periods)

Guided media-Twisted pair cable, Co-axial cable, fibre optics cable
Unguided Media- radio wave, Microwave, Infrared

5. Error Detection and Correction

(08 Periods)

Types of Errors, redundancy, detection v/s correction, Forward error correction v/s retransmission.

Error detection through Parity bit, block parity to detect double errors and correct single errors.

INSTRUCTIONAL STRATEGY

Explanation of basic concept of data communication and all entities involved need to be elaborated precisely by the teacher with the emerging technologies. The topics should be clarified diagrammatically as well as with help of multimedia presentations.

MEANS OF ASSESSMENT

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

RECOMMENDED BOOKS

1. Data Communication and Networking by Forouzan; Tata McGraw Hill
2. Computer Networking by Tanenbaum; Prentice Hall of India, New Delhi
3. Data and Computer Communication by William Stalling
4. Data Communication by PS Gupta
5. Computer Communication and Networking by John Freer
6. e-books/e-tools/relevant software to be used as recommended by AICTE/HSBTE/NITTTR.

Websites for Reference:

<http://swayam.gov.in>

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (in Periods)	Marks Allotted (%)
1.	08	18
2.	12	23
3.	12	23
4	08	18
5	08	18
Total	48	100

SOFT SKILLS – I

L T P
- - 2

RATIONALE

The present day world requires professionals who are not only well qualified and competent but also possess good communication skills. The diploma students not only need to possess subject related knowledge but also soft skills to get good jobs or to rise steadily at their work place. The objective of this subject is to prepare students for employability in job market.

LEARNING OUTCOMES

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

- Identify components of effective verbal communication
- Prepare a report
- Learn the techniques of enhancing memory
- Set goals for overall personality development
- Understand the concept of quality and its implementation in an organization.

DETAILED CONTENTS

- Soft Skills - Concept and Importance
- Communication Skills- Improving verbal communication
- Report Writing
- Method to enhance memory and concentration
- Component of overall personality- Dressing sense/etiquettes/body language etc.

In addition, the students must participate in the following activities to be organized in the institute.

- Sports
- NCC/NSS
- Camp – Blood donation
- Cultural Event

Note : Extension Lectures by experts may be organized. There will be no examination for this subject.

FOURTH SEMESTER

4.1 DATA STRUCTURES USING C

L T P
3 - 6

RATIONALE

Data structures are the techniques of designing the basic algorithms for real-life projects. Understanding of data structures is essential and this facilitates the understanding of the language. The practice and assimilation of data structure techniques is essential for programming. The knowledge of 'C' language and data structures will be reinforced by practical exercises during the course of study. The course will help students to develop the capability of selecting a particular data structure.

LEARNING OUTCOMES

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

- Identify the problem and formulate an algorithm for it.
- Identify the best data structures to solve the problem
- Store data, process data using appropriate data structures
- Sort the data in ascending or descending order.
- Implement trees and various traversing techniques.
- Implement various searching and sorting algorithms and to compare them for checking efficiency.

DETAILED CONTENTS

1. Fundamental Notations (06 Periods)
 - 1.1 Problem solving concept top down and bottom up design, structured programming
 - 1.2 Concept of data types, variables and constants
 - 1.3 Concept of variables and constants
2. Arrays (08 Periods)
 - 2.1 Concept of Arrays
 - 2.2 Storage representation of multi-dimensional arrays.
 - 2.3 Operations on arrays with Algorithms (searching, traversing, inserting, deleting)
3. Linked Lists (09 Periods)
 - 3.1 Introduction to linked list
 - 3.2 Representation of linked lists in Memory
 - 3.3 Operations on linked list (Insertion, deletion and traversals)
 - 3.4 Application of linked lists

4. Stacks, Queues and Recursion (09 Periods)
- 4.1 Introduction to stacks
 - 4.2 Representation of stacks
 - 4.3 Implementation of stacks
 - 4.4 Applications of stacks
 - 4.5 Introduction to queues
 - 4.6 Implementation of queues
 - 4.7 Application of Queues
5. Trees (07 Periods)
- 5.1 Concept of Trees
 - 5.2 Representation of Binary tree in memory
 - 5.3 Traversing Binary Trees (Pre order, Post order and In order)
6. Sorting and Searching (09 Periods)
- 6.1 Introduction to sorting and searching
 - 6.2 Search algorithm (Linear and Binary)
 - 6.3 Sorting algorithms (Bubble Sort, Insertion Sort, Quick Sort, Selection Sort,

LIST OF PRACTICALS

Write programmes in C to implement

1. Sorting an array
2. The addition of two matrices using functions
3. The multiplication of two matrices
4. Push and pop operation in stack
5. Inserting and deleting elements in queue
6. Insertion and deletion of elements in linked list
7. The selection sort technique
8. The bubble sort technique
9. The quick sort technique
10. The binary search procedures to search an element in a given list
11. The linear search procedures to search an element in a given list

INSTRUCTIONAL STRATEGY

This subject clears all fundamentals of programming techniques. Teachers should stress on explaining all the techniques and algorithms in detail in theory sessions. The students should be asked to convert their ideas about a problem into an algorithm in theory class and implement it in practical class. This will help the students to have clear concepts of programming.

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, development and viva-voce

RECOMMENDED BOOKS

1. Data Structure using C by Robert Kruse; Prentice Hall of India
2. Data Structure through C by Yashwant Kanekar; BPB Publications
3. Data structures – Schaum’s Outline Series by Lipschutz; McGraw Hill Education Pvt Ltd , New Delhi
4. Data Structure using C by ISRD Group ; Tata McGraw Hills Education Pvt Ltd , New Delhi
5. Expert Data Structures with C by R.B. Patel ; Khanna Publishers, New Delhi.
6. Data Structures and Algorithm Using C by RS Salaria; Khanna Book Publishing Co. (P) Ltd. New Delhi
7. Data Structure through C in depth by SK Srivastava, Deepali Srivastava; BPB Publications
8. Data Structure through “C” Language by Sameeran Chattopadhyay, Matangini Chottopadhyay; BPB Publications
9. Data Structure through “C” Language by DOEACC; BPB Publications
10. Data Structure using “C” Lab Workbook by Shukla; BPB Publications
11. e-books/e-tools/relevant software to be used as recommended by AICTE/HSBTE/NITTTR.

Websites for Reference:

<http://swayam.gov.in>

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Periods)	Marks Allotted (%)
1	06	10
2	08	15
3	09	20
4	09	20
5	07	15
6	09	20
Total	48	100

4.2 OBJECT ORIENTED PROGRAMMING USING JAVA

L T P
3 - 6

RATIONALE

Object orientation is a new approach to understand the complexities of the real world. In contrast to the earlier approaches like procedural etc, object orientation helps to formulate the problems in a better way giving high reliability, adaptability and extensibility to the applications. The students are already familiar with this concept of programming in C which is the basic for JAVA. This course offers the modern programming language JAVA that shall help the students to implement the various concept of object orientation practically. The students will be able to programme in the object oriented technology with the usage of JAVA.

LEARNING OUTCOMES

After undergoing the subject, students will be able to:

- Explain the concepts of OOPS
- Explain and execute the language construct concepts.
- Debug and compile the program written in Java.
- Explain and implement class program.
- Explain and execute member functions.
- Describe and implement inheritance concepts.
- Explain and implement Polymorphism using Java program.
- Install Java IDE, Compiler, Java virtual machines
- Explain and implement the abstract class and interface.
- Implement the exception handling in live projects

DETAILED CONTENTS

1. Introduction and Features (04 Periods)
 - 1.1 Fundamentals of object oriented programming – procedure oriented programming Vs. object oriented programming (OOP)
 - 1.2 Object oriented programming concepts – Classes, object, object reference, abstraction, encapsulation, inheritance, polymorphism
2. Language Constructs (10 Periods)

Review of constructs of C used in JAVA : variables, types and type declarations, data types, increment and decrement operators, relational and logical operators; if then else clause; conditional expressions, input using scanner class and output statement, loops, switch case, arrays, methods.

3. Classes and Objects (10 Periods)
 - 3.1 Creation, accessing class members
 - 3.2 Private Vs Public Vs Protected Vs Default
 - 3.3 Constructors
4. Inheritance (10 Periods)

Definition of inheritance, protected data, private data, public data, constructor chaining, order of invocation, types of inheritance, single inheritance, multilevel inheritance, hierarchical inheritance, hybrid inheritance
5. Polymorphism (07 Periods)

Method & constructor overloading, method overriding.
6. Abstract class & Interface (07 Periods)

Key points of Abstract class & interface, difference between an abstract class & interface, implementation of multiple inheritance through interface.

LIST OF PRACTICALS

1. Consider we have a Class of Cars under which Santro Xing, Alto and Wagon R represents individual Objects. In this context each Car Object will have its own, Model, Year of Manufacture, Colour, Top Speed, etc. which form Properties of the Car class and the associated actions i.e., object functions like Create(), Sold(), display() form the Methods of Car Class. Use this class to create another class Company that tracks the models it create.
2. In a software company Software Engineers, Sr. Software Engineers, Module Lead, Technical Lead, Project Lead, Project Manager, Program Manager, Directors all are the employees of the company but their work, perks, roles, responsibilities differs. Create the Employee base class would provide the common behaviors of all types of employee and also some behaviors properties that all employee must have for that company. Also include search method to search an employee by name.
3. Suppose the Airport personals want to maintain records for the arrival and departure of the planes. Create a class Airport that has data like name, id, and address. Create two more classes for Arrival and Departure implementing Airport that will have track of planes (their name, id, arrival time or departure time and a counter to count the number of arrivals) also include the necessary methods to access the information.

Also try to keep record of passengers by creating a new class Passenger. Also include a method search() in Airport class to search any passenger by name.

4. Create a whole menu driven hospital management system using concept of OOP like classes, inheritance. Include information about the following:
 - a. Patient -name, registration id, age, disease, etc.
 - b. Staff – id, name, designation, salary, etc.

5. Create a class called Musicians to contain three methods string (), wind () and perc (). Each of these methods should initialize a string array to contain the following instruments:
 - veena, guitar, sitar, sarod and mandolin under string ()
 - flute, clarinet saxophone, nadhaswaram and piccolo under wind ()
 - tabla, mridangam, bangos, drums and tambour under perc ()

It should also display the contents of the arrays that are initialized. Create a derived class called TypeInsto contain a method called get () and show (). The get () method must display a means as follows.

Type of instruments to be displayed:

- a. String instruments
- b. wind instruments
- c. Percussion instruments

The show () method should display the relevant detail according to our choice. The base class variables must be accessible only to its derived classes.

6. Write three derived classes inheriting functionality of base class person (should have a member function that ask to enter name and age) and with added unique features of student, and employee, and functionality to assign, change and delete records of student and employee.

7. Using the concept of multiple inheritance create classes: Shape, Circle, Square, Cube, Sphere, Cylinder. Your classes may only have the class variable specified in the table below and the methods Area and/or Volume to output their area and/or volume.

Class	Class Variable	Constructor	Base class
Shape	String name	Shape()	
Circle	double radius	Circle(double r, String n)	Shape
Square	double side	Square(double s, String n)	Shape
Cylinder	double height	Cylinder(double h, double r, String n)	Circle
Sphere	None	Sphere(double r, String n)	Circle
Cube	None	Cube(double s, String n)	Square

8. Write a program to create class Person.
 - a. Make two classes, Student and Instructor, inherit from Person. A person has a name and year of birth.

- b. A student has a major, student id.
- c. An instructor has salary, subject.

Write the class definitions, the constructors, set methods, get methods and for all classes.

9. Old MacDonald had a farm and several types of animals. Every animal shared certain characteristics: they had a type (such as cow, chick or pig) and each made a sound (moo, cluck or oink). An Interface defines those things required to be an animal on the farm. Define new classes for the Old MacDonald that implement the Animal and Farm class. Create array of object of animal to define the different types of animal in the farm. Also create appropriate methods to get and set the properties.
10. Write a program with Student as abstract class and create derive classes Engineering, Medicine and Science from base class Student. Create the objects of the derived classes and process them and access them using array of pointer of type base class Student.

INSTRUCTIONAL STRATEGY

The subject is totally practical based. Students should be given clear idea about the basic concepts of programming. In practical session student should be asked to draw flow chart write algorithm and then write program for algorithm and run on computer. It is required that students should maintain records (files with printouts).

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, development and viva-voce

RECOMMENDED BOOKS

1. Object Oriented Programming using JAVA by Sunil Bhutani & Amrendra Shara; Eagle Publishing House, Jalandhar
2. Java Programming by Sachin Malhotra; Oxford University Press, New Delhi
3. Head First Java, O-REILLY, Kathy Sierra & Bert Bates.
4. Object-Oriented programming With Java, C.Thomas Wu.
5. Advance Java Programming by Uttam K. Roy; Oxford University Press, New Delhi
6. e-books/e-tools/relevant software to be used as recommended by AICTE/HSBTE/NITTTR.

Websites for Reference:

<http://swayam.gov.in>

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Periods)	Marks Allotted (%)
1.	04	08
2.	10	25
3.	10	17
4.	10	22
5.	07	14
6.	07	14
Total	48	100

4.3 COMPUTER ORGANIZATION

L T P
3 - -

RATIONALE

The subject provides the students with the knowledge of detailed organization of currently available personal computers in order to understand their functioning . The students will also get familiar with Architecture of multi processor systems.

LEARNING OUTCOMES

After undergoing the subject, students will be able to :

- Use CPU, register and stack.
- Compare micro programmed and hardwired control.
- Compare RISC and CISC architecture.
- Understand memory hierarchy and memory types.
- Explain the function of BIOS.
- Illustrate multi processor systems.

DETAILED CONTENTS

1. Hardware organisation of computer system (18 Periods)
 - CPU organisation : instruction formats(three address, two address, one address, zero address and RISC instruction).
Addressing modes: Immediate, register, direct, in direct, relative, indexed.
 - CPU Design : Microprogrammed vs hard wired control.
 - Reduced instruction set computers: CISC characteristics, RISC characteristics, and their comparison.
2. Memory organisation (14 periods)
 - Memory Hierarchy
 - RAM and ROM chips, Memory address map, Memory connections to CPU.
 - Auxillary memory : Magnetic disks and magnetic tapes.
 - Associative memory
 - Cache memory
 - Virtual memory
3. I/O organisation (10 Periods)
 - a. Basis Input output system(BIOS)
 - Function of BIOS

- Testing and initialization
- Configuring the system
- b. Modes of Data Transfer
 - Programmed I/O : Synchronous, asynchronous and interrupt initiated.
 - DMA data transfer only concept

4. Architecture of multi processor systems (06 Periods)

- Forms of parallel processing
- Parallel processing and pipelines, basic characteristics of multiprocessor

INSTRUCTIONAL STRATEGY

Since the subject is theoretical one, the practical aspects should be taught along with the theory instruction. The students be given quiz tests and asked to give seminars on small topics. There is sufficient time in the subject and the students can be taken to laboratory for demonstration.

MEANS OF ASSESSMENT

- Assignments and quiz/class tests, mid-term and end-term written tests
- Viva-voce

LIST OF RECOMENEDED BOOKS

1. Computer Architecture and Organisation by Moris Mano
2. Computer Architecture by J.P.Hayes
3. Structured Computer Organisation By Tanenbaum Andrew S, PHI
4. e-books/e-tools/relevant software to be used as recommended by AICTE/HSBTE/NITTTR.

Websites for Reference:

<http://swayam.gov.in>

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (in periods)	Marks Allotted (%)
1.	18	35
2.	14	30
3.	10	20
4.	06	15
Total	48	100

4.4 MICROPROCESSORS AND PERIPHERAL DEVICES

L T P

3 - 3

RATIONALE

The study of microprocessors in terms of architecture, software and interfacing techniques leads to the understanding of working of CPU in a microcomputer. The development in microprocessors of 32 bit architecture brings the students face-to-face with mainframe enabling them to get employment in R&D, assembly, repair and maintenance of hardware of microprocessors and computers. Microprocessors find application in process control industry. They also form a part of the electronic switching system between source and destination in long distance telecommunications. Thus the microprocessor is an area of specialization. Students of electronics and related engineering branches often use microprocessors to introduce programmable control in their projects, in industrial training.

LEARNING OUTCOMES

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

- Describe all the internal parts and pins of 8085
- Write and Edit assembly language program using mnemonics
- Write, execute and debug assembly language programs for simple applications
- Interface various peripheral devices with microprocessor.
- Use various data transfer techniques in micro computers
- Describe the internal parts and pins of 8086

DETAILED CONTENTS

1. Evolution of Microprocessor (04 Periods)
Typical organization of a microcomputer system and functions of its various blocks.
Microprocessor, its evolution, function and impact on modern society
2. Architecture of a Microprocessor (With reference to 8085 microprocessor) (12 Periods)
Concept of Bus, bus organization of 8085, Functional block diagram of 8085 and function of each block, Pin details of 8085 and related signals, Demultiplexing of address/data bus generation of read/write control signals, Steps to execute a stored programme

3. Instruction Timing and Cycles (06 periods)
Instruction cycle, machine cycle and T-states, Fetch and execute cycle.
4. Programming (with respect to 8085 microprocessor) (08 Periods)
Brief idea of machine and assembly languages, Machines and Mnemonic codes.
Instruction format and Addressing mode.
5. Memories and I/O interfacing (08 periods)
Concept of memory mapping, partitioning of total memory space. Address decoding, concept of peripheral mapped I/O and memory mapped I/O. Interfacing of memory mapped I/O devices.
6. Interrupts (04 Periods)
Concept of interrupt, Maskable and non-maskable, Edge triggered and level triggered interrupts, Software interrupt, Restart interrupts and its use, Various hardware interrupts of 8085,
7. Data Transfer Techniques (04 Periods)
Concept of programmed I/O operations, sync data transfer, async data transfer (hand shaking), Interrupt driven data transfer, DMA, Serial output data, Serial input data
8. Architecture of 8086 Microprocessor (02 periods)
 - Block diagram
 - Pin and Signals
 - Diagram

LIST OF PRACTICALS

1. Familiarization of different keys of 8085 microprocessor kit and its memory map
2. Steps to enter, modify data/program and to execute a programme on 8085 kit
3. Writing and execution of ALP for addition and subtraction of two 8 bit numbers
4. Writing and execution of ALP for multiplication and division of two 8 bit numbers
5. Writing and execution of ALP for arranging 10 numbers in ascending/descending order
6. Writing and execution of ALP for 0 to 9 BCD counters (up/down counter according to choice stored in memory)
7. Interfacing exercise on 8255 like LED display control
8. Interfacing exercise on 8253 programmable interval timer

9. Interfacing exercise on 8279 programmable KB/display interface like to display the hex code of key pressed on display
10. Use of 8085 emulator for hardware testing

INSTRUCTIONAL STRATEGY

The digital systems in microprocessors have significant importance in the area of electronics. Adequate competency needs to be developed by giving sufficient practical knowledge in microprocessors (programming as well as interfacing). Help may be taken in the form of charts, simulation packages to develop clear concepts of the subject. Programming exercises other than the given in the list may be given to the students.

MEANS OF ASSESSMENT

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

RECOMMENDED BOOKS

1. Microprocessor Architecture, Programming and Applications with 8080/8085 by Ramesh S Gaonker, Willey Eastern Ltd. New Delhi
2. Introduction to Microprocessor by Mathur ,Tata McGraw Hill Education Pvt Ltd , New Delhi
3. Microprocessor and Microcontrollers by Dr BP Singh, Galgotia Publications, New Delhi
4. Microprocessor and Applications by Badri Ram: Tata McGraw Hill Education Pvt Ltd , New Delhi
5. Microprocessor and Microcomputers by Refiquzzaman, Prentice Hall of India Ltd., New Delhi.
6. Microprocessor programming & applications.by sudhir Goyal, North Publication.
7. Digital Logic and Computer Design by Mano, M Morris; Prentice Hall of India, New Delhi
8. Digital Electronics by Rajaraman; Prentice Hall of India Ltd., New Delhi
9. e-books/e-tools/relevant software to be used as recommended by AICTE/HSBTE/NITTTR.

Websites for Reference:

<http://swayam.gov.in>

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Periods)	Marks Allotted (%)
1.	04	07
2.	12	22
3	06	15
4	08	20
5.	08	15
6.	04	08
7.	04	08
8	02	05
Total	48	100

4.5 DATABASE MANAGEMENT SYSTEM

L T P
3 - 3

RATIONALE

Database and database systems have become an essential component of everyday life in modern society. This course will acquaint the students with the knowledge of fundamental concepts of DBMS and its application in different areas, storage, manipulation and retrieval of data using query languages. Oracle/My SQL/SQL Server can be use as package to explain concepts.

LEARNING OUTCOMES

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

- Define and describe the database
- Contrast and compile the design of database architecture
- Convert and compare the designs and differentiate between the keys
- Convert database in the form of tables
- Normalize the data
- Provide the security to the database
- Respond various queries in the SQL

DETAILED CONTENTS

1. Introduction (06 Periods)
Database Systems; Database and its purpose, Characteristics of the database approach, Advantages and disadvantages of database systems. Classification of DBMS Users; Actors on the scene, Database Administrators, Database Designers, End Users, System Analysts and Application Programmers,
2. Database System Concepts and Architecture (06 Periods)
Data models, schemas, instances, data base state. DBMS Architecture; The External level, The conceptual level, The internal level, Mappings. Data Independence; Logical data Independence, Physical data Independence. Classification of Database Management Systems- Centralized, Distributed, parallel and object based.
3. Data Modeling using E.R. Model (Entity Relationship Model) (06 Periods)
Data Models Classification; File based or primitive models, traditional data models, semantic data models. Entities and Attributes, Entity types and Entity sets, Key attribute and domain of attributes, Relationship among entities.

4. Relational Model: (10 Periods)
Relational Model Concepts: Domain, Attributes, Tuples cardinality, keys(Primary, Secondary, foreign, alternative keys) and Relations. Relational constraints and relational database schemes; Domain constraints, Key constraints and constraints on Null. Relational databases and relational database schemes, Comparison b/w E/R model and Relational model.
5. Normalization (10 Periods)
Trivial and non-trivial dependencies.
Non-loss decomposition and functional dependencies, First, Second and Third normal forms, Boyce/Codd normal form,
6. MYSQL/SQL (Structured Query Language) (10 Periods)
SQL* DDL (Data Definition Languages): Creating Tables, Creating a table with data from another table, Inserting values into a table, updating columns of a Table, Deleting Rows, Dropping a Table. DML (Data Manipulation Language): Grant and Revoke Command, Maintaining Database Objects, Commit and Rollback, various types of select commands, various types of joins, sub query, aggregate functions. Challenges of My SQL. Introduction to Big Data.

LIST OF PRACTICALS FOR DBMS

1. Exercises on creation and modification of structure of tables.
2. Exercises on inserting and deleting values from tables.
3. Exercises on querying the table (using select command).
4. Exercises on using various types of joins.
5. Exercises on commands like Grant, Revoke, Commit and Rollback etc.
6. Design of database for any application.

INSTRUCTIONAL STRATEGY

Explanation of concepts using real time examples, diagrams etc. For practical sessions books along with CDs or learning materials with specified activities are required. Various exercises and small applications should be given along with theoretical explanation of concepts.

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, development and viva-voce

RECOMMENDED BOOKS

- 1) Fundamentals of Database Management Systems by Dr Renu Vig and Ekta Walia, - an ISTE, Publication, New Delhi

- 2) Database Management Systems by Arun K Majumdar and P Bhattacharya, Tata McGraw Hill Education Pvt Ltd, New Delhi
- 3) Introduction to DBMS by by ISRD Group, Tata McGraw Hill Education Pvt Ltd, New Delhi
- 4) Database Management Systems by Alexis Leon and Mathews Leon; Vikas Publishing House Pvt. Ltd., New Delhi
- 5) An introduction to database systems by Date C.J. Adison Wesley
- 6) Fundamentals of Database Systems by Elmasri/Navathe/Adison Wesley
- 7) SQL Unleashed by Hans Ladanyi Techmedia Publications, 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>

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Periods)	Marks Allotted (%)
1	06	15
2	06	10
3	06	12
4	10	18
5	10	20
6	10	25
Total	48	100

SOFT SKILLS – II

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- - 2

RATIONALE

The present day world requires professionals who are not only well qualified and competent but also possess good communication skills. The diploma students not only need to possess subject related knowledge but also soft skills to get good jobs or to rise steadily at their work place. The objective of this subject is to prepare students for employability in job market.

LEARNING OUTCOMES

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

- Develop Communication Skills
- Work in a team
- Learn to resolve conflict by appropriate method
- Identify leadership traits and learn self motivation
- Follow ethics

DETAILED CONTENTS

- Concept of team building, behavior in a team
- Developing Interpersonal Relations- empathy, sympathy
- Communication skills-improving non-verbal communication
- Conflict Management
- Motivation
- Leadership
- Professional Ethics and Values
- Health, Hygiene, Cleanliness and Safety

In addition, the students must participate in the following activities to be organized in the institute

- Sports
- NCC/NSS
- Camp – Environment awareness
- Cultural Event

Note : Extension Lectures by experts may be organized. There will be no examination for this subject.

INDUSTRIAL TRAINING

Industrial training provides an opportunity to students to experience the environment and culture of industrial production units and commercial activities undertaken in field organizations. It prepares student for their future role as diploma engineers in the world of work and enables them to integrate theory with practice.

For this purpose, students at the end of fourth semester need to be sent for industrial training of 08 weeks duration to be organized during the semester break starting after IV Semester examinations. The concerned HODs along with other teachers will guide and help students in arranging appropriate training places relevant to their specific branch. It is suggested that a training schedule may be drawn for each student before starting of the training in consultation with the training providers. Students should also be briefed in advance about the organizational setup, product range, manufacturing process, important machines and materials used in the training organization.

Equally important with the guidance is supervision of students training in the industry/organization by the teachers. A teacher may guide a group of 4-5 students. A minimum of one visit per week by the teacher is recommended. Students should be encouraged to write daily report in their diary to enable them to write final report and its presentation later on.

An internal assessment of 100 and external assessment of 100 marks have been provided in the study and evaluation scheme of V Semester. Evaluation of professional industrial training report through viva-voce/presentation aims at assessing students understanding of materials, industrial process, practices in industry/field organization and their ability to engage in activities related to problem solving in industrial setup as well as understanding of application of knowledge and skills learnt in real life situations. The formative and summative evaluation may comprise of weightage to performance in testing, general behavior, quality of report and presentation during viva-voce examination. It is recommended that such evaluations may be carried out by a team comprising of concerned HOD, teachers and representative from industry. The components of evaluation will include the following.

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| a) Punctuality and regularity | 15% |
| b) Initiative in learning new things | 15% |
| c) Relationship with workers | 15% |
| d) Industrial training report | 55% |