Diploma CSE

Semester: I

S.NO	COURSE TITLE	COURSE CODE	TEACHING SCHEDULE PER WEEK				CREDITS	EVALUATION SCHEME						
			L	T	P	TOTAL		INTERNAL			EXTERNAL			All TOTAL
								Th.	Pr.	Tot.	Th.	Pr.	Tot.	
1	English	ENGL0111	2	0	2	4	5.5	40	25	65	60	50	110	175
2	Applied Mathematics-I	MATH0138	3	1	0	4	4.0	40	00	40	60	00	60	100
3	Applied Physics-I	PHYS0117	2	1	2	5	5.5	40	25	65	60	50	110	175
4	Engineering Graphics	MECH1103	1	0	2	5	3.0	40	25	65	60	25	85	150
5	Computer Fundamentals	CSEN1108	3	0	0	3	4.0	40	00	40	60	00	60	100
6	Information Technology Lab	CSEN1109	0	0	2	2	2.0	00	50	50	00	50	50	100
		Total	**11**	**02**	**08**	**21**	**24**		125	325	300	175	475	**800**

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

LEARNING OUTCOMES

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

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

DETAILED CONTENTS

1. Basics of Communication
1.1. Definition and process of communication
1.2. Types of communication – Verbal (Listening, Speaking, Reading and Writing) and Non-verbal
2. Functional Grammar
2.1. Noun and Pronoun
2.2. Punctuation
2.3. Preposition
2.4. Conjunction
2.5. Tenses (verb (Main verb and Auxiliary verb)
3. Reading Skills
3.1. Unseen passage for comprehension. Based upon the passage, flowing aspects may be covered
• Questions from the passage
• One-word substitution
• Prefixes and Suffixes
• Antonyms and Synonyms etc.
4. Writing skills
4.1. Correspondence – Business and official
4.2. Notice, including Press Releases
4.3. Memos
4.4. Circular
4.5. Basics of Report Writing

4.6. Resume Writing
4.7. Writing E-mail
4.8. Paragraph writing
4.9. Picture composition

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

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.

MODULE NAME: APPLIED MATHEMATICS-I
MODULE CODE: MATH0138

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1. Algebra

1.1 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.

1.2 Logarithms and its basic properties

1.3 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).

1.4 Permutation, combination formula, Values of $^{n}P_r$ and $^{n}C_r$.

1.5 Binomial theorem for positive integral index , General term, simple problems

2. Complex numbers

Definition of complex number, real and imaginary parts of a complex number, Polar and Cartesian Form and their inter conversion, Conjugate of a complex number, modulus and amplitude, addition subtraction, multiplication and division of complex number.

3. Trigonometry

3.1 Concept of angle: measurement of angle in degrees, grades, radians and their conversions.

3.2 T-Ratios of standard angle (00,300,450etc) and fundamental Identities, Allied angles (without proof) Sum, Difference formulae and their applications (without proof). Product formulae (Transformation of product to sum, difference and vice versa)

3.3 Applications of Trigonometric terms in engineering problems such as to find an angle of elevation, height, distance etc.

4. Co-ordinate Geometry

4.1 Point: Distance Formula, Mid Point Formula, Centroid of triangle and area of triangle.

4.2 Straight line: Slope of a line, equation of straight line in various standards forms (without proof); (slope intercept form, intercept form, one-point form, two-point form, normal form, general form), angle between two straight lines.

4.3 Circle: General equation of a circle and identification of centre and radius of circle. To find the equation of a circle, given:

* Centre and radius

* Coordinates of end points of a diameter

5. Differential Calculus

5.1 Definition of function; Concept of limits (Introduction only) and problems related to four standard limits only.

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

5.3 Differentiation of sum, product and quotient of functions.

5.4 Successive differentiation (up to 2nd order)

Application of differential calculus in:

(a) Rate measures

(b) Maxima and minima

6. **Integral Calculus**

6.1 Integration as inverse operation of differentiation with simple examples.

6.2 Simple standard integrals, Integrations by parts and related Simple problems

6.3 Evaluation of definite integrals with given limits.

6.4 Applications of integration: for evaluation of area under a curve and axes (Simple problems where the limits are given).

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.

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MODULE NAME: APPLIED PHYSICS-I
MODULE CODE: PHYS0117

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

Note: Teachers should give examples of engineering/technology applications of various concepts and principles in each topic so that students are able to appreciate learning of these concepts and principles. In all contents, SI units should be followed. Working in different sets of units can be taught through relevant software.

LEARNING OUTCOMES
- After undergoing this subject, the students will be able to:
- Identify physical quantities, parameters and select their units for use in engineering solutions.
- Find units and dimensions of different physical quantities.
- Represent physical quantities as scalar and vectors.
- Use basic laws of motions,
- Analyze and design banking of roads and apply conservation of momentum principle to explain recoil of gun etc.
- Define work, energy and power and their units. Solve problems about work and power
- State the principle of conservation of energy.
- Identify forms of energy, conversion from one form to another.
- Compare and contrast the physical properties associated with linear motion and rotational motion and give examples of conservation of angular momentum.
- Describe the surface tension phenomenon and its units, applications, effects of temperature on surface tension.
- Describe the viscosity of liquids.
- Define stress and strain, modulus of elasticity.
- State Hooke's law.
- Measure temperature in various processes on different scales.
- Distinguish between conduction, convection and radiation.
- Use equipments like Vernier calliper, screw gauge, Spherometer.

DETAILED CONTENTS

1. **Units and Dimensions**
1.1 Definition of Physics, Physical quantities (Fundamental and derived),

1.2 Units: fundamental and derived units,

1.3 Systems of units: CGS, FPS, MKS, SI

1.4 Definition of Dimensions;

1.5 Dimensional formulae and SI units of physical quantities (distance, displacement, area, volume, velocity, acceleration, momentum, force, impulse, work, power, energy, pressure, surface tension, stress, strain)

1.6 Principle of homogeneity of dimensions

1.7 Dimensional equations, Applications of dimensional equations; checking of correctness of equation, Conversion of system of unit (force, work)

2. Force and Motion
2.1 Scalar and vector quantities –(Definition and examples),

2.2 Addition of Vectors, Triangle & Parallelogram Law (Statement only),

2.3 Scalar and Vector Product (statement and formula only)

2.4 Definition of Distance, displacement, speed, velocity, acceleration

2.5 Force and its units, concept of Resolution of force

2.6 Newton's Law of motion (Statement and examples),

2.7 Linear Momentum, conservation of momentum (Statement only), Impulse

2.8 Circular motion: definition of angular displacement, angular velocity, angular acceleration, frequency, time period; Relation between linear and angular velocity.

2.9 Centripetal and centrifugal forces(definition and formula only)

2.10 Application of centripetal force in Banking of roads (derivation for angle of banking)

3. Work, Power and Energy
3.1 Work (Definition, Symbol, Formula and SI units)

3.2 Energy (Definition and its SI units), Examples of transformation of energy.

3.3 Kinetic Energy (Formula, examples and its derivation)

3.4 Potential Energy (Formula, examples and its derivation)

3.5 Law of conservation of mechanical energy for freely falling bodies (With Derivation)

3.6 Power (definition, formula and units)

3.7 Simple Numerical problems based on formula of Power

4. Rotational Motion
4.1 Rotational motion with examples

4.2 Definition of torque and angular momentum and their examples

4.3 Conservation of angular momentum (quantitative) and its examples
4.4 Moment of inertia and its physical significance, radius of gyration (definition, derivation and formula).
5. Properties of Matter
5.1 Definition of Elasticity, Deforming force, Restoring force, example of Elastic and plastic body,

5.2 Definition of Stress and strain with their types,

5.3 Hooke's law, Modulus of Elasticity (Young's, Bulk modulus and shear)

5.4 Pressure (definition, formula, unit), Pascals Law

5.5 Surface tension: definition, its units, applications of surface tension, effect of temperature on Surface tension

5.6 Viscosity: definition, units, effect of temperature on viscosity

5.7 Fluid motion, stream line and turbulent flow.

6. Heat and temperature

6.1 Definition of heat and temperature (on the basis of kinetic theory),

6.2 Difference between heat and temperature

6.3 Principles of measurement of temperature.

6.4 Modes of transfer of heat (Conduction, convection and radiation with examples).

6.5 Properties of heat radiation

6.6 Different scales of temperature and their relationship

LIST OF PRACTICALS (To perform minimum fourteen experiments)

1. To find diameter of solid cylinder using a vernier calliper

2. To find internal diameter and depth of a beaker using a vernier calliper and hence find its volume.

3. To find the diameter of wire using screw gauge

4. To find thickness of paper using screw gauge.

5. To determine the thickness of glass strip using a spherometer

6. To determine radius of curvature of a given spherical surface by a spherometer.

7. To verify parallelogram law of forces

8. To determine the atmospheric pressure at a place using Fortin's Barometer

9. To determine force constant of spring using Hooke's law

10. Measuring room temperature with the help of thermometer and its conversion in different scale.

11. To find the time period of a simple pendulum

12. To determine and verify the time period of Cantilever

RECOMMENDED BOOKS

1. Text Book of Physics for Class XI (Part-I, Part-II); N.C.E.R.T., Delhi

2. Applied Physics, Vol. I and Vol. II by Dr. HH Lal; TTTI Publications, Tata McGraw Hill, Delhi

3. Concepts in Physics by HC Verma, Vol. I & Vol.II, Bharti Bhawan Ltd. New Delhi

4. Engineering Physics by PV Naik, Pearson Education Pvt. Ltd, New Delhi

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

6. Practical Physics, by C. L. Arora, S Chand Publication

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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:

1)   First angle projection is to be followed.
2)   Minimum 20 sheets to be prepared.
3)   Instructions relevant to various drawings may be given along with Appropriate demonstration, before assigning drawing practice to the students.
4)   Students should be encouraged to use engineering graph book 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 the assembly from part details of objects
- Draw different section of various types of keys and cotter joints
- Draw various riveted joints

MODULE NAME-ENGINEERING GRAPHICS
MODULE CODE:
1.   **Introduction to engineering drawing**   **(01 sheet)**
  1.1   Definition of Engineering Drawing. Introduction to drawing instruments, materials, layout and sizes of drawing sheets and drawing boards, different grades of pencils to be used.
  1.2   Different types of lines in engineering drawing as per BIS specifications
  1.4   Free hand sketches of various kind of objects.
  1.5   Necessity of dimensioning, method and principles of dimensioning (mainly theoretical instructions)

1.6 Dimensioning of overall sizes, circles, threaded holes, chamfered surfaces, angles, tapered surfaces, hole.
1.7 Scales – their needs and importance (theoretical instructions), type of scales, definition of R.F. and length of scale.

2 Projections (02sheets)
2.1 Theory of orthographic projections (Elaborate theoretical instructions)
2.2 Projection of Points in different quadrant
2.3 Projection of Straight Line (1st and 3rd angle)
2.4 Fundamentals of isometric projections and isometric scale.

3 Common Symbols and Conventions used in Engineering (01 sheet)
3.1 Civil Engineering sanitary fitting symbols
3.2 Electrical fitting symbols for domestic interior installations
3.3 Safety symbols used in engineering works.

4 Detail and Assembly Drawing (02 sheets)
4.1 Principle and utility of detail and assembly drawings
4.2 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,.

5. Keys and Cotters (02 sheets)
5.1 Various types of keys and cotters - their practical application, drawings of various keys and cotters showing keys and cotters in position.
5.2 Various types of joints
- Gib and cotter joint
- Knuckle joint

6. Rivets and Riveted Joints (02 sheets)
6.1 Types of general purpose-rivets heads
6.2 Caulking and fullering of riveted joints
6.3 Types of riveted joints
(i) Lap joint-Single riveted, double riveted (chain and zig-zag type)
(ii) Single riveted, Single cover plate butt joint
(iii) Single riveted, double cover plate butt joint
(iv) Double riveted, double cover plate butt joint(chain and zig-zag type)

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.

MODULE NAME: COMPUTER FUNDAMENTALS
MODULE CODE: CSEN1108

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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
- List the features of the MS Word, MS-Exce1 &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**
   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   List types of memory used in a Computer.
   1.7   Generations of computers.
   1.8   Know importance of binary number system for use in Digital Computers.

2. **DOS & Windows Operating Systems**
   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
   2.5   List the features of Window desktop
   2.6   List the components of Window
   2.7   State the function of each component of Window 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 finding a file using search option
   2.12   Describe installing new software using control panel
   2.13   Describe uninstalling software using control panel
   2.14   Explain the procedure for changing resolution, color, appearances, and screensaver option of the display
   2.15   Narrate the process of changing the system date and time

3.	**Fundamentals of Internet**
	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 purpose of web browser software
	3.7	Describe the purpose of World Wide Web, FTP, telnet and E-mail
	3.8	Explain the process of sending and receiving-mail
	3.9	Describe DNS
	3.10	Describe the role of search engines with examples
	3.11	Know about social network sites

4.	**Understand Programming Methodology**
	4.1.	Programming development cycle algorithm
	4.2	Program flowchart and types
	4.3	Differentiate algorithm and flowchart
	4.4	Develop algorithms for simple problems
	4.5	The symbols used in flowcharts
	4.6	Programming Paradigms

RECOMMENDED BOOKS

1.	Fundamentals of Computer by E Ba1agurusamy, Tata McGraw Hill Education Pvt. Ltd, New Delhi
2.	Fundamentals of Computer by V Raja Raman; 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 Organization 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, NewDelhi
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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LIST OF PRACTICALEXERCISES

1. Windows Operating System.
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
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 shortcuts
   - 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 setup:
      - 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, auto text
      - Inserting date, time, special symbols, importing graphic images, drawing tools
   e) Tables and Borders:
      - Creating a table, formatting cells, use of different border styles, shading in tables, merging of cells, partition of cells, inserting and deleting a row in a table
      - Print preview, zoom, page set up, printing options
      - Using find, replace options
   f) Using Tools like:
      - Spell checker, help, use of macros, mail merge, thesaurus word content and statistics, printing envelops and 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 spreadsheets

b) Menu commands:

Create, format charts, organize, manage data, solving problem by analyzing data.
Programming with Excel Work Sheet, getting information while working

c) Workbooks:

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

I) Exchange data with other application:

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

7. PowerPoint Presentation (MS Office/Open Office)

a) Introduction to Power Point

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 ClipArt

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 slideshow?
- Viewing the presentation using slide navigator Slide transition
Animation effects, timing, order etc.

8. Internet and its Applications

a) Browsing and down loading of information from internet.

b) Sending and receiving-mail
- Creating a message Creating an address book
Attaching a file with e-mail message
- Receiving a message
- Deleting a message

9. Functioning of Antivirus
   a) Installation and updation of an antivirus.
   b) How to scan and remove the virus.
10. Types of Computer Networks.
11. Changing resolution, colour, appearances, and screensaver option of the display.
Installing and uninstalling of new software using control.

Semester: II

S.NO	COURSE TITLE	COURSE CODE	TEACHING SCHEDULE PER WEEK				CREDITS	EVALUATION SCHEME						
			L	T	P	TOTAL		INTERNAL			EXTERNAL			All TOTAL
								Th.	Pr.	Tot.	Th.	Pr.	Tot.	
1	Applied Mathematics-II	MATH0139	3	1	0	4	4.0	40	00	40	60	00	60	100
2	Applied Physics-II	PHYS0118	2	1	2	5	4.5	25	15	40	60	25	85	125
3	Applied Chemistry-I	CHEM0113	2	1	2	5	4.5	25	25	50	75	25	100	150
4	Fundamental of Electrical and Electronics Engg. /Applied Mechanics	ECEN0101/ MECH1104	2	0	2	4	5.5	40	25	65	60	50	110	175
5	Internet of Things & Artificial Intelligence Lab	CSEN1110	0	0	2	2	2.5	00	50	50	00	100	100	150
6	General Workshop Practice	MECH1105	0	0	3	3	2.0	00	50	50	00	50	50	100
		Total	11	02	08	21	23		125	325	300	175	475	800

MODULE NAME: APPLIED MATHEMATICS-II
Module Code: MATH0139

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1. Numerical Integration
Numerical integration by Trapezoidal Rule, Simpson's $1/3_{rd}$ Rule and Simpson's $3/8_{th}$ rule.

2. Differential Equations
Definition, order, degree and linearity of an ordinary differential equation. Solution of Ist order and Ist degree differential equation by variable separable method (Simple problems).

3. Vectors
Definition of vector and scalar quantities. Addition and subtraction of vectors. Dot product and cross product of two vectors. Thumb rule. Angle between two vectors, application of dot and cross product in engineering problems, scalar triple product and vector triple product.

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

5. Probability
Definition and laws on probability, concept of random variable, probability distribution (Binomial, Poisson and Normal) and their applications

6. Conic Section
Definitions and equations of Parabola, Ellipse and Hyperbola. Problems related to Parabola, Hyperbola and Ellipse.

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

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MODULE NAME: APPLIED PHYSICS-II
Module code: PHYS0118

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Unit-I: Wave motion and its applications

Wave motion, transverse and longitudinal wave motion with examples, Terms used in wave motion like displacement, amplitude, time period, frequency, wavelength, wave velocity; relationship among wave velocity, frequency and wave length . Simple Harmonic Motion (SHM): definition, examples

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

Wave Optics: Coherent Sources. Concept of Interference of light. Young's Double slit experiment. Theory of Fringes and fringe width.

Unit-II:
Electrostatics
Electric charge, unit of charge, conservation of charge. Coulombs law of electrostatics, Electric field, Electric lines of force (definition and properties), Electric field intensity due to a point charge. Definition of Electric flux, Gauss law (Statement and derivation). Capacitor and Capacitance (with formula and units), Series and parallel combination of capacitors (simple numerical problems)

Current Electricity
Electric Current and its Unit, Direct and alternating current, Resistance, Specific Resistance and Conductance (definition and units). Series and Parallel combination of Resistances. Ohm's law (statement and formula), Heating effect of current, Electric power and its units. Kirchhoff's laws (statement and formula). Meter bridge and wheatstone Bridge.

Unit-III: Electromagnetic Induction and Alternating Currents

Magnetic field, magnetic intensity, magnetic lines of force, magnetic flux and their units
Electromagnetic induction (definition). Laws of electromagnetic Induction. Alternating currents: RC and LC circuits.

Unit IV: Electronic and Semiconductor Devices:
Boolean Algebra: OR, NOR and NAND gates.
Semiconductor Electronics: Definition of Energy level, Energy bands, Types of materials (insulator, semi conductor, conductor) with examples, Intrinsic and extrinsic semiconductors, p-n junction diode and its V-I characteristics. Diode as rectifier – half wave and full wave rectifier (center tap only).

RECOMMENDED BOOKS
1. Text Book of Physics for Class XI (Part-I, Part-II); N.C.E.R.T., Delhi

2. Applied Physics, Vol. I and Vol. II by Dr. HH Lal; TTTI Publications, Tata McGraw Hill, Delhi

3. Concepts in Physics by HC Verma, Vol. I &Vol.II, Bharti Bhawan Ltd. New Delhi

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Basic Concepts of Chemistry   (07hrs)
    1.1 Definition of chemistry and its importance
    1.2 S.I. Units of pressure, volume, density, specific gravity, surface tension and viscosity
    1.3 Matter element, compound and mixtures, atoms, molecules, ions, symbols and formulae
    (recapitulation only)
    1.4 Writing chemical formula of simple chemical compounds and calculation of percentage
    composition of chemical compounds
    1.5 Chemical Equations, thermo-chemical equations, balancing of chemical equations by HIT
    and Trial method

Atomic Structure and Chemical Bonding   (11hrs)

    2.1 Introduction to atom and its constituent particles, Dalton's atomic theory, Rutherford's
    and Bohr's model of atom (overview only)

    2.2 Atomic number, mass number, isotopes, isobars and isotones

    2.3 Concept of atomic orbitals, shapes of s and p-orbitals, quantum numbers

    2.4 Aufbau principle, exclusion principle, Hund's rule and electronic configuration of
    elements upto (Z=30)

    2.5 Chemical bond, types of chemical bonding: ionic and covalent (sigma and pi bonds) with
    suitable examples.

Water   (10hrs)
    3.1 Sources of Water
    3.2 Types of water based on dissolved salts.
    3.2.1 Hard water, soft water
    3.2.2 Units to measure hardness in ppm(mg/l) and simple numerical, degree Clark and degree
    French
    3.3 Disadvantages of use of hard water in domestic and industrial applications(mainly boiler
    feed water)
    3.4 methods to remove hardness by
    3.4.1 Ion exchange process
    3.4.2 Lime soda process
    3.4.3 Reverse Osmosis method

Solutions   (07hrs)
    4.1 Concept of homogeneous solution, brief introduction in terms (i) Ionization (ii) Acidity (iii)
    Basicity (iv) equivalent weight abd gram equivalent weight with suitable examples
    4.2 Strength of a solution (i) Normality (ii) Molarity (iii) Molality
    4.3 Definition of pH, simple numerical and different industrial applications of pH.
    4.4 Buffer solution and applications of buffer.

Electrolysis   (05hrs)
5.1 Electronic concept of oxidation and reduction
5.2 Definition of the terms: Electrolyte, Non Electrolyte with suitable examples
5.3 Faraday's Laws of Electrolysis and simple numerical.

List of Practicals

1.   Volumetric analysis and study of apparatus used therein. Simple problems on volumetric
      analysis equation
2.   Preparation of standard solution of oxalic acid or potassium dichromate
3.   Determine the strength of solution of HCl with the help of a solution of NaOH and an
      intermediate solution of standard oxalic acid

4. Estimation of total dissolved solids (TDS) in water sample gravimetrically
5. Estimation of total alkalinity of water volumetrically
6. Determine the pH of given sample using pH meter
7. Determine the percentage purity of commercial sample like blue vitriol, 12.5 g. of which have been dissolved per litre. Given $M/20$ $Na_2S_2O_3$.
8. Determination of solubility of a solid at room temperature
9. To verify the first law of electrolysis (electrolysis of copper sulphate solution using copper electrode)

Recommended Books

1. Chemistry in Engineering by J.C. Kuriacose and J. Rajaram; Tata McGraw-Hill Publishing Company Limited, New Delhi
2. Engineering Chemistry by Dr. S. Rabindra and Prof. B.K. Mishra ; Kumar and Kumar Publishers (P) Ltd. Bangalore-40
3. A Text Book of Applied Chemistry-I by SS Kumar; Tata McGraw Hill, Delhi
4. Progressive Applied Chemistry –I and II by Dr. G.H. Hugar; Eagle Prakashan, Jalandhar
5. Engineering Chemistry by Jain PC and Jain M, Dhanpat Rai Publishers, Delhi
6. Chemistry of Engineering by Aggarwal CV
7. Chemistry for Environmental Engineers by Swayer and McCarty, McGraw Hill, Delhi
8. A Text Book of Applied Chemistry-I by Sharma and Others; Technical Bureau of India, Jalandhar

MODULE CODE: FUNDAMENTAL OF ELECTRICAL & ELECTRONICS ENGINEERING
Module Code: ECEN0101

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1. Semiconductor physics

1.1 Review of basic atomic structure and energy levels.
1.2 Concept of conductors, insulators and semiconductors.
1.3 Concept of extrinsic & intrinsic semiconductors, minority & majority charge carriers.

1.4 P&N type of semiconductors, effect of temperature on conductivity of conductors.

2. Semiconductor diode

2.1 PN junction diode.
2.2 Mechanism of current flow in PN junction diode.
2.3 Forward &Reverse biased conditions.
2.4 Drift &Diffusion currents & depletion layer.
2.5 Application of diode as half wave rectifier, full wave rectifier & bridge rectifier.

3. Electromagnetic induction

3.1 Concept of electromagnetic field produced by flow of electric current.
3.2 Magnetic circuit, concept of magneto motive force (mmf).
3.3 Flux, reluctance, permeability.
3.4 Analogy between electric & magnetic circuit.

4. AC fundamentals

4.1 Concept of alternating quantities.
4.2 Difference between AC & DC.
4.3 Concept of cycle, frequency,time period, amplitude, instantaneous value, average value r.m.s

value, maximum value, form factor and peak factor.

5. Introduction to bipolar transistors

5.1 Concept of bipolar transistors.
5.2 PNP& NPN transistors.
5.3 Mechanism of current flow in PNP&NPN transistors & their symbols.

6. Introduction to electrical machines

6.1 Transformer: principal of operation, constructional details of single phase transformer, turns ratio, efficiency, losses in a transformer.
6.2 DC machines: principal of operation, construction of DC motor& generator.
6.3 AC machines: principle & working of synchronous machines, single phase induction motor.

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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MODULE NAME: APPLIED MECHANICS
Module Code: MECH1104

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The subject Applied Mechanics deals with basic concepts of mechanics like laws of forces, moments, friction, center of gravity, laws of motion and simple machines which are required by the students for further understanding of other allied subjects. The subject enhances the analytical ability of the students.

1. **Introduction**
   1.1 Concept of engineering mechanics definition of mechanics, statics, dynamics, application of engineering mechanics in practical fields. Definition of Applied Mechanics.
   1.2 Definition, basic quantities and derived quantities of basic units and derived units
   1.3 Different systems of units (FPS, CGS, MKS and SI) and their conversion from one to another for density, force, pressure, work, power, velocity, acceleration
   1.4 Concept of rigid body, scalar and vector quantities

2. **Laws of forces**
   2.1 Definition of force, measurement of force in SI units, its representation, types of force: Point force/concentrated force & Uniformly distributed force, effects of force, characteristics of a force
   2.2 Different force systems (coplanar and non-coplanar), principle of transmissibility of forces, law of super-position
   2.3 Composition and resolution of coplanar concurrent forces, resultant force, method of composition of forces, laws of forces, triangle law of forces, polygon law of forces
   2.4 Free body diagram
   2.5 Equilibrant force and its determination 2.6 Lami's theorem (concept only)

3. **Moment**
   3.1 Concept of moment
   3.2 Moment of a force and units of moment
   3.3 Varignon's theorem (definition only)
   3.4 Principle of moment and its applications (Levers – simple and compound)
   3.5 Parallel forces (like and unlike parallel force), calculating their resultant.
   3.6 Concept of couple, its properties and effects

4. **Friction**
   4.1 Definition and concept of friction, types of friction, force of friction
   4.2 Laws of static friction, coefficient of friction, angle of friction, angle of repose, Cone of friction
   4.3 Equilibrium of a body lying on a horizontal plane, equilibrium of a body lying on a rough inclined plane.

5. **Centre of Gravity**
   5.1 Concept, definition of centroid of plain figures and center of gravity of symmetrical solid bodies
   5.2 Determination of centroid of plain and composite lamina using moment method only, centroid of bodies with removed portion
   5.3 Determination of centre of gravity of solid bodies - cone, cylinder, hemisphere and sphere

6. **Simple Machines**
   6.1 Definition of effort, velocity ratio, mechanical advantage and efficiency of a machine and their relationship, law of machines
   6.2 Simple and compound machine (Examples)

6.3 Definition of ideal machine, reversible and self-locking machine
6.4 Effort lost in friction, Load lost in friction, determination of maximum mechanical advantage and maximum efficiency
6.5 System of pulleys (first, second, third system of pulleys), determination of velocity ratio, mechanical advantage and efficiency
6.6 Working principle and application of wheel and axle, Weston's Differential Pulley Block, simple screw jack, worm and worm wheel, single and double winch crab.

APPLIED MECHANICS LAB

LIST OF PRACTICALS
1. Verification of the polygon law of forces using greaves and apparatus.
2. To verify the forces in different members of jib crane.
3. To verify the reaction at the supports of a simply supported beam.
4. To find the mechanical advantage, velocity ratio and efficiency in case of an
5. inclined plane.
6. To find the mechanical advantage, velocity ratio and efficiency of a screw jack.
7. To find the mechanical advantage, velocity ratio and efficiency of worm and
8. worm wheel.
9. To find mechanical advantage, velocity ratio and efficiency of single purchase crab.
10. To find out center of gravity of regular lamina.
11. To find out center of gravity of irregular lamina.
12. To determine coefficient of friction between three pairs of given surface.

MODULE NAME: INTERNET OF THINGS AND ARTIFICIAL INTELLIGENCE LAB
Module Code: CSEN1110

1. Introduction to Internet of Things (IoT)
2. Applications, architecture, protocols
3. Physical Design/Logical Design of IoT
4. Functional blocks of IoT, Communication Models.
5. Basics of C language using Arduino IDE
6. Variables, datatype, loops, control statement, function
7. Interfacing Light Emitting Diode (LED)- Blinking LED
8. Interfacing Liquid Crystal Display(LCD) – display data generated by sensor on LCD
9. Interfacing Air Quality Sensor-pollution (e.g. MQ135) - display data on LCD , switch on LED when data sensed is higher than specified value.
10. Interfacing Bluetooth module (e.g. HC05)- receiving data from mobile phone on Arduino and display on LCD
11. Understanding excel for analysing data
12. Introduction to Artificial Intelligence (AI), Machine Learning (ML), Deep Learning (DL).
13. Role of AI in IoT and its applications

REFERENCE BOOKS:

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

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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 hand on experience about use of different tools and basic manufacturing practices. This course aims at developing general manual and machining skills in the students. Besides above, the development of dignity of labour, precision, safety at workplace, team working and development of right attitude are the other objectives.

1. Carpentry Shop
1.1 Introduction to various types of wood such as Deodar, Kail, Partal, Teak, Mango, Sheesham, etc. (Demonstration and their identification).
1.2 Demonstration, function and use of commonly used hand tools. Care, maintenance of tools and safety measures to be observed.
Job I Marking, sawing, planning and chiseling & their practice (size should be mentioned)
1.3 Introduction to various types of wooden joints, their relative advantages and uses.
Job II Preparation of half lap joint
Job III Preparation of Mortise and Tenon Joint
1.4 Demonstration of various methods of painting wooden items.
Job IV Preparation of wooden surface before painting including primer coating
1.5 Safety precautions in carpentry shop

2. Fitting Shop
2.1 Introduction to fitting shop tools, common materials used in fitting shop, Identification of materials. Such as Steel, Brass, Copper, Aluminium etc. Identification of various sections of steel such as Flat, Angle, Tee, Channel, Bar Girder, Square, Z-Section, etc.
2.2 Description and demonstration of various types of work benches, holding devices and files. Precautions while filing.
2.3 Description and demonstration of simple operation of hack-sawing, demonstration and description of various types of blades and their specifications, uses and method of fitting the blade.
Job I Marking of job, use of marking tools and measuring instruments.
Job II Making a cutout from a square piece of MS Flat using hand hacksaw.
2.4 Care and maintenance of measuring tools like calipers, steel rule, try square, vernier calipers, micrometer, height gauge, combination set. Handling of measuring instruments, checking of zero error, finding of least count (all gauges including dial gauge).

3. Welding Shop
3.1 (a) Introduction to welding and its importance in engineering practice; types of welding; common materials that can be welded, introduction to welding equipment e.g.a.c. welding set, d.c. rectifier, electrode holder, electrodes and their specifications, welding screens and other welding related equipment, accessories and gloves.

(b) Safety precautions during welding

(c) Hazards of welding and its remedies

3.2 Electric arc welding, (a.c. and d.c.) precautions while using electric arc welding, Practice in setting current and voltage for striking proper arc. Earthing of welding machine.

Job I Welding practice on electric arc welding for making uniform and straight weld beads

3.3 Various types of joints and end preparation.

Job II Preparation of butt joint by electric arc welding.

Job III Preparation of lap joint by electric arc welding.

4. Electric Shop

4.1 Study, demonstration and identification of common electrical materials such as wires, cables, switches, fuses, ceiling roses, PVC Conduits, PVC Channels and allied items, tools along with electrical instruments such as voltmeter, ammeter and multimeter.

4.2 Study of electrical safety measures and demonstration about use of protective devices such as fuses, MCBs, ELCBs and relays including earthing.

Job I Identification of phase, neutral and earth of domestic appliances and their connection to two pin/three pin plugs.

4.3 Study of common electrical appliances such as electric iron, electric kettle, ceiling fan, table fan, electric mixer, electric Geyser, gas geyser, desert cooler, refrigerator, water purifier

5. Smithy Shop

5.1 Demonstration and detailed explanation of tools and equipment used. Forging operations in smithy shop. Safety measures to be observed in the smithy shop.

5.2 Demonstration and description of bending operation, upsetting operation, description and specification of anvils, swage blocks, hammers etc.

5.3 Demonstration and description of tongs, fullers, swages etc.

Job I To forge a L-hook.

Job II To prepare a job involving upsetting process

6. Sheet Metal Shop

Introduction to sheet metal shop, use of hand tools and accessories e.g. different types of hammers, hard and soft mallet, sheet and wire gauge, necessary allowance required

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

SEMESTER III

S.NO	COURSE TITLE	COURSE CODE	TEACHING SCHEDULE PER WEEK				CREDITS	EVALUATION SCHEME						
			L	T	P	TOTAL		INTERNAL			EXTERNAL			All TOTAL
								Th.	Pr.	Tot.	Th.	Pr.	Tot.	
1	Programming in C	CSEN2126	3	0	2	5	4	25	25	50	100	50	150	200
2	Operating Systems	CSEN2127	3	0	2	5	4	25	25	50	100	50	150	200
3	Digital Electronics	ECEN2122	3	0	2	5	4	25	25	50	100	50	150	200
4	Multimedia Applications	CSEN2128	3	0	2	5	4	25	25	50	100	50	150	200
5	Data Communication	CSEN2129	4	0	0	4	4	50	-	50	100	-	100	150
6	Soft Skills -I	VALU0151	0	0	2	2	-	-	25	25	-	-	-	25
		Total	16	00	10	26	20	150	125	275	500	200	700	975

PROGRAMMING IN C

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RATIONALE

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 program
- Explain and execute member functions of C in the program
- Describe and implement array concept in C program
- 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   Program 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**   (08 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

3   **Pointers**   (06 Periods)

    4.1.   Introduction to pointers
    4.2   Address operator and pointers
    4.3   Declaring and initializing pointers,
    4.4   Single pointer,

5.   **Functions**   (08 Periods)

    5.1   Introduction to functions
    5.2   Global and Local Variables
    5.3   Function Declaration
    5.4   Standard functions
    5.5   Parameters and Parameter Passing
    5.6   Call - by value/reference

6.   **Array and Strings**   (06 Periods)

    6.1.   Introduction to Arrays
    6.2.   Array Declaration, Length of array
    6.3   Single and Multidimensional Array.
    6.4   Arrays of characters
    6.5   Introduction of Strings
    6.6   String declaration and definition
    6.7   String Related function i.e. strlen, strcpy, strcmp
    6.8   Passing an array to function
    6.9   Pointers to an array and strings.

7.   **Structures and Unions**   (08 Periods)

    7.1   Declaration of structures
    7.2   Accessing structure members
    7.3   Structure Initialization
    7.4   Pointer to a structures,
    7.5   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.   Simple programs using pointers.
12.   Programs on one-dimensional array.

13.   Programs on two-dimensional array.
14.   (i) Programs for putting two strings together.
             (ii) Programs for comparing two strings.
15.   Simple programs using functions
16.   Simple programs using structures.
17.   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. Programmming 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.

OPERATING SYSTEMS

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RATIONALE

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)** (09 Periods)

   Process concept, Process State, Process Control Block, Scheduling Queues, Scheduler, Job Scheduler, Process Scheduler, Context Switch, Operations on Processes, Interprocess Communication, 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), Multiprocessor scheduling, Process Synchronization.

3. **Deadlocks (Principles and Brief Concept)** (04 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)** (09 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, Hardware support for paging, Protection and sharing, Disadvantages of paging, Segmentation, Virtual Memory.

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

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

6. **File Management (Principles and Brief Concept)** (04 periods)

Types of File System; Simple file system, Basic file system, Logical file system, Physical file system, Various Methods of Allocating Disk Space

7. **Linux Operating System** (09 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 Shell: concepts of command options, input, output,redirection, pipes, redirecting and piping with standard errors, Shell scripts,vi editing commands

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
9. Write a shell program that finds the factorial of a number.
10. Write a shell program that finds whether a given number is prime or not.
11. Write a shell program to find the average of three numbers.
12. Write a shell program that will convert all the text of the file from lowercase to uppercase.

INSTRUCTIONAL STRATEGY
This subject is both theory and practical oriental. 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.

DIGITAL ELECTRONICS

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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.

DETAILED CONTENTS

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.
   (a) Introduction to TTL and CMOS logic families

5. **Logic Simplification**   (04 Periods)

a) Postulates of Boolean algebra, De Morgan's Theorems. Implementation of Boolean (logic) equation with gates

b) Karnaugh map (upto 4 variables) and simple application in developing combinational logic circuits

6. **Arithmetic circuits**   (02 Periods)

a) Half adder and Full adder circuit, design and implementation.
b) 4 bit adder circuit

7. **Decoders, Multiplexers, De Multiplexers and Encoder**   (04 Periods)

a) Four bit decoder circuits for 7 segment display and decoder/driver ICs.
b) Basic functions and block diagram of MUX and DEMUX with different ICs
c) Basic functions and block diagram of Encoder

8. **Latches and flip flops**   (04 Periods)

a) Concept and types of latch with their working and applications
b) Operation using waveforms and truth tables of RS, T, D, Master /Slave JK flip flops.
c) Difference between a latch and a flip flop

9. **Counters**   (06 Periods)

a) Introduction to Asynchronous and Synchronous counters
b) Binary counters
c) Divide by N ripple counters, Decade counter, Ring counter

10. **Shift Register**   (06 Periods)

Introduction and basic concepts including shift left and shift right.

a) Serial in parallel out, serial in serial out, parallel in serial out, parallel in parallel out.
b) Universal shift register

11. **A/D and D/A Converters**   (06 Periods)

- Working principle of A/D and D/A converters
- Brief idea about different techniques of A/D conversion and study of :
    - Stair step Ramp A/D converter
    - Dual Slope A/D converter
    - Successive Approximation A/D Converter
- Detail study of :
    - Binary Weighted D/A converter
    - R/2R ladder D/A converter
- Applications of A/D and D/A converter.

12. **Semiconductor Memories**   (03 periods)

Memory organization, classification of semiconductor memories (RAM, ROM, PROM, EPROM, EEPROM, static and dynamic RAM, introduction to 74181 ALU IC

LIST OF PRACTICALS

1. Verification and interpretation of truth tables for AND, OR, NOT NAND, NOR and Exclusive OR (EXOR) and Exclusive NOR(EXNOR) gates

2. Realisation of logic functions with the help of NAND or NOR gates

3. - To design a half adder using XOR and NAND gates and verification of itsoperation
   - Construction of a full adder circuit using XOR and NAND gates and verify itsoperation

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, New Delhi

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

MULTIMEDIA APPLICATIONS

L T P
3 0 2

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, Multimedia 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 – benefits and problems.

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, Use of various codes like bar code, QR code in multimedia applications.

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, applying colour viewing and manipulating time line, animating, processing, guiding layers, importing and editing sound and video clips in flash

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.

8. Generation and recognition of bar code & QR code using pre built application/mobile applications.

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.

DATA COMMUNICATION

L T P
4 0 0

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**   (07 periods)

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

2. **Data and Signals**   (10 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
   Transmission Impairment- Attenuation, Distortion and noise
   Performance- bandwidth, throughput, latency, jitter

3. **Digital and Analog Transmission**   (10 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. **Multiplexing – FDM, WDM, TDM**   (07 periods)

5. **Transmission media**   (07 periods)
   Guided media-Twisted pair cable, Co-axial cable, fibre optics cable
   Unguided Media- radio wave, Microwave, Infrared

6. **Error Detection and Correction** (07 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.
General principles of error detection and correction using cyclic redundancy check

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.

SOFT SKILLS – I

L T P
0 0 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 organisation.

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.

SEMESTER IV

S.NO	COURSE TITLE	COURSE CODE	STUDY SCHEME/ HOURS		CREDITS	TEACHING SCHEDULE PER WEEK				EVALUATION SCHEME							
			Th	Pr		L	T	P	TOTAL	INTERNAL			EXTERNAL			All TOTAL
										Th.	Pr.	Tot.	Th.	Pr.	Tot.	
1	Data Structures Using C	CSEN2130	3	6	6	3	0	2	5	25	25	50	100	50	150	200
2	Object Oriented Programming Using JAVA	CSEN2131	3	6	6	3	0	2	5	25	25	50	100	50	150	200
3	Computer Organization	CSEN2132	3	-	3	3	0	2	5	50	-	50	100	-	100	150
4	*Microprocessors & Peripheral Devices	ECEN2123	3	3	4	3	0	2	5	25	25	50	100	50	150	200
5	Database Management System	CSEN2133	3	3	4	3	0	2	5	25	25	50	100	50	150	200
6	Soft Skills -II	VALU0152	-	2	-	0	0	2	2	-	25	25	-			25
	Total		15	20	23	15	0	12	27	150	125	275	500	200	700	975

DATA STRUCTURES USING C

L T P
3 0 2

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 pointer 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
    3.5   Doubly linked lists
    3.6   Operations on doubly linked lists (Insertion, deletion and traversals)

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   Circular Queues
    4.8   De-queues
    4.9   Application of Queues
    4.10   Recursion

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)
    5.4   Searching, inserting and deleting binary search trees
    5.5   Introduction to Heap

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, Merge
           Sort, Heap Sort

LIST OF PRACTICALS

Write programs 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.   Inserting and deleting elements in circular queue
7.   Insertion and deletion of elements in linked list
8.   Insertion and deletion of elements in doubly linked list
9.   The Factorial of a given number with recursion and without recursion
10.   Fibonacii series with recursion and without recursion
11.   Program for binary search tree operation
12.   The selection sort technique
13.   The bubble sort technique
14.   The quick sort technique
15.   The merge sort technique
16.   The binary search procedures to search an element in a given list
17.   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.

OBJECT ORIENTED PROGRAMMING USING JAVA

L T P
3 0 2

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 program 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**   (03 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
    1.3   Introduction of eclipse (IDE) for developing programs in Java

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** (08 Periods)

    3.1   Creation, accessing class members

    3.2   Private Vs Public Vs Protected Vs Default
    3.3   Constructors
    3.4   Object & Object Reference

4. **Inheritance** (09 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** (06 Periods)

Method & constructor overloading, method overriding, up-casting and down-casting.

6. **Abstract class & Interface** (06 Periods)

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

7. **Exception Handling** (06 Periods)

Definition of exception handling, implementation of keywords like try, catch, finally, throw & throws. importance of exception handling in practical implementation of live projects.

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

COMPUTER ORGANIZATION

L T P
3 0 2

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 multiprocessor 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 multiprocessor systems.

DETAILED CONTENTS

1. **Hardware organisation of computer system**   (16 periods)
   - CPU organisation: general register organisation, stack 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: Micro programmed 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
   - Memory management hardware
   - Read and Write operation

3. **I/O organisation** (08 periods)
   a. Basis Input output system(BIOS)
      o Function of BIOS
      o Testing and initialization
      o Configuring the system
   b. Modes of Data Transfer
      o Programmed I/O: Synchronous, asynchronous and interrupt initiated.
      o DMA data transfer

4. **Architecture of multiprocessor systems** (10 periods)

   - Forms of parallel processing
   - Parallel processing and pipelines, basic characteristics of multiprocessor
   - General purpose multiprocessors'
   - Interconnection networks: time shared common bus, multi port memory, cross bar switch, multi stage switching networks and hyper cube structures.

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.

L T P
3 0 2

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** (03 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)** (09 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, De-multiplexing of address/data bus generation of read/write control signals, Steps to execute a stored program

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)** (12 periods)

Brief idea of machine and assembly languages, Machines and Mnemonic codes. Instruction format and Addressing mode. Identification of instructions as to which addressing mode they belong. Concept of Instruction set. Explanation of the instructions of the following groups of instruction set. Data transfer group,

Arithmetic Group, Logic Group, Stack, I/O and Machine Control Group. Programming exercises in assembly language. (Examples can be taken from the list of experiments).

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** (03 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, Servicing interrupts, extending interrupt system

7. **Data Transfer Techniques** (03 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. **Peripheral devices** (02 periods)

8255 PPI, 8253 PIT and 8257 DMA controller

9 **Architecture of 8086 Microprocessor** (02 periods)
- Block diagram
- Minimum and Maximum mode
- Pin and Signals

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 sub station 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.

DATABASE MANAGEMENT SYSTEM

L T P
3 0 2

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 used 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, Workers behind the scene (DBMS system designers and implementers, tool developers, operator and maintenance personnel)

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. Database Languages and Interfaces; DBMS Language, DBMS Interfaces. Classification of Database Management Systems- Centralized, Distributed, parallel and object based.

3. **Data Modeling using E.R. Model (Entity Relationship Model)**   (05 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, Database design with E/R model.

4. **Relational Model:**   (08 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, Entity integrity, referential integrity and foreign key. Comparison b/w E/R model and Relational model.

5. **Normalization**   (08 Periods)

Trivial and non-trivial dependencies.

Non-loss decomposition and functional dependencies, First, Second and Third normal forms, Boyce Codd normal form, denormalization

6. **Database Access and Security**   (06 Periods)
Creating and using indexes, creating and using views.
Database security, process controls, database protection, grant and revoke

7. **MYSQL/SQL (Structured Query Language)**   (09 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): Database Security and Privileges, 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. Understanding Big Data with samples.

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 using functions provided by database package.

6. Exercises on commands like Grant, Revoke, Commit and Rollback etc.

7. 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.

SOFT SKILLS – II

L T P
0 0 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.