Curriculum for

Diploma Programme in

COMPUTER SCIENCE AND ENGINEERING

For the State of Punjab

(As per NSQF Guidelines)

Prepared by:

Curriculum Development Centre

National Institute of
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STUDY AND EVALUATION SCHEME FOR DIPLOMA PROGRAMME IN COMPUTER SCIENCE AND ENGINEERING

FIRST SEMESTER

Sr. No.	SUBJECTS	STUDY SCHEME Hrs/Week		Credit	MARKS IN EVALUATION SCHEME								Total Marks of **Int. & Ext.**
					INTERNAL ASSESSMENT			EXTERNAL ASSESSMENT					
		L/T	**P**		**Th**	**Pr**	**Tot**	**Th**	**Hrs**	**Pr**	**Hrs**	**Tot**	
1.1	*English and Communication Skills – I	3	2	4	20	10	30	50	3	20	3	70	100
1.2	*Applied Mathematics - I	4	-	4	50	-	50	50	3	-	-	50	100
1.3	*Applied Physics – I	3	2	4	20	10	30	50	3	20	3	70	100
1.4	*Environmental Studies	2	-	2	50	-	50	50	3	-	-	50	100
1.5	**Computer Fundamentals and Information Technology	2	2	3	20	10	30	50	3	20	3	70	100
1.6	*Engineering Drawing – I	-	6	3	-	50	50	50	3	-	-	50	100
1.7	+General Workshop – I	-	4	2	-	50	50	-	-	50	3	50	100
#Student Centred Activities including Traffic Awareness and Road Safety Camp(I)		-	5	-	-	-	-	-	-	-	-	-	-
Total		14	21	22	160	130	290	300	-	110	-	410	700

* Common course with other diploma programmes
** Common course with diploma in Information Technology
\+ Common course with diploma programmes in Electronics and Communication Engineering and Information Technology
\# SCA will comprise of co-curricular activities like extension lectures, games, hobby clubs e.g. photography etc., seminars, declamation contests, educational field visits, N.C.C., NSS, Cultural Activities and other activities to promote experiential learning.

SECOND SEMESTER (COMPUTER SCIENCE AND ENGINEERING)

Sr. No.	SUBJECTS	STUDY SCHEME Hrs/Week		Credit	MARKS IN EVALUATION SCHEME								Total Marks of **Int. & Ext.**
					INTERNAL ASSESSMENT			EXTERNAL ASSESSMENT					
		L/T	**P**		**Th**	**Pr**	**Tot**	**Th**	**Hrs**	**Pr**	**Hrs**	**Tot**	
2.1	*English and Communication Skills - II	3	2	4	20	10	30	50	3	20	3	70	100
2.2	*Applied Mathematics – II	3	-	3	50	-	50	50	3	-	-	50	100
2.3	*Applied Physics -II	2	2	3	20	10	30	50	3	20	3	70	100
2.4	*Applied Chemistry	3	2	4	20	10	30	50	3	20	3	70	100
2.5	**Basics of Electrical and Electronics Engineering	3	2	4	20	10	30	50	3	20	3	70	100
2.6	**Desk Top Publishing (DTP) Fundamentals	-	4	2	-	50	50	-	-	50	3	50	100
2.7	**Computer Workshop	-	4	2	-	50	50	-	-	50	3	50	100
2.8	+General Workshop – II	-	4	2	-	50	50	-	-	50	3	50	100
#Student Centred Activities including Traffic Awareness and Road Safety Camp(II)		-	1	-	-	-	-	-	-	-	-	-	-
Total		14	21	24	130	190	320	250	-	230	-	480	800

* Common Course with other diploma programmes
** Common course with diploma in Information Technology
\+ Common course with diploma programmes in Electronics and Communication Engineering and Information Technology
\# SCA will comprise of co-curricular activities like extension lectures, games, hobby clubs e.g. photography etc., seminars, declamation contests, educational field visits, N.C.C., NSS, Cultural Activities and other activities to promote experiential learning.

THIRD SEMESTER (COMPUTER SCIENCE AND ENGINEERING)

Sr. No.	SUBJECTS	STUDY SCHEME Hrs/Week		Credit	MARKS IN EVALUATION SCHEME								Total Marks of **Int. & Ext.**
					INTERNAL ASSESSMENT			EXTERNAL ASSESSMENT					
		L/T	**P**		**Th**	**Pr**	**Tot**	**Th**	**Hrs**	**Pr**	**Hrs**	**Tot**	
3.1	+Digital Electronics	3	2	4	20	10	30	50	3	20	3	70	100
3.2	**Computer Programming Using C	3	4	5	20	10	30	50	3	20	3	70	100
3.3	**Database Management System	3	4	5	20	10	30	50	3	20	3	70	100
3.4	**Operating Systems	3	2	4	20	10	30	50	3	20	3	70	100
3.5	**Internet and Web Technologies	2	4	4	20	10	30	50	3	20	3	70	100
3.6	Open Elective (Offline/MOOCs)	2	-	2	50	-	50	50	3	-	-	50	100
#Student Centred Activities including Energy Conservation Awareness Camp; Drug Use and Abuse Awareness Camp		-	3	-	-	-	-	-	-	-	-	-	-
	Total	16	19	24	150	50	200	300	-	100	-	400	600

** Common course with diploma in Information Technology

\+ Common course with diploma programmes in Electronics and Communication Engineering and Information Technology

\# SCA will comprise of co-curricular activities like extension lectures, games, hobby clubs e.g. photography etc., seminars, declamation contests, educational field visits, N.C.C., NSS, Cultural Activities and other activities to promote experiential learning.

FOURTH SEMESTER (COMPUTER SCIENCE AND ENGINEERING)

Sr. No.	SUBJECTS	STUDY SCHEME Hrs/Week		Credit	MARKS IN EVALUATION SCHEME								Total Marks of **Int. & Ext.**
					INTERNAL ASSESSMENT			EXTERNAL ASSESSMENT					
		L/T	**P**		**Th**	**Pr**	**Tot**	**Th**	**Hrs**	**Pr**	**Hrs**	**Tot**	
4.1	*Generic Skills and Entrepreneurship Development	3	-	3	50	-	50	50	3	-	-	50	100
4.2	**Data Structures	3	4	5	20	10	30	50	3	20	3	70	100
4.3	**Object Oriented Programming Using Java	3	4	5	20	10	30	50	3	20	3	70	100
4.4	**Computer Architecture	3	-	3	50	-	50	50	3	-	-	50	100
4.5	**Computer Network and Security	3	2	4	20	10	30	50	3	20	3	70	100
4.6	Minor Project	-	4	2	-	50	50	-	-	50	3	50	100
#Student Centred Activities including Entrepreneurial Awareness Camp		-	6	-	-	-	-	-	-	-	-	-	-
	Total	15	20	22	160	80	240	250	-	110	-	360	600

* Common Course with other diploma programmes

** Common course with diploma in Information Technology

\# SCA will comprise of co-curricular activities like extension lectures, games, hobby clubs e.g. photography etc., seminars, declamation contests, educational field visits, N.C.C., NSS, Cultural Activities and other activities to promote experiential learning.

Industrial Training - After examination of 4th Semester, the students will go for training in a relevant industry/field organisation for a minimum period of 6 weeks and shall prepare a diary. It shall be evaluated during 5th semester by his/her teacher for 50 marks. The students shall also prepare a report at the end of training and shall present it in a seminar, which will be evaluated for another 50 marks. This evaluation will be done by HOD and lecturer incharge – training in the presence of one representative from training organizations.

1.1 ENGLISH AND COMMUNICATION SKILLS – I

L	P
3	2

RATIONALE

Communication skills play 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.

LEARNING OUTCOMES

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

- Pronounce properly.
- Overcome communication barriers.
- Write legibly and effectively.
- Listen in proper prospective.
- Read various genres adopting different reading techniques.
- Converse logically.

DETAILED CONTENTS

1. Basics of Communication (12 hrs)

    1.1 Definition and process of communication
    1.2 Introduction to types of communication - formal and informal, oral and written, verbal and non-verbal
    1.3 Objectives of communication
    1.4 Essentials of communication
    1.5 Introduction to channels of communication - formal (upward, downward, diagonal, horizontal), informal (grapevine, consensus)
    1.6 Barriers to communication

2. Functional Grammar and Vocabulary (12 hrs)

    2.1 Parts of speech
    2.2 Article
    2.3 Tenses
    2.4 Subject verb agreement sentences
    2.5 Active and passive voice
    2.6 Synonyms and antonyms
    2.7 Pair of words
    2.8 Correction of incorrect sentences

3. Listening (04 hrs)

3.1 Meaning of listening
3.2 Listening and hearing
3.3 Importance of listening
3.4 Active listening – Meaning and strategies
3.5 Methods to improve listening skills

4. Speaking (03 hrs)

4.1 Importance
4.2 Methods to improve speaking

5. Reading (12 hrs)

5.1 Meaning
5.2 Techniques of reading: skimming, scanning, intensive and extensive reading
5.3 Comprehension, vocabulary enrichment and grammar exercises based on following readings:

Section - I

- My Struggle for an Education – Booker T. Washington
- Abraham Lincoln's letter to his son's headmaster – Abraham Lincoln
- Gateman's Gift – R.K Narayan
- The Selfish Giant - Oscar Wilde

Section - II

- Say Not, the Struggle Nought Availeth – A H Clough
- Stopping by Woods on a Snowy Evening – Robert Frost
- Where the Mind is Without Fear – Rabindranath Tagore

6. Writing (02 hrs)

6.1 Significance and effectiveness of writing
6.2 Paragraph writing – Word choice, sentence formation and construction of paragraph.

LIST OF PRACTICALS

1. Self and peer introduction
2. Newspaper reading
3. Just a Minute session – extempore
4. Situational conversation and role play
5. Language learning using open source software.

6. Greetings for different occasions
7. Improving pronunciation through tongue twisters.

INSTRUCTIONAL STRATEGY

Open source software should be used to help the students in developing listening skills. Student centred activities such as group discussions, role play should be used to ensure active participation of students in the classroom.

RECOMMENDED BOOKS

1. Revathi, Srinivas, "Communicating Effectively in English, Book-I", Abhishek Publications, Chandigarh.
2. Mohan, Krishna & Meera Banerji, "Developing Communication Skills (2nd Edition)", Published by Macmillan Publishers India Ltd; New Delhi.
3. Eastwood, John, "Oxford Practice Grammar", Oxford University Press, London
4. Chadha, R. K., "Communication Techniques and Skills", Dhanpat Rai Publications, New Delhi.
5. Wren & Martin, "High School English Grammar and Composition", S. Chand & Company Ltd., Delhi.
6. Kumar, Sanjay & Pushp Lata, "Communication Skills", Oxford University Press, New Delhi

WEBSITES FOR REFERENCE

1. http://www.mindtools.com/ page 8.html
2. http://www.letstalk.com.in
3. http://www.englishlearning.com
4. http://learnenglish.britishcouncil.org/en/

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (Out of 50)
1	12	12
2	12	12
3	04	6
4	03	3
5	12	15
6	02	2
Total	**45**	**50**

1.2 APPLIED MATHEMATICS - I

L	P
4	-

RATIONALE

Contents of this course provide fundamental base for understanding engineering problems and their solution algorithms. Contents of this course will enable students to use basic tools like binomial theorem, partial fractions, etc. for solving complex engineering problems with exact solutions in a way which involve less computational task. The analytical capabilities will enable the students to solve problems in engineering field.

LEARNING OUTCOMES

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

- Apply Complex Number and its representation for two dimensional designing and related calculations.
- Apply the basic concepts of permutation and combination to find out various ways or arrangements possible for a particular problem.
- Apply binomial theorem to find approximate value of certain expressions and extracting roots of certain expressions.
- Apply basics concepts of partial fractions to simplify the concept of rational expression.
- Solve engineering problems that are in matrix format by applying the basic understanding of matrices and their properties,
- Solve problems related to height, distance, elevation by making use of trigonometry.
- Write the equation of straight line and circle by using coordinate geometry.
- Optimize the utilization of resources by applying concepts of linear programming.

DETAILED CONTENTS

1. Algebra (20 hrs)

   1.1 Complex Numbers: Complex number, representation, modulus and amplitude.

   1.2 Partial fractions (linear factors, repeated linear factors, non-reducible quadratic factors excluding repeated factors).

   1.3 Meaning of ${}^{n}p_{r}$ & ${}^{n}c_{r}$ (mathematical expression). Binomial theorem (without proof) for positive integral index (expansion and general form); binomial theorem for any index (expansion without proof), first and second binomial approximation with applications to engineering problems.

   1.4 Introduction to Matrices and Determinants – Addition, subtraction and multiplication (upto 3 * 3 matrices), Determinants, simple properties, Crammer Rule.

2. Trigonometry (15 hrs)

   2.1 Introduction to T ratios, T-Ratios of Allied angles (without proof), Sum, Difference formulae and their applications (without proof). Product formulae (Transformation of product to sum, difference and vice versa). T-Ratios of multiple angles, sub-multiple angles (2A, 3A, A/2).

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

3. Co-ordinate Geometry (18 hrs)

   3.1 Cartesian and Polar coordinates (two dimensional), conversion from Cartesian to Polar coordinates and vice-versa

   3.2 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, symmetric form, normal form, general form), inter section of two straight lines, concurrency of lines, angle between straight lines.

   3.3 General equation of a circle and its characteristics. To find the equation of a circle, given:

   * Centre and radius
   * Three points lying on it
   * Coordinates of end points of a diameter

4. Operations Research (7 hrs)

4.1 Linear Programming Problems formulations.

4.2 Graphical Method

INSTRUCTIONAL STATREGY

Basic of algebra, trigonometry, coordinate geometry, operations research can be taught in the light of their applications in the field of engineering and technology. By laying more emphasis on applied part, teacher can also help in providing a good continuing education base to the students.

RECOMMENDED BOOKS

1. Grewal, BS, "Elementary Engineering Mathematics", Khanna Publishers, New Delhi
2. Sabharwal, SS & Dr Sunita Jain, "Applied Mathematics, Vol. I & II", Eagle Parkashan, Jalandhar
3. Sastry, SS, "Engineering Mathematics, Vol I & II", Prentice Hall of India Pvt. Ltd.,
4. Pal, Srimanta and Subodh C. Bhunia, "Engineering Mathematics", Oxford University Press, New Delhi

SUGGESTED DISTRIBUTION OF MARKS

Topic	Time Allotted (Hrs)	Marks Allotted (Out of 50)
1.	20	16
2.	15	12
3.	18	16
4	7	06
Total	**60**	**50**

1.3 APPLIED PHYSICS – I

L	P
3	2

RATIONALE

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

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

LEARNING OUTCOMES

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

- Select units of various physical quantities for use in engineering solutions.
- Represent physical quantities as scalar and vector.
- Use the concepts of force and motion to solve problems.
- Solve problems related to friction, work, power and energy,
- Comprehend properties of matter.
- Comprehend modes of heat transfer.
- Make measurements with accuracy.

DETAILED CONTENTS

1. Units and Dimensions (9 hrs)

    1.1 Physical quantities Units - fundamental and derived units, systems of units (FPS, CGS and SI units)
    1.2 Dimensions and dimensional formulae of physical quantities (area, volume, velocity, acceleration, momentum, force, impulse, work, power, energy, surface tension, stress, strain)
    1.3 Principle of homogeneity of dimensions
    1.4 Dimensional equations and their applications, conversion of units from one system to another for density, force, pressure, work, power, velocity and acceleration. Checking of dimensional equations
    1.5 Limitations of dimensional analysis

2. Force and Motion (10 hrs)

2.1 Scalar and vector quantities – examples, representation of vector, types of vectors
2.2 Addition and Subtraction of Vectors, Triangle and Parallelogram law (Statement only), Scalar and Vector Product.
2.3 Resolution of Vectors
2.4 Force, Momentum, Statement of Conservation of linear momentum, its applications
2.5 Impulse and its Applications
2.6 Circular motion, definition of angular displacement, angular velocity, angular acceleration, frequency, time period.
2.7 Relation between linear and angular velocity, linear acceleration and angular acceleration (Only Formula), Angular momentum and torque (definition only)
2.8 Concept of centripetal and centrifugal forces and their applications with examples such as banking of roads

3. Work, Power and Energy (8 hrs)

3.1 Work: and its units, examples of zero work, positive work and negative work
3.2 Friction: concept, types, laws of limiting friction
3.3 Energy and its units: Kinetic energy and gravitational potential energy with examples and their derivation
3.4 Principle of conservation of mechanical energy for freely falling bodies, examples of transformation of energy.
3.5 Power and its units, calculation of power in numerical problems

4. Properties of Matter (9 hrs)

4.1 Elasticity: definition of stress and strain, Modulii of elasticity (Only definition, No derivation) , Hooke's law, significance of stress strain curve
4.2 Pressure: definition, its units, atmospheric pressure, gauge pressure, absolute pressure
4.3 Surface tension: concept, its units, angle of contact, applications of surface tension, effect of temperature on surface tension
4.4 Viscosity and coefficient of viscosity: Terminal velocity, Stoke's law

5. Thermometry (9 hrs)

5.1 Difference between heat and temperature
5.2 Modes of transfer of heat (Conduction, convection and radiation with examples)
5.3 Different scales of temperature and their relationship
5.4 Expansion of solids, liquids and gases, coefficient of linear, surface and cubical expansions and relation amongst them
5.5 Concept of Co-efficient of thermal conductivity

LIST OF PRACTICALS (to perform minimum 8 experiments)

1. To find volume of solid sphere using a vernier caliper.
2. To find internal diameter and depth of a beaker using a vernier caliper and hence find its volume.
3. To find the diameter of wire using a screw gauge
4. To determine the thickness of glass strip using a spherometer
5. To verify parallelogram law of forces
6. To study conservation of energy of a ball or cylinder rolling down an inclined plane.
7. To determine the atmospheric pressure at a place using Fortin's Barometer
8. To determine the viscosity of glycerin by Stoke's method
9. To determine the coefficient of linear expansion of a metal rod
10. To determine force constant of spring using Hooks law

INSTRUCTIONAL STATREGY

Teacher may use various teaching aids like models, charts, graphs and experimental kits etc. for imparting effective instructions in the subject. The teacher should explain about field applications before teaching the basics. to develop proper understanding of the physical phenomenon. Use of demonstration can make the subject interesting and develop scientific temper in the students.

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", TTTI Publications, Tata McGraw Hill, Delhi
3. Verma, HC, "Concepts in Physics Vol. I & II", Bharti Bhawan Ltd. New Delhi
4. "Comprehensive Practical Physics, Vol, I & II", JN Jaiswal, Laxmi Publications (P) Ltd., New Delhi
5. Naik, PV, "Engineering Physics", Pearson Education Pvt. Ltd, New Delhi
6. Banwait, RA & R, Dogra, "Applied Physics I & II", Eagle Parkashan, Jalandhar
7. Bhhatacharya, DK & Poonam Tandan, "Engineering Physics", Oxford University Press, New Delhi

SUGGESTED DISTRIBUTION OF MARKS

Topic	Time Allotted (Hrs)	Marks Allotted (Out of 50)
1.	9	10
2.	10	12
3.	8	8
4.	9	10
5.	9	10
Total	**45**	**50**

1.4 ENVIRONMENTAL STUDIES

L	P
2	-

RATIONALE

Engineering activities require the use of natural resources which results in wide-ranging adverse effects on the environment. Natural replenishment of these recourses is practically impossible. This necessities that all technicians should know about the basics of ecology, environment and its functions, environmental pollution and management and environmental legislation which will enable them to accomplish their professional work with environmental compatibility. Hence this subject.

LEARNING OUTCOMES

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

- Comprehend the importance of ecosystem and environment.
- Demonstrate interdisciplinary nature of environmental issues.
- Identify different types of environmental pollution and control measures.
- Take corrective measures for the abetment of environmental pollutions.
- Compute the impact of human activities on the environment.
- Understand purpose of environmental legislation acts.
- Define energy management, energy conservation and energy efficiency
- Demonstrate positive attitude towards judicious use of energy and environmental protection
- Practice energy efficient techniques in day-to-day life and industrial processes.
- Adopt cleaner productive technologies
- Identify the role of non-conventional energy resources in environmental protection.

DETAILED CONTENTS

1. Introduction: (4 hrs)
   Basics of ecology, eco system and environment. Review of carbon, nitrogen, sulphur and water cycle)

2. Conservation of land reforms: (3 hrs)
   Desertification, Causes, effects and prevention. rain water harvesting, maintenance of ground water, deforestation – its effects and control measures

3. Environmental Pollution: (10 hrs)
   Sources of pollution - natural and man made, causes, effects and control measures of pollution (air, water, noise, soil and radioactive). Concept of BOD, COD and AQI, Prevention of Pollution- Introduction to Cleaner Production Technologies, Waste Minimization Techniques, Concept of Zero Discharge, Impact of Energy

Usage on Environment: Global Warming, Green House Effect, Depletion of Ozone Layer, Acid Rain.

4. Solid Waste management (3 hrs)
Classification of refuse material, sources, effects and control measures. Introduction to E-waste Management

5. Environmental Legislation (4 hrs)
Introduction to Water (prevention and control of pollution) Act, Air (Prevention and Control of Pollution) Act and Environmental Protection Act, Role and Function of State Pollution Control Board, Introduction to Energy Conservation Act & its importance, Concept of Environmental Impact Assessment (EIA)

6. Energy Conservation and Sustainable Development (6 hrs)
Introduction to Energy Management, Energy Conservation, Energy efficiency and its need. Role of Non-conventional Energy Resources (Solar Energy, Wind Energy, Bio mass energy, hydro energy) in environmental protection. Sustainable development, Concept of Green building and eco friendly materials.

INSTRUCTIONAL STRATEGY

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

RECOMMENDED BOOKS

1. Sharma, BR, "Environmental and Pollution Awareness", Satya Prakashan, New Delhi.
2. Khitoliya, Dr. RK, "Environmental Pollution", S Chand Publishing, New Delhi.
3. Deswal and Deswal, "Environmental Science", Dhanpat Rai and Co. (P) Ltd. Delhi.
4. Bharucha, Erach, "Environmental Studies", University Press (India) Private Ltd., Hyderabad.
5. Dhamija, Suresh K, "Environmental Engineering and Management", SK Kataria and Sons, New Delhi

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (Out of 50)
1	4	06
2	3	05
3	10	16
4	3	05
5	4	06
6	6	12
Total	**30**	**50**

1.5 COMPUTER FUNDAMENTALS AND INFORMATION TECHNOLOGY

L	P
2	2

RATIONALE

Information technology has great influence on all aspects of life. Almost all work places and living environment are being computerized. The subject introduces the fundamentals of computer system for using various hardware and software components. In order to prepare diploma holders to work in these environments, it is essential that they are exposed to various aspects of information technology such as understanding the concept of information technology and its scope; Operating a computer; Use of various office automation tools using MS Office/Open Office/Libre Office, Internet concepts. This exposure will enable the students to enter their professions with confidence.

LEARNING OUTCOMES

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

- Identify computer hardware components, network components and peripherals.
- Install application and utility software.
- Use word processing software to prepare document.
- Use spreadsheet software to create workbook and automate calculation.
- Use presentation software to create interactive presentation.
- Browse information on the Web.

DETAILED CONTENTS

1. Basic Concepts of IT and Its Application (2 hour)

   Information Technology concept and scope, applications of IT.

2. Computer Hardware: (6 hour)

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

3. Software Concepts: (2 hour)

   System software, Application software, Utility Software

4. MS-Word (6 hour)

Features, File Management, Page Setup, Editing a document, Formatting a document, Formatting paragraph, Using find, replace mail merge

5. MS-Excel (6 hour)

Features, Starting Excel, open worksheet, enter, edit, data formulae to calculate values, format data, create chart, printing chart, save worksheet

6. MS-PowerPoint (6 hour)

Features, Starting PowerPoint, Slide layout, templates etc. Opening a new/existing presentation, Different views for viewing slides, Adding text boxes, Adding/importing pictures, Adding movie and sound, Adding tables and chart etc.

7. Internet Concepts: (2 hour)

Introduction to LAN, WAN, PAN, MAN, Introduction of Internet, applications of internet like: e-mail and browsing, Various browsers.

LIST OF PRACTICAL EXERCISES

1. Given a PC, identify its basic hardware components, network components and peripherals. List their functions.

2. Installation of various application software and utility software.

3 Installation of I/O devices like scanner, printer and plotter.

4. Practice on various features/functions of Windows Operating System.

Word Processing (MS Word/Open Office Writer/Libre Office Writer)

5. Creating/opening, saving and printing a document
6. Editing and formatting a document
7. Setting paragraph and page margins.
8. Adding header, footer and page numbering
9. Creating, inserting and formatting a table.
10. Spell checker, inserting date, time, special symbols, importing graphic images, drawing tools.

Spread Sheet Processing (MS Excel/Open Office Calc/Libre Office Calc)

11 Creating/opening, saving and printing a worksheet.
12 Editing and formatting of worksheets including changing colour, size, font, alignment of text and cell formatting.
13 Using statistical functions like sum, avg, min, max, if, count and countif, lookup.
14 Creating and formatting a chart, Using charts to analyse data. Use of filters.

Presentation Software (MS Power Point/Open Office Impress/Libre Office Impress)

15. Creating, saving, opening and printing a presentation.
16. Different views of a slide.
17. Using slide layout and template.
18. Editing and formatting slides by adding titles, subtitles, text, background, watermark, table, charts, images and sound.
19. Viewing the slide show with slide transition, animation effect, timing and order.

Internet and its Applications

20. Creating an e mail account. Sending and receiving e-mail.
21. Browsing and down loading of information from internet.
22. Surfing different websites like institute website, State Board PSBTE website, DTE website, NITTTR, Chandigarh website, AICTE website, various search engines like google, bing etc.

INSTRUCTIONAL STRATEGY

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

RECOMMENDED BOOKS

1. Computer Fundamentals and Information Technology by Vipan Arora, Eagle Parkashan, Jalandhar
2. Computer Fundamentals by PK Sinha; BPB Publication, New Delhi
3. Fundamentals of Computer by V Rajaraman; Prentice Hall of India Pvt. Ltd., New Delhi
4. MS Office for Everyone by Sanjay Saxena; Vikas Publishing House Pvt. Ltd., Jungpura, New Delhi

5. Fundamentals of Information Technology by Leon and Leon; Vikas Publishing House Pvt. Ltd., Jungpura, New Delhi

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (Out of 50)
1	02	4
2	06	9
3	02	4
4	06	9
5	06	9
6	06	9
7	02	6
Total	**30**	**50**

1.6 ENGINEERING DRAWING - I

L	P
-	6

RATIONALE

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

Note:

i) First angle projection is to be followed
ii) Minimum of 16 sheets to be prepared and at least 3 sheets on AutoCAD
iii) Instructions relevant to various drawings may be given along with appropriate demonstrations, before assigning drawing practice to students

LEARNING OUTCOMES

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

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

DETAILED CONTENTS-CUM- PRACTICAL EXERCISES

1. Introduction to Engineering Drawing (03 sheets)

   1.1 Introduction to drawing instruments, materials, layout and sizes of drawing sheets and drawing boards.

   1.2 Different types of lines in Engineering drawing as per BIS specifications

   1.3 Practice of vertical, horizontal and inclined lines, geometrical figures such as triangles, rectangles, circles, ellipses and curves, hexagonal, pentagon with the help of drawing instruments.

   1.4 Free hand and instrumental lettering (Alphabet and numerals) – upper case (Capital Letter), single stroke, vertical and inclined at 75 degree, series of 5,8,12 mm of free hand and instrumental lettering of height 25 to 35 mm in the ratio of 7:4

2. Dimensioning Technique (01 sheet)

   2.1 Necessity of dimensioning, method and principles of dimensioning (mainly theoretical instructions)

   2.2 Dimensioning of overall sizes, circles, threaded holes, chamfered surfaces, angles, tapered surfaces, holes, equally spaced on P.C.D., counter sunk holes, counter bored holes, cylindrical parts, narrow spaces and gaps, radii, curves and arches

3. Scales (02 sheets)

   3.1 Scales –their needs and importance (theoretical instructions), type of scales, definition of R.F. and length of scale

   3.2 Drawing of plain and diagonal scales

4. Orthographic Projections (06 sheets)

   4.1 Theory of orthographic projections (Elaborate theoretical instructions)

   4.2 Projection of Points in different quadrant

   4.3 Projection of Straight Line (1^{st} and 3^{rd} angle)
   - 4.3.1. Line parallel to both the planes
   - 4.3.2. Line perpendicular to any one of the reference plane
   - 4.3.3. Line inclined to any one of the reference plane.

4.4 Projection of Plane – Different lamina like square, rectangular, triangular and circle inclined to one plane, parallel and perpendicular to another plane in 1st angle only

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

4.6 Identification of surfaces

5. Sections (02 sheets)

5.1 Importance and salient features

5.2 Drawing of full section, half section, partial or broken out sections, Offset sections, revolved sections and removed sections.

5.3 Convention sectional representation of various materials, conventional breaks for shafts, pipes, rectangular, square, angle, channel, rolled sections

5.4 Orthographic sectional views of different objects.

6. Isometric Views (02 sheets)

6.1 Fundamentals of isometric projections and isometric scale.

6.2 Isometric views of combination of regular solids like cylinder, cone, cube and prism.

7. Common Symbols and Conventions used in Engineering (02 sheets)

7.1 Civil Engineering sanitary fitting symbols

7.2 Electrical fitting symbols for domestic interior installations

*8. Introduction to Computer Aided Drafting (03 sheets)

Basic introduction and operational instructions of various commands in Computer Aided Drafting. At least three 2 D drawings using Computer Aided Drafting of cube, cuboid, cone, pyramid, truncated cone and pyramid, sphere and combination of above solids.

* **Computer aided drawing will be evaluated internally by sessional marks and not by final theory paper.**

INSTRUCTIONAL STRATEGY

Teacher should show model of realia of the component/part whose drawing is to be made. Emphasis should be given on cleanliness, dimensioning and layout of sheet. Focus should be on proper selection of drawing instruments and their proper use. The institute should procure AutoCAD or other engineering graphics software for practice in engineering drawings. Teachers should undergo training in AutoCAD/Engineering Graphic. Separate labs for practice on AutoCAD should be established.

RECOMMENDED BOOKS

1. Singh, Surjit, “A Text Book of Engineering Drawing”, Dhanpat Rai & Co., Delhi
2. Gill, PS, “Engineering Drawing”, SK Kataria & Sons, New Delhi
3. Bhatt, ND, “Elementary Engineering Drawing in First Angle Projection”, Charotar Publishing House Pvt. Ltd., Anand
4. Layall, JS, “Engineering Drawing I & II”, Eagle Parkashan, Jalandhar
5. Goel, DK, “Engineering Drawing I”, GBD Publication.

1.7 GENERAL WORKSHOP – I
(For Computer Science and Engineering, Information Technology, Electronics and Communication Engineering)

L	P
-	4

RATIONALE

In order to have a balanced overall development of diploma engineers, it is necessary to integrate theory with practical. General workshop practical included in the curriculum in order to provide hands-on practical knowledge of different tools and basic manufacturing processes. Basic knowledge of workshop technology and practical in various workshops develop the attitude of team working, safety awareness and development of right attitude. This subject provides miniature industrial environment in the educational institute.

LEARNING OUTCOMES

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

- Identify shop wise tools and equipment, their types, specifications and use with proficiency.
- Identify different types of materials, their uses and to maintain tools, equipment etc.
- Use and take measurements with the help of basic measuring tools/instrument.
- Select proper tools for a particular operation and use hand tools in different workshops with predefined outcome.
- Select materials, tools, and sequence of operations to make a job as per given specification/drawing.
- Prepare simple jobs independently and inspect the same according to drawing.
- Operate various tools and equipment in different workshops with predefined outcome, performance, standards.
- Follow the safety procedures and precautionary measures in different workshop with zero accidents.

DETAILED CONTENTS CUM PRACTICAL EXERCISES

Note: The students are supposed to come in proper workshop uniform prescribed by the institute. Wearing shoes in the workshop(s) is compulsory. Importance of safety and cleanliness, safety measures and upkeep of tools, equipment and environment in each of the following workshops will be explained for conduct of practical. The students should prepare sketches of various tools/jobs sequence of operations etc. in their practical notebook.

The following shops are included in the syllabus:

1. Welding Shop –I
2. Fitting Shop –I
3. Sheet Metal Shop –I
4. Electric Shop-I
5. Carpentry Shop –I
6. Electronic Shop –I

1. WELDING SHOP –I

1.1 Safety precautions of concerned shop and use of Personal Protective Equipment (PPE). Introduction and importance of welding as compared to other material joining processes. Classification of welding processes. Specifications and type of welding machines, welding parameters, welding methods, welding joints and welding positions. Classification and coding of electrodes and functions of electrode coating ingredients.

1.2 Demonstration of hand tools, arc welding machines, equipment and materials to be welded.

1.3 Jobs to be prepared:

Job I Practice of striking arc (Minimum 4 beads on 100 mm long M.S. flat) and Practice of depositing beads at different current levels. (Minimum 4 beads on M.S. flat at four different setting of current level).

Job II Making a lap joint using arc welding (SMAW) on MS Flat.

2. FITTING SHOP –I

2.1 Safety precautions of concerned shop and use of Personal Protective Equipment (PPE). Introduction, functions, classification, specification and use of various types of holding, cutting, marking and measuring tools used in fitting shop like-Bench vice, V block, C clamp, Ball peen hammer, scriber, punches, files, hacksaw, surface plate, try square, calipers, steel rule, Vernier calliper, Micrometre and Vernier height gauge etc. Identification of materials like-Iron, Copper, Stainless Steel, Aluminium etc.), Identification of various steel sections like-flat, angle, channel, bar etc.). Introduction to various fitting shop operations/processes (Hacksawing, Drilling, Chipping and Filing).

2.2 Demonstration of various types of holding, cutting, marking and measuring tools used in fitting shop.

2.3 Jobs to be prepared:

Job I To make a rectangular job by performing the operations: Sawing, Marking, filing on MS work piece (75 x 50 x 6 mm) by making sides at 90 degree and surface flatness at 180 degrees and to maintain dimensions within an accuracy of ± 0.25 mm.

Job II To Make 'V' type cut-out profile from a square piece of MS flat using hand hacksaw, filing, marking and measuring operations.

3. SHEET METAL SHOP – I

3.1. Safety precautions of concerned shop and use of Personal Protective Equipment (PPE). Introduction and functions of various types of tools used in sheet metal shop: - snips, hand shearing, measuring tools, marking tools, striking tools and bending tools including types of stakes. Introduction and importance to different types of joints and fasteners used in sheet metal work. Introduction and purpose of different metals used in sheet-metal work-black iron, galvanized iron, aluminium and stainless steel. Introduction of different types of Rivets, types of riveted joints, advantages, disadvantages and applications.

3.2 Demonstration of various types of holding, cutting, marking and bending tools used in fitting shop. demonstration of various raw materials used in sheet metal shop e.g. black-iron sheet, galvanized-iron plain sheet, galvanised corrugated sheet, aluminium sheet etc.

3.3 Jobs to be prepared:

Job I Shearing and bending practice on a sheet using hand shears/snips and stakes.

Job II To fabricate different types of sheet metal joint such as lap joint-single seam/double seam.

4. ELECTRIC SHOP - I

4.1 Safety precautions of concerned shop and use of Personal Protective Equipment (PPE). Introduction, functions and specifications of different types of tools, wires, cables, switches, fuses, cleats, clamps, allied items, and accessories used in Electric shop. Introduction to battery charger and its functioning. Introduction to common electrical appliances such as auto electric iron, electric kettle, ceiling/table fan, desert cooler etc. Introduction to lead acid battery and nickel cadmium battery.

4.2 Demonstration and identification of common electrical materials with standard ratings and specifications such as wires, cables, switches, fuses, cleats, clamps and allied items, tools and accessories. Demonstration of common electrical appliances such as auto electric iron, electric kettle, ceiling/table fan, desert cooler etc. Demonstration of lead acid battery and nickel cadmium battery.

4.3 Job Practice:

Job I Identification of phase, neutral, earth wires for connection to domestic electrical appliances and their connections to three pin plugs.

Job II Practice in making series and parallel circuit. Make one lamp control by one switch circuit.

Job III Installation of battery and connecting two or three batteries in series and parallel.

5. CARPENTRY SHOP – I

5.1 Safety precautions of concerned shop and use of Personal Protective Equipment (PPE). Introduction to wood, timber their properties, uses & defects and their joints. Seasoning of wood and its advantages. Introduction, specifications and function of various types of tools used in carpentry (such as different types of Saws, C-Clamp, Chisels, Carpenter's vice, Mallets, Marking gauges, Scriber, Try-square, Steel tape, Wooden plane, Metallic Jack plane, Rulers) by segregating as cutting tools, supporting tools, holding tools, measuring tools etc. Types of wooden joints. Techniques/method of sharpening of jack plane cutter/blade.

5.2 Demonstration of wood/timber, seasoning, various types of tools used in carpentry shop. Types of wooden joints.

5.3 Jobs to be Prepared:

Job 1 To make a rectangular wooden piece involving operations like-plaining, marking, sawing and measuring.

Job II Iron jack plane blade/cutter sharpening and Chisel sharpening practice.

Job III To make a Half Lap Joint (cross, L or T shape – any one)

6. ELECTRONIC SHOP – I

6.1 Safety precautions of concerned shop and use of personal protective equipment (PPE), Difference between electrical and electronic devices, Tools used in electronics workshop - Tweezers, Screw drivers (different sizes), Insulated Pliers, Cutter, Snipper, Crimping tool, different types of Screw Drivers, L-Keys, Soldering Iron, Files, multimeter (analog and digital)

6.2 Demonstrate the jointing methods. mounting and dismantling as well as uses of the items mentioned below:

Various tools used in electronics shop. Various types of single, multi-cored insulated screened power, audio video, co-axial, general purpose wires/cables. Various types of fuses (slow acting, fast acting, thermal fuse and glass fuse). Various switches

6.3 Job Practice

Job I To make perfect solder joints and exposure to modern soldering and re soldering process.

Job II To make soldering on PCBs and to remove components/wires by de-soldering.

Job III Cut, strip, connect/solder/crimp different kinds of wires/cables (including coaxial and shielded cable) to different types of power/general purpose/ audio video/ telephone plugs, sockets jacks, terminal, binding, posts, terminal strips, connectors.

Note:

1. Workshop instructors will guide and help the students throughout the practical class in order to explain and complete the job according to syllabus and for providing necessary facilities to the students during performance of practical by observing the safety precautions

2. The Workshop Superintendent or Foreman Instructor or Instructor will demonstrate and deliver the theoretical instructions with regard to introduction, functions, classification and specification of tools, instruments, equipment, apparatus etc. of all the topics covered in the syllabus of workshops.

3. The Workshop Superintendent or Foreman Instructor will also conduct the mid-term test and final practical exam of this subject.

RECOMMENDED BOOKS

1. Workshop Practice By Swaran Singh, S.K. Kataria & Sons Publisher of Engineering Books New Delhi.
2. Workshop Practice by HS Bawa; Tata McGraw Hill Publishers, New Delhi.
3. Workshop Technology I, II, III, by SK Hajra, Choudhary and AK Choudhary; Media Promoters and Publish ers Pvt. Ltd. Mumbai
4. Workshop Technology Vol. I, II, III by Manchanda; India Publishing House, Jalandhar
5. Workshop Technology by B.S. Raghuwanshi; Dhanpat Rai and Co., New Delhi

TRAFFIC AWARENESS & ROAD SAFETY CAMP (I)

A diploma holder must have knowledge of various types of traffic rules and regulations. Road safety education is vital for people of all ages. As a responsible citizen, you should be aware of each and every road safety rules. Observation is the key skill you need in ensuring road safety By obeying safety rules and regulations, you can save yourself and others on the road. This camp covers the basic concepts of traffic rules and safety. Lectures will be delivered on following broad topics with the coordination of Distt. Traffic police. There will be no exam for this camp.

1. Road safety Scenario
2. School bus and traffic management
3. Awareness of Traffic Signs
4. Speeding Limit
5. Always Wear your Shields
6. Overtaking
7. Awareness through Hoardings
8. Walking & Safe cycling

2.1 ENGLISH AND COMMUNICATION SKILLS - II

L	P
3	2

RATIONALE

Communication skills play 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.

LEARNING OUTCOMES

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

- Make proper oral presentations.
- Speak confidently.
- Debate properly.
- Write accurate official/business letters.
- Respond to telephone calls effectively.
- Overcome communication barriers.

DETAILED CONTENTS

1. Functional Grammar and Vocabulary (12 hrs)

   Theory and Practical exercises on following:
   1.1 One word substitution
   1.2 Functional Grammar and Vocabulary
   1.3 Prefixes and Suffixes
   1.4 Punctuation
   1.5 Narration
   1.6 Idioms and Phrases

2. Reading (9 hrs)
   Comprehension, Vocabulary enrichment and grammar exercises based on the following readings:

   Section-I

   - The Last Leaf - O' Henry
   - Sparrows - K A Abbas
   - The Postmaster - Rabindra Nath Tagore

Section-II

- Night of the Scorpion - Nissim Ezekiel
- All the World is a Stage - William Shakespeare
- Success – Emily Dickenson
- Daffodils – William Wordsworth

3. Writing (24 hrs)

3.1 Writing Resume and Cover letter
3.2 Correspondence: Business and Official
3.3 Report Writing – Introduction and features of good report.
3.4 Press Release
3.5 Memos and Circulars
3.6 Notices (lost, found, and auction)
3.7 Agenda and Minutes of Meetings
3.8 Filling-up different forms such as bank form and on-line form for placement etc.
3.9 Precis Writing
3.10 E mail writing

LIST OF PRACTICALS

1. Group discussion on some current topic of interest.
2. Small speech using voice modulation.
3. Debate
4. Manners and Etiquette
5. Power point presentation
6. Telephonic conversation: General etiquette for making and receiving calls.
7. Mock interviews

INSTRUCTIONAL STRATEGY

Open source software should be used to help the students in developing listening skills. Student centred activities such as group discussions, role play should be used to ensure active participation of students in the classroom.

RECOMMENDED BOOKS

1. Revathi, Srinivas, "Communicating Effectively in English, Book-I", Abhishek Publications, Chandigarh.
2. Mohan, Krishna & Meera Banerji, "Developing Communication Skills (2nd Edition)", Published by Macmillan Publishers India Ltd; New Delhi.
3. Eastwood, John, "Oxford Practice Grammar", Oxford University Press, London

4. Chadha, R. K., "Communication Techniques and Skills", Dhanpat Rai Publications, New Delhi.
5. Wren & Martin, "High School English Grammar and Composition", S. Chand & Company Ltd., Delhi.
6. Kumar, Sanjay & Pushp Lata, "Communication Skills", Oxford University Press, New Delhi

WEBSITES FOR REFERENCE

1. http://www.mindtools.com/ page 8.html
2. http://www.letstalk.com.in
3. http://www.englishlearning.com
4. http://learnenglish.britishcouncil.org/en/

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (Out of 50)
1	12	12
2	9	12
3	24	26
Total	**45**	**50**

2.2 APPLIED MATHEMATICS – II

L	P
3	-

RATIONALE

Applied mathematics forms the backbone of engineering students. Basic elements of differential calculus, integral calculus and differential equations have been included in this course. This will develop analytical abilities to apply in engineering field and will provide continuing educational base to the students.

LEARNING OUTCOMES

After undergoing the subject, students will be able to:

- Apply differential calculus to solve max/min and related rate measure problems.
- Apply concepts of definite integrals to calculate the area of a curve bounded by axes.
- Evaluate complex integrals in a simpler way by applying definite integral.
- Solve engineering problems by making use of ordinary differential equations.

DETAILED CONTENTS

1. Differential Calculus (18 hrs)

1.1 Definition of function; Introduction to limit and continuity (definition only).

1.2 Standard differentiation of algebraic, trigonometric, inverse trigonometric functions, logarithmic function and exponential function.

1.3 Differentiation of sum, product and quotient of functions, Differentiation of function of a function, differentiation of implicit functions and parametric functions.

1.4 Logarithmic differentiation and successive differentiation (excluding nth order).

1.5 Application of differential calculus in:

(a) Rate Measures

(b) Maxima and minima (single variable functions) using second order derivative only

(c) Equation of tangent and normal to a curve (for explicit functions only)

2. Integral Calculus (22 hrs)

2.1 Indefinite integrals, Integration as inverse operation of differentiation with simple examples.

2.2 Standard integrals and related simple problems

2.3 Simple integration by substitution, by parts and by partial fractions (for linear factors only)

2.4 Evaluation of definite integrals (simple problems)

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

using formulae without proof (m and n being positive integers only).

2.5 Applications of integration for evaluation of area bounded by a curve and axes (Simple problems).

3. Differential Equations (5 hrs)

3.1 Definition, order, degree of ordinary differential equations.

3.2 Formation of differential equation (up to 2^{nd} order). Solution of Differential equations with Variable separation and Linear Differential equations.

INSTRUCTIONAL STATREGY

Basic elements of Differential Calculus, Integral Calculus, and Differential Equations can be taught in the light of their applications in the field of engineering and technology. By laying more stress on applied part, teachers can also help in providing continuing education base to the students.

RECOMMENDED BOOKS

1. Grewal, BS, "Elementary Engineering Mathematics", Khanna Publishers, New Delhi

2. Engineering Mathematics by Vol. I & II by S Kohli, IPH, Jalandhar

3. Sabharwal, SS & Dr Sunita Jain, "Applied Mathematics, Vol. I & II", Eagle Parkashan, Jalandhar

4. Engineering Mathematics, Vol I, II & III by V Sundaram et al, Vikas Publishing House (P) Ltd., New Delhi

5. Sastry, SS, "Engineering Mathematics, Vol I & II", Prentice Hall of India Pvt. Ltd.,

6. Pal, Srimanta and Subodh C. Bhunia, "Engineering Mathematics", Oxford University Press, New Delhi

SUGGESTED DISTRIBUTION OF MARKS

Topic	Time Allotted (Hrs)	Marks Allotted (Out of 50)
1	18	20
2	22	25
3	5	05
Total	**45**	**50**

2.3 APPLIED PHYSICS – II

L	P
2	2

RATIONALE

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

LEARNING OUTCOMES

After undergoing this subject, the student will be able to;

- Apply the concept of wave motion
- Illustrate laws of reflection and refraction of light.
- Comprehend the phenomenon related to electrostatics
- Comprehend the terms and laws related to electricity and magnetism.
- Make use of laser for engineering applications.

DETAILED CONTENTS

1. Wave motion and its Applications (6 hrs)

   1.1 Wave motion, transverse and longitudinal wave motion with examples, sound and light waves, relationship among wave velocity, frequency and wave length and its application
   1.2 Free, forced and resonant vibrations with examples
   1.3 Acoustics of buildings – reverberation, reverberation time, echo, noise, coefficient of absorption of sound, methods to control reverberation time and their applications
   1.4 Ultrasonics – Introduction and applications.

2. Optics (6 hrs)

   2.1 Laws of reflection and refraction, refractive index, lens formula for thin lenses, power of lens, magnification
   2.2 Total internal reflection and its applications, Critical angle and conditions for total internal reflection
   2.3 Simple and compound microscope, astronomical telescope in normal adjustment, magnifying power (Only formula).

3. Electrostatics (6 hrs)

3.1 Coulombs law, unit of charge,
3.2 Electric field, Electric lines of force and their properties, Electric flux, Electric potential and potential difference
3.3 Capacitor and its working principle, Capacitance and its units. Capacitance of parallel plate capacitor (No derivation), Series and parallel combination of capacitors (numericals)
3.4 Dielectric and its effect on capacitance, dielectric break down

4. Electricity and Magnetism (9 hrs)

4.1 Electric Current and its Unit, Direct and alternating current,
4.2 Resistance and its Units, Specific Resistance, Conductance, Specific Conductance, Series and Parallel combination of Resistances. Factors affecting Resistance, Superconductivity (concept only)
4.3 Ohm's law and its verification
4.4 Kirchhoff's laws, Wheatstone bridge principle
4.5 Heating effect of current, Electric power, Electric energy and its units (related numerical problems)
4.6 Introduction to magnetism, Types of magnetic materials. Dia, para and ferromagnetic materials with their properties,
4.7 Magnetic field and its units, magnetic lines of force, magnetic flux and their units
4.8 Concept of electromagnetic induction, Faraday's Laws and Lenz's law, Galvanometer and its use.

5. Modern Physics (3 hrs)

5.1 Lasers: its characteristics, spontaneous and stimulated emission, population inversion; Principle, construction and working of Ruby laser, engineering applications of lasers.

LIST OF PRACTICALS (To perform minimum 8 experiments)

1. To find the time period of a simple pendulum
2. To determine and verify the time period of cantilever
3. To verify laws of reflection from a plane mirror.
4. To find the focal length of convex lens by parallax method.
5. To determine the magnifying power of an astronomical telescope
6. To verify ohm's laws by drawing a graph between voltage and current.
7. To verify laws of resistances in series and parallel combination.
8. To find resistance of galvanometer by half deflection method
9. To measure very low resistance and very high resistances using Slide Wire bridge
10. Use of CRO in plotting AC and DC waveforms.
11. To find wave length of the laser beam.

INSTRUCTIONAL STATREGY

Teacher may use various instructional media like models, charts and graphs while imparting instructions. The field application should be made clear before teaching the basics to develop proper understanding of the physical phenomenon**.** Use of demonstration can make the subject interesting and develop scientific temper in the students.

RECOMMENDED BOOKS

1. Text Book of Physics (Part-I, Part-II); N.C.E.R.T., Delhi
2. Concepts in Physics by HC Verma, Vol. I & II, Bharti Bhawan Ltd. New Delhi
3. Practical Physics by C. L. Arora, S Chand Publications
4. Engineering Physics by PV Naik, Pearson Education Pvt. Ltd, New Delhi

SUGGESTED DISTRIBUTION OF MARKS

Topic	Time Allotted (hrs)	Marks Allotted (Out of 50)
1	06	10
2	06	10
3	06	10
4	09	15
5	03	05
Total	**30**	**50**

2.4 APPLIED CHEMISTRY

L	P
3	2

RATIONALE

The use of various chemicals and chemical products in diverse technical and engineering fields have repeatedly proved the importance of Applied Chemistry, which enhances its role to a new peak. On the other hand, ever increasing use of such materials will compel engineers, technocrats to acquire essential applied chemistry knowledge in order to select engineering materials, which not only suit them but also provide more environmental compatibility. This situation demands principles of Applied Chemistry in diploma-engineering courses. Principles of Applied Chemistry will enable budding diploma holders to develop scientific temper and appreciate importance of chemistry. Hence the subject of Applied Chemistry.

LEARNING OUTCOMES

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

- Interpret both qualitative and quantitative aspects of simple chemical substances.
- Substantiate the laws and principles on which structure of atom is established.
- Understand types of bonds in chemical substance and their influence on the properties of chemical substances.
- Prepare solution of required concentrations.
- Understand qualitatively and quantitatively pH and buffer solutions.
- Significance of pH and buffer solutions and their industrial applications (in the process such as electrolysis, electrochemical machining of materials etc).
- Explain cause and factors adversely affecting natural water quality and remedial measures available for water purification to achieve water quality standards required for domestic, agricultural and industrial applications.
- Appreciate and practice the water conservation techniques.
- Identify and classify the substance based on the electric behavior.
- Realize the laws/principles efficiently used in development of electrochemical cells towards the greener energy.
- Identify most efficient fuel for the engine and engineering applications.
- Understand the elementary idea of polymers and plastics
- Distinguish different type of plastics and their applications.

DETAILED CONTENTS

1. Basic Concept of Chemistry (2 hrs)
   - 1.1 Symbols of elements and valency, writing of chemical formulae of simple compounds.
   - 1.2 Calculation of molecular masses of $CaCO_3$, NaCl, $CuSO_4$, NaOH, $Ca(OH)_2$, H_2SO_4, $C_2H_2O_4$. (Atomic mass of elements should be provided)

2. Atomic Structure and Chemical Bonding (8 hrs)
   - 2.1 Bohr's model of atom (qualitative treatment only).
   - 2.2 Atomic number, atomic mass number isotopes and isobars.
   - 2.3 Definition of orbit and orbitals, shapes of s and p orbitals only, quantum numbers and their significance,
   - 2.4 Aufbau's principle, Pauli's exclusion principle and Hund's rule electronic configuration of elements with atomic number (Z) = 30 only. (Electronic configurations of elements with atomic number greater than 30 are excluded).
   - 2.5 Chemical bonding and cause of bonding and types of chemical bonding; Ionic bond (example NaCl) and Covalent bond (sigma (σ) and pi (π) bonds) with examples of H_2, O_2, N_2 and CH_4 Metallic bonding.

3. Solutions (05 hrs)
   - 3.1 Definition of solution, solute and solvent with examples
   - 3.2 Methods to express the concentration of solution- molarity (*M*) and molality (m), mass percentage, volume percentage and mole fraction and related simple numericals.
   - 3.3 Arrhenius concept of acids and bases. pH of solution, simple numericals on pH and industrial applications of pH.
   - 3.4 Definition of buffer solution and types of buffer solutions with examples and industrial applications of buffers solutions.

4. Water (10 hrs)
   - 4.1 Classification of water – soft water and hard water, action of soap on hard water, types of hardness, causes of hardness, units of hardness – mg per liter (mgL^{-1}) and part per million (ppm) and simple numericals.
   - 4.2 Disadvantages caused by the use of hard water in domestic industry and boiler feed water.
   - 4.3 Removal of hardness -Permutit process and Ion-exchange process.
   - 4.4 Drinking water and characteristics of drinking water.
   - 4.5 Natural water sterilization by chlorine and UV radiation and reverse osmosis (elementary idea).

5. Electro Chemistry (6 hrs)
   - 5.1 Electronic concept of oxidation, reduction and redox reactions
   - 5.2 Definition of terms: electrolytes, non-electrolytes with suitable examples
   - 5.3 Faradays laws of electrolysis and simple numerical problems.
   - 5.4 Industrial Application of Electrolysis – Electroplating.
   - 5.5 Application of redox reactions in electrochemical cells (qualitative idea only excluding reactions) - commercial dry cell (Primary) and elementary idea of secondary cell (Only lead storage battery)

6. Chemistry of Fuels and Lubricants (12 hrs)
   - 6.1. Definition of fuel, classification of fuels (primary and secondary), characteristics of good fuel.

6.2 Calorific value-higher calorific value, lower calorific value, determination of calorific value of solid or liquid fuel using Bomb calorimeter and numerical examples.
6.3 Coal - proximate analysis of coal
6.4 Fuel rating – Octane number and Cetane number, fuel-structural influence on Octane and Cetane numbers
6.5 Gaseous fuels – chemical composition, calorific value and applications of natural gas (CNG), LPG, producer gas, water gas and biogas. (preparation/manufacture excluded)
6.6 Definition of Lubricant and characteristics of good lubricant
6.7 Classification of lubricants –liquid lubricants, solid lubricants, semi-solid lubricants with examples
6.8 Properties of lubricant: Physical properties –viscosity and viscosity index, cloud point and pour point, flash point and fire point, oiliness. Chemical properties- Total Acid Value or Number (TAV or TAN), carbon residue, saponification value.

7. Polymers and Plastics (02 hrs)
7.1 Definition of polymer, monomer and degree of polymerization
7.2 Brief introduction of plastics - thermo plastics and thermo setting plastics with suitable examples (PVC, PS, PTFE, Nylon 6, Nylon 66, bakelite) distinction between thermo and thermo setting plastics
7.3 Applications of polymers in industry and daily life
7.4 Introduction to nano materials and nano technology

LIST OF PRACTICALS

1. Preparation of standard solution of oxalic acid.
2. To determine strength of given sodium hydroxide solution by titrating against standard oxalic acid solution using phenolphthalein indicator.
3. To determine TDS in given sample of water.
4. To prepare Mohr's salt from ferrous sulfate and ammonium sulfate.
5. Determination of pH of given solution using pH meter.
6. Estimation of total alkalinity of given water sample by titrating it against standard sulfuric acid solution.
7. Gravimetric estimation of moisture in the given coal sample (proximate analysis).
8. Gravimetric estimation of ash content in the given coal sample (proximate analysis).
9. Determination of viscosity of given liquid using Redwood viscometers
10. To construct simple Daniel cell and measure its e.m.f. using voltmeter.
11. To estimate hardness of water using EDTA method.

INSTRUCTIONAL STRATEGY

Teachers may take help of various models and charts while imparting instructions to make the concept clear. More emphasis should be laid on discussing and explaining practical applications of various chemical process and reactions.In addition, students

should be encouraged or motivated to study those processes in more details, which may find practical application in their future professional career.

RECOMMENDED BOOKS

1. Kuricose, J.C. and J. Rajaram, "Chemistry in Engineering", Tata McGraw Hill, Publishing Company Limited, New Delhi.
2. Jain, P.C. & Monika Jain, "Engineering Chemistry", Dhanapat Rai Publishing Company, New Delhi.
3. Ahuja, S. C. and G. H. Hugar, "Eagle's Applied Chemistry (I and II)", Eagle Prakashan, Jalandhar.
4. Rao, C N R, "Understanding Chemistry", Universities Press (India) Pvt Ltd., 2011
5. Chopra, H. K. & A. Parmar, "Engineering Chemistry – A Text Book", Narosa Publishing House, New Delhi.
6. Pandey, Dr. Himanshu, "Engineering Chemistry", Goel Publishing House, Meerut, India.

SUGGESTED DISTRIBUTION OF MARKS

Topics	Time Allotted (hrs)	Marks Allotted (Out of 50)
1.	02	03
2.	08	08
3.	05	06
4.	10	12
5.	06	06
6.	12	12
7.	02	03
Total	**45**	**50**

2.5 BASICS OF ELECTRICAL AND ELECTRONICS ENGINEERING

L	P
3	2

RATIONALE

This subject gives the knowledge of fundamental concepts and principles of basic electrical and electronics engineering and aims at providing the students to understand the basic concepts and principles of DC and AC Circuits, electromagnetic induction and with basic understanding of various types of materials such as conductors, semiconductors and insulators, p-n junction, need of rectifiers, concept of transistor, working of transistors in various configurations and their applications. The teacher should give emphasis on understanding of concepts by explaining the various terms used in the subject. Practical exercises have been included in order to reinforce various concepts. Industrial/field exposure must be given by organizing industrial visit.

LEARNING OUTCOMES

After going through the subject, the students will be able to:

- Explain the concept of DC circuits and various laws such as Ohm's Law, Kirchhoff's Laws.
- Demonstrate the concept of electro-magnetic induction, self-inductance, mutual inductance and terminologies related to EMI.
- Demonstrate the types of cell and batteries, its construction, applications and steps to maintain the battery.
- Describe the concept of AC quantity and AC circuits containing resistance, inductance and capacitor.
- Plot the VI characteristics of PN junction diode and Zener diode.
- Explain the concept of Half wave, Full wave and Bridge rectifier and observe waveforms of each.
- Plot input and output characteristics of transistor in CB and CE mode.
- Explain the concept of FET and MOSFET and plot the input, output characteristics

DETAILED CONTENTS

1. **DC Circuits** (05 hrs)

1.1 Definition of voltage, current, power and energy with their units, Ohm's Law, Difference between ac and dc. Simple problems on series and parallel combination of resistors with their wattage consideration.

1.2 Application of Kirchhoff's current law and Kirchhoff's voltage law to simple circuits. Star – Delta connections and their conversion. Concept of Voltage source and current source.

1.3 Concept of nodal analysis, Mesh and loop analysis,

1.4 Theorems: Superposition theorem, Thevenin's theorem, Norton's theorem, Maximum Power transfer theorem.

2. Electro Magnetic Induction (05 hrs)

2.1 Concept of electro-magnetic field produced by flow of electric current, magnetic circuit, concept of magneto-motive force (MMF), flux, reluctance, permeability, analogy between electric and magnetic circuit.

2.2 Faraday's laws of electro-magnetic induction, principles of self and mutual induction, self and mutually induced e.m.f.

3. Batteries (06 hrs)

3.1 Basic idea of primary and secondary cells

3.2 Construction, working principle and applications of Lead-Acid, Lithium-ion, Nickel-Cadmium batteries, Charging methods used for lead-acid battery, Care and maintenance of lead-acid battery, Series and parallel connections of batteries

3.3 General idea of solar cells, solar panels and their applications

4. AC Fundamentals (06 hrs)

4.1 Concept of alternating quantities, Concepts of: cycle, frequency, time period, amplitude, instantaneous value, average value, r.m.s. value, maximum value, form factor and peak factor, Representation of sinusoidal quantities by phasor diagrams.

4.2 Equation of sinusoidal wave form for an alternating quantity and its derivation

4.3 Effect of alternating voltage applied to a pure resistance, pure inductance and pure capacitance.

5. Semiconductor Physics (06 hrs)

5.1 Basic atomic structure, Concept of insulators, conductors and semiconductors, atomic structure of Germanium (Ge) and Silicon (Si).

5.2 Concept of intrinsic and extrinsic semiconductor and types, process of doping.

5.3 Energy level diagram of conductors, insulators and semiconductors; minority and majority charge carriers.

5.4 Formation of P and N type semiconductors and their conductivity, effect of temperature on conductivity of intrinsic semiconductors.

6. Semiconductor Diode: (06 hrs)

6.1 PN junction diode, forward and reverse biased PN junction, potential barrier, drift and diffusion currents, depletion layer, V-I characteristics,

6.2 Zener diode and their applications.

6.3 Application of diode as half-wave, full wave and bridge rectifiers.(without derivation).

6.4 Voltage regulators and their types.
6.5 Clipper & clampers

7. Bipolar-Transistors (06 hrs)

7.1 Concept of a bipolar transistor, its structure, PNP and NPN transistors, their symbols and mechanism of current flow; Current relations in a transistor; concept of leakage current;

7.2 CB, CE, CC configurations of a transistor and their comparison .

8. Field Effect Transistors (05 hrs)

8.1 Construction, operation and characteristics of FETs and their applications.

8.2 Construction, operation and characteristics of a MOSFET in depletion and enhancement modes and its applications.

8.3 CMOS - advantages and applications

LIST OF PRACTICALS

1. Operation and use of the following instruments: voltmeter, ammeter ,Wattmeter, Multi-meter, CRO, Signal generator, LCR meter, Regulated Power Supply by way of taking readings of relevant quantities with their help.

2. To verify following network theorems applicable to D.C. circuit. i) Superposition Theorem, ii) Thevenin's Theorem

3. Determination of voltage-current relationship in a dc circuit under specific physical conditions and to draw conclusions.

4. Verification of Kirchhoff's Current and Voltage Laws in a dc circuit

5. Observation of change in resistance of a bulb in hot and cold conditions, using voltmeter and ammeter.

6. To find the ratio of inductance of a coil having air-core and iron-core respectively and to observe the effect of introduction of a magnetic core on coil inductance

7. Identification and connection of batteries in an electronic circuit.

8. Plotting of V-I characteristics of a PN junction diode

9. Plotting of V-I characteristics of a Zener diode.

10. To observe and plot the output wave shape of :

    a. Half-wave rectifier circuit using one diode

    b. Full-wave rectifier circuit using two diodes

    c. Bridge-rectifier circuit using four diodes

11. Plotting of input and output characteristics of transistors in CE & CB configuration.

RECOMMENDED BOOKS

1. Basics of Electrical Engineering by G.L. Marwaha, Eagle Parkashan, Jalandhar.
2. Basic Electrical and Electronics Engineering by SK Sahdev; Dhanpat Rai and Co, New Delhi.
3. A Textbook of Basic Electrical and Electronics Engineering by J.B Gupta , S.K. Kataria & Sons, New Delhi
4. Basic Electronics by Harish C. Saini , Eagle Parkashan, Jalandhar
5. Basic Electronics and Linear Circuit by NN Bhargava, Kulshreshta and SC Gupta, Tata McGraw Hill Education Pvt Ltd., New Delhi.

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (Out of 50)
1	05	06
2	05	06
3	06	06
4	06	07
5	06	07
6	06	07
7	06	06
8	05	05
Total	**45**	**50**

2.6 DESKTOP PUBLISHING (DTP) FUNDAMENTALS

L	P
-	4

RATIONALE

This course will enable the students to familiarize with the features and use of application packages such as Adobe Photoshop, Corel Draw or any other equivalent latest package(s). They will develop skills in handling the software. Adobe Photoshop 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 a multimedia application.

Note: Since this is a practical oriented subject, there will be no theory paper. It is suggested that the teacher should explain the following topics during the practical classes itself.

LEARNING OUTCOMES

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

- 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.
- Demonstrate the concepts related to desktop publishing software.
- Design visiting cards and advertisement pamphlets.
- Design wedding cards, flex and printed designer boxes.
- Design multi-page document and drawing pictures for the books.
- Add special effects in drawing.
- Generate special effects to various types of text in various documents.
- Add various symbols to a design and creating different patterns.

TOPICS TO BE EXPLAINED THROUGH DEMONSTRATION

1. Introduction

   Overview of Desktop Publishing (DTP)

2. Photoshop and Animation Technology

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

Animation Technology

Definition, History of Animation, Types of animation- 2D and 3D, Basic principles of animation, Various Terms-Animation Drawings/Cels, Rough Drawings, Clean ups, Colour reference drawings, Layout, Model Sheet, Key Drawings and in Between, Master Background, Concept Piece, Character drawing, Story Board.

3. Corel Draw/Inkscape

3.1 Introduction, exploring Corel Draw screen, using dialog boxes, using roll ups, create/open file, save file, import/export files, print file

- Use of ribbon bar, use of tool box, select object, shaping objects using zoom tool, filling objects, outline objects, use of line tool
- Setting up new drawing, setting multi-page document, undo/redo mistakes, repeat, cut, copy, paste, delete, duplicate, clone
- Insert object, paste special, copy attributes from select all, drawing objects, selecting objects
- Page setup, insert/delete page, use of layers, roll up, grid and scale set up, guideline set up

3.2 Formatting objects

- Arranging objects: align, order, group, ungroup
- Arranging objects: combine, break apart, weld, intersection, trim, separate
- Mode edit: to line, to curve, stretch, rotate, align, convert to curves
- Creating special effects: Transform roll up, clear transformation, add perspective, envelope roll up
- Creating special effects: blend roll-up, extrude roll up, counter roll up, power line, power-clip clear effects
- Working with text: Character, paragraph text, frame, setting of tabs, indents, bullets, spacing in paragraph text

LIST OF PRACTICALS

1. Using various features of Photo-shop/GIMP
2. Making multimedia presentations combining, Flash, Photo-shop, such as department profile, lesson presentation, games and project presentation
3. Flip Books: Capture a series of images using your camera's continuous mode. Design your Flipbook, Printing the flipbook, Layout the Flipbook pages, Arrange the pictures, Holding the end of the stack.
4. Stop Motion Animation: using characters in stop motion animation.

5. Inserting objects in the drawing, aligning, ordering, grouping and ungrouping of those objects
6. Use of combine, break apart, weld, intersection, trim and separate tools in a given drawing
7. Use of mode edit tools i.e. to line, to curve, to stretch, and rotate
8. Creating special effects i.e. transform roll-up, envelop roll up, add perspective, extrude roll up, contour roll up, power line, power clip, clear effects.
9. To insert character and paragraph text in a drawing and frame, setting of tabs, indents, bullets and spacing in paragraph text.
10. Filling of text to a given path, aligning it to base line, straighten text and edit text
11. Using tools such as spell checker, and thesaurus.
12. Using find and replace text utility and type assist.
13. Adding various symbols to a drawing and creating different patterns.
14. To draw various logos with the help of tracing methods.

INSTRUCTIONAL STRATEGY

This subject is completely practical oriented. Stress is to be given to impart hands on experience to the students. With this subject, the students will be able to create, edit, format and print a document with the help of corel-draw, Adobe Photoshop etc.

RECOMMENDED BOOKS

1. Learning Desktop Publishing by Ramesh Bangia; Khanna Book Publishing Co. Pvt. Ltd., New Delhi
2. Desktop Publishing from A to Z by Bill Grout and Osborne; McGraw Hill
3. DTP (Desktop Publishing) for PC user by Houghton; Galgotia Publishing House Pvt. Ltd., Daryaganj, New Delhi.

2.7 COMPUTER WORKSHOP

L	P
-	4

RATIONALE

The course aims at making the students familiar with various parts of computers and how to assemble them, and different types of peripherals desired. In addition, the course will provide the students with necessary knowledge and skills in computer software installation and maintenance to make him diagnose software faults.

LEARNING OUTCOMES

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

- Identify various computer components.
- Write the specifications of a computer.
- Describe and differentiate various types of Motherboard, Processors, RAM, Secondary storage devices.
- Install various components of computer.
- Assemble and de-assemble computer system.
- Install operating system i.e. MS-Window and Linux.
- Diagnose the various faults in computer system i.e. SMPS, HDD, RAM.
- Identify various cables used for connection.
- Outline the dimensions (space requirements) for setting a computer centre.
- Install and configure various application software.
- Identify various types of virus and clean the system using various antivirus software.

DETAILED CONTENTS

Part-A (Hardware)

1.1 Familiarization and specifications with various components and parts of personal computer: Mother board details, hard disk drive, floppy disk drive. CD ROM drive, DVD, Blu-ray keyboard, display devices, various chips (memory chips and CPU); serial and parallel ports, inkjet, USB Ports, SATA Fire wire, Bluetooth, Dot matrix and Laser printers.

1.2 Introduction and working principle of UPS

1.3 Assembling and disassembling of PCs, power supply, linear power supply and switch mode power supply, trouble shooting of SMPS.

1.4 Setting up of basic infrastructure for computers (including power layout, air conditioning, earthing etc.

1.5 Demonstrate various types of cables like twisted pair cable, co axial cable, fiber optics cable, general purpose cables

1.6 Introduction to various networking devices like network interface card, hubs, router, switch, connectors, and modem.

1.7 Introduction to single phase and three phase supply and wiring system. Importance of three phase supply and wiring system.

1.8 Use of multimeter to test components and measurement of circuit voltage, resistance.

Part-B (Software)

1.9 Introduction to FOSS, installation of various operating systems, LINUX/MS windows latest versions. Setting up multiboot system/dual boot system. Familiarization of their features with practical demonstrations. Create window system image. Installation and configuration of device drivers. Disk management

1.10 Installation of latest version of application software proprietary/free software like MS-Office/open office, Adobe Photoshop, Corel Draw, Macromedia Flash etc.

1.11 Installation and configuration of latest version of database software like Oracle/ MySQL/ SQL Server etc.

1.12 Introduction to Virus/Spyware/Worm/Trojan Horse, their detection, prevention and cure.

1.13 Installation, uninstallation and use of Antivirus software.

INSTRUCTIONAL STRATEGY

As the subject is practice oriented, sufficient exercises on assembling and dissembling of computer system should be given.. Field visits to the places where assembly of computers is taking place will be helpful to the students. Visits to the manufacturing units of CVT or UPS will also be helpful to the students.

RECOMMENDED BOOKS

1) PC Upgrade and Maintenance Guide by Mark Minasi, BPB Publication
2) Hardware Bible by Winn Rosch, Techmedia Publications
3) IBM PC and Clones by B Govinda Rajalu. Tata McGraw Hill Education Pvt Ltd , New Delhi

4) Common Computer Circuits and Faults Vol. 1 by M. Lotia, BPB Publications, New Delhi
5) Monitor and Fault Diagnosis Vol. 1 and II. M. Lotia, BPB Publications, New Delhi
6) Complete Guide to Window and Workstation by Peter Norton. Tech Media Publications, New Delhi

2.8 GENERAL WORKSHOP - II
(For Computer Science and Engineering, Information Technology, Electronics and Communication Engineering)

L	P
-	4

RATIONALE

Psychomotor skills are mastered through practice, an opportunity therefore, has been extended to students through this course to refine their skills in different trades. The basic skills developed during first semester will be refined during this course by doing higher order skills jobs including machining. In addition to developing general manual and machining skills in the students, the objective of development of sense of dignity of labour, precision, safety at work places, team working and right attitude among the students will also be met.

LEARNING OUTCOMES

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

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

DETAILED CONTENTS (PRACTICAL)

Note: The students are supposed to come in proper workshop uniform prescribed by the institute. Wearing shoes in the workshop(s) is compulsory. Importance of safety and cleanliness, safety measures and upkeep of tools, equipment and environment in each of the following workshops will be explained for conduct of practical. The students should prepare sketches of various tools/jobs sequence of operations etc. in their practical notebook.

The following shops are included in the syllabus.

1 Welding Shop –II
2 Fitting Shop – II
3 Sheet Metal Shop –II
4 Electric Shop -II
5 Carpentry Shop –II
6 Electronic Shop –II

1. WELDING SHOP –II

1.1 Safety precautions of concerned shop and use of Personal Protective Equipment (PPE). Introduction to gas welding (Oxy-acetylene welding, Air acetylene welding, Oxy-hydrogen welding). Introduction to gas welding equipment: - Gas welding torch, cylinders, Blow pipe and Pressure regulators etc. Types of gas welding flames. Functions of filler materials and fluxes. Introduction to soldering and brazing. Difference between welding, soldering and brazing. Introduction to resistance welding.

1.2 Demonstration of Gas welding equipment, TIG, MIG and Spot welding machines. Demonstration of brazing and soldering

1.3 Jobs to be prepared:

Job I Making a lap joint on 75 mm × 35 mm × 3mm M.S. plate using gas welding (Oxy-acetylene).

Job II Making a simple job on spot welding machine.

2. FITTING SHOP - II

2.1 Safety precautions of concerned shop and use of Personal Protective Equipment (PPE). Introduction, function and specification of different types of cutting tools (chisels and scrapers etc.), tightening tools (pliers, screw driver, wrenches etc.) types of drill and drilling machines used in fitting shop. Classification of files: according to cut, grade, and shape. Measuring devices (Fillet/radius gauge, screw pitch gauge, wire gauge, telescopic gauge), Vernier height gauge. Surface gauge and universal surface gauge. Description of drill, reamer, tap and die set. Selection of dies for threading, selection of drill size for taping.

2.2 Demonstration on use of various measuring tools (Vernier caliper, Vernier height gauge and outside and inside micrometers etc.), finding least count and checking of zero error. Demonstration of various types of drills, taps and dies.

2.3 Jobs to be prepared:

Job I To make a job by drilling and tapping (manually) process on soft metals- Aluminum or Copper or Bronze.

Job II To Make ‘U’ type cut-out profile from a square piece of MS flat using hand hacksaw, filing, marking, drilling and measuring operations up to an accuracy of $\pm$ 0.1 mm.

3. SHEET METAL SHOP - II

3.1 Safety precautions of concerned shop and use of Personal Protective Equipment (PPE). Introduction and functions of various machines and equipment used in sheet metal shop e.g. Shearing Machine, Bar Folder, Burring Machine, Wood Turning Machine, Wiring Machine, Setting Down Machine, Forming Machine, Fly press etc. Introduction to various metal forming processes e.g. Spinning, Punching, Blanking, cup drawing, Introduction to metal spinning process. Introduction of various types of nuts, bolts, screws etc.

3.2 Demonstration of various machines and types of nuts, bolts, screws etc.

3.3 Jobs to be prepared:

Job I To prepare a job involving soldering or brazing process.

Job II To fabricate a funnel/conduit pipe from GI sheet.

4. ELECTRIC SHOP - II

4.1 Safety precautions of concerned shop and use of Personal Protective Equipment (PPE), Introduction and use of single phase and three phase supply, its wiring system and importance. Introduction and function of an electric motor for any three-phase electric machine. Estimating and costing of power consumption. Identification and familiarization with the following tools: Tweezers, Screw Drivers (Different sizes), Insulated pliers, Cutters, Sniper, Philips Screw driver (star screw driver), L-Keys.

4.2 Demonstration of dismantling, servicing and reassembling of table/ceiling fan, air-cooler, auto electric iron, heater etc. Testing and reversing direction of rotation of single phase and three phase motors and their wiring methods.

4.3 Job Practice:

Job I Connection of single-phase energy meter with supply and load including reading and working out power consumption and cost of energy.

Job II Finding faults in electric circuits, machines, with series testing lamp and multimeter.

Job III Connection and wiring practice for reversing direction of rotation of single phase and three phase motors

.

5. CARPENTRY SHOP – II

5.1 Safety precautions of concerned shop and use of Personal Protective Equipment (PPE). Introduction, parts and functions of Jig saw and radial saw wood working machine, Band saw, Circular saw and Electric Planer. Introduction and basic functions of Wood working lathe and its tools. Saw re-sharpening machine, wood working lathe, Saw Brazing unit.

5.2 Demonstration of Rip Saw, dovetail saw and Tenon saw. Method of sharpening various saws. Demonstration on Band Saw and Circular Saw, Chain and Chisel, Universal wood working machine, Saw re-sharpening machine, Saw Brazing unit.

5.3 Jobs to be prepared:
Job I Preparation of mitre joint.
Job II Preparation of a lengthening joint

6. ELECTRONIC SHOP – II

6.1 Identification and familiarization with tools used in laying of networking, monitoring systems.

6.2 Identification and familiarization with different types of Routers, Modems, Switches, Smart hubs etc.

6.3 Job Practice

Job I Creation of LAN. connecting at least 4 systems.

Job II Use of various types of switches and protective devices in electronic circuits

Job III To make regulated power supply on general purpose PCB.

Note:-

1. Workshop instructors will guide and help the students throughout the practical class in order to explain and complete the job according to syllabus and for providing necessary facilities to the students during performance of practical by observing the safety precautions
2. The Workshop Superintendent or Foreman Instructor or Instructor will demonstrate and deliver the theoretical instructions with regard to introduction, functions, classification and specification of tools, instruments, equipment, apparatus etc. of all the topics covered in the syllabus of workshops.
3. The Workshop Superintendent or Foreman Instructor will also conduct the mid-term test and final practical exam of this subject.

RECOMMENDED BOOKS

1. Workshop Practice By Swaran Singh, S.K. Kataria & Sons Publisher of Engineering Books New Delhi.
2. Workshop Practice by HS Bawa; Tata McGraw Hill Publishers, New Delhi.
3. Workshop Technology I, II, III, by SK Hajra, Choudhary and AK Choudhary; Media Promoters and Publish ers Pvt. Ltd. Mumbai
4. Workshop Technology Vol. I, II, III by Manchanda; India Publishing House, Jalandhar
5. Workshop Technology by B.S. Raghuwanshi; Dhanpat Rai and Co., New Delhi

TRAFFIC AWARENESS & ROAD SAFETY CAMP (II)

A diploma holder must have knowledge of various types of traffic rules and regulations. Road safety education is vital for people of all ages. As a responsible citizen, you should be aware of each and every road safety rules. Observation is the key skill you need in ensuring road safety By obeying safety rules and regulations, you can save yourself and others on the road. This camp covers the basic concepts of traffic rules and safety. Lectures will be delivered on following broad topics with the coordination of Distt. Traffic police. There will be no exam for this camp.

1. Time management
2. Traffic light signals
3. Speed limits of vehicles
4. Schedule of offences
5. Dividing lines
6. Proper road Maintenance and Warnings
7. Test yourself

3.1 DIGITAL ELECTRONICS

L	P
3	2

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.

LEARNING OUTCOMES

After undergoing the subject, student will be able to:

- Verify and interpret truth tables for all logic gates.
- Realize all logic functions with AND, OR, NOT, 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, de-multiplexer, encoder and decoder ICs
- Design a four bit ring counter and verify its operation
- Design 4-bit SISO, PISO, SIPO, PIPO shift registers

DETAILED CONTENTS

1. Introduction (02 hrs)

   a) Distinction between analog and digital signal.
   b) Applications and advantages of digital signals.

2. Number System (04 hrs)

   a) Binary, octal and hexadecimal number system: conversion from decimal and hexadecimal to binary and vice-versa.
   b) Binary addition, subtraction, multiplication and division including binary points. Sign magnitude method of representation, 1's and 2's complement method of addition/subtraction, floating point representation

3. Codes and Parity (04 hrs)

   a) Concept of code, weighted and non-weighted codes, examples of BCD, excess-3 and Gray code.

   b) Concept of parity, single and double parity and error detection and correction (Hamming code)
   c) Alpha numeric codes: ASCII, EBCDIC and Unicode.

4. Logic Gates (06 hrs)

a) Concept of negative and positive logic
b) Definition, symbols and truth tables of gates. Construction of NOT, AND and OR gates from NAND and NOR gates (universal gates).

5. Logic Simplification (05 hrs)

a) Postulates of Boolean algebra, De Morgan's Theorems. Various identities. Formulation of truth table and Boolean equation for simple problem. Implementation of Boolean (logic) equation with gates

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

6. Arithmetic circuits (05 hrs)

a) Half adder and Full adder circuit, design and implementation.
b) Half and Full subtractor circuit, design and implementation.
c) 4 bit adder/subtractor.
d) Adder and subtractor IC (7484)
e) 2-bit comparator

7. Decoders, Multiplexers and De-Multiplexers (06 hrs)

a) Basic functions and block diagram of Encoders and decoders.
b) Basic functions and block diagram of Multiplexers and De-Multiplexers. Different types and ICs.
c) Four bit decoder circuits for 7 segment display and decoder/driver ICs.

8. Latches and flip flops (04 hrs)

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

9. Shift Register (06 hrs)

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

c) Buffer register, Tristate Buffer register
d) IC 7495

10. Counters (03 hrs)

a) Introduction to Asynchronous and Synchronous counters
b) Binary up/down counters (upto MOD-8)
c) Decade counter.
d) Pre settable and programmable counters
e) Ring counter with timing diagram
f) Counter ICs

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
   - Design of a NOR gate latch and verification of its operation

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

4. To design 4 bit adder, 2's complement subtractor circuit using an 4 bit adder IC and an XOR IC and verify the operation of the circuit.

5. To design a NOR Gate Latch and verification of its operation

6 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).

7. Verification of truth table for encoder and decoder ICs, Mux and DeMux

8. To design a 4 bit SISO, SIPO, PISO, PIPO shift registers using JK/D flip flops and verification of their operation.

9. To design a 4 bit ring counter and verify its operation.

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.

RECOMMENDED BOOKS

1. Malvino Leach,"Digital Electronics and Applications", Tata McGraw Hill Education Pvt Ltd, New Delhi
2. Morris Mano,"Digital Logic Designs", Prentice Hall of India, New Delhi
3. Floyd and Jains, "Digital Fundamentals", Pearson Education
4. KS Jamwal,"Digital Electronics", Dhanpat Rai and Co., New Delhi
5. RJ Tocci,"Digital Systems: Principles and Applications", Prentice Hall of India, New Delhi

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allocation (Out of 50)
1.	2	2
2.	4	5
3.	4	5
4.	6	8
5.	5	5
6.	5	5
7.	6	6
8.	4	4
9	6	6
10.	3	4
Total	**45**	**50**

3.2 COMPUTER PROGRAMMING USING C

L	P
3	4

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 programme
- Explain and execute member functions of C in the programme
- Describe and implement array concept in C programme
- Describe and execute pointers
- Handle file with C

DETAILED CONTENTS

1. Algorithm and Programming Development (02 hrs)

    1.1 Overview of computer language and Operating systems – Machine level language, assembly level language, high level language, assembler, compiler and interpreter
    1.2 Steps in development of a program
    1.3 Flow charts, Algorithm development
    1.4 Programme Debugging

2. Program Structure (08 hrs)

2.1 I/O statements, assign statements
2.2 Constants, variables and data types
2.3 Operators and Expressions
2.4 Standards and Formatted
2.5 Data Type Casting

3. Control Structures (08 hrs)

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

4. Functions (08 hrs)

4.1 Introduction to functions
4.2 Global and Local Variables
4.3 Function Declaration
4.4 Standard functions
4.5 Parameters and Parameter Passing
4.6 Call - by value/reference

5. Arrays (06 hrs)

5.1 Introduction to Arrays
5.2 Array Declaration, Length of array
5.3 Single and Multidimensional Array.
5.4 Arrays of characters
5.5 Passing an array to function

6. Pointers, Structures and Unions (07 hrs)
6.1 Introduction to Pointers
6.2 Declaration of structures
6.3 Accessing structure members
6.4 Structure Initialization
6.5 Unions

7. File Handling with C (06 hrs)
7.1 Introduction to Files (streams in C)
7.2 File : File Declaring, File Opening, File Closing
7.3 Operations on File : Reading on File, Writing on File, Appending on file
7.4 Random Access of a file
7.5 Command line argument.

LIST OF PRACTICALS

1. Programming exercises on executing and editing a C program.
2. Programming exercises on defining variables and assigning values to variables.
3. Programming exercises on arithmetic and relational operators.
4. Programming exercises on arithmetic expressions and their evaluation.
5. Programming exercises on formatting input/output using printf and scanf and their return type values.
6. Programming exercises using if statement.
7. Programming exercises using if – Else.
8. Programming exercises on switch statement.
9. Programming exercises on do – while, statement.
10. Programming exercises on for – statement.
11. Programs on one-dimensional array.
12. Programs on two-dimensional array.
13. (i) Programs for putting two strings together.
    (ii) Programs for comparing two strings.
14. Simple programs using structures.
15. Simple programs using pointers.
16. Simple programs using union.
17. Write a program to apply open, close and save operations on a file to be performed on C file.
18. Program to perform write and read operations in file.

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).

RECOMMENDED BOOKS

1. Kanetkar, Yashwant, "Let us C". BPB Publication, New Delhi
2. Balaguruswami, E, "Programming in ANSI C", Tata McGraw Hill Education Pvt. Ltd. New Delhi.
3. Salaria, RS, "Problem Solving and Programming in C", Khanna Book Publishing Co (P) Ltd. New Delhi.
4. Gottfried, "Programming in C", Schaum Series, Tata McGraw Hill Education Pvt. Ltd., New Delhi.
5. Subburaj, R, "Programming in C", Vikas Publishing House Pvt. Ltd., Jangpura, New Delhi.

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (Out of 50)
1	02	02
2	08	09
3	08	09
4	08	09
5	06	06
6	07	09
7	06	06
Total	**45**	**50**

3.3 DATABASE MANAGEMENT SYSTEM

L	P
3	4

RATIONALE

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

LEARNING OUTCOMES

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

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

DETAILED CONTENTS

1. Introduction (04 hrs)

   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 (05 hrs)

   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

3. Data Modeling using E.R. Model (Entity Relationship Model) (06 hrs)

   Data Models Classification; File based or primitive models, traditional data models, semantic data models. Entities and Attributes, Entity types and Entity sets, Relationship among entities

4. Relational Model: (05 hrs)

   Relational Model Concepts: Domain, Attributes, Tuples 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

5. Normalization (05 hrs)

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

6. Database Access and Security (06 hrs)

   Database security, process controls, database protection, grant and revoke

7. MYSQL/SQL (Structured Query Language) (14 hrs)

   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.

LIST OF PRACTICALS

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.

RECOMMENDED BOOKS

1) Vig, Dr. Renu, and Ekta Walia, "Fundamentals of Database Management Systems", an ISTE, Publication, New Delhi.
2) ISRD Group, "Introduction to DBMS", Tata McGraw Hill Education Pvt Ltd, New Delhi.
3) Wesley, Date C.J. Adison, "An Introduction to Database Systems".
4) Elmasri, Navathe, Adison Wesley, "Fundamentals of Database Systems".
5) Desai, Bipin C., "An Introduction to Database Systems", Galgotia Publications Pvt. Ltd., Daryaganj, New Delhi 110002.

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (Out of 50)
1	04	4
2	05	6
3	06	8
4	05	5
5	05	5
6	06	6
7	14	16
Total	**45**	**50**

3.4 OPERATING SYSTEMS

L	P
3	2

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:

- Identify memory management technique.
- Differentiate scheduler algorithm.
- Setup of Linux labs.
- Use Linux for running various programming languages
- Set up open source labs.
- Describe and identify various file system.
- Assist in handling other open sources

DETAILED CONTENTS

1. Overview of Operating Systems (03 hrs)

   Definition of Operating Systems, Types of Operating Systems – Distributed OS and Network OS, Importance of Operating Systems, Functions of Operating Systems

2. Process Management (04 hrs)

   Process Concepts, Process Control block, Process State Diagram, Operations on Processes, Inter Process Communication, Process synchronization and semaphores

3. CPU Scheduling (04 hrs)
   Basic Concepts, Scheduling Queues, Schedulers, Scheduling Criteria, Scheduling Algorithms and their evaluation

4. Deadlock (05 hrs)
   Deadlock model, Characterization, Methods for handling deadlocks, Deadlock prevention, Deadlock avoidance, Deadlock detection and recovery

5. Memory Management (05 hrs)

   Basic Concepts, Logical vs Physical address space, Swapping, Paging and segmentation, Virtual Memory and demand paging

6. Input Output Management (04 hrs)

   Dedicated and shared devices, Input output devices and storage devices,

7. File System Management (04 hrs)
   File Concepts, Access methods, File Structure, Allocation methods and free space management

8. Linux Operating System (16 hrs)

   Introduction, history of Linux, Linux Overview, Structure of Linux, Linux releases, open linux, system requirements, file structures, Linux Commands and Filters: Shell: concepts of command options, input, output redirecting and network file, process and communication commands like: mkdir, cd, ls, who, whoami, cat, more, tail, head, mv, chmod, grep, wc, sort, kill, write, wall, mail, news

LIST OF PRACTICALS

1. Directory commands
2. File commands
3. Process management
4. Using file permission commands
5. Mail commands
6. Establishment of LAN network for homogeneous and heterogeneous systems through DHCP.

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.

RECOMMENDED BOOKS

1. Operating Systems by Achyut S Godbole and Atul Kahate: Tata McGraw Hill Education Pvt Ltd , New Delhi
2. Linux – The Complete Reference by Ruichard Peterson, Tata McGraw Hill, New Delhi
3. Operating Systems by Stallings Tata McGraw Hill.
4. Operating Systems- A Concept Based Approach by Dham Dhare, Tata McGraw Hill Education Pvt Ltd , New Delhi
5. Operating System Concepts by Ekta Walia, Khanna Publishers, New Delhi.

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (Out of 50)
1.	03	03
2.	04	04
3.	04	05
4	05	06
5	05	06
6	04	05
7	04	05
8	16	16
Total	**45**	**50**

3.5 INTERNET AND WEB TECHNOLOGIES

L	P
2	4

RATIONALE

This course will enable the students to understand the basics of internet and various application of internet like e-mail, FTP, Telnet, Newsgroups and video conferencing In addition, this course develops competency amongst the students to design professional web sites and interactive web pages. They will have overview of different technologies like of HTML, CSS, JavaScript.

LEARNING OUTCOMES

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

- Define internet and its operation.
- Outline application of internet.
- Use application of video conferencing
- Use application of E-communication
- Describe the application of E-communication and benefit to society.
- Define and differentiate between various web browsers.
- Develop static webpage/web portal.
- Validate input data.

DETAILED CONTENTS

1. Internet Basics (06 hrs)

   Concept of Internet, its applications, specification and technical details for establishing Internet. Types and functions of modems, Internet service providers, Intranets, E-mail, Telnet, FTP, IRC, NNTP, Video conferencing, e-commerce

2. Internet Connectivity (04hrs)

   Wired and wireless connectivity like optical fibre, cable media, mobile internet, leased line, ISDN, VSAT, RF link, Wi-Fi

3. World Wide Web (WWW): (06 hrs)

   World Wide Web and its evolution, web page, web server, HTTP/HTTPS protocol. Examples of web servers. Navigation Tools: Mozilla Firefox, Google Chrome, Internet Explorer, Uniform Resource Locator (URL). Hypertext, hyperlinks and hypermedia, URL, its registration, browsers, search engines, proxy servers

4. Developing Web Portals Using HTML (4 hrs)

- Basic structure of HTML
- Introduction to HTML 5
- Formatting text, title, headings, Horizontal rules and comments
- Inserting links and images,
- Creating tables
- Creating forms using HTML 5
- Using div and span tag

5 Cascading Style Sheets (CSS) (4 hrs)

- Introduction to syntax of CSS,
- Different methods of including CSS,
- CSS attributes,
- CSS box model
- Various CSS properties like margin, padding, border
- Font related CSS properties like Text, fonts, color
- CSS background related properties
- Class and Id in CSS

6 JavaScript (06 hrs)

- Basic introduction to JavaScript
- Methods of including JavaScript
- Variable declaration
- Operators in JavaScript
- Control Statements and looping Statements
- Document Object Model (DOM)
- Validating Forms using JavaScript

LIST OF PRACTICALS

1. Configuring computer system to access internet
2. Managing social networking profile and e-mail account
3. To demonstrate the use of TELNET, FTP, IRC
4. Demonstration of audio-video conferencing
5. Demonstration of e-commerce transaction
6. Creating Web pages using HTML and CSS
7. Creating the email validation using JAVA script
8. Creating of mobile validation, regex checking and empty text box.

INSTRUCTIONAL STRATEGY

Students should be exposed to Internet as the subject is practice oriented, theoretical Instruction may be given during practical session also.

RECOMMENDED BOOKS

1. Rajkamal, "Internet and Web Technologies", Tata McGraw Hill Education Pvt. Ltd., New Delhi.
2. Alam, Tanweer, "Web Technology", Khanna Book Publishing Co. (P) Ltd., New Delhi.
3. Stephanie, Cottrell, Bryant, "Teach Yourself HTML 4.0 with XML, DHTML and Java Script", IDG Books India Pvt. Ltd., New Delhi.
4. Dynamic Web Publishing – Unleashed Tech Media

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (Out of 50)
1	06	10
2	04	06
3	06	10
4	04	06
5	04	06
6	06	12
Total	**30**	**50**

3.6 OPEN ELECTIVE

L	P
2	-

RATIONALE

Open Elective refers to a course that students can opt for in addition to their primary area of study. The open electives is from an unrelated discipline with the intention to provide exposure in that discipline. It provides the students the opportunity to select and learn a subject related to his/her interest, thus allowing them to explore their passion..

LIST OF SUGGESTED OPEN ELECTIVES

The student can opt one course out of the following :

1 Foreign Language
2 National Cadet Corps (NCC)
3 Yoga
4 First Aid
5 Creative Writing
6 Sketching, Drawing and Colour Studies
7 Gardening
8 Photography
9 Legal Studies
10 Event Management
11 Diet and Nutrition

Open elective can be offered online or offline.

3.6.1 FOREIGN LANGUAGE
(French, Japanese, German, Spanish)

L	P
2	-

RATIONALE

This course is an introduction to the specific language. Learning to understand and articulate oneself in day to day real life situations, and to begin to make sense of the language as a cultural space are the overall objectives of the course. The student should be able to grasp the basic sentence structure and build a good foundational vocabulary through this course.

LEARNING OUTCOMES

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

- Enhance the level of vocabulary in specific language.
- Manage situational communication in specific language.

DETAILED CONTENTS

1. Introduction (06 hrs)

   Self introduction, Numbers, Days, Months, Date, Time, and Counting

2. Vocabulary (06 hrs)

   My home, My family, My friend, Daily routine, Hobbies, Food, Greeting and Thanking

3. Grammar (12 hrs)

   Verb and Verb forms, Articles, Possessive pronouns, Auxiliary verbs, Questions, Present and Past tense

4. Theme (06 hrs)

   Means of transport, Basic directions, Food, Drink, Family, Groceries and Meals

RECOMMENDED BOOKS

1. Annie Berthet, Hugot et al, “Alter Ego - Méthode de Français”, Hachette.
2. 3 A Corporation, “Minna no Nihongo”, Goyal Publishers, New Delhi.
3. Stefanie Dengler, “NETZWERK Deutsch als Fremdsprache A1”, Goyal Publishers, New Delhi.
4. Jaime Corpas et.al, “Aula International 1”, Difusión, Madrid.

INSTRUCTIONAL STRATEGY

Teachers are expected to develop necessary knowledge in the students for comprehending basic concepts and principles of the subject so that they may pursue their passion. As far as possible, the teaching of subject shall be supplemented by demonstration and practices to enhance the relevant skills.

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (Out of 50)
1	06	10
2	06	10
3	12	20
4	06	10
Total	**30**	**50**

3.6.2 NATIONAL CADET CORPS (NCC)

L	P
2	-

RATIONALE

This course is structured to instil in the students qualities like nationalism, patriotism, discipline, team spirit, esprit-de-corps, leadership, self-confidence, national integration and improve their personality. The objective of the course is to expose the students to a regimental way of life, which is essential to inculcate in them the values of discipline, duty, punctuality, orderliness, smartness, and respect for authority, correct work ethos and self-confidence. In addition, it will inculcate defence services work ethos, which is characterized by hard work, sincerity of purpose, honesty, ideals of selfless service, dignity of labour, secular outlook, comradeship, spirit of adventure and sportsmanship.

LEARNING OUTCOMES

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

- Explain aims and objectives of NCC.
- Understand the importance of national integration.
- Assist Civil Administration in performance of selective duties during disasters.
- Perform drill without arms.
- Contribute towards nation building.
- Provide voluntary social service.

DETAILED CONTENTS

1. Introduction (08 hrs)

Aims and objectives of NCC, Organisation structure and training, NCC Song, National Integration and awareness, Religions, Culture, Traditions and Customs of India, National Integration: Importance and Necessity. Freedom Struggle and Nationalist Movement in India, Problems/ Challenges of national integration, Unity in diversity, Famous leaders of India, Images/ Slogans for national integration, Contribution of youth to nation building

2. Civil Affairs (04 hrs)

Civil Defence Organization and its duties/ NDMA, Types of emergencies/ Natural Hazards, Role of NCC during Natural Hazards/ Calamities

3. Drill Without Arms (08 hrs)

General and Words of Command, Attention, Stand at Ease and Stand Easy, turning and inclining at the halt, Sizing, forming up in three ranks and numbering, open and close order march and Dressing, Saluting at the halt, Getting on parade, dismissing and falling out, Marching, length of pace and time of marching in quick time and halt, slow march and halt, Turning on the march and wheeling, Saluting on the March Individual word of command

4. Personality Development and Leadership (04 hrs)

Personality development, self-awareness, Leadership, life/soft skills, time management and character building.

5. Social Service (06 hrs)

Basics of Social service, and its needs, Social/ Rural Development Projects: MNREGA, SGSY, NSAP; Literacy enhancement and poverty alleviation, Social evils, Contribution of youth towards social welfare.

RECOMMENDED BOOKS

1 "Cadet Hand Book (Common Subjects)", published by DG, NCC.
2 "Grooming Tomorrow's Leaders", published by DG, NCC.
3 "Youth in Action", published by DG, NCC.

INSTRUCTIONAL STRATEGY

Teachers are expected to develop necessary knowledge in the students for comprehending basic concepts and principles of the subject so that they may pursue their passion. As far as possible, the teaching of subject shall be supplemented by demonstration and practices to enhance the relevant skills.

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (Out of 50)
1	08	14
2	04	06
3	08	14
4	04	06
5	06	10
Total	**30**	**50**

3.6.3 YOGA

L	P
2	-

RATIONALE

Yoga is a practice that connects the body, breath, and mind. It uses physical postures, breathing exercises, and meditation to improve overall health. It not only improves physical health but also mental and spiritual well-being, which are the foundations of life. The course is aimed at developing skills in yoga for strength, flexibility and relaxation.

LEARNING OUTCOMES

At the end of the course, the students will be able to:

- Explain the importance of yoga and its effect on health
- Perform yoga in various forms and combinations
- Understand the philosophy of heartfulness meditation.
- Promote positive health and holistic wellness through yoga and meditation.

DETAILED CONTENTS

1. Yoga (4 hrs)

   Concept, need and importance, Yogic principles, Rules and precautions to be followed by yoga practitioners, Introduction to Ashtanga yoga and Yoga sutra

2. Asanas and Mudras (14 hrs)

   Basic asanas, Asanas in different postures - Sukshma Vayayam, Pawan Muktasan, Surya Namaskar, Hasta Utthanasana, Padahastasana, Tadasana, Vrikshasana,Tirayak Tadasana, Natarajasana, Vajrasana, Padmasana, Bhujangasana.
   Mudras - Concept, Important mudras - Prana Mudra, Varuna Mudra, Prithvi Mudra, Aakash Mudra, Gyana Mudra.

3. Pranayama (6 hrs)

Kapalbhati Pranayama, Nadi Shodhan Pranayama (Anulom Vilom), Bhastrika Pranayama, Ujjayi Pranayama.

4. Meditation (3 hrs)

Heartfulness meditation, Practice on meditation

5. Health Benefits of Yoga and Meditation (3 hrs)

Benefits and effect of Asanas, Mudras and Pranayama on various systems and organs of human body. Relaxation and wellness through meditation

RECOMMENDED BOOKS

1. Saraswati, Swami Satyananda, "Asana, Pranayama, Mudra and Bandha", Yoga Publication Trust, Bihar.
2. BKS Iyengar, "Light on Yoga", George Allen and Unwin.
3. Mudras by Heartfulness; Heartfulness Education Trust.
4. Kamlesh D Patel, "The Way of the Heart", Spiritual Hierarchy Publication Trust
5. Goel, Aruna, "Yoga Education: Philosophy and Practice", Deep & Deep Publications, New Delhi.
6. Nagendra, H R, and R Nagarathna, "Yoga for Promotion of Positive Health". Swami Vivekananda Yoga Prakashan.

INSTRUCTIONAL STRATEGY

Teachers are expected to develop necessary knowledge in the students for comprehending basic concepts and principles of the subject so that they may pursue their passion. As far as possible, the teaching of subject shall be supplemented by demonstration and practices to enhance the relevant skills.

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (Out of 50)
1	04	06
2	14	24
3	06	10
4	03	05
5	03	05
Total	**30**	**50**

3.6.4 FIRST AID

L	P
2	-

RATIONALE

First aid is a valuable and life-saving course. The objective of this course is to impart knowledge and skills to the students necessary in an emergency to help sustain life, reduce pain, and minimize the consequences of injury or sudden illness until professional medical help
arrives.

LEARNING OUTCOMES

At the end of the course, the students will be able to:

- Administer basic life support skills including cardiopulmonary resuscitation
- Provide first aid of simple and multiple system trauma.

DETAILED CONTENTS

1. Basics of First Aid (4 hrs)

   First aid, importance of first aid, first aider, laws of first aid, contents of an ideal first aid kit, dealing with an emergency.

2. Emergency Response (10 hrs)

   CPR, steps for performing CPR,CPR for newborns and infants, recovery position, first aid in drowning, fractures of bones, causes and types of fractures, dislocation.

3. First Aid in Burns (4 hrs)

   Types of burns, danger of burns, first aid in dry burns and scalds, electrical burns, chemical burns, sunburn, heatstroke.

4. First Aid in Wounds and Injuries (6 hrs)

Types of wounds- small cuts and abrasions, Head injury- nose bleed, bleeding gums, bleeding from varicose veins, Shocks- causes of shock and its first aid.

5. First Aid in Poisoning (3 hrs)

Poisoning by swallowing, gases, injections, skin absorption, Animal bites, snake bites and insect stings.

6. First Aid in Foreign Objects Entering the Sense Organs: (3 hrs)

Foreign body in the eye, ear, nose, skin, swallowing of foreign objects.

Note : Persons from Civil Defence/ National Disaster Response Force (NDRF) etc. can be invited for conduct of first aid classes and demonstration of first aid practices.

RECOMMENDED BOOKS

1. Gauri Goyal, Dr. Kumkum Rajput, Dr. Manjul Mungali,, "First Aid and Health", SBPD Publishing House
2. Williamson, Swapna Naskar and Goswami Mala, "First Aid and Emergency Care", Kumar Publishing House, New Delhi.
3. Mahopatra, R., "First Aid for You and Me", Academic Publishers, New Delhi.

INSTRUCTIONAL STRATEGY

Teachers are expected to develop necessary knowledge in the students for comprehending basic concepts and principles of the subject so that they may pursue their passion. As far as possible, the teaching of subject shall be supplemented by demonstration and practices to enhance the relevant skills.

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (Out of 50)
1	04	06
2	10	18
3	04	06
4	06	10
5	03	05
6	03	05
Total	**30**	**50**

3.6.5 CREATIVE WRITING

L	P
2	-

RATIONALE

Creative writing is a written art form that uses the imagination to tell stories and compose essays, poetry, screenplays, novels, lyrics, and more. The objective of this course is to acquaint the students with ideas related to creative writing including art, craft and basic skills required for a creative writer.

LEARNING OUTCOMES

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

- Distinguish between literary genres.
- Practice various forms of creative writing.
- Write for various media.

DETAILED CONTENTS

1. Fundamentals of Creative Writing (06 hrs)

   Meaning and significance of creative writing, Genres of creative writing: poetry, fiction, Non-fiction, Drama and other forms, Research for creative writing

2. Elements of Creative Writing (10 hrs)

   Plot, Setting, Character, Dialogue, Point of view, Literary devices and figurative language, Elements of style, Grammar and the structure of language, Proof reading and editing

3. Traditional Forms of Creative Writing (10 hrs)

   Fiction: short story, novella and novel, Poetry, Drama, Essay, Fable, Biography, Memoire and autobiography, Travelogues, Diaries, Self-narrative writing

4. Writing for Media (04 hrs)

Print media, Broadcast media, Internet - Web content writing and blog writing, Advertising

RECOMMENDED BOOKS

1. Anjana Neira Dev. Anuradha Marwah, Swati Pal, "Creative Writing: A Beginner's Manual", Pearson Longman, Delhi
2. Robert Scholes, Nancy R. Comley, Carl H. Klaus, Michael Silverman, "Elements of Literature: Essay, Fiction, Poetry, Drama, Film", Delhi
3. Bell, Julia and Magrs, Paul, "The Creative Writing Course-Book", Macmillan, London
4. Gardner, John, "The Art of Fiction", Vintage, New York

INSTRUCTIONAL STRATEGY

Teachers are expected to develop necessary knowledge in the students for comprehending basic concepts and principles of the subject so that they may pursue their passion. As far as possible, the teaching of subject shall be supplemented by demonstration and practices to enhance the relevant skills.

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (Out of 50)
1	6	10
2	10	16
3	10	16
4	4	08
Total	**30**	**50**

3.6.6 SKETCHING, DRAWING AND COLOUR STUDIES

L	P
2	-

RATIONALE

This course is aimed to develop aesthetic sense of students. It also encompasses training in sketching, drawing and colouring to develop their mental faculties of observation, imagination and creation.

LEARNING OUTCOMES

At the end of the course, the students will be able to:

- Sketch common objects and various geometrical and non-geometrical forms found in life and nature.
- Use different medium and materials.
- Use colour judiciously in creation of visual work.
- Prepare collage using various paper and materials.

DETAILED CONTENTS

1. Sketching of Objects and Nature (8 hrs)

   Sketching of objects at home like cup, plate, glass, book, pencil box etc.
   Sketching of tree, mountain, hills, vegetables flower etc. for Nature study using Pencil, colour Pencil

2. Drawing of Human and Animal Figures (10 hrs)

   Drawing of Human and animal form with the help of Basic Geometrical shapes

3. Collage Making (4 hrs)

   Creating Collage with the help of coloured cut out papers, picture from a magazine or any easily available materials

4. Colours (8 hrs)

Water colour, Poster colour, Colour theory – Colour system, Colour wheel, Colour dimensions, Drawing with oil pastel colour and dry pastel.

RECOMMENDED BOOKS

1. Betty Edwards, "Color: A Course in Mastering the Art of Mixing Colors", Penguin Group Inc., New York
2. Feisner, E., "Colour Studies", Fairchild Publications, USA

INSTRUCTIONAL STRATEGY

Teachers are expected to develop necessary knowledge in the students for comprehending basic concepts and principles of the subject so that they may pursue their passion. As far as possible, the teaching of subject shall be supplemented by demonstration and practices to enhance the relevant skills.

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (Out of 50)
1	08	14
2	10	16
3	04	06
4	08	14
Total	**30**	**50**

3.6.7 GARDENING

L	P
2	-

RATIONALE

Gardening activities are fantastic for helping students engage in a way that is more difficult in the classroom. Watching plants grow is a fun and educational experience for them. Their enormous curiosity and excitement over anything new makes them natural for gardening. Growing plant seeds teaches them how nature works and adds to their interest in environmental sustainability.

LEARNING OUTCOMES

At the end of the course, the students will be able to :

- Explain various techniques of gardening, cultivation, multiplication, raising of seedlings of garden
- Discuss new and modern techniques of plant propagation.
- Develop interest in nature and plant life.

DETAILED CONTENTS

1. Gardening (6 hrs)

   Definition, objectives and scope. Different types of gardening - landscape and home/ terrace gardening, parks and its components. Plant materials and design.

2. Gardening Operations (14 hrs)

   Soil laying, manuring, watering, management of pests and diseases and harvesting.

3. Sowing/Raising of Seeds and Seedlings (10 hrs)

Structure and types - Seed dormancy; causes and methods of breaking dormancy. Seed storage: Seed banks, factors affecting seed viability, genetic erosion Seed production technology. Seed testing and certification. Transplanting of seedlings.

RECOMMENDED BOOKS

1. Bose T.K., Mukherjee, D., "Gardening in India", Oxford & IBH Publishing Co. New Delhi.
2. Kumar, N., "Introduction to Horticulture", Rajalakshmi Publications. Nagercoil, Tamil Nadu.
3. Sandhu, M.K., "Plant Propagation", New Age International Publishers.

INSTRUCTIONAL STRATEGY

Teachers are expected to develop necessary knowledge in the students for comprehending basic concepts and principles of the subject so that they may pursue their passion. As far as possible, the teaching of subject shall be supplemented by demonstration and practices to enhance the relevant skills.

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (Out of 50)
1	06	10
2	14	24
3	10	16
Total	**30**	**50**

3.6.8 PHOTOGRAPHY

L	P
2	-

RATIONALE

Photography is a unique and creative medium of self-expression that requires aesthetic sense as well as technical expertise. Students who are highly passionate about learning the workings of cameras and different technologies based on them can pursue this course. The objective of this course is to enable the candidates to understand the utility of different camera parts and the art of taking candid shots.

LEARNING OUTCOMES

At the end of the course, the students will be able to:

- Explain the principles of photography.
- Handle various cameras for taking photographs.
- Apply aesthetics of photography.

DETAILED CONTENTS

1. Basic Photography (04 hrs)

   Meaning and definition of photography, Basic principle in the film and digital photography, History of photography.

2. Camera Function and Accessories (04 hrs)

   Basic camera, Different parts of camera and their basic functions, Camera Accessories

3. Main Controls of Camera (10 hrs)

   Parts of Camera, Types of lenses, Shutter, Diaphragm, Exposure, Film and digital image sensor, Depth of field, Lighting, Photography with flash, Filters in photography.

4. Digital Camera (05 hrs)

Process of digital imaging, Types of digital cameras, Menu operationsof digital cameras, Introduction to colors.

5. Aesthetics of Photography (07 hrs)

Definition of lighting, Principles of lighting, Reflection, Light characteristics, Color, Direct light and indirect light, Light and subject, Light as subject, Shadow as subject, Light sources, Natural light and artificial light, Principles of visualization, Composition guidelines

RECOMMENDED BOOKS

1. Dilwali, Ashok, "All about Photography", National Book Trust, New Delhi.
2. Sharma, O.P., "Practical Photography", Hind Pocket Books.
3. Freeman, "The Photographer's Guide to Light", John Collins & Brown

INSTRUCTIONAL STRATEGY

Teachers are expected to develop necessary knowledge in the students for comprehending basic concepts and principles of the subject so that they may pursue their passion. As far as possible, the teaching of subject shall be supplemented by demonstration and practices to enhance the relevant skills.

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SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (Out of 50)
1	04	06
2	04	08
3	10	16
4	05	08
5	07	12
Total	**30**	**50**

3.6.9 LEGAL STUDIES

L	P
2	-

RATIONALE

The course introduces the students to Indian legal system, contracts management, and legal documentation. Further, the course familiarizes students with basic knowledge of labour laws that would be useful.

LEARNING OUTCOMES

At the end of the course, the students will be able to:

- Understand the Indian Legal System.
- Discuss Indian Contract Act.
- Explore labour laws and laws related to women.

DETAIL CONTENTS

1. Introduction to Indian Legal System (4 hrs)

   Constitution of India, Sources of Law and Judicial system.

2. The Indian Contract Act (6 hrs)

   Contract – meaning and kinds. Essentials of a valid contract, Discharge of a contract, Contract of Agency

3. Legal Documentation (10 hrs)

   Drafting of legal documents including Non-Disclosure Agreements (NDA), Request for Proposal (RFP), collaboration agreements, joint venture agreements, tendering and subcontracting

4. Labour Laws (6 hrs)

Provident Fund, ESIC, Gratuity and Bonus

5. Legislation Related to Women (4 hrs)

Sexual harassment at Work place (Prevention, Prohibition and Redressal), Protection of Women from Domestic Violence Act, Criminal Law (Amendment) Act, The Indecent Representation of Women (Prohibition) Act.

RECOMMENDED BOOKS

1. Joseph Minattur, "Indian Legal System", Indian Law Institute, New Delhi.
2. Srivastava, S.C., "Industrial Relations and Labour Laws", Vikas Publishing House Pvt. Ltd.
3. Aggarwal, S K, "Business Law", Galgotia Publishers, Delhi.

INSTRUCTIONAL STRATEGY

Teachers are expected to develop necessary knowledge in the students for comprehending basic concepts and principles of the subject so that they may pursue their passion. As far as possible, the teaching of subject shall be supplemented by demonstration and practices to enhance the relevant skills.

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (Out of 50)
1	04	07
2	06	10
3	10	16
4	06	10
5	04	07
Total	**30**	**50**

3.6.10 EVENT MANAGEMENT

L	P
2	-

RATIONALE

Event Management is a course which deals with the planning, coordinating, and organising of events for people and communities. It is a part of the mass communication course which is offered by many prestigious colleges in India. Event management course aims to imbibe knowledge on analysing, marketing, planning and strategies in business administration to its students.

LEARNING OUTCOMES

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

- Explain the purpose of special events in an organization.
- Use techniques and strategies required to plan successful special events.
- Promote and conduct special events.
- Assess the quality and success of special events.

DETAILED CONTENTS

1. Principles of Event Management (04 hrs)

   Introduction to event management, size & type of event, event team, code of ethics, principles of event management, role of event manager – planning, organising, leading and controlling an event

2. Event Planning (08 hrs)

   Objective of event, use of planning tools, protocols, dress codes, staging, staffing.

3. Event Marketing (04 hrs)

   Advertising, publicity, event marketing process, even hospitality

4. Event Leadership (06 hrs)

Teambuilding & work distribution, managing team, managing meetings, written & verbal communication.

5. Event Safety and Security (04 hrs)

Role of Security, Safety, Crowd management, Risk management.

6. Event Accounting (04 hrs)

Budget, Cash flow analysis, Profit & loss statement, Balance sheet.

RECOMMENDED BOOKS

1. Singla, Sita Ram, "Event Management", ATH Publishers, New Delhi.
2. Sharma, Divakar, "Event Planning and Management", Deep & Deep Publication.

INSTRUCTIONAL STRATEGY

Teachers are expected to develop necessary knowledge in the students for comprehending basic concepts and principles of the subject so that they may pursue their passion. As far as possible, the teaching of subject shall be supplemented by demonstration and practices to enhance the relevant skills.

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (Out of 50)
1	4	06
2	8	12
3	4	08
4	6	10
5	4	08
6	4	06
Total	**30**	**50**

3.6.11 DIET AND NUTRITION

L	P
2	-

RATIONALE

The objective of this course is to help the students to understand the concept of diet and nutrients and provide knowledge about causes and symptoms of Nutrition-related disorders.

LEARNING OUTCOMES

On completion of this course, the students will be able to:

- Comprehend the nutritional value of different food items.
- Explain the need of nutrition during the normal stages of life.
- Calculate normal dietary requirements and balanced diet.

DETAILED CONTENTS

1. Introduction (04 hrs)

   Basic concepts of health, Nutrition, Nutrients, Nutrition requirement, Balanced diet. Relationship between health & nutrition, Assessment of nutritional status.

2. Nutrients (16 hrs)

   Nutrients & their classification. Macro Nutrients –Sources, Functions and Effects on the Body; Micro nutrients - sources, Functions and effects on the Body; Fat soluble nutrients - sources, Functions and effects on the body, Water soluble nutrients - Sources, Functions and effects on the body, Digestion, Absorption of carbohydrates, Lipids, Proteins and energy.

3. Energy and Nutrition-related Disorders (06 hrs)

Basic concepts, Definition and components of energy requirement, Protein malnutrition, Iodine deficiency disorders, Disease and disorder caused by imbalance of nutrients, Food allergies.

4. Nutritional Needs (04 hrs)

Nutritional need during normal stages of life - Infancy, Childhood, Adolescence, Pregnancy, Lactation and Old age, Disease management with diet.

RECOMMENDED BOOKS

1. Antia, F.P., "Clinical Dietetics and Nutrition", Oxford University Press.
2. Swaminathan, "Essentials of Food and Nutrition", Ganesh and Co., Madras.
3. Subhangini Joshi, "Nutrition and Dietetics", McGraw Hill Publishers.
4. B.S. Narsinga Rao et al, "Nutritive Value of Indian Foods", National Institute of Nutrition, Hyderabad.

INSTRUCTIONAL STRATEGY

Teachers are expected to develop necessary knowledge in the students for comprehending basic concepts and principles of the subject so that they may pursue their passion. As far as possible, the teaching of subject shall be supplemented by demonstration and practices to enhance the relevant skills.

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (Out of 50)
1	04	06
2	16	28
3	06	10
4	04	06
Total	**30**	**50**

ENERGY CONSERVATION AWARENESS CAMP

A diploma holder must have knowledge of various tips of energy conservation. Energy conservation has attained priority as it is regarded as additional energy resource. Energy saved is energy produced. This camp covers the basic concepts of energy management and its conservation. It gives the insight to energy conservation opportunities in household appliances and star rating. Lectures will be delivered on following broad topics. There will be no exam for this camp.

1. Classification of energy- primary and secondary energy, commercial and non-commercial energy, non-renewable and renewable energy with special reference to solar energy

2. Introduction to energy management, energy conservation, energy efficiency and its need

3. Salient features of Energy Conservation Act 2001 & The Energy Conservation (Amendment) Act, 2010 and its importance

4. Standards and Labeling

- Concept of star rating and its importance
- Types of product available for star rating

5. Salient Features of Punjab Energy Conservation Building Code (ECBC)

6. General Energy Saving Tips in:

    - Lighting System
    - Room Air Conditioners
    - Refrigerators
    - Water Heater
    - Computers
    - Fans, Heaters, Blowers and Washing Machines
    - Colour Television
    - Water Pumps
    - Kitchens
    - Transport

DRUGS USE AND ABUSE AWARENESS CAMP

This is to be organized at a stretch for two to three days during third semester. Lectures will be delivered on the following broad topics. There will be no examination for this subject.

1. Drugs Use and Abuse in Society
   b. Concept and overview
   c. Extent of the problem
   d. Drug use as a social problem
   e. Causes of Drug Use: Biological, Socio-cultural, psychological

2. Types of Dugs and identification of Abuse
   a. Familiar drugs: Tabacco, Caffeine, over the counter drugs
   b. Restricted Drugs: Opiates, Hallucinogens, Marijuana
   c. Reformance enhancing drugs
   d. Uppers and Downers: Stimulants and Depressants

3. Impact of Drug Abuse
   a. Individual level biological and psychological
   b. Family social, National

4. Management and Prevention of Drug Abuse
   a. Medical and psychological
   b. Role of family School , Media and Legislation

4.1 GENERIC SKILLS AND ENTREPRENEURSHIP DEVELOPMENT

L	P
3	-

RATIONALE

Generic Skills and Entrepreneurship Development is one of the courses from "Human Science" subject area. Generic skills have emerged as an important component of employability skills, which enable an individual to become and remain employable over lifetime and to lead happy and prosperous life. Entrepreneurship development aims at developing conceptual understanding for setting-up one's own business venture/enterprise. This aspect of Human Resource Development has become equally important in the era, when wage employment prospects have become meager. Both the subject areas are supplementary to each other and soft skills are required to be developed in diploma pass-outs for enhancing their employability and self confidence.

LEARNING OUTCOMES

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

- Explain the importance of generic skills
- Manage himself/herself physically, intellectually and psychologically
- Work effectively as a team member
- Manage tasks effectively
- Develop an entrepreneurial mindset.
- Identify entrepreneurial support system for new ventures and small businesses.
- Recognize a business opportunity.
- Conduct market survey and prepare project report.

DETAILED CONTENTS

1. Introduction to Generic Skills (04 hrs)

   1.1 Importance of Generic Skill Development
   1.2 Life Long Learning and associated importance of Generic Skill Development

2. Managing Self (07 hrs)

   2.1 Knowing Self for Self Development
   - Self-concept, personality, traits, multiple intelligence such as language intelligence, numerical intelligence, psychological intelligence etc.

   2.2 Managing Self - Physical
   Personal grooming, Health, Hygiene, Time Management
   2.3 Managing Self – Intellectual development

- Information Search: Sources of information
- Communication: Official & business correspondence, Job application covering letter and resume

2.4 Managing Self – Psychological
- Stress, Emotions, Anxiety-concepts and significance
- Techniques to manage stress

3. Managing in Team (06 hrs)

3.1 Team - definition, team dynamics
3.2 Team related skills- sympathy, empathy, co-operation, concern, lead and negotiate, work well with people from culturally diverse background

4 Task Management (03 hrs)

4.1 Task Initiation, planning, execution, close out
4.2 Exercises/case studies on task planning towards development of skills for task management

5. Problem Solving (05 hrs)

5.1 Prerequisites of problem solving- meaningful learning, ability to apply knowledge in problem solving
5.2 Different approaches for problem solving.
5.3 Steps followed in problem solving.
5.4 Exercises/case studies on problem solving.

6. Entrepreneurship (20 hrs)

6.1 Introduction
- Concept/Meaning and its need
- Qualities of an entrepreneur
- Entrepreneurial Support System e.g., District Industry Centres (DICs), Commercial Banks, State Financial Corporations, Small Industries Service Institute (SISIs), Small Industries Development Bank of India (SIDBI), National Bank of Agriculture and Rural Development (NABARD), National Small Industries Corporation (NSIC) and other relevant institutions/organizations at State/National level.

6.2 Obtaining financial assistance through various government schemes like Prime Minister Employment Generation Program (PMEGP) Pradhan Mantri Mudra Yojana (PMMY) , Make in India, Start up India, Stand up India , National Urban Livelihood Mission (NULM); Technology Business Incubator (TBI) and Science and Technology Entrepreneur Parks (STEP).

6.3 Market Survey and Opportunity Identification (Business Planning)
- How to start a small scale unit/ industry
- Procedures for registration of small-scale unit /industry

- Assessment of demand and supply in potential areas of growth.
- Understanding business opportunity
- Considerations in product selection

6.4 Project Report Preparation

- Preliminary Project Report
- Techno-Economic Feasibility Report
- Exercises on preparation of Detailed Project Report

INSTRUCTIONAL STRATEGY

This subject will require a blend of different teaching and learning methods beginning with lecture method. Some of the topics may be taught using question answer, assignment, case studies or seminar. In addition, expert lectures may be arranged from within the institution or from management organizations. Conceptual understanding of Entrepreneurship, inputs by teachers and outside experts will expose the students so as to facilitate in starting ones own business venture/enterprise. The teacher will discuss success stories and case studies with students, which in turn, will develop managerial qualities in the students. There may be guest lectures by successful diploma holding entrepreneurs and field visits also. The students may also be provided relevant text material and handouts.

RECOMMENDED BOOKS

1. Balasubramanian, S., "Soft Skills for Interpersonal Communication", Orient Black Swan, New Delhi.
2. "Lifelong learning", Policy Brief (www.oecd.orf).
3. Rathore, BS, and Dr JS Saini, "A Handbook of Entrepreneurship", Aapga Publications, Panchkula (Haryana).
4. Gupta, CB, and P Srinivasan, "Entrepreneurship Development", Sultan Chand and Sons, New Delhi.
5. "Entrepreneurship Development", Tata McGraw Hill Publishing Company Ltd., New Delhi.

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (Out of 50)
1.	04	06
2.	07	08
3.	06	06
4.	03	04
5.	05	06
6.	20	20
Total	**45**	**50**

4.2 DATA STRUCTURES

L	P
3	4

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 various designing techniques
- Store data, process data in linked list.
- Sort the data in ascending or descending order.
- Apply various data structure techniques in an array.
- Implement trees and various traversing techniques.
- Implement various sorting algorithms and to compare them for checking efficiency.
- Identify proper data handling technique for handling data.

DETAILED CONTENTS

1. Fundamental Notations (6 hrs)
   - 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 (6 hrs)
   - 2.1 Concept of Arrays, Single and multi dimensional arrays,
   - 2.2 Representation of arrays - Row major order and column major order
   - 2.3 Finding location of an element in single and multi dimensional arrays
   - 2.4 Operations on arrays with Algorithms (searching, traversing, inserting, deleting)

3. Stacks, Queues and Recursion (8 hrs)

   3.1 Introduction to stacks
   3.2 Representation of stacks
   3.3 Implementation of stacks
   3.4 Applications of stacks
   3.5 Introduction to queues
   3.6 Implementation of queues
   3.7 Circular Queues
   3.8 De-queues
   3.9 Recursion

4. Linked Lists (9 hrs)

   a. Introduction to linked list
   b. Representation of linked lists in Memory
   c. Operations on linked list
   d. Application of linked lists
   e. Doubly linked lists
   f. Operations on doubly linked lists

5. Trees (8 hrs)

   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

6. Sorting and Searching (8 hrs)

   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.

LIST OF PRACTICALS

Write programmes in C to implement

1. Sorting an array
2. The addition of two matrices using functions
3. The multiplication of two matrices
4. Push and pop operation in stack
5. Inserting and deleting elements in queue
6. 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 using with recursion and without recursion
10. Fibonacci series with recursion and without recursion
11. Program for binary search tree operation

12. The selection sort techniques
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 algorithm in detail in theory sessions. The students should be asked to convert their ideas about a problem into and algorithms in theory class and them write programs for the algorithms. Finally all the programmes should be run on computers. This will help the students to have clear concepts of programming.

RECOMMENDED BOOKS

1. Lipschutz, "Data structures – Schaum's Outline Series", McGraw Hill Education Pvt Ltd , New Delhi.
2. ISRD Group, "Data Structure using C", Tata McGraw Hills Education Pvt Ltd., New Delhi.
3. Sofat, Sanjiv, "Data Structures", Khanna Publishers, New Delhi.
4. Patel, R.B., "Expert Data Structures with C", Khanna Publishers, New Delhi.
5. Salaria, RS, "Data Structures and Algorithm Using C", Khanna Book Publishing Co. (P) Ltd. New Delhi.
6. Kanetkar, Yashwant, "Data Structure through C", BPB Publications.

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (Out of 50)
1	6	6
2	6	6
3	9	10
4	8	10
5	8	10
6	8	8
Total	**45**	**50**

4.3 OBJECT ORIENTED PROGRAMMING USING JAVA

L	P
3	4

RATIONALE

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

LEARNING OUTCOMES

After undergoing the subject, students will be able to:

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

DETAILED CONTENTS

1. Overview of Java (06 hrs)

   History and evolution, Features of Java, OOPs using Java, Anatomy of Java Programmee, Java Bytecode, Difference between JDK, JRE and JVM, Installing JDK, Compiling Java Program, Applications of Java

2. Language Constructs (12 hrs)

   Data types and type declarations, Literals, variables, type conversion, and casting, operators, control statements, looping and jump statements, input using scanner class, arrays and functions.

3. Classes and Objects (08 hrs)

Creating classes and declaring objects, Object & Object Reference defining methods, Defining access specifiers, accessing class members, Constructors, using this keyword, garbage collection

4. Inheritance (05 hrs)

Definition of inheritance, constructor chaining, order of invocation, types of inheritance, single inheritance, multilevel inheritance, hierarchical inheritance, hybrid inheritance, Using final keyword

5. Polymorphism (04 hrs)

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

6. Packages, Abstract class & Interface (06 hrs)

Defining packages, Access protection, Importing packages, Key points of Abstract class & interface, difference between an abstract class & interface, implementation of multiple inheritance through interface.

7. Exception Handling (04 hrs)

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. Installation of JDK and compiling a simple Java program
2. Programming exercise on control flow statement, operators and looping statements in Java.
3. Program to scan the input using input scanner class
4. Programming exercise on arrays and functions in Java
5. Program to demonstrate the concept of classes and objects using access specifiers
6. Program to demonstrate the use of constructors
7. Programming exercise on different type of inheritance in Java
8. Program to demonstrate the concept of overloading and overriding
9. Program to demonstrate the concept of packages, abstract classes and interfaces
10. Programming exercise on exception handling

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).

RECOMMENDED BOOKS

1. Herbert, Schildt,"The Complete Reference Java", McGraw Hill Publishers
2. Bhutani, Sunil, & Amrendra Shara, "Object Oriented Programming using JAVA", Eagle Publishing House, Jalandhar.
3. Malhotra, Sachin, "Java Programming", Oxford University Press, New Delhi.
4. "Head First Java", O-REILLY, Kathy Sierra & Bert Bates.
5. Wu, C.Thomas, "Object-Oriented programming With Java".

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (hrs)	Marks Allotted (Out of 50)
1.	06	02
2.	12	12
3.	08	09
4.	05	12
5.	04	05
6.	06	05
7.	04	05
Total	45	50

4.4 COMPUTER ARCHITECTURE

L	P
3	-

RATIONALE

This subject provides the students with the knowledge of detailed organization of currently available personal computers in order to understand their functioning and maintenance. The students will also get familiar with different types of mother boards, architecture and bus standards.

LEARNING OUTCOMES

After undergoing the subject, students will be able to:

- Illustrate the use of number system and coding system.
- Compare and contrast different RISC and CISC architectures.
- Understand the use of registers in computer organization.
- Apply various arithmetic operations.
- Identify different I/O interfaces.
- Distinguish different types of interrupts and DMA.
- Understand the purpose of memory hierarchy.
- Compare and contrast the use of different memory organizations.

DETAILED CONTENTS

1. Data Representation (6 hrs)

   Data Types-Number System, 1's Complement, 2's Complement, BCD Code, Gray Code

2. Central Processing Unit (7 hrs)

   Introduction, General Register Organization, Stack Organization, Instruction Formats, Addressing Modes, Introduction to RISC, CISC architecture, Pipeline processing, Parallel processing

3. Arithmetic Operations (8 hrs)

   Introduction, Addition, Subtraction, Multiplication and Division algorithm

4. Input-Output Organisation (12 hrs)

   Input-output interface, I/O bus and interface for module, I/ O vs memory bus. Isolated vs memory mapped, IP modes of data transfer, first in first out buffer, priority interrupt, daisy chaining priority, parallel priority interrupt priority encoder, interrupt cycle, direct memory access DMA controller, DMA transfer

5. Memory Organisation (12 hrs)

Memory hierarchy; main memory, memory address, map, RAM and ROM chips, memory connection to CPU, auxiliary memory, associative memory, read and write operation, cache memory, associative mapping, virtual memory, memory management hardware, memory segmentation.

INSTRUCTIONAL STRATEGY

As this paper is fully theoretical so it should be taught in a way to make it interesting by showing charts to the students to enable them to understand the subject theoretically. Block diagram of computer, algorithms to various arithmetic operations, CDs for demonstration should be used to make the students understand the subject. After completing the subject, students must know how the computer works, about various types of controllers and memory organization.

RECOMMENDED BOOKS

1. Rafiquzzaman, "Computer Architecture", M; Prentice Hall of India, New Delhi.
2. Bose, SK, "Hardware and Software of Personal Computers", Willey Eastern Ltd., New Delhi.
3. Tanenbaum, Andrew S, "Structured Computer Organisation", Prentice Hall of India, New Delhi.
4. Mano, Morris, "Computer system Architecture", Pearson Education India

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (Out of 50)
1	6	06
2	7	08
3	8	08
4	12	14
5	12	14
Total	**45**	**50**

4.5 COMPUTER NETWORK AND SECURITY

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RATIONALE

The future of computer technology is in computer networks. Global connectivity can be achieved through computer networks. A diploma holder should therefore understand the function of networks. Knowledge about hardware and software requirements of networks is essential.

LEARNING OUTCOMES

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

- Setup Networking Labs
- Setup Basic Wireless Labs
- Diagnose & Solve Network Problems
- Diagnose & Solve Network Problems remotely
- Provide security to networks
- Manage & handle WAN
- Prevent external Network Attacks

DETAILED CONTENTS

1. Networks Basics (05 hrs)

    - Concept of network
    - Types of network - LAN, MAN and WAN
    - Network Services
    - Topologies
    - Switching Techniques

2. Networking Models (10 hrs)

    - Introduction to IEEE Standards
    - OSI Reference Model
    - TCP/IP Model

3. IP Addressing (08 hrs)

- Concept of physical and logical addressing
- Different classes of IP addressing, special IP address
- Sub netting and super netting
- Loop back concept
- IPV4 and IPV6 packet Format
- Configuring IPV4 and IPV6

4. Network Connectivity (05 hrs)

- Network connectivity Devices
- NICs
- Hubs, Switches, Routers
- Configuration of Routers & Switches

5 Network Administration (08 hrs)

- Network Security Principles, Cryptography, using secure protocols
- DHCP Server
- Workgroup/Domain Networking

6 Network Security (07 hrs)

- Using ssh, sftp & https
- Virus, Worms and Trojans Definitions, preventive measures , deploying virus protection.
- Computer Network Attacks: Active Attacks, Passive Attacks, Stealing Passwords, Social Engineering, Bugs and Backdoors, Denial-of-Service Attacks, Botnets, Phishing Attacks
- Firewalls Definition and types of firewalls, Configuring & deployment of Firewall
- Spoofing vs Hijacking , Remote password guessing, eavesdropping, methods of password cracking,

7 Wireless Networks (02 hrs)

- Wireless Basics
- Wireless Security

LIST OF PRACTICALS

1. Recognize the physical topology and cabling (coaxial, OFC, UTP, STP) of a network.
2. Recognition and use of various types of connectors RJ-45, RJ-11,BNC and SCST
3. Making of cross cable and straight cable
4. Install and configure a network interface card in a workstation.
5. Identify the IP address of a workstation and the class of the address and configure the IP Address on a workstation
6. Study and Demonstration of sub netting of IP address
7. Use of Netstat and its options.
8. Connectivity troubleshooting using PING, IPCONFIG, IFCONFIG
9. Installation of Network Operating System(NOS)
10. Simulating a network set up.

INSTRUCTIONAL STRATEGY

Since the facilities are not available in the polytechnic, students need exposure to various security systems and software available in some organisations, universities and engineering colleges. For this, visits may be organized for students. The teachers should also be exposed in this area. Some practicals can be conducted in the laboratory.

RECOMMENDED BOOKS

1. Tanenbaum, “Computer Networks”, Prentice Hall of India, New Delhi.
2. Forouzan, “Data Communications and Networking”, Edition 2nd and 4th, Tata McGraw Hill Education Pvt Ltd., New Delhi.
3. Stallings, William, “Data and Computer Communication”, Pearson Education, New Delhi.
4. Jain, V.K., and Narija Bajaj, “Computer Network and Communications”, Cyber Tech Publications, New Delhi.
5. Katre, J.S., “Computer Network”, Tech-Max Publication, Pune.

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (hrs)	Marks Allotted (Out of 50)
1.	05	05
2.	10	10
3.	08	09
4.	05	06
5.	08	10
6.	07	08
7.	02	02
Total	**45**	**50**

4.6 MINOR PROJECT

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Minor project work aims at exposing the students to the various industries dealing with computers. It is expected from them to get acquainted with computer environment possess desired attitudes. For this purpose student during middle of the course are required to be sent for a period of two to four weeks at a stretch in different establishments. Depending upon the interest of students they are sent for exposure to:

1) Industrial practices in installation and maintenance of computers and computer networks
2) Fabrication of computers
3) Fault diagnosis and testing of computers
4) Industrial practices in respect of documentation and fabrication
5) A variety of computers and peripherals in assembly organizations
6) Software package development organizations
7) Maintenance of database
8) Write be stored procedure or functions which can be attached as the library objects to the main projects
9) Write a procedure function to convert number of words.
10) Write a procedure function to convert all data function (create your own) Database connectivity, (SQL server, Oracle, Access), Library classes in C++ (same application).,
11) design web applications using PHP

The teachers may guide /help students to identify their minor project work and chalk out their plan of action well in advance.

As a minor project activity each student is supposed to study the operations at site and prepare a detail project report of the observations/processes/activities by him/her. The students should be guided by the respective subject teachers; each teacher may guide a group of 4 to 5 students.

Evaluation of Students for Minor Project :

The criteria for evaluation of minor project work is as follows :

Criteria	Weightage
Punctuality and Regularity	10 %
Planning and Execution	30%
Initiative in learning new things	10%
Report Writing	20%
Presentation and Viva	30%

Note :
A viva voce examination will be conducted at the end of minor project for assessing the work of student. The examination Committee for this purpose will consist of a professional and the teacher who has guided the project.

ENTREPRENEURIAL AWARENESS CAMP

This is to be organized at a stretch for two to three days during fourth semester. Lectures will be delivered on the following broad topics. There will be no examination for this subject.

1. Who is an entrepreneur?
2. Need for entrepreneurship, entrepreneurial career and wage employment
3. Scenario of development of small scale industries in India
4. Entrepreneurial history in India, Indian values and entrepreneurship
5. Assistance from District Industries Centres, Commercial Banks. State Financial Corporations, Small industries Service Institutes, Research and Development Laboratories and other financial and development corporations
6. Considerations for product selection
7. Opportunities for business, service and industrial ventures
8. Learning from Indian experiences in entrepreneurship (Interaction with successful entrepreneurs)
9. Legal aspects of small business
10. Managerial aspects of small business
11. Preparation of Project Report

INDUSTRIAL TRAINING OF STUDENTS

It is needless to emphasize further the importance of Industrial Training of students during their 3 years of studies at Polytechnics. It is industrial training, which provides an opportunity to students to experience the environment and culture of industrial production units and commercial activities undertaken in field organizations. It prepares student for their future role as diploma engineers in the world of work and enables them to integrate theory with practice. Polytechnics have been arranging industrial training of students of various durations to meet the above objectives.

This document includes guided and supervised industrial training of a minimum of 6 weeks duration to be organised during the semester break starting after second year i.e. after 4th semester examinations. The concerned HODs along with other teachers will guide and help students in arranging appropriate training places relevant to their specific branch. It is suggested that a training schedule may be drawn for each student before starting of the training in consultation with the training providers. Students should also be briefed in advance about the organizational setup, product range, manufacturing process, important machines and materials used in the training organization.

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

An internal assessment of 50 and external assessment of 50 marks have been provided in the study and evaluation scheme of 5th Semester. Evaluation of professional industrial training report through viva-voce/presentation aims at assessing students understanding of materials, industrial process, practices in industry/field organization and their ability to engage in activities related to problem solving in industrial setup as well as understanding of application of knowledge and skills learnt in real life situations.

Teachers and students are requested to see the footnote below the study and evaluation scheme of 4th semester for further details.

The teacher along with field supervisors will conduct performance assessment of students. The components of evaluation will include the following:

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