COMPETENCY BASED CURRICULUM

DIPLOMA
IN
COMPUTER ENGINEERING

(Duration 03 Years)
NSQF Level – 5

Under
Haryana State Board of Technical Education

Developed By

Curriculum Development Center

National Institute of Technical Teachers Training & Research

(Ministry of Education, Government of India)

Sector - 26, Chandigarh, UT, India.

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PREFACE

Learning and learning experience are the foundation of any education system. Appropriateness of education and its useful implications stand on the platform of knowledge and skill. But the knowledge and skill cannot be quantified qualitatively without ensuring learning experience. Curriculum is the pathway to select and organise learning experience. It helps the teachers to provide tangible resources, goals and objectives to learners. Curriculum acts as a catalyst to stimulate creativity, innovation, ethics, values, responsibility and many human factors. Curriculum embodies rigour and high standards and creates coherence to empower learner to meet the industrial and societal needs. Curriculum is a central guide for a teacher to plan a standard based sequence for the instructional delivery.

The industrial revolution 4.0 has forced the technical education system to reinvent the curriculum to meet the human resource requirement of the industry. The data driven systems relying on the subjects like machine-learning, Artificial Intelligence, Data Science etc are literally forcing the technical education system to offer different subjects differently to address the emerging challenges. The non-linear way of learning now facilitates students to choose path of knowledge to skill or vice-versa. The bi-directional process requires innovative curriculum design and revision. Diploma programme is now more challenging than ever. The level of skill and knowledge demanded by industry from diploma holders are highly interdisciplinary at the same time address special need. Hence, there is a need to align the curriculum to National Skill Qualification Framework (NSQF).

National Education Policy, NEP-2020 has now opened up diversities for the education system to explore and exploit to make the education relevant. The policy emphasises to inculcate value, ethics, respect to culture and society etc along with industry ready knowledge and skill among the students. The interdisciplinary nature of curriculum, academic bank of credits and integration of technology in teaching-learning envisaged in NEP-2020 make it more challenging for curriculum development. NITTTR, Chandigarh has developed the art of curriculum development over 54 years of its existence. The expertise and experience available in the institute follow time-tested and acclaimed scientific methods to design/revise curriculum. The experienced faculty members entrusted with the curriculum development or revision activities are well-versed with NSQF, NEP and Outcome based education. I am happy to note that **Haryana State Board of Technical Education, Panchkula, Haryana** reposed their confidence on this expertise to develop **AICTE/NSQF/NEP 2020** aligned curriculum for the state. This documented curriculum is an outcome of meticulous planning and discussions among renowned experts of the subject through series of workshops. The effective implementation of this curriculum supported with quality instructional resources will go a long way in infusing the learning experience among learners to make them industry ready.

Director

National Institute of Technical Teachers Training & Research, Chandigarh

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Professor & Head
Curriculum Development Center
National Institute of Technical Teachers Training & Research, Chandigarh

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1. SALIENT FEATURES

1.	Name	:	**Diploma in Computer Engineering**
2.	Duration	:	**03 Years**
3.	Hours per week	:	**35**
4.	Entry Qualification	:	**10th Pass**
5.	Student Intake	:	**As per sanctioned strength**
6.	Pattern	:	**Semester**
7.	Scheme	:	**Multi Point Entry and Exit**
8.	NSQF Level	:	**5**
9.	Theory Practical Ratio	:	**33 : 67**
10.	Project Work	:	**Minor and Major Project**
11.	In-house/Industrial Training	:	**Mandatory after First and Second Year**

2. NSQF GUIDELINES

National Skill Qualification Framework has defined total Ten Levels. Each level of the NSQF is associated with a set of descriptors made up of five outcome statements, which describe in general terms, the minimum knowledge, skills and attributes that a learner needs to acquire in order to be certified for that level.

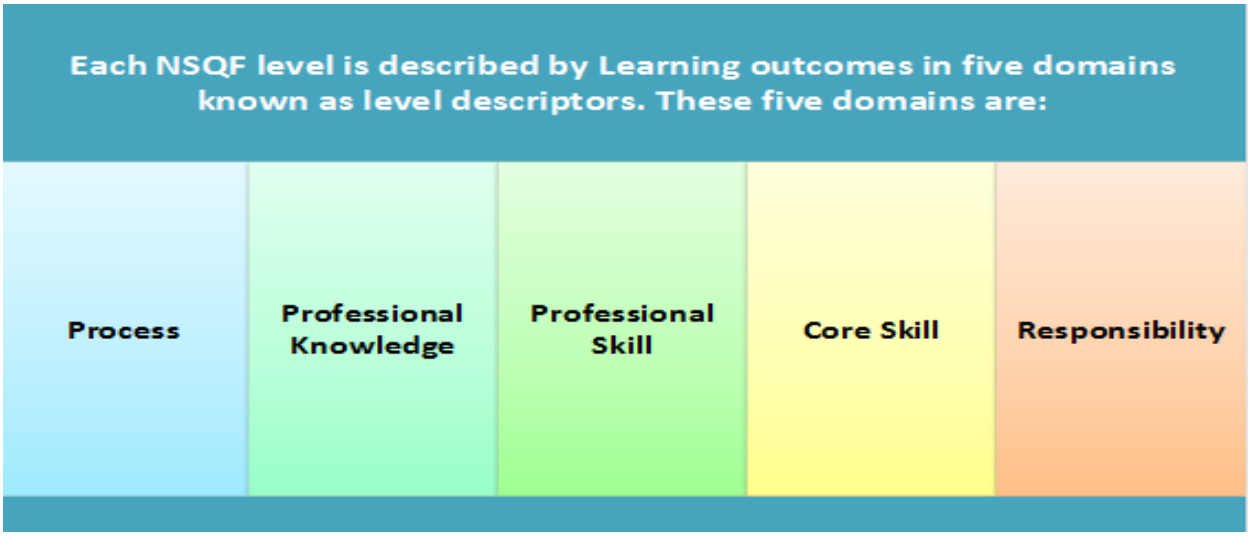

Fig1: NSQF Domains

NSQF LEVEL - 3 COMPLIANCE

The NSQF level - 3 descriptor is as follows:

Process	• Person may carry out a job which may require limited range of activities routine and predictable.
Professional Knowledge	• Basic facts, process and principle applied in trade of employment.
Professional Skill	• Recall and demonstrate practical skill, routine and repetitive in narrow range of application.
Core Skill	• Communication written and oral, with minimum required clarity, skill of basic arithmetic and algebraic principles, personal banking, basic understanding of social and natural environment.
Responsibility	• Under close supervision. Some responsibility for own work within defined limit.

Fig 2: NSQF Level – 3 Descriptor

Work requiring knowledge, skills and aptitudes at level 3 will be routine and predictable. Job holders will be responsible for carrying out a limited range of jobs under close supervision. Their work may require the completion of a number of related tasks. People carrying out these job roles may be described as “Semi skilled workers”. Individuals in jobs which require level 3 qualifications will normally be expected to be able to communicate clearly in speech and writing and may be required to use arithmetic and algebraic processes. They will be expected to have previous knowledge and skills in the occupation and should know the basic facts, processes and principles applied in the trade for which they are qualified and be able to apply the basic skills of the trade to a limited range of straightforward jobs in the occupation.

They will be expected to understand what constitutes quality in their job role and more widely in the sector or sub-sector and to distinguish between good and bad quality in the context of the jobs they are given. Job holders at this level will be expected to carry out the jobs they are given safely and securely. They will work hygienically and in ways which show an understanding of environmental issues. This means that they will be expected to take responsibility for their own health and safety and that of fellow workers and, where appropriate, customers and/or clients. In working with others, they will be expected to conduct themselves in ways which show a basic understanding of the social environment. They should be able to make a good contribution to team work.

NSQF LEVEL - 4 COMPLIANCE

The NSQF level-4 descriptor is given below:

Process	• Work in familiar, predictable, routine, situation of clear choice
Professional Knowledge	• Factual knowledge of field of knowledge or study.
Professional Skill	• Recall and demonstrate practical skill, routine and repetitive in narrow range of application, using appropriate rule and tool, using quality concepts.
Core Skill	• Communication written and oral, with required clarity, skill of basic arithmetic and algebraic principles, personal banking, basic understanding of social and natural environment.
Responsibility	• Responsibility for own work and learning.

Fig 3: NSQF Level – 4 Descriptor

Work requiring knowledge, skills and aptitudes at level 4 will be carried out in familiar, predictable and routine situations. Job holders will be responsible for carrying out a range of jobs, some of which will require them to make choices about the approaches they adopt. They will be expected to learn and improve their practice on the job. People carrying out these jobs may be described as "skilled workers". Individuals in jobs which require level 4 qualifications should be able to communicate clearly in speech and writing and may be required to use arithmetic and algebraic processes. They will be expected to have previous knowledge and skills in the occupation in which they are employed, to appreciate the nature of the occupation and to understand and apply the rules which govern good practice. They will be able to make choices about the best way to carry out routine jobs where the choices are clear.

They will be expected to understand what constitutes quality in the occupation and will distinguish between good and bad quality in the context of their job roles. Job holders at this level will be expected to carry out their work safely and securely and take full account of the health and safety on colleagues and customers. They will work hygienically and in ways which show an understanding of environmental issues. In working with others, they will be expected to conduct themselves in ways which show a basic understanding of the social and political environment. They should be able to guide or lead teams on work within their capability.

NSQF LEVEL - 5 COMPLIANCE

The NSQF level-5 description is given below:

Process	• Job that requires well developed skill, with clear choice of procedures in familiar context.
Professional Knowledge	• Knowledge of facts, principles, processes and general concepts, in a field of work or study.
Professional Skill	• A range of cognitive and practical skills required to accomplish tasks and solve problems by selecting and applying basic methods, tools, materials and information.
Core Skill	• Desired mathematical skill; understanding of social, political; and some skill of collecting and organising information, communication.
Responsibility	• Responsibility for own work and learning and some responsibility for others' works and learning

Fig 4: NSQF Level – 5 Descriptor

Work requiring knowledge, skills and aptitudes at level 5 will also be carried out in familiar situations, but also ones where problems may arise. Job holders will be able to make choices about the best procedures to adopt to address problems where the choices are clear. Individuals in jobs which require level 5 qualifications will normally be responsible for the completion of their own work and expected to learn and improve their performance on the job. They will require well developed practical and cognitive skills to complete their work. They may also have some responsibility for others' work and learning. People carrying out these jobs may be described as "fully skilled workers" or "supervisors".

Individuals employed to carry out these jobs will be expected to be able to communicate clearly in speech and writing and may be required to apply mathematical processes. They should also be able to collect and organise information to communicate about the work. They will solve problems by selecting and applying methods, tools, materials and information. They will be expected to have previous knowledge and skills in the occupation, and to know and apply facts, principles, processes and general concepts in the occupation. They will be expected to understand what constitutes quality in the occupation and will distinguish between good and bad quality in the context of their work. They will be expected to operate hygienically and in ways which show an understanding of environmental issues. They will take account of health and safety issues as they affect the work they carry out or supervise.

In working with others, they will be expected to conduct themselves in ways which show an understanding of the social and political environment.

3. NATIONAL EDUCATION POLICY (NEP) - 2020

NEP 2020 aims at a comprehensive holistic education to develop all capacities of human beings - intellectual, aesthetic, social, physical, emotional, and moral - in an integrated manner. A holistic arts education will help develop well-rounded individuals that possess: critical 21st century capacities in fields across the arts, humanities, languages, sciences, social sciences, and professional, technical, and vocational fields; an ethic of social engagement; soft skills, such as communication, discussion and debate; and rigorous specialization in a chosen field or fields. Such a holistic education shall be, in the long term, the approach of all undergraduate programmes, including those in professional, technical, and vocational disciplines.

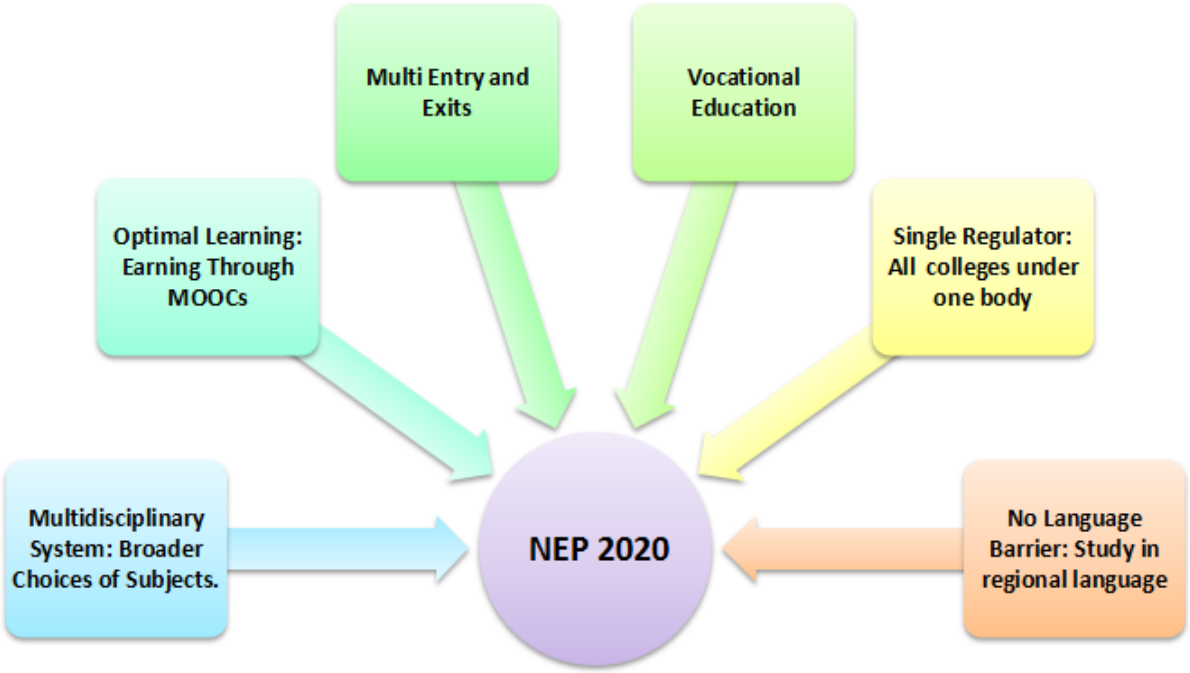

Fig 5: NEP 2020

Flexibility in curriculum and novel and engaging course options will be on offer to students, in addition to rigorous specialisation in a subject or subjects. Pedagogy for courses will strive for significantly less rote learning and an increased emphasis on communication, discussion, debate, research, and opportunities for cross-disciplinary and interdisciplinary thinking. The flexible and innovative curriculum shall emphasize on offering credit-based courses and projects in the areas of community engagement and service, environmental education and value-based education. as part of a holistic education, students will be provided with opportunities for internships with local industry, businesses, artists, crafts persons, villages and local communities, etc., as well as

research internships with faculty and researchers at their own or other HEIs or research institutions, so that students may actively engage with the practical side of their learning and, as a by-product, further improve their employability.

Effective learning requires relevant curriculum, engaging pedagogy, continuous formative assessment and adequate student support. The curriculum must be updated regularly aligning with the latest knowledge requirements and shall meet specified learning outcomes. High-quality pedagogy is then necessary to successfully impart the curricular material to students; pedagogical practices determine the learning experiences that are provided to students - thus directly influencing learning outcomes. The assessment methods have to be scientific and test the application of knowledge. Higher Education Institutes should move to a criterion-based grading system that assesses student achievement based on the learning goals for each programme, making the system fairer and outcomes more comparable. HEIs should also move away from high-stakes examinations towards more continuous and comprehensive evaluation.

4. DIPLOMA PROGRAMME OUTCOMES

The programme outcomes are derived from five domains of NSQF Level namely Process, Professional Knowledge, Professional Skill, Core Skill, Responsibility. After completing this programme, the student will be able to:

PO1: Perform tasks in limited range of activities, familiar situation with clear choice of procedures.

PO2: Acquire knowledge of principles and processes in the field of Computer Engineering.

PO3: Develop skills to accomplish quality tasks and solve problems using methods, tools, materials and information**.**

PO4: Demonstrate skill of communication, basic mathematics, collecting and organizing information along with knowledge of social, political and natural environment.

PO5: Take the responsibility of own works and supervises others work.

PO6: Select multidisciplinary and open subjects of own interest and perform self learning through Massive Open Online Courses.

5. DERIVING CURRICULUM AREAS FROM DIPLOMA PROGRAMME OUTCOMES

The following curriculum areas have been derived from Diploma Programme Outcomes:

Sr. No.	Programme Outcomes	Curriculum Subjects / Areas
1.	Perform tasks in limited range of activities, familiar situation with clear choice of procedures.	• Applied Physics - I • Computer Workshop-I • Electronics Workshop • Advances in IT • Analog Electronics • Applied Physics - II • Engineering Graphics • Multimedia Applications • Operating Systems • Digital Electronics • Programming in C • Data Structures using C • Object Oriented Programming using • Java Data Base Management System • Web Technologies • Python Programming • Computer Networks • Programme Elective – I • Application Development using Web Framework • Programme Elective - II
2.	Acquire knowledge of principles and processes in Electronics and Communication Engineering related field.	• Applied Physics - I • Advances in IT • Analog Electronics • Applied Physics - II • Multimedia Applications • Operating Systems • Digital Electronics

		• Programming in C • Data Base Management System • Computer Organisation & Architecture • Data Structures using C • Object Oriented Programming using Java • Web Technologies • Python Programming • Computer Networks • Programme Elective – I • Software Engineering • Programme Elective - II
3.	Develop skills to accomplish quality tasks and solve problems using methods, tools, materials and information**.**	• Computer Workshop-I • Electronics Workshop • Advances in IT • Analog Electronics • Multimedia Applications • Industrial / In - House Training – I • Operating Systems • Digital Electronics • Programming in C • Data Base Management System • Data Structures using C • Object Oriented Programming using Java • Web Technologies • Python Programming • Computer Networks • Programme Elective – I • Industrial Training – II • Application Development using Web Framework • Programme Elective - II
4.	Demonstrate skill of communication, basic mathematics, collecting and organizing information along with knowledge of	• English and Communication Skills - I • Applied Mathematics - I

	social, political and natural environment.	• Fundamentals of IT • Advances in IT • Applied Mathematics - II • Environmental Studies & Disaster Management • Industrial / In - House Training – I • English and Communication Skills – II • Minor Project • Industrial Training – II • Entrepreneurship Development & Management • Industrial Internship / Major Project
5.	Take the responsibility of own works and supervises others work.	• Computer Workshop-I • Industrial / In - House Training – I • Minor Project • Industrial Training – II • Industrial Internship / Major Project
6.	Select multidisciplinary and open subjects of own interest and perform self learning through Massive Open Online Courses.	• Multidisciplinary Elective • Open Elective

FIRST YEAR

NSQF LEVEL - 3

6. DIPLOMA PROGRAMME STUDY AND EVALUATION SCHEME
FIRST YEAR

FIRST SEMESTER

Sr. No.	SUBJECTS	STUDY SCHEME Periods/Week		Credits (C) L + P = C	MARKS IN EVALUATION SCHEME						Total Marks of Internal & External
					INTERNAL ASSESSMENT			EXTERNAL ASSESSMENT			
		L	P		Th	Pr	Total	Th	Pr	Total	
1.1	*English and Communication Skills - I	2	2	2 + 1 = 3	40	40	80	60	60	120	200
1.2	*Applied Mathematics - I	4	-	4 + 0 = 4	40	-	40	60	-	60	100
1.3	*Applied Physics - I	2	2	2 + 1 = 3	40	40	80	60	60	120	200
1.4	*Fundamentals of IT	2	4	2 + 2 = 4	40	40	80	60	60	120	200
1.5	Computer Workshop	-	6	0 + 3= 3	-	40	40	-	60	60	100
1.6	**Electronics Workshop	-	6	0 + 3=3	-	40	40	-	60	60	100
# Student Centered Activities(SCA)		-	5	-	-	-	-	-	-	-	-
Total		**10**	**25**	**20**	**160**	**200**	**360**	**240**	**300**	**540**	**900**

* Common with other Diploma Courses.

** Common with Medical Electronics.

Student Centered Activities will comprise of co-curricular activities like extension lectures on Constitution of India, Games, Yoga, Human Ethics, Knowledge of Indian System, Hobby clubs e.g. Photography etc., Seminars, Declamation contests, Educational field visits, N.C.C., NSS, Cultural Activities and self study etc.

SECOND SEMESTER

Sr. No.	SUBJECTS	STUDY SCHEME Periods/Week		Credits (C) L + P = C	MARKS IN EVALUATION SCHEME						Total Marks of Internal & External
					INTERNAL ASSESSMENT			EXTERNAL ASSESSMENT			
		L	P		Th	Pr	Total	Th	Pr	Total	
2.1	Advances in IT	3	2	3 + 1 = 4	40	40	80	60	60	120	200
2.2	*Applied Mathematics-II	4	-	4 + 0 = 4	40	-	40	60	-	60	100
2.3	*Applied Physics - II	2	2	2 + 1 = 3	40	40	80	60	60	120	200
2.4	Analog Electronics	2	4	2 + 2 = 4	40	40	80	60	60	120	200
2.5	*Engineering Graphics	-	6	0 + 3 = 3	-	40	40	60	-	60	100
2.6	Multimedia Applications	2	4	2 + 2 = 4	40	40	80	60	60	120	200
2.7	*Environmental Studies & Disaster Management	2	-	2 + 0 = 2	40	-	40	60	-	60	100
# Student Centered Activities (SCA)		-	2	-	-	-	-	-	-	-	-
Total		**15**	**20**	**24**	**240**	**200**	**440**	**420**	**240**	**660**	**1100**

* Common with other Diploma Courses

\# Student Centered Activities will comprise of co-curricular activities like extension lectures on Constitution of India, Games, Yoga, Human Ethics, Knowledge of Indian System, Hobby clubs e.g. Photography etc., Seminars, Declamation contests, Educational field visits, N.C.C., NSS, Cultural Activities and self study etc.

Summer Industrial/In-house Training: After 2nd semester, students shall undergo Summer Training of minimum 4 Weeks.

7. HORIZONTAL AND VERTICAL SUBJECTS ORGANISATION

Sr. No.	Subjects/Areas	Hours Per Week	
		First Semester	Second Semester
1.	English and Communication Skills - I	4	-
2.	Applied Mathematics - I	4	-
3.	Applied Physics - I	4	-
4.	Fundamentals of IT	6	-
5.	Computer Workshop	6	-
6.	Electronics Workshop	6	-
7.	Advances in IT	-	5
8.	Applied Mathematics-II	-	4
9.	Applied Physics - II	-	4
10.	Analog Electronics	-	6
11.	Engineering Graphics	-	6
12.	Multimedia Applications	-	6
13.	Environmental Studies & Disaster Management	-	2
14.	Student Centered Activities	5	2
	Total	**35**	**35**

8. COMPETENCY PROFILE & EMPLOYMENT OPPORTUNITIES

In government and private sectors related to **Computer Engineering**, **"Semi Skilled workers"** are required to carry out a limited range of predictable tasks under close supervision. They are normally expected to communicate clearly in speech and along with knowledge of arithmetic and algebraic processes. They should know the basic facts, processes and principles applied in limited area of Electronics and Communication Engineering.

Computer Engineering NSQF Level – 3 pass out students are expected to recall and demonstrate practical routine and repetitive skills, in narrow range of related applications. They should have the basic knowledge of Concrete use of physical principles and analysis in various technical fields. They should have good exposure of various aspects of information technology such as understanding the concepts of information technology and its scope, operating a computer: use of various office management tools, using internet and mobile applications etc. They should be able to operate basic software related to computer and should have good exposure of types of computers, computer components and interfaces, input and output devices installation and assembly.

Computer Engineering students are expected to write scripts that control a sequence of program steps such as those used in developing testing and deploying software. They should be able to handle modern scripting languages like Java Script. They are expected to realize circuits with components such as diodes, BJTs and transistors along with understanding of various types of amplifier circuits. They should be able to identify the proper applications of multimedia, evaluate the appropriate multimedia systems and develop effective multimedia applications.

They will have scope wage employment in organizations like Radar and Wireless, Railways, Defence Services, Para-military Forces**,** Civil Aviation**,** Defence Organizations**,** Electricity Boards and Corporations etc. They have scope in industries related to Computer Assembly, Computer Peripheral, Computer Software, Internet Server Providers**,** D.T.H component and Fabrication**,** EPBX, Telephone Exchange etc**.**

They will also have scope in establishing small start ups in the area of Marketing and Sales, Repair and Maintenance**,** Preparing Simulated Models**,** website development and multimedia application development etc.

9. PROGRAMME OUTCOMES

The programme outcomes are derived from five domains of NSQF Level – 3 namely Process, Professional Knowledge, Professional Skill, Core Skill, Responsibility. After completing this level, the student will be able to:

PO1: Carry out a task which may require limited range of predictable activities.

PO2: Acquire knowledge of Basic facts, process and principles related to Computer Engineering for employment.

PO3: Demonstrate practical skill in narrow range of Computer Engineering applications.

PO4: Communicate in written and oral, with minimum required clarity along with skill of basic arithmetic and algebraic principles, personal banking and basic understanding of social and natural environment.

PO5: Perform task under close supervision with some responsibility for own work within defined limit.

10. ASSESSMENT OF PROGRAMME AND COURSE OUTCOMES

Programme Outcomes to be assessed	Assessment criteria for the Course Outcomes
PO1: Carry out a task which may require limited range of predictable activities.	• Identify physical quantities, select their units and make measurements with accuracy. • Represent physical quantities as scalar and vector and identify type of motions, various forms of energy, their conversion and applications. • Draw Orthographic views of different objects viewed from different angles.. • Draw and interpret sectional views of an object which are otherwise not visible in normal view. • Draw Isometric views of different solids and develop their surfaces. • Identify conventions for different engineering materials, symbols, sections of regular objects and general fittings used in Civil and Electrical household appliances /fittings. • Draw orthographic views of different objects by using basic commands of AutoCAD. • Identify and Handle various hardware components • Design and Develop Websites using HTML • Develop interactive Internet applications • Create interactive applications in Java script. • Design Internet Applications using Java Script • Differentiate between types of waves and their motion. • Illustrate laws of reflection and refraction of light. • Demonstrate competency in phenomena of electrostatics and electricity • Design and analyze small signal amplifier circuits applying the biasing techniques learnt earlier. • Design and realize different classes of Power Amplifiers and tuned amplifiers useable for audio and Radio applications. • Develop a well-designed, interactive Web site with

	respect to current standards and practices • Demonstrate in-depth knowledge in an industry-standard multimedia development tool and its associated scripting language • Design time-based and interactive multimedia components. • Identify electronics components like resistors, capacitors, diodes, transistors etc. • Implement soldering and de-soldering on electronic circuit interconnections. • Identify different active electronic components and assemble circuits on breadboard. • Use measuring instruments like Multimeter, Function generator, Power Supply & DSO. • Able to test various electronic circuitry and batteries.
PO2: Acquire knowledge of Basic facts, process and principles related to Computer Engineering for employment.	• Identify physical quantities, select their units for use in engineering solutions, and make measurements with accuracy. • Represent physical quantities as scalar and vector and identify type of motions, various forms of energy, their conversion and applications. • Describe the need of HTML and its applications in Web Development • Demonstrate competency in phenomena of electrostatics and electricity. • Characterize properties of material to prepare new materials for various technical applications. • Identify and able to understand physics behind various types of materials. • Cascade different amplifier configurations to obtain the required overall specifications like Gain, Bandwidth, Input and Output interfacing Impedances. • Utilize the Concepts of negative feedback to improve the stability of amplifiers and positive feedback to generate sustained oscillations. • Determine the appropriate use of interactive verses standalone Web applications • Demonstrate in-depth knowledge in an industry-standard multimedia development tool and its

	associated scripting language • Identify issues and obstacles encountered by Web authors in deploying Web-based application.
PO3: Demonstrate practical skill in narrow range of Computer Engineering applications.	• Elaborate scientific work, energy and power, forms of friction and solve problems related to them. • Comprehend properties of matter and effect of temperature on various matter and phenomenon. • Demonstrate the use of physical principles and analysis in various fields of engineering. • Install different types of software and use them appropriately • Assemble computer components • Interface various devices to PC/Laptop • Troubleshoot and Maintain PC/Laptop • Design and Develop Websites using HTML • Develop interactive Internet applications • Create interactive applications in Java script. • Design Internet Applications using Java Script • Characterize properties of material to prepare new materials for various technical applications. • Demonstrate a strong foundation on Modern Physics to use at various technical applications. • Design and analyze small signal amplifier circuits applying the biasing techniques learnt earlier. • Design and realize different classes of Power Amplifiers and tuned amplifiers useable for audio and Radio applications. • Develop a well-designed, interactive Web site with respect to current standards and practices • Demonstrate in-depth knowledge in an industry-standard multimedia development tool and its associated scripting language • Design time-based and interactive multimedia components.
PO4: Demonstrate skill of communication, basic mathematics, collecting and organizing information along with knowledge of social, political and natural environment.	• Identify the nuances of Communication, both Oral and Written. • Acquire knowledge of the meaning of communication, communication process and speaking skills.

	• Acquire enhanced vocabulary and in-depth understanding of Grammatical Structures and their usage in the communication. • Communicate effectively with an increased confidence to read, write and speak in English language fluently. • Understand the geometric shapes used in engineering problems by Co-ordinate Geometry and Trigonometry. • Formulate engineering problems into mathematical formats with the use matrices, coordinate geometry and trigonometry • Calculate the approximate value of roots of certain expressions in engineering problems by application of binomial theorem. • Explore the idea of location, graph, and linear relationships between two variables. • Explain the basic components of Computers, Internet and issues of abuses/ attacks on information and computers. • Handle the Computer / Laptop / Mobiles / Internet Utilities and Install/Configure OS. • Assemble a PC and connect it to external devices. • Manage and Use Office practiced Automation Tools. • Develop worksheets and Prepare presentations. • Formulate the engineering problems into mathematical format with the use of differential equations and differential • Use the differentiation and Integration in solving various Mathematical and Engineering problems. • Calculate the approximate area under a curve by applying integration and numerical methods. • Understand the purposes of measures of central tendency and calculate the measures of central tendency (mode, median, mean) for a set of data. • Learn about basic fundamentals about MATLAB/ SciLab and mathematical calculation with MATLAB/ SciLab software. • Comprehend the importance of sustainable ecosystem

	• Demonstrate interdisciplinary nature of environmental issues • Implement corrective measures for the abatement of pollution. • Identify the role of non-conventional energy resources in environmental protection. • Manage various types of disasters
PO5: Perform task under close supervision with some responsibility for own work within defined limit.	• Identify and Handle various hardware components • Install different types of software and use them appropriately • Assemble computer components • Interface various devices to PC/Laptop • Troubleshoot and Maintain PC/Laptop • Design and Develop Websites using HTML • Develop interactive Internet applications • Create interactive applications in Java script. • Design Internet Applications using Java Script • Develop a well-designed, interactive Web site with respect to current standards and practices • Design time-based and interactive multimedia components • Identify electronics components like resistors, capacitors, diodes, transistors etc. • Implement soldering and de-soldering on electronic circuit interconnections. • Identify different active electronic components and assemble circuits on breadboard. • Use measuring instruments like Multimeter, Function generator, Power Supply & DSO. • Able to test various electronic circuitry and batteries.

11. SUBJECTS & CONTENTS

(FIRST YEAR)

FIRST SEMESTER

1.1 ENGLISH & COMMUNICATION SKILLS – I

L	P
2	2

RATIONALE

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

COURSE OUTCOMES

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

CO1: Identify the nuances of Communication, both Oral and Written.

CO2: Acquire knowledge of the meaning of communication, communication process and speaking skills.

CO3: Acquire enhanced vocabulary and in-depth understanding of Grammatical Structures and their usage in the communication.

CO4: Communicate effectively with an increased confidence to read, write and speak in English language fluently.

DETAILED CONTENTS

UNIT I

Reading

1.1 Techniques of reading: Skimming and Scanning

1.2 Extensive and Intensive Reading: Textual Study

1.3 Homecoming – R.N. Tagore

1.4 Life Sketch of Sir Mokshagundam Visvesvarayya

1.5 Life Sketch of Dr. Abdul Kalam

1.6 Narayan Murthy’s speech at LBSNA, Dehradun

UNIT II

Fundamentals of Communication

2.1 Concept and Process of Communication,

2.2 Types of Communication (Verbal Communication)

2.3 Barriers to Communication

2.4 Speaking Skill: Significance and essentials of Spoken Communication

2.5 Listening Skill: Significance and essentials of Listening

UNIT III

Grammar and Usage

3.1 Nouns

3.2 Pronouns

3.3 Articles

3.4 Verbs(Main and Auxiliary)

3.5 Tenses

UNIT IV

Writing Skills

4.1 Significance, essentials and effectiveness of Written Communication

4.2 Notice Writing

4.3 Official Letters and E-mails.

4.4 Frequently-used Abbreviations used in Letter-Writing

4.5 Paragraph Writing

4.6 Netiquettes

PRACTICAL EXERCISES

1 Reading

Reading Practice of lessons in the Lab Activity classes.

i. Comprehension exercises of unseen passages along with the lessons prescribed.

ii. Vocabulary enrichment and grammar exercises based on the selected readings.

iii. Reading aloud Newspaper headlines and important articles.

2 Fundamentals of Communication

i. Introducing oneself, others and leave- taking(talking about yourself)

ii. Just a minute (JAM) sessions: Speaking extempore for one minute on given topics

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

3 Grammar and Usage

i. Written and Oral Drills will be undertaken in the class to facilitate holistic linguistic competency among learners.

ii. Exercises on the prescribed grammar topics.

4 Writing Skills

i. Students should be given Written Practice in groups so as to inculcate team-spirit and collaborative learning .

ii. Group exercises on writing paragraphs on given topics.

iii. Opening an e-mail account, receiving and sending emails

RECOMMENDED BOOKS

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

INSTRUCTIONAL STRATEGY

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

1.2 APPLIED MATHEMATICS – I

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RATIONALE

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

COURSE OUTCOMES

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

CO1: Understand the geometric shapes used in engineering problems by Co-ordinate Geometry and Trigonometry.

CO2: Formulate engineering problems into mathematical formats with the use matrices, co-ordinate geometry and trigonometry

CO3: Calculate the approximate value of roots of certain expressions in engineering problems by application of binomial theorem.

CO4: Explore the idea of location, graph, and linear relationships between two variables.

CO5: Learn about basic fundamentals about MATLAB/ SciLab and mathematical calculation with MATLAB/ SciLab software.

DETAILED CONTENTS

UNIT I

Algebra

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

1.2 Logarithms and its basic properties

UNIT II

Binomial Theorem, Determinants and Matrices

2.1 Meaning of ${}^{n}p_{r}$ & ${}^{n}c_{r}$ (mathematical expression). Binomial theorem (without proof) for positive integral index (expansion and general form); binomial theorem for any index (expansion up to 3 terms - without proof), first binomial approximation with application to engineering problems.

2.2 Determinants and Matrices – Evaluation of determinants (upto 2^{nd}order), solution of equations (upto 2 unknowns) by Crammer's rule, definition of Matrices and its types, addition, subtraction and multiplication of matrices (upto 2^{nd} order).

UNIT III

Trigonometry

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

3.2 T-Ratios of Allied angles (without proof), Sum, Difference formulae and their applications (without proof). Product formulae (Transformation of product to sum, difference and vice versa

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

UNIT IV

Co-ordinate Geometry

4.1 Cartesian and Polar co-ordinates (two dimensional), Distance between two points, mid-point, centroid of vertices of a triangle.

4.2 Slope of a line, equation of straight line in various standards forms (without proof); (slope intercept form, intercept form, one-point form, two-point form, symmetric form, normal form, general form), intersection of two straight lines, concurrency of lines, angle between straight lines, parallel and perpendicular lines, perpendicular distance formula, conversion of general form of equation to the various forms.

UNIT V

Geometry of Circle and Software

Circle

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

I. Centre and radius
II. Three points lying on it
III. Coordinates of end points of a diameter

Software

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

RECOMMENDED BOOKS

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

SUGGESTED WEBSITES

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

INSTRUCTIONAL STATREGY

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

1.3 APLIED PHYSICS-I

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RATIONALE

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

COURSE OUTCOMES

After completing this subject, student should be able to:

CO1: Identify physical quantities, select their units and make measurements with accuracy.

CO2: Represent physical quantities as scalar and vector and identify type of motions, various forms of energy, their conversion and applications.

CO3: Elaborate scientific work, energy and power, forms of friction and solve problems related to them.

CO4: Comprehend properties of matter and effect of temperature on various matter and phenomenon.

CO5: Demonstrate the use of physical principles and analysis in various technical fields.

DETAILED CONTENTS

UNIT I

Unit and Dimensions

1.1 Definition of Physics, physical quantities- fundamental and derived

1.2 Units: fundamental and derived

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

1.4 Dimension, dimensional formulae and SI units of physical quantities-distance, displacement, area, volume, density, velocity, acceleration, linear momentum, force, impulse, work, power, energy, pressure, surface tension, stress, strain)

1.5 Dimensional equations, principle of homogeneity of dimensional equation

1.6 Application of dimensional analysis: checking the correctness of physical equation, conversion of system of unit (force, work, acceleration)

UNIT II

Force and Motion

2.1 Scalar and vector quantities– definition and examples, representation of vector, types of vector (unit vector, position vector, co-initial vector, collinear vector, co-planar vector)

2.2 Vector algebra- addition of vectors, Triangle & Parallelogram law (statement and formula only),

2.3 Scalar and vector product (statement and formula only)

2.4 Force and its units, resolution of force (statement and formula only)

2.5 Newton's laws of motion (statement and examples)

2.6 Linear momentum, Law of conservation of linear momentum (statement and examples), Impulse

2.7 Circular motion: definition of angular displacement, angular velocity, angular acceleration, frequency, time period; Relation between linear and angular velocity, centripetal and centrifugal forces (definition and formula only), application of centripetal force in banking of road

2.8 Rotational motion: definition with examples

2.9 Definition of torque, angular momentum, moment of inertia and its physical significance

UNIT III

Work, Power and Energy

3.1 Work- definition, symbol, formula and SI unit, types of work (zero work, positive work and negative work) with example

3.2 Friction– definition and its simple daily life applications

3.3 Power- definition, formula and units

3.4 Energy- definition and its SI unit, examples of transformation of energy.

3.5 Kinetic energy- definition, examples, formula and its derivation

3.6 Potential energy- definition, examples, formula and its derivation

3.7 Law of conservation of mechanical energy for freely falling bodies (with derivation)

3.8 Simple numerical problems based on formula of Power and Energy

UNIT IV

Properties of Matter

4.1 Elasticity and plasticity- definition, deforming force, restoring force, example of elastic and plastic body

4.2 Definition of stress and strain, Hooke's law, modulus of elasticity

4.3 Pressure- definition, atmospheric pressure, gauge pressure, absolute pressure, Pascal's law

4.4 Surface tension- definition, SI unit, applications of surface tension, effect of temperature on surface tension

4.5 Viscosity: definition, unit, examples, effect of temperature on viscosity

UNIT V

Heat and Temperature

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

5.2 Difference between heat and temperature

5.3 Principle and working of mercury thermometer

5.4 Modes of transfer of heat- conduction, convection and radiation with examples.

5.5 Properties of heat radiation

5.6 Different scales of temperature and their relationship

PRACTICAL EXERCISES

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

RECOMMENDED BOOKS

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

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

SUGGESTED WEBSITES

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

INSTRUCTIONAL STATREGY

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

1.4 FUNDAMENTALS OF IT

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RATIONALE

Information technology has great influence on all aspects of life. Almost all work places and living environment are being computerized. In order to prepare diploma holders to work in these environments, it is essential that they are exposed to various aspects of information technology such as understanding the concepts of information technology and its scope, operating a computer: use of various office management tools, using internet and mobile applications etc. This course is intended to make new students comfortable with computing environment - Learning basic computer skills, learning basic application software tools, Understanding Computer Hardware, Cyber security awareness.

COURSE OUTCOMES

At the end of the course student will be able to

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

DETAILED CONTENTS

UNIT I

Basics of Computer

Brief history of development of computers, Definition of Computer, Block diagram of a Computer, Hardware, Software, Booting: Cold and Hot Booting, Interaction between the CPU and Memory with Input/Output devices, Function of CPU and major functional parts of CPU.

Memory, Bit, Nibble, Byte, KB, MB, GB, TB, PB, Functions of memory, Use of storage devices in a Computer, List types of memory used in a Computer, Importance of cache memory, CPU speed and CPU word length

UNIT II

Basic Internet Skills

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

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

Unit III

Basic Logic building

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

Unit IV

Office Tools

Office Tools like LibreOffice/OpenOffice/MSOffice.

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

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

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

Unit V

Use of Social Media

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

PRACTICAL EXERCISES

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

3. Read Wikipedia pages on computer hardware components, look at those components in lab, identify them, recognize various ports/interfaces and related cables, etc.
4. Using Administrative Tools/Control Panel Settings of Operating Systems
5. Connect various peripherals (printer, scanner, etc.) to computer, explore various features of peripheral and their device driver software.
6. Explore features of Open Office tools and MS-Office, create documents, create presentation, create spread sheet, using these features, do it multiple times
7. Working with Conversion Software like pdf To Word, Word To PPT, etc.
8. Working with Mobile Applications – Searching for Authentic Mobile app, Installation and Settings, Govt. of India Mobile Applications
9. Creating email id, sending and receiving mails with attachments.
10. Using Google drive, Google calendar
11. Create Flow chart and Algorithm for the following:

a. Addition of n numbers and display result
b. To convert temperature from Celsius to Fahrenheit
c. To find Area and Perimeter of Square
d. Swap Two Numbers
e. find the smallest of two numbers
f. Find whether given number is Even or Odd
g. To print first n even Numbers
h. find sum of series 1+2+3+…..+N
i. print multiplication Table of a number
j. generate first n Fibonacci terms 0,1,1,2,3,5…n (n>2)
k. sum and average of given series of numbers
l. Factorial of number n (n!=1x2x3x…n)
m. Armstrong Number
n. Find whether given number is Prime or not

RECOMMENDED BOOKS

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

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

SUGGESTED WEBSITES

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

INSTRUCTIONAL STRATEGY

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

1.5 COMPUTER WORKSHOP

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RATIONALE

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

COURSE OUTCOMES

At the end of the course student will be able to
CO1: Identify and Handle various hardware components
CO2: Install different types of software and use them appropriately
CO3: Assemble computer components
CO4: Interface various devices to PC/Laptop
CO5: Troubleshoot and Maintain PC/Laptop

PRACTICAL EXERCISES

UNIT I

Introduction

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

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

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

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

Laptop: Introduction to Laptop, advantages over Desktops

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

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

SMPS: Introduction to SMPS, Study of SMPS Connectors

UNIT II

Memory Storage Devices

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

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

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

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

UNIT III

I/O Devices and Interfacing

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

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

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

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

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

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

Graphic Cards: Introduction to different types of Graphics cards

UNIT IV

Maintenance and Trouble Shooting of Desktop and Laptops

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

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

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

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

UNIT V

Assembling and Installation of Hardware/Software

Assembling and Disassembling of PC

Installation and Troubleshooting: Formatting, Partitioning and Installation of OS: Windows and Linux
Installation of peripheral devices: Printers, scanner
Installation of software's: application software, systems software

RECOMMENDED BOOKS

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

SUGGESTED WEBSITES

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

INSTRUCTIONAL STRATEGY

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

1.6 ELECTRONICS WORKSHOP

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RATIONALE

Electronic practice is the backbones of the real work situation, which helps in development and enhancement of relevant skill required in engineering. The main objective of this course is to impart knowledge of different electronics components used in electronic circuits and develop the ability to understand datasheets. The course also describes various electronic components for different applications.

COURSE OUTCOMES

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

CO1: Identify electronics components like resistors, capacitors, diodes, transistors etc.
CO2: Implement soldering and de-soldering on electronic circuit interconnections.
CO3: Identify different active electronic components and assemble circuits on breadboard.
CO4: Use measuring instruments like Multimeter, Function generator, Power Supply & DSO.
CO5: Able to test various electronic circuitry and batteries.

PRACTICAL EXERCISES

UNIT I

Basic Electronic Components

1.1 Concept of Resistors, Color Coding, Tolerance, Maximum power rating, Application of LDR.
1.2 Classification of Capacitors, Coding of capacitors-using numerals, directly printed values on capacitors, Ceramic capacitor and Electrolytic capacitor.
1.3 Concept of Inductors
1.4 Testing of components using Multi meter/LCR Q-meter

UNIT II

Soldering & De-soldering

2.1 Identify different types of soldering guns and practice soldering of different electronic active and passive components and IC bases on lug boards and PCBs.

2.2 Join the broken PCB track and test
2.3 Practice de-soldering using pump and wick
2.4 Prepare component for soldering.
2.5 Demonstrate soldering and de-soldering using soldering and de-soldering stations.

UNIT III

Active Electronic Components

3.1 Identify different types of mains transformers and their testing.
3.2 Identify the primary and secondary transformer windings and test the polarity.
3.3 Identify different sizes, shapes of cores used in low capacity transformers.
3.4 Measure the primary and secondary voltage of different transformers.
3.5 PN junction diode: Terminal Identification, setting on bread board and testing.
3.6 Zener diode: Terminal Identification, setting on bread board and testing.
3.7 LED, Photo diode :Terminal Identification, setting on bread board and testing.
3.8 Integrated Circuits (ICs) like 7404, 7408, 7432, 7805, 555, 741: Pin diagram, Identification, setting on bread board and testing.
3.9 Switches, Application of Toggle, Rotary, push to on & push to off
3.10 Relays and application of General purpose relay

UNIT IV

Electronic Testing Equipments

4.1 Power Supply, DC power supply, Concept of Dual power supply
4.2 Cathode Ray Oscilloscope (CRO), CRO probes, Front panel controls, AC/DC voltage measurement, Frequency measurement, wave form generation.
4.3 Function Generator, Front panel controls, Functions: sine wave, square wave, triangular wave and Amplitude measurement.
4.4 Digital Multi Meter, Front panel controls of DMM
4.5 Study of AC and DC Waveforms
4.6 Construction of various electronic circuits on breadboard Circuits like: rectifiers, filter circuits, clipper, clamper, transistor amplifiers, logic gates, LED driver circuit, power supply, etc
4.7 Testing of outputs of various electronic circuits using test Equipment.

UNIT V

AC and Electrical Cables

5.1 Identify the Phase, Neutral and Earth on power Socket.
5.2 Construct a test lamp and use it to check mains.

5.3 Use a Tester to monitor AC power.
5.4 Measure the voltage between phase and ground and rectify earthing.
5.5 Identify and test different AC mains cables.
5.6 Skin the electrical wires /cables using the wire stripper and cutter. .
5.7 Prepare the mains cable for termination.
5.8 Measure AC and DC voltages using multi meter
5.9 Replace the fuse, battery for the given multimeter

RECOMMENDED BOOKS

1. Prof. D.Chhatopadhyay & Prof. P.C Rakshit, "Basic Electronics" New Age International (P) Ltd. Publishers, 2010.
2. Zber, "Basic Electronics Lab Manual", Mc Graw Hill India, Seventh Edition, 2001.
3. Stan Gibilisco & Simon Monk, "Electricity & Electronics", Mc Graw Hill Education Sixth Edition, 2016.
4. Marc De Vinck "Getting Started with Soldering", Shroff/Maker Media, First Edition, 2018.

SUGGESTED WEBSITES

1. www.electronics.wisc-online.com
2. www.electronicsforu.com
3. https://www.electronics-tutorials.ws/design

INSTRUCTIONAL STRATEGY

This is hands-on practice based workshop for development of required skills in the students. There are five units of equal weightage. The teacher should also engage the students for various Hands on Practice/Training of Students during Educational Tour, Seminar/ Assignment Event, Students Quiz.

SECOND SEMESTER

SECOND SEMESTER

2.1 ADVANCES IN IT

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RATIONALE

A scripting language or script language is a programming language for a runtime system that automates the execution of tasks that would otherwise be performed individually by a human operator. The purpose of the course is to prepare students for building scripts that control a sequence of program steps such as those used in developing testing and deploying software. Modern scripting languages like Java Script are used as an example of scripting language in this course.

COURSE OUTCOMES

At the end of the course student will be able to

CO1: Describe the need of HTML and its applications in Web Development
CO2: Design and Develop Websites using HTML
CO3: Develop interactive Internet applications
CO4: Create interactive applications in Java script.
CO5: Design Internet Applications using Java Script

DETAILED CONTENTS

UNIT I

HTML Fundamentals

Introduction to HTML- Characteristics of HTML language, Structure of a HTML page. Describing Tags. How to create a HTML document? Viewing HTML document, commonly used web browsers. HTML4 – List of Tags in HTML4, HTML tags: Container elements, empty elements. Using tags, Heading, Paragraph, Changing appearance of text (bold, italics, underline, subscript, superscript), center tag, title tag. Changing font size, text color and background, Changing the background color and background of HTML page, Top marging, left margin, & nbsp,<hr> and its attributes.

UNIT II

Working with HTML

Using list and images: Unordered lists: type attribute. Ordered lists: start attribute, type attribute, value attribute. Nested lists. Inserting images, aligning an image, centering image, adding border to a image, alternate text, setting height and width, adding space around the image. Working with links: Anchor elements, creating hyperlink to a document. Internal linking and external linking.

UNIT III

Designing with HTML

Creating tables: Creating a table, attributes of table tag (BORDER, BORDERCOLOR, BGCOLOR, ALIGN, CELLSPACING, CELLPADING, WIDTH) Attributes of table row <tr> and table data <td> tag (BORDERCOLOR, BGCOLOR, ALIGN, VALIGN, HEIGHT). Row span and Col span.

Working with Frames. Use and creating frames. Introduction to Forms

Steps for developing a Website.

UNIT IV

JAVA Script Overview and Core Language Features

Introduction to Scripting Languages, JavaScript Implementation-ECMAScript-DOM-BOM-Values-Variables-Literals-Constants-Operators and Expressions-Regular Expressions Conditional Branching Statements- Conditional Looping Statements-Functions-Creating Simple Java Script page-Adding JavaScript page into HTML

UNIT V

Document Access

The Document Object Model: Mapping your HTML -Text Nodes-Attribute Nodes Accessing the Nodes you Want: Finding an Element by ID-Finding Elements by Tag Name-Finding Elements by Class Name; Navigating the DOM Tree-Interacting with Attributes - Changing Styles: Changing Styles with Class and Id-Font-Table Layout-Text Properties- Padding, Borders and Margins

PRACTICAL EXERCISES

PART A: HTML

1. Creating an HTML document
2. Working with Mark up Tags
3. Working with Heading-Paragraphs

4. Working with Text
5. Working with Lists
6. Working with Tables and Frames
7. Working with Hyperlinks
8. Working with Images and Multimedia
9. Working with Forms and controls.

PART B: Java Script

1. Create a HTML form with Name, Password and Confirm Password Write a Java script to validate if Password and Confirm Password field values are same.
2. Write a Java script to animate a simple Image using set Timeout.
3. Write a Java script to illustrate auto refreshing in your own Web page.
4. Develop a simple calculator using Java script.
5. Write a Java script to illustrate the use of cookies in your own Web page.
6. Write a Java script to prompt two integer numbers from the user and display the sum of them.
7. Write a Java script to greet the user with "Good Morning" or "Good Afternoon" or "Good Evening" depending on the current time.
8. Generate a Digital Clock using Java script.
9. Write a Java script to change the background color of the image in definite time intervals.

RECOMMENDED BOOKS

1. Nicholas C.Zakas, "Professional JavaScript for Web Developers", Wrox-Wiley Dreamtech, 2005.
2. Thomas A.Powell, "HTML&XHTML –The Complete Reference", Tata McGraw Hill, 2006
3. JavaScript: The Definitive Guide-By David Flannagan;2003
4. John R Vacca, "JavaScript Development", Morgan Kaufmann 2004.
5. Paul Lomax, Matt Childs, Ran Petrusha, "VBScript in a nutshell", O'Reilly, 2005.
6. John Pollac, "JavaScript", McGraw Hill, 2005.
7. Adrian Kingley, "VBScript Programmers Reference", Wrox, 2004.

SUGGESTED WEBSITES

1. https://nptel.ac.in/courses/117/106/117106113/
2. https://nptel.ac.in/courses/106/105/106105084/

INSTRUCTIONAL STRATEGY

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

2.2 APPLIED MATHEMATICS – II

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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.

COURSE OUTCOMES

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

CO1: Formulate the engineering problems into mathematical format with the use of differential equations and differential

C02: Use the differentiation and Integration in solving various Mathematical and Engineering problems.

CO3: Calculate the approximate area under a curve by applying integration and numerical methods.

CO4: Understand the purposes of measures of central tendency and calculate the measures of central tendency (mode, median, mean) for a set of data.

CO5: Learn about basic fundamentals about MATLAB/ SciLab and mathematical calculation with MATLAB/ SciLab software.

DETAILED CONTENTS

UNIT I

Differential Calculus

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

1.2 Differentiation of x^n, sin x, cos x, e^x by first principle.

1.3 Differentiation of sum, product and quotient of functions.

UNIT II

Differential Calculus and Its Applications

2.1 Differentiation of trigonometric functions, inverse trigonometric functions. Logarithmic differentiation, successive differentiation (upto 2nd order)

2.2 Application of differential calculus in:

(a) Rate measures (b) Maxima and minima

UNIT III

Integral Calculus

3.1 Integration as inverse operation of differentiation with simple examples.

3.2 Simple standard integrals and related problems, Integration by Substitution method and Integration by parts.

3.3 Evaluation of definite integrals with given limits.

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

using formulae without proof (m and n being positive integers only) using pre-existing mathematical models.

UNIT IV

Application of Integration, Numerical Integration and Differential Equations

4.1 Applications of integration: for evaluation of area under a curve and axes (Simple problems).

4.2 Numerical integration by Trapezoidal Rule and Simpson's $1/3^{rd}$ Rule using pre-existing mathematical models.

Differential Equations

4.3 Definition, order, degree, Type of differential Equations, linearity, Formulation of ordinary differential equation (up to 1^{st} order), solution of ODE (1^{st} order) by variable separation method.

UNIT V

Statistics and Software

Statistics

5.1 Measures of Central Tendency: Mean, Median, Mode

5.2 Measures of Dispersion: Mean deviation, Standard deviation

Software

5.3 SciLab software – Theoretical Introduction.

5.4 Basic difference between MATLAB and SciLab software,

5.5 Calculations with MATLAB or ScilLab - (a) Representation of matrix (2×2 order), (b) Addition, Subtraction of matrices (2×2 order) in MATLAB or SciLab

RECOMMENDED BOOKS

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

SUGGESTED WEBSITES

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

INSTRUCTIONAL STRATEGY

This is theoretical subject and contains five units of equal weight age. 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. Students need to be taught the skills needed to use software tools built by experts through multiple problem solving based on the topics that the industry requires. For example they need to know how to use mathematical models that use integration as opposed to learning how integration can be used. Useful authenticated software MATLAB or open source software SciLab can be taught theoretically by books/online literatures and basic operations can be shown practically with practical software laboratory or small mobile apps of these software or authentic Trial version of MATLAB/ SciLab software. Diploma students need to know which tools to use and how to do the job.

2.3 APPLIED PHYSICS-II

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RATIONALE

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

COURSE OUTCOMES

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

CO1: Differentiate between types of waves and their motion.

CO2: Illustrate laws of reflection and refraction of light.

CO3: Demonstrate competency in phenomena of electrostatics and electricity.

CO4: Characterize properties of material to prepare new materials for various technical applications.

CO5: Demonstrate a strong foundation on Modern Physics to use at various technical applications.

DETAILED CONTENTS

UNIT I

Wave Motion and its Applications

1.1 Waves: definition, types (mechanical and electromagnetic wave)

1.2 Wave motion- transverse and longitudinal with examples, terms used in wave motion like displacement, amplitude, time period, frequency, wavelength, wave velocity; relationship among wave velocity, frequency and wave length

1.3 Simple harmonic motion (SHM): definition, examples

1.4 Cantilever: definition, formula of time period (without derivation)

1.5 Free, forced and resonant vibrations with examples

1.6 Sound waves: types (infrasonic, audible, ultrasonic) on the basis of frequency, noise, coefficient of absorption of sound, echo

UNIT II

Optics

2.1 Reflection and refraction of light with laws, refractive index

2.2 Lens: introduction, lens formulae (no derivation), power of lens and simple numerical problems

2.3 Total internal reflection and its applications, critical angle and conditions for total internal reflection

2.4 Superposition of waves (concept only), definition of Interference, Diffraction and Polarization of waves

2.5 Introduction to Microscope, Telescope and their applications

UNIT III

Electrostatics and Electricity

3.1 Electric charge, unit of charge, conservation of charge

3.2 Coulomb's law of electrostatics

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

3.4 Definition of electric flux, Gauss law (statement and formula)

3.5 Capacitor and capacitance (with formula and unit)

3.6 Electric current and its SI Unit, direct and alternating current

3.7 Resistance, conductance (definition and unit)

3.8 Series and parallel combination of resistances

3.9 Ohm's law (statement and formula)

UNIT IV

Classification of Materials and their Properties

4.1 Definition of energy level, energy bands

4.2 Types of materials (conductor, semiconductor, insulator and dielectric) with examples, intrinsic and extrinsic semiconductors (introduction only)

4.3 Introduction to magnetism, type of magnetic materials: diamagnetic, paramagnetic and ferromagnetic materials with examples

4.4 Magnetic field, magnetic lines of force, magnetic flux

4.5 Electromagnetic induction (definition)

UNIT V

Modern Physics

5.1 Laser: introduction, principle, absorption, spontaneous emission, stimulated emission, population inversion

5.2 Engineering and medical applications of laser

5.3 Fibre optics**:** introduction to optical fibers (definition, principle and parts), light propagation, fiber types (mono-mode, multi-mode), applications in medical, telecommunication and sensors

5.4 Nanotechnology: introduction, definition of nanomaterial's with examples, properties at nanoscale, applications of nanotechnology (brief)

PRACTICAL EXERCISES

1. Familiarization with apparatus (resistor, rheostat, key, ammeter, voltmeter, telescope, microscope etc.)
2. To find the time period of a simple pendulum.
3. To study variation of time period of a simple pendulum with change in length of pendulum.
4. To determine and verify the time period of Cantilever.
5. To verify Ohm's laws by plotting a graph between voltage and current.
6. To study colour coding scheme of resistance.
7. To verify laws of resistances in series combination.
8. To verify laws of resistance in parallel combination.
9. To find resistance of galvanometer by half deflection method.
10. To verify laws of reflection of light using mirror.
11. To verify laws of refraction using glass slab.
12. To find the focal length of a concave lens, using a convex lens.

RECOMMENDED BOOKS

1. "Text Book of Physics for Class XII (Part-I, Part-II)", N.C.E.R.T., Delhi.
2. Dr. HH Lal, "Applied Physics, Vol. I & II", TTTI Publications, Tata McGraw Hill, Delhi.
3. AS Vasudeva, "Applied Physics –II", Modern Publishers, Jalandhar.
4. R A Banwait, "Applied Physics – II", Eagle Prakashan, Jalandhar.
5. N Subrahmanyam, Brij Lal and Avadhanulu, "A text book of OPTICS", S Chand Publishing, New Delhi.

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

SUGGESTED WEBSITES

1. http://swayam.gov.in

INSTRUCTIONAL STATREGY

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

2.4 ANALOG ELECTRONICS

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RATIONALE

This course will introduce circuit realizations with components such as diodes, BJTs and transistors studied earlier to give understanding of various types of amplifier circuits such as small signal, cascaded, large signal and tuned amplifiers. It will familiarize the Concept of feedback in amplifiers so as to differentiate between negative and positive feedback.

COURSE OUTCOMES

After undergoing the subject, student will be able to:

CO1: Design and analyze small signal amplifier circuits applying the biasing techniques learnt earlier.

CO2: Cascade different amplifier configurations to obtain the required overall specifications like Gain, Bandwidth, Input and Output interfacing Impedances.

CO3: Design and realize different classes of Power Amplifiers and tuned amplifiers useable for audio and Radio applications.

CO4: Utilize the Concepts of negative feedback to improve the stability of amplifiers and positive feedback to generate sustained oscillations.

DETAILED CONTENTS

UNIT I

Semiconductors and Diodes: Electrons- free and valence. Conductors, Insulators, and Semiconductors- definition & energy band diagrams. Properties of semiconductors. Meaning of Hole current, electron-hole pairs, recombination, doping, acceptor and donor impurities. Intrinsic and Extrinsic, N and P type semiconductors. Diode- formation, depletion region, VI Characteristics, ratings, types and applications. Zener diode- reverse bias characteristics, voltage regulation, shunt voltage regulator, and applications. Varistor and Thermistor working and applications.

UNIT II

Transistors and MOSFETs: Transistors- definition, terminals, types, symbols, formation of NPN and PNP, ratings. Transistor biasing- definition, importance, list types, stabilisation, thermal runaway, heat sink, and voltage divider method. List configurations and applications. Alpha and Beta- definitions, relation. CE input and output characteristics- cut off, saturation, and active regions. Transistor as a switch. List applications. FET- definition, types. MOSFET- definition, types, symbols. N type enhancement mode- construction, working, characteristics, switch. List applications and ratings. Differentiate BJT and MOSFET.

UNIT III

Rectifiers, filters and regulators: Regulated power supply- block diagram and applications. Rectifiers- definition, half wave, centre tapped and bridge full wave rectifier, efficiency, ripple factor, PIV, ratings. Filters- definition, necessity, C and PI filters, Regulator-definition, working of 7805, operating voltages- 7809, 7812, 7905, 7912.

UNIT IV

Amplifiers and Oscillators: Amplifier- definition, faithful amplification, classification based on configuration, power, and frequency. Transistor CE amplifier with biasing. Working of class A, B, C, and Push pull amplifier. Two stage RC coupled amplifier working, gain in dB, frequency response. Feed back- definition, types, advantages and disadvantages, applications. Oscillators- definition, classification, LC tank circuit, criteria. RC phase shift and crystal oscillator- working, applications. CRT- construction, working and applications.

UNIT V

OP-AMP and Timers: OPAMP– definition, block diagram, operation, characteristics, applications, µA 741 pin diagram. Definitions of virtual ground, CMRR and Slew rate. OPAMP applications– inverting, integrator, differentiator, summer, voltage follower, and comparator. Filters- definition, Working- low pass, high pass passive and active filters, applications. Timers– block diagram, pin diagram of 555, duty cycle, time constant, applications. Multi-vibrators- Astable and monostable using 555.

PRACTICAL EXERCISES

1. Familiarity with working knowledge of the following Instruments. (a) CRO (b) Multimeter (c) Function generator (d) Regulated power supply (e) Active passive components (f) Bread Board
2. Study of V-I Characteristics of a Diode.

3. Study and draw the characteristics of half wave and full wave rectifiers.
4. Study and draw the characteristics of rectifier filter circuit.
5. Study of Clipping & Clamping circuit.
6. Study zener diode characteristics.
7. Study zener diode as voltage regulator.
8. Study the characteristics of transistor in Common Base configuration.
9. Plot and study the input and output characteristics of BJT in common emitter configuration.
10. Graphical determination of small signal hybrid parameter of BJT.
11. Study and draw the characteristics of FET in common source configuration
12. Study characteristics of SCR.
13. Study of characteristics of DIAC.
14. Plot V-I characteristic of TRIAC.
15. Study and draw the characteristics of FET in common drain configuration.
16. Study the Series and Shunt Voltage Regulator.
17. Study of frequency response of active filters HP, LP & BP.

RECOMMENDED BOOKS

1. Electronics Principles and applications by Charles A Schuler and Roger L Tokhiem, Sixth Edition, Mc. Graw Hill , 2008.
2. Electronics Principles by Malvino, Mc. Graw Hill, Third edition. 2000.
3. Electronics Devices and Circuits by Allan Mottershed, PHI Learning Pvt. Ltd., First Edition.
4. Electronics Analog and Digital by I. J. Nagrath, PHI Learning Pvt. Ltd., 2013 Edition.
5. Linear Integrated Circuits by Ramakant A. Gayakwad, PHI Learning Pvt. Ltd., Fourth Edition.

SUGGESTED WEBSITES

1. http://swayam.gov.in

INSTRUCTIONAL STRATEGY

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

2.5 ENGINEERING GRAPHICS

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RATIONALE

Drawing is the language of engineers and technicians. Reading and interpreting engineering drawings 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.

COURSE OUTCOMES

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

CO1: Draw Orthographic views of different objects viewed from different angles..

CO2: Draw and interpret sectional views of an object which are otherwise not visible in normal view.

CO3: Draw Isometric views of different solids and develop their surfaces.

CO4: Identify conventions for different engineering materials, symbols, sections of regular objects and general fittings used in Civil and Electrical household appliances /fittings.

CO5: Draw orthographic views of different objects by using basic commands of AutoCAD.

DETAILED CONTENTS

UNIT I

1. Introduction to Engineering Drawing and Graphics

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

1.2 Symbols and conventions-

a) Conventions of Engineering Materials, Sectional Breaks and Conventional lines.
b) Civil Engineering Sanitary fitting symbols
c) Electrical fitting symbols for domestic interior installations.

1.3 Geometrical construction-geometrical figures such as triangles, rectangles, circles, ellipses and curves, hexagons, pentagons bisecting a line and arc , division of line and circle with the help of drawing instruments.

2. Technical Lettering of Alphabet and Numerals

Definition and classification of lettering, Free hand (of height of 5,8,12 mm) and instrumental lettering (of height 20 to 35 mm): upper case and lower case, single and double stroke, vertical and inclined (Gothic lettering) at 75 degree to horizontal and with suitable height to width ratio 7:4.

3. Dimensioning

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

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

4. Scales

4.1 Scales –Needs and importance (theoretical instructions), Type of scales, Definition of Representative Fraction (R.F.) and Length of Scale.

4.2 To draw/construct plain and diagonal scales.

UNIT II

1 Orthographic Projections

1.1 Theory of orthographic projections (Elaborate theoretical instructions).

1.2 Three views of orthographic projections of different objects of given pictorial view of a block in 1st and 3rd angle.

1.3 Projection of Points in different quadrant

1.4 Projection of Straight Line (1^{st} angle)

i. Line parallel to both the planes.

ii. Line perpendicular to any one of the reference plane and parallel to others

iii. Line inclined to any one of the references and parallel to another plane.

1.5 Projection of Plane – Different lamina like square rectangular, triangular, circle and Hexagonal pentagon. Trace of planes (HT and VT).

1.6 Identification of surfaces.

2. Sectioning

2.1 Importance and salient features

2.1 Drawing of full section, half section, partial or broken out sections, Offset sections, revolved sections and removed sections (theoretical only).

2.3 Orthographic sectional views of different objects.

UNIT III

1. Introduction of projection of right solids such as prism & pyramid (square, Pentagon, Hexagonal) cube, cone & cylinder (Axes perpendicular to H.P and parallel to V.P.)
2. Introduction of sections of right solids - Section planes, Sections of Hexagonal prism, pentagon pyramid, cylinder and cone (Section plane parallel to anyone reference planes and perpendicular to V.P. and inclined to H.P.)
3. Development of Surfaces – Development of lateral surfaces of right solids like cone, cylinder, pentagonal prism, pyramid and hexagonal pyramid (Simple problems)

UNIT IV

Isometric Views

1. Fundamentals of isometric projections and isometric scale.
2. Isometric views of different laminas like circle, pentagon and hexagon.
3. Isometric views of different regular solids like cylinder, cone, cube, cuboid, pyramid and prism.
4. Isometric views from given different orthographic projections(front, side and top view)

UNIT V

Introduction to AutoCAD

Basic introduction and operational instructions of various commands in AutoCAD. At least two sheets of different objects on AutoCAD (given pictorial/isometric view of a block). AutoCAD skill of student is evaluated in internal assessment only not in external exam.

RECOMMENDED BOOKS

1. A Text Book of Engineering Drawing by Surjit Singh; Dhanpat Rai & Co.,Delhi
2. Engineering Drawing by PS Gill; SK Kataria & Sons, New Delhi
3. Elementary Engineering Drawing in First Angle Projection by ND Bhatt;Charotar Publishing House Pvt. Ltd.,Anands
4. Engineering Drawing and Graphics using AutoCAD by T. Jeyapoovan,Vikas Publishing House Pvt, Ltd Noida.
5. A Text Book of Engineering Drawing by S.R.Singhal and O.P.Saxena, Asian Publisher, Delhi
6. Engineering Drawing by RB Gupta, Satya Prakashan, New Delhi

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. First angle projection is to be followed. Minimum of 20 sheets to be prepared and at least 2 sheets on AutoCAD**.** Instructions relevant to various drawings may be given along with appropriate demonstrations, before assigning drawing practice to students. This subject contains five units of equal weight age.

2.6 MULTIMEDIA APPLICATIONS

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RATIONALE

This course introduces how multimedia can be used in various application areas. It provides a solid foundation to the students so that they can identify the proper applications of multimedia, evaluate the appropriate multimedia systems and develop effective multimedia applications. It gives a detailed view of various classification, audio technologies, texts, and animations.

COURSE OUTCOMES

At the end of the course student will be able to

CO1: Develop a well-designed, interactive Web site with respect to current standards and practices

CO2: Demonstrate in-depth knowledge in an industry-standard multimedia development tool and its associated scripting language

CO3: Determine the appropriate use of interactive verses standalone Web applications

CO4: Design time-based and interactive multimedia components

CO5: Identify issues and obstacles encountered by Web authors in deploying Web-based application

DETAILED CONTENTS

UNIT I

Definitions and Classification

Multimedia Hardware- Multimedia Software–Meetings the analog signals – Search of Digital recording – CD ROMs.

UNIT II

Digital Audio Technologies

Sound Cards – Playback and Recording – MIDI – working with MIDI.

UNIT III

Multimedia texts

Coloring – Digital Imaging Fundamentals – Digital Image Development and Editing.

UNIT IV

Animation fundamentals

Animation Software tools – Animation Techniques – Digital video fundamentals – Digital video production techniques.

UNIT V

M/M Project Design Concepts

Authoring – Project Planning and Costing – Multimedia team.

PRACTICAL EXERCISES

2D Animation software (Adobe Flash)

Study of Adobe Flash Tools; Frame by Frame Animation; Motion Tweening; Simple Tweening; Using Guide Layer; Shape Tweening; Simple Tweening; Shape Hint; Masking; Single Layer Masking; Double Layer Masking; Movie Clip; Buttons; Publishing of Flash Movie

Action Scripts

1. Simple functions: Stop, Play, Go to, Get URL, Call
2. Properties - _x, _y, _x Scale, _y Scale, _alpha
3. Event handling

Image Editing Software (Adobe Photoshop)

Study of Adobe Photoshop tools

2. Image editing
3. Applying special effects.

RECOMMENDED BOOKS

1. Multimedia Magic – S.Gokul - BPB Publications, 2008.
2. Multimedia – Making it work – T. Vaughan – Osborne McGraw Hill - 2005.
3. Fundamentals of Multimedia – Drew – Pearson Education – 2006.
4. Multimedia Systems – Buford – Pearson Education – 2007.

SUGGESTED WEBSITES

1. https://nptel.ac.in/courses/117/105/117105083/
2. https://nptel.ac.in/courses/106/106/106106200/

INSTRUCTIONAL STRATEGY

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

2.7 ENVIRONMENTAL STUDIES AND DISASTER MANAGEMENT

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RATIONALE

A diploma holder must have knowledge of different types of pollution caused due to industrial and construction activities so that he/she may help in balancing the ecosystem and controlling pollution by various control measures. The course is intended to provide a general concept in the dimensions of environmental pollution and disasters caused by nature beyond the human control as well as the disasters and environmental hazards induced by human activities with emphasis on disaster preparedness, response and recovery.

COURSE OUTCOMES

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

CO1: Comprehend the importance of sustainable ecosystem
CO2: Demonstrate interdisciplinary nature of environmental issues
CO3: Implement corrective measures for the abatement of pollution.
CO4: Identify the role of non-conventional energy resources in environmental protection.
CO5: Manage various types of disasters

DETAILED CONTENTS

UNIT I

Introduction

1.1 Basics of ecology, eco system- concept, and sustainable development, Sources, advantages, disadvantages of renewable and nonrenewable energy.
1.2 Rain water harvesting
1.3 Deforestation – its effects & control measures

UNIT II

Air and Noise Pollution

2.1 Air Pollution: Source of air pollution. Effect of air pollution on human health, economy, Air pollution control methods.

2.2 Noise Pollution: Source of noise pollution, Unit of noise, Effect of noise pollution, Acceptable noise level, Different method of minimizing noise pollution.

UNIT III

Water and Soil Pollution

3.1 Water Pollution: Impurities in water, Cause of water pollution, Source of water pollution. Effect of water pollution on human health, Concept of DO, BOD, COD. Prevention of water pollution- Water treatment processes, Sewage treatment. Water quality standard.

3.2 Soil Pollution :Sources of soil pollution, Effects and Control of soil pollution, Types of Solid waste- House hold, Industrial, Agricultural, Biomedical, Disposal of solid waste, Solid waste management E-waste, E – waste management

UNIT IV

Impact of Energy Usage on Environment

Global Warming, Green House Effect, Depletion of Ozone Layer, Acid Rain. Eco-friendly Material, Recycling of Material, Concept of Green Buildings, Concept of Carbon Credit & Carbon footprint.

UNIT V

Disaster Management

A. Different Types of Disaster:

Natural Disaster: such as Flood, Cyclone, Earthquakes and Landslides etc.

Man-made Disaster: such as Fire, Industrial Pollution, Nuclear Disaster, Biological Disasters, Accidents (Air, Sea Rail & Road), Structural failures(Building and Bridge), War & Terrorism etc.

B.Disaster Preparedness:

Disaster Preparedness Plan

Prediction, Early Warnings and Safety Measures of Disaster

Psychological response and Management (Trauma, Stress, Rumour and Panic)

RECOMMENDED BOOKS

1. Environmental Studies by S.C. Sharma & M.P. Poonia, Khanna Publishing House, New Delhi
2. Environmental and Pollution Awareness by Sharma BR; Satya Prakashan, New Delhi.
3. Environmental Pollution by Dr. RK Khitoliya; S Chand Publishing, New Delhi

4. Environmental Studies by Erach Bharucha; University Press (India) Private Ltd., Hyderabad.
5. Environmental Engineering and Management by Suresh K Dhamija; S K Kataria and Sons, New Delhi.
6. E-books/e-tools/relevant software to be used as recommended by AICTE/BTE/NITTTR, Chandigarh.
7. Disaster Management by Dr. Mrinalini Pandey, Wiley India Pvt. Ltd.
8. Disaster Science and Management by Tushar Bhattacharya, McGraw Hill Education (India) Pvt. Ltd.

INSTRUCTIONAL STRATEGY

In addition to theoretical instructions, different activities pertaining to Environmental Studies and Disaster Management like expert lectures, seminars, visits etc. may also be organized This subject contains five units of equal weight age.

SECOND YEAR

NSQF LEVEL - 4

12. STUDY AND EVALUATION SCHEME

THIRD SEMESTER

Sr. No.	SUBJECTS	STUDY SCHEME Periods/Week		Credits L+P= C	MARKS IN EVALUATION SCHEME						Total Marks of Internal & External
					INTERNAL ASSESSMENT			EXTERNAL ASSESSMENT			
		L	P		Th	Pr	Total	Th	Pr	Total	
3.1	Industrial/In-House Training - I	-	2	0+1=1	-	40	40	-	60	60	100
3.2	Operating Systems	3	4	3+2 =5	40	40	80	60	60	120	200
3.3	**Digital Electronics	3	4	3+2 =5	40	40	80	60	60	120	200
3.4	**Programming in C	3	4	3+2 =5	40	40	80	60	60	120	200
3.5	Data Base Management System	2	4	2+2=4	40	40	80	60	60	120	200
	# SCA	-	6	-	-	-	-	-	-	-	-
	Total	**11**	**24**	**20**	**160**	**200**	**360**	**240**	**300**	**540**	**900**

** Common with Electronics and Communication Engineering.

Student Centered Activities will comprise of co-curricular activities like extension lectures on Constitution of India, Electoral Literacy, Motor Vehicles (Driving) Regulations 2017 etc., games, hobby clubs e.g. photography etc., seminars, declamation contests, educational field visits, N.C.C., NSS, Cultural Activities and self-study etc.

FOURTH SEMESTER

Sr. No.	SUBJECTS	STUDY SCHEME Periods/Week		Credits (C) L + P = C	MARKS IN EVALUATION SCHEME						Total Marks of Internal & External
					INTERNAL ASSESSMENT			EXTERNAL ASSESSMENT			
		L	P		Th	Pr	Total	Th	Pr	Total	
4.1	*English and Communication Skills - II	2	2	2+1=3	40	40	80	60	60	120	200
4.2	Computer Organisation & Architecture	4	-	4+0=4	40	-	40	60	-	60	100
4.3	Data Structures using C	3	4	3+2=5	40	40	80	60	60	120	200
4.4	Object Oriented Programming using Java	2	4	2+2=4	40	40	80	60	60	120	200
4.5	Open Elective (MOOCs+/Offline)	2	-	2+0=2	40	-	40	60	-	60	100
4.6	Minor Project	-	6	0+3=3	-	40	40	-	60	60	100
# Student Centered Activities (SCA)		-	6	-	-	-	-	-	-	-	-
Total		**13**	**22**	**21**	**200**	**160**	**360**	**300**	**240**	**540**	**900**

* Common with other Diploma Courses

\+ Assessment of Open Elective through MOOCs shall be based on assignments out of 100 marks.

\# Student Centered Activities will comprise of co-curricular activities like extension lectures on Constitution of India, Electoral Literacy, Motor Vehicles (Driving) Regulations 2017 etc., games, hobby clubs e.g. photography etc., seminars, declamation contests, educational field visits, N.C.C., NSS, Cultural Activities and self-study etc.

Industrial Training: After 4th Semester, students shall undergo Industrial Training of 4 Weeks.

13. HORIZONTAL AND VERTICAL SUBJECTS ORGANISATION

Sr. No.	Subjects/Areas	Hours Per Week	
		Third Semester	Fourth Semester
1.	Industrial/In-House Training - I	2	-
2.	Operating Systems	7	-
3.	Digital Electronics	7	-
4.	Programming in C	7	-
5.	Data Base Management System	6	-
6.	English and Communication Skills - II	-	4
7.	Computer Organisation & Architecture	-	6
8.	Data Structures using C	-	7
9.	Object Oriented Programming using Java	-	6
10.	Open Elective (MOOCs/Offline)	-	2
11.	Minor Project	-	6
12.	Student Centered Activities	6	4
	Total	**35**	**35**

14. COMPETENCY PROFILE & EMPLOYMENT OPPORTUNITIES

Government and private sectors related to **Computer Engineering** require **skilled manpower** to work in familiar, predictable, routine situations of clear choice. They are expected to have factual knowledge of computer engineering field. They are expected to communicate with required clarity. Students after completing level 4 shall have knowledge of basic arithmetic, algebraic principles and basic understanding of social and natural environment. They are expected to recall and demonstrate skills in narrow range of applications using appropriate rules and tools to maintain quality.

Skilled workers will be responsible for carrying out a range of jobs, some of which will require them to make choices about the approaches they adopt. They will be expected to learn and improve their practice on the job. They should know what constitutes quality in the occupation and should distinguish between good and bad quality in the context of their job roles. Skilled worker at this level will be expected to carry out their work safely and securely and take full account of the health and safety on colleagues and customers. They should work hygienically and in ways which show an understanding of environmental issues. In working with others, they will be expected to conduct themselves in ways which show a basic understanding of the social and political environment.

Computer Engineering students after completing NSQF Level – 4 are expected have the knowledge of drives and controls used for automation in robotic industries. They are expected to have good knowledge of various operating systems and data base management system. They are expected to have good knowledge of logic gates, combinational digital circuits and sequential digital circuits. At this level, students should have exposure of programming languages like C and Java. They should be able to handle data structures using C and should have good knowledge of computer organization and architecture. They are also expected to handle computer industry related small projects at this level.

Computer Engineering students have scope in organizations like Radar and Wireless, Railways, Defence Services, Para-military Forces**,** Civil Aviation**,** Defense Organizations**,** Electricity Boards and Corporations etc. They have scope in industries related to Computer Assembly, Computer Peripheral, Computer Software, Internet Server Providers**,** D.T.H component and Fabrication**,** EPBX, Telephone Exchange etc**.** They will also have scope in establishing small startups in the area of Marketing and Sales, Repair and Maintenance**,** Preparing Simulated Models**,** website development and multimedia application development etc.

15. PROGRAMME OUTCOMES

The programme outcomes are derived from five domains of NSQF Level – 4 namely Process, Professional Knowledge, Professional Skill, Core Skill, Responsibility. After completing this level, the student will be able to:

PO1: Work in familiar, predictable, routine situation of clear choice.

PO2: Acquire factual knowledge in the field of computer engineering for employment.

PO3: Demonstrate routine and repetitive skills in narrow range of applications using appropriate rules and tools for quality.

PO4: Communicate with required clarity along with social and natural environment understanding.

PO5: Perform tasks with responsibility for own work and learning.

PO6: Select open elective of own interest to develop self-learning habit through online courses.

16. ASSESSMENT OF PROGRAMME AND COURSE OUTCOMES

Programme Outcomes to be assessed	Assessment criteria for the Course Outcomes
PO1: Work in familiar, predictable, routine situation of clear choice.	• Categorize different types of schedulers and scheduling algorithms. • Define deadlock and the various ways to recover from deadlock • Practice general commands, filters, shell scripts in Linux. • Design various combinational circuits • Develop various sequential circuits. • Analyze A/D & D/A converters and various memories. • Identify various control structures, variables and implement them. • Practice pointer in an array and structure. • Use structures and union for handling data. • Explain and execute member functions in C language. • Describe and implement array in C language. • Perform the execution of pointers in C language. • Compile the design of database architecture. • Convert database in the form of tables. • Provide the security to the database. • Respond various queries in the SQL • Use CPU, register and stack. • Explain and perform the functions of BIOS. • Demonstrate multi-processor systems. • Identify the problem and formulate an algorithm for it. • Recognize the best data structures to solve the problem. • Store data, process data using appropriate data structures. • Sort the data in ascending or descending order.

	• Implement trees and various traversing techniques. • Develop searching and sorting algorithms and to compare them for checking efficiency. • Execute the language construct and classes concepts. • Describe and implement inheritance and polymorphism. • Install Java IDE, Compiler, Java virtual machines • Explain and implement the abstract class and interface. • Implement the exception handling in live projects.
PO2: Acquire factual knowledge in the field of automation and robotics for employment	• Explain various types and services of operating system • Describe memory management and virtual memory. • Understand various types of number systems and digital codes. • Describe the logic gates and able to perform logics simplification. • Identify various control structures, variables and implement them. • Explain and execute member functions in C language. • Define and describe the database • Describe micro programmed and hardwired control. • Compare RISC and CISC architecture. • Study memory hierarchy and memory types. • Explain and perform the functions of BIOS. • Identify the problem and formulate an algorithm for it. • Recognize the best data structures to solve the problem. • Learn the concepts of OOPS using JAVA.

	• Describe and implement inheritance and polymorphism. • Explain and implement the abstract class and interface.
PO3: Demonstrate routine and repetitive skills in narrow range of applications using appropriate rules and tools for quality.	• Categorize different types of schedulers and scheduling algorithms. • Define deadlock and the various ways to recover from deadlock • Practice general commands, filters, shell scripts in Linux • Design various combinational circuits • Develop various sequential circuits. • Analyze A/D & D/A converters and various memories. • Identify various control structures, variables and implement them. • Practice pointer in an array and structure. • Use structures and union for handling data. • Explain and execute member functions in C language. • Describe and implement array in C language. • Perform the execution of pointers in C language. • Compile the design of database architecture. • Convert database in the form of tables. • Provide the security to the database. • Respond various queries in the SQL. • Use CPU, register and stack. • Explain and perform the functions of BIOS. • Demonstrate multi-processor systems. • Identify the problem and formulate an algorithm for it. • Recognize the best data structures to solve the problem. • Store data, process data using appropriate data structures. • Sort the data in ascending or descending order. • Implement trees and various traversing

	techniques. • Develop searching and sorting algorithms and to compare them for checking efficiency. • Execute the language construct and classes concepts. • Describe and implement inheritance and polymorphism. • Install Java IDE, Compiler, Java virtual machines • Explain and implement the abstract class and interface. • Implement the exception handling in live projects.
PO4: Communicate with required clarity along with social and natural environment understanding.	• Develop required competencies for effective communication and presentation. • Communicate effectively with an increased confidence; read, write and speak in English language fluently. • Comprehend special features of format and style of formal communication through various modes. • Write a Report, Resume, make a Presentation, Participate in GDs and Face Interviews • Illustrate use of communication to build a positive self-image through self-expression and develop more productive interpersonal relationships. • Write the minor project report effectively. • Present the minor project report using PPT.
PO5: Perform tasks with responsibility for own work and learning.	• Understand the working environment of industries. • Take necessary safety precautions and measures. • Learn about present and future requirement of industries. • Work in team for solving industrial problems • Develop required competencies and skills for relevant industries. • Select the minor project according to the need of relevant industries. • Work as a team member for successful

	completion of minor project. • Acquire Life Long Learning skills.
PO6: Select open elective of own interest to develop self-learning habit through online courses.	• State the basic concepts and principles about the subject of interest. • Perform in a better way in the professional world. • Select and learn the subject related to own interest. • Explore latest developments in the field of interest. • Develop the habit of self-learning through online courses.

17. SUBJECTS & CONTENTS

(SECOND YEAR)

THIRD SEMESTER

3.1 INDUSTRIAL / IN – HOUSE TRAINING - I

L	P
-	2

RATIONALE

Industrial training / In – house training will help the students to understand the working environment of relevant industries. The student will learn to work in team to solve the industrial problems. It will also give exposure about the present and future requirements of the relevant industries. This training is very important for development of required competencies and skills for employment and start– ups.

COURSE OUTCOMES

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

CO1: Understand the working environment of industries
CO2: Take necessary safety precautions and measures.
CO3: Learn about present and future requirement of industries.
CO4: Work in team for solving industrial problems
CO5: Develop competencies and skills required by relevant industries.
CO6: Develop writing, speaking and presentations skills.

PRACTICAL EXERCISES

1. Report writing based on industrial training.
2. Preparation of Power Point Slides based on industrial training and presentation by the candidate.
3. Internal Evaluation based on quality of Report, PPT preparation, PPT presentation and answer to queries.
4. External Evaluation based on quality of Report, PPT preparation, PPT presentation and answer to queries.

GUIDELINES

Students will be evaluated based on Industrial training / In – house training report and their

presentation using Power Point about the knowledge and skills gained during the training. The Head of the Department will depute faculty coordinators by assigning a group of students to each. The coordinators will mentor and guide the students in preparing the PPTs for final presentation. The following performance parameters are to be considered for assessment of the students out of 100 marks:

	Parameter	**Weightage**
i	Industrial / In-house assessment of the candidate by the trainer	40%
ii	Report Writing	20%
iii	Power Point Presentation	20%
iv	Viva-voce	20%

3.2 OPERATING SYSTEMS

L	P
3	4

RATIONALE

This course will the students in understanding the 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.

COURSE OUTCOMES

After undergoing the subject, the students will be able to:
CO1: Explain various types and services of operating system
CO2: Categorize different types of schedulers and scheduling algorithms.
CO4: Define deadlock and the various ways to recover from deadlock
CO5: Describe memory management and virtual memory.
CO6: Practice general commands, filters, shell scripts in Linux

DETAILED CONTENTS

UNIT I

Overview of Operating Systems

Definition of Operating Systems, Types of Operating Systems, Operating System Services, User operating system interface, System Calls, Types of System Calls, System Programs, Operating System Structure, Virtual Machine, Benefits of Virtual Machine

UNIT II

Process Management and Deadlocks

Process concept, Process State, Process Control Block, Scheduling Queues, Scheduler, Job Scheduler, Process Scheduler, Context Switch, Operations on Processes, Interprocess Communication, Shared Memory Systems, Message-Passing Systems, CPU Scheduler, Scheduling Criteria, Scheduling Algorithms, Preemptive and Non Preemptive, First come first serve (FCFS),

Shortest Job first (SJF), Round Robin (RR), Multiprocessor scheduling, Process Synchronization. Deadlock, Conditions for Dead lock, Methods for handling deadlocks, D e a d Prevention, Deadlock Avoidance, Deadlock detection, Recovery from deadlock.

UNIT III

Memory Management Function

Definition – Logical and Physical address Space, Swapping, Memory allocation, Contiguous Memory allocation, Fixed and variable partition, Internal and External fragmentation and Compaction, Paging – Principle of operation, Page allocation, Hardware support for paging, Protection and sharing, Disadvantages of paging, Segmentation, Virtual Memory.

UNIT IV

I/O Management Functions and File Management

Dedicated Devices, Shared Devices, I/O Devices, Storage Devices, Buffering, Spooling.
Types of File System; Simple file system, Basic file system, Logical file system, Physical file system, Various Methods of Allocating Disk Space

UNIT V

Linux Operating System

History of Linux and Unix, Linux Overview, Structure of Linux, Linux releases, Open Linux, Linux System Requirements, Linux Commands and Filters: mkdir, cd, rmdir, pwd, ls, who, whoami, date, cat, chmod, cp, mv, rm, pg, more, pr, tail, head, cut, paste, nl, grep, wc, sort, kill, write, talk, mseg, wall, merge, mail, news Shell: concepts of command options, input, output, redirection, pipes, redirecting and piping with standard errors, Shell scripts, vi editing commands

PRACTICAL EXERCISES

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

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

RECOMMENDED BOOKS

1. Silberschatz, Galvin, "Operating System Concepts", Wiley Publication.
2. Stallings, "Operating Systems", Tata McGraw Hill.
3. Dham Dhare, "Operating Systems- A Concept Based Approach", Tata McGraw Hill Education Pvt. Ltd., New Delhi.
4. Achyut S Godbole and Atul Kahate, "Operating Systems", Tata McGraw Hill Education Pvt. Ltd., New Delhi.
5. "Unleashed Linux", Tech Media Publishers, New Delhi.
6. e-books/e-tools/relevant software to be used as recommended by AICTE/HSBTE/NITTTR.

SUGGESTED WEBSITES

1. http://swayam.gov.in

INSTRUCTIONAL STRATEGY

This is hands on practice based subject and topics taught in the class should be practiced in the Lab regularly for development of required skills in the students. This subject contains five units of equal weight age. Laboratory must have windows as well as Linux operating system. Concepts of O.S. must be taught practically. While imparting instructions, the teachers are expected to lay more emphasis on concepts and principles of operating systems, its features and practical utility.

3.3 DIGITAL ELECTRONICS

L	P
3	4

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 detailed exposure of number systems and various codes. The students will understand various logic gates and their logic simplification. It will help the students to design various combinational, sequential circuits, converters and memories.

COURSE OUTCOMES

After undergoing this subject, the students will be able to:
CO1: Understand various types of number systems and digital codes.
CO2: Describe the logic gates and able to perform logics simplification.
CO3: Design various combinational circuits
CO4: Develop various sequential circuits.
CO5: Analyze A/D & D/A converters and various memories.

DETAILED CONTENTS

UNIT I
Number Systems and Codes

1.1 Introduction to analog and digital signal
1.2 Binary, octal and hexadecimal number system: conversion from decimal and hexadecimal to binary and vice-versa.
1.3 Binary addition and subtraction including binary points. 1's and 2's complement method of addition/subtraction.
1.4 Concept of code, weighted and non-weighted codes, examples of 8421, BCD, excess-3 and Gray code.
1.5 Concept of parity, single and double parity and error detection.

UNIT II

Logic Gates and Logic Simplifications

2.1 Concept of negative and positive logic

2.2 Definition, symbols and truth tables of NOT, AND, OR, NAND, NOR, EXOR Gates, NAND and NOR as universal gates.

2.3 Introduction to TTL and CMOS logic families

2.4 Postulates of Boolean algebra, De Morgan's Theorems. Implementation of Boolean

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

UNIT III

Combinational Circuits

3.1 Half adder, Full adder circuit, design and implementation.

3.2 4 bit adder circuit

3.3 Four bit decoder circuits for 7 segment display and decoder/driver ICs.

3.4 Basic functions and block diagram of MUX and DEMUX with different ICs

3.5 Basic functions and block diagram of Encoder

UNIT IV

Sequential Circuits

4.1 Concept and types of latch with their working and applications

4.2 Operation using waveforms and truth tables of RS, T, D, Master/Slave JK flip flops. Difference between a latch and a flip flop

4.3 Introduction to Asynchronous and Synchronous counters. Binary counters, Divide by N ripple counters, Decade counter, Ring counter

4.4 Introduction and basic concepts including shift left and shift right.

4.5 Serial in parallel out, serial in serial out, parallel in serial out, parallel in parallel out.

4.6 Universal shift register

UNIT V

Converters and Memories

5.1 Working principle of A/D and D/A converters

5.2 Brief idea about different techniques of A/D conversion and study of :

a) Stair step Ramp A/D converter

b) Dual Slope A/D converter

c) Successive Approximation A/D Converter

5.3 Detail study of :

a) Binary Weighted D/A converter

b) R/2R ladder D/A converter

5.4 Applications of A/D and D/A converter.

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

PRACTICAL EXERCISES

1. Verification and interpretation of truth tables for AND, OR, NOT NAND, NOR and Exclusive OR (EXOR) and Exclusive NOR(EXNOR) gates
2. Realisation of logic functions with the help of NAND or NOR gates
3. To design a half adder using XOR and NAND gates and verification of its operation
4. To design of a full adder circuit using XOR and NAND gates and verify its operation
5. To design circuit for 7 segment display ICs.
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.
8. Verification of truth table for Multiplexers and x and De-Multiplexers
9. To design a 4 bit SISO, SIPO, PISO, PIPO shift registers using JK/D flip flops and verification of their operation.
10. To design a 4 bit ring counter and verify its operation.
11. Use of Asynchronous Counter ICs (7490 or 7493)
12. To design and verification of A/D converter
13. To design and verification of D/A converter
14. To design and verification of 74181 ALU IC

RECOMMENDED BOOKS

1. Malvino Leach, “Digital Electronics and Applications”, Tata McGraw Hill Education Pvt. Ltd., New Delhi, 8th Edition, 2015.
2. Morris Mano, “Digital Logic Designs”, Prentice Hall of India, New Delhi, 6th Edition, 2018.
3. Soumitra Kumar Mandal, “Digital Electronics”, Tata McGraw Hill Education Pvt. Ltd., 2010.
4. V K Sangar, “Digital Electronics”, Raj Publishers, Jalandhar, 2017.

5. Tokheim, "Digital Electronics", Tata McGraw Hill Education Pvt. Ltd, 4th Edition, 2007.
6. Thomas Floyds, "Digital Fundamentals", Universal Book Stall, 11th Edition, 2017.
7. RP Jain, "Digital Electronics", Tata McGraw Hill Education Pvt. Ltd., New Delhi, 4th Edition, 2010.
8. KS Jamwal, "Digital Electronics", Dhanpat Rai and Co., New Delhi, 2010.
9. Yashpal and Sanjeev Kumar, "Digital Electronics", North Publication, Ambala City, 1st Edition, 2020.
10. BR Gupta, "Digital Electronics", Dhanpat Rai & Co., New Delhi, 2020.
11. RJ Tocci, "Digital Systems: Principles and Applications", Prentice Hall of India, New Delhi, 2000 Edition.
12. V. Rajaraman, "Digital Electronics by Prentice Hall of India", New Delhi, 5th Edition, 2007.
13. Naresh Gupta, "Fundamentals of Digital Electronics", Jain Brothers, New Delhi, 2005.
14. e-books/e-tools/relevant software to be used as recommended by AICTE/HSBTE/NITTTR.

SUGGESTED WEBSITES

1. http://swayam.gov.in

INSTRUCTIONAL STRATEGY

This is hands on practice based subject and topics taught in the class should be practiced in the Lab regularly for development of required skills in the students. This subject contains five units of equal weight age. All experiments may preferably be done on Bread Boards.

3.4 PROGRAMING IN C

L	P
3	4

RATIONALE

Computers play a vital role in present day professional life of technician's. 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.

COURSE OUTCOMES

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

CO1: Identify various control structures, variables and implement them.
CO2: Practice pointer in an array and structure.
CO3: Use structures and union for handling data.
CO4: Explain and execute member functions in C language.
CO5: Describe and implement array in C language.
CO6: Perform the execution of pointers in C language.

DETAILED CONTENTS

UNIT I

Basics of C Programming

1.1 Steps in development of a program, Flow charts, Algorithm development
1.2 Programme Debugging, I/O statements, Constants, variables and data types
1.3 Operators & Expressions, Unformatted and Formatted IOS, Data Type Casting
1.4 Decision making with IF – statement, IF – Else and Nested IF
1.5 While and do-while, for loop, Break. Continue, goto and switch statements

UNIT II

Pointers and Functions

2.1 Introduction to pointers, Address operator and pointers
2.2 Declaring and initializing pointers, Single pointer,
2.3 Introduction to functions, Function Declaration, calling, definition
2.4 Parameter Passing, Call - by value/reference, Global and Local Variables

UNIT III

Arrays and Strings

3.1 Introduction to Arrays
3.2 Array Declaration, Length of array
3.3 Single and muti dimensional array
3.4 Arrays of characters
3.5 Introduction of Strings
3.6 String declaration and definition
3.7 String related function i.e. strlen, strcpy, strcmp
3.8 Passing an array to function
3.9 Pointers to an array and strings.

UNIT IV

Structures and Unions

4.1 Declaration of structures
4.2 Accessing structure members
4.3 Structure Initialization
4.4 Pointer to a structures,
4.5 Unions

UNIT V

File Handling

5.1 Opening and Closing of File
5.2 Modes of Accessing Files
5.3 Reading and Writing in the File

PRACTICAL EXERCISES

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 print f and scan f and their return type values.
6. Programming exercises using if statement.
7. Programming exercises using if – Else.
8. Programming exercises on switch statement.

9. Programming exercises on do – while, statement.
10. Programming exercises on for – statement.
11. Simple programs using pointers.
12. Programs on one-dimensional array.
13. Programs on two-dimensional array.
14. Programs for putting two strings together. (ii) Programs for comparing two strings.
15. Simple programs using functions
16. Simple programs using structures.
17. Simple programs using union.
18. Program on Reading and Writing data to a file.

RECOMMENDED BOOKS

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

SUGGESTED WEBSITES

1. http://swayam.gov.in

INSTRUCTIONAL STRATEGY

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

3.5 DATABASE MANAGEMENT SYSTEM

L	P
2	4

RATIONALE

Database management 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. It will give exposure to the students about storage, manipulation and retrieval of data using query languages like Oracle/My SQL/SQL

COURSE OUTCOMES

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

CO1: Define and describe the database
CO2: Compile the design of database architecture
CO3: Convert database in the form of tables
CO3: Provide the security to the database
CO5: Respond various queries in the SQL

DETAILED CONTENTS

UNIT I

Introduction to Database system Concepts and Architecture

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).

Data models, schemas, instances, data base state. DBMS Architecture; The External level, The conceptual level, The internal level, Mappings. Data Independence; Logical data Independence, Physical data Independence. Database Languages and Interfaces; DBMS Language, DBMS Interfaces. Classification of Database Management Systems- Centralized, Distributed, parallel and object based.

UNIT II

Data Modeling using E.R. Model (Entity Relationship Model) and Relational

Data Models Classification; File based or primitive models, traditional data models, semantic data models. Entities and Attributes, Entity types and Entity sets, Key attribute and domain of attributes, Relationship among entities, Database design with E/R model.

Relational Model Concepts: Domain, Attributes, Tuples cardinlity, keys (Primary, Secondary, foreign, alternative keys) and Relations. Relational constraints and relational database schemes; Domain constraints, Key constraints and constraints on Null. Relational databases and relational database schemes, Entity integrity, referential integrity and foreign key. Comparison b/w E/R model and Relational model.

UNIT III

Normalization Trivial and Non-trivial Dependencies.

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

UNIT IV

Database Access and Security

Creating and using indexes, creating and using views.

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

UNIT V

MYSQL/SQL (Structured Query Language)

SQL* DDL (Data Definition Languages): Creating Tables, Creating a table with data from another table, Inserting values into a table, updating columns of a Table, Deleting Rows, Dropping a Table. DML (Data Manipulation Language): Database Security and Privileges, Grant and Revoke Command, Maintaining Database Objects, Commit and Rollback, various types of select commands, various types of joins, sub query, aggregate functions. Challenges of My SQL. Introduction to Big Data. Understanding Big Data with samples.

PRACTICAL EXERCISES

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**.**

RECOMMENDED BOOKS

1. Dr. Renu Vig and Ekta Walia, "Fundamentals of Database Management Systems", an ISTE, Publication, New Delhi.
2. Arun K Majumdar and P Bhattacharya, "Database Management Systems", Tata Mc Graw Hill Education Pvt. Ltd., New Delhi.
3. ISRD Group, "Introduction to DBMS", Tata McGraw Hill Education Pvt. Ltd., New Delhi.
4. Alexis Leon and Mathews Leon, "Database Management Systems", Vikas Publishing House Pvt. Ltd., New Delhi.
5. Date C.J. Adison Wesley, "An Introduction to Database Systems".
6. Elmasri/Navathe/Adison Wesley, "Fundamentals of Database Systems".
7. "SQL Unleashed", Hans Ladanyi Techmedia Publications, New Delhi.
8. e-books/e-tools/relevant software to be us as recommended by AICTE/HSBTE/NITTTR.

SUGGESTED WEBSITES

1. http://swayam.gov.in

INSTRUCTIONAL STRATEGY

This is hands on practice based subject and topics taught in the class should be practiced in the Lab regularly for development of required skills in the students. This subject contains five units of equal weight age. Server can be used as package to explain concepts.

FOURTH SEMESTER

4.1 ENGLISH AND COMMUNICATION SKILL - II

L	P
2	2

RATIONALE

Communication II moves a step further from Communication Skills I and is aimed at enhancing the linguistic competency of the students. Language as the most commonly used medium of self-expression remains indispensable in all spheres of human life – personal, social and professional. This course is intended to make fresh ground in teaching of Communicative English as per the requirements of National Skill Quality Framework.

COURSE OUTCOMES

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

CO1: Communicate effectively with an increased confidence; read, write and speak in English language fluently.

CO2: Comprehend special features of format and style of formal communication through various modes.

CO3: Write a Report, Resume, make a Presentation, Participate in GDs and Face Interviews

CO4: Illustrate use of communication to build a positive self-image through self-expression and develop more productive interpersonal relationships.

DETAILED CONTENTS

UNIT I

Reading

1.1 Portrait of a Lady - Khushwant Singh

1.2 The Doctor's Word by R K Narayan

1.3 Speech by Dr Kiran Bedi at IIM Indore2007 Leadership Concepts

1.4 The Bet - by Anton Chekov

UNIT II

Effective Communication Skills

2.1 Modern means of Communication (Video Conferencing, e- mail, Teleconferencing)

2.2 Effective Communication Skills: 7 C's of Communication
2.3 Non-verbal Communication – Significance, Types and Techniques for Effective Communication
2.4 Barriers and Effectiveness in Listening Skills
2.5 Barriers and Effectiveness in Speaking Skills

Unit III

Professional Writing

3.1 Correspondence: Enquiry letters, placing orders, complaint letters
3.2 Report Writing
3.3 Memos
3.4 Circulars
3.5 Press Release
3.6 Inspection Notes and tips for Note-taking
3.7 Corrigendum writing
3.8 Cover Letter

UNIT IV

Grammar and Vocabulary

4.1 Prepositions
4.2 Conjunctions
4.3 Punctuation
4.4 Idioms and Phrases: A bird of ill omen, A bird's eye view, A burning question, A child's play, A cat and dog life, A feather in one's cap, A fish out of water, A shark, A snail's pace, A snake in the grass, A wild goose chase, As busy as a bee, As faithful as dog, Apple of One's eye, Behind one's back, Breath one's last, Below the belt, Beat about the bush, Birds of a feather flock together, Black Sheep, Blue blood, By hook or crook, Chicken hearted, Cut a sorry figure ,Hand in glove, In black and white, In the twinkling, In full swing ,Is blind as a bat, No rose without a thorn, Once in a blue moon, Out of the frying pan in to the fire, know no bounds ,To back out, To bell the cat, To blow one's trumpet, To call a spade a spade, To cut one's coat according to one's cloth, To eat humble pie, To give ear to, To have a thing on one's finger tips, To have one's foot in the grave, To hold one's tongue, To kill two birds with one stone, To make an ass of oneself, To put two and two together, To the back bone, Turn coat, ups and downs.
4.5 Pairs of words commonly misused and confused: Accept-except, Access-excess, Affect-effect, Artificial- artful, Aspire-expire, Bail-bale, Bare-bear, Berth-birth, Beside-besides, Break-brake, Canvas-canvass, Course- coarse, Casual-causal, Council-counsel,

Continual-continuous, Coma-comma, Cue- queue, Corpse- corps-core, Dairy-diary, Desert-dessert, Dual-duel, Dew- due, Die-dye, Draft- draught-drought, Device-devise, Doze-dose, Eligible-illegible, Emigrant- immigrant, Envelop-envelope, Farther-further, Gate-gait, Goal-goal, Human-humane, Honorable-honorary, Hail-hale, Hair-heir-hare, Industrial-industrious, Impossible- impassable, Idle-idol-ideal, Lose-loose, Later-latter, Lesson-lessen, Main-Mane, Mental-mantle, Metal-mettle, Meter-metre, Oar-ore, Pray-prey, Plain-plan, Principal - principle, Personal- personnel, Roll- role, Route-rout- roote, Stationary-stationery, Union- unity, Urban- urbane, Vocation- vacation, Vain- vein-vane, Vary- very.

4.6 Translation of Administrative and Technical Terms in Hindi or Mother tongue: Academy, Abandon, Acting in official capacity, Administrator, Admission, Aforesaid, Affidavit, Agenda, Alma Master, Ambiguous, Appointing Authority, Apprentice, Additional, Advertisement, Assistant, Assumption of charge, Assurance, Attested copy, Bonafide, Bond, Cashier, Chief Minister, Chief Justice Clerical error, Commanding ,Officer, Consent, Contractor, corruption, Craftsman, Compensation, Code, Compensatory allowance, Compile, Confidential letter, Daily Wager, Data, Dearness allowance, Death - Cum Retirement, Dispatch, Dispatch Register, Disciplinary, Disciplinary Action, Disparity Department, Dictionary, Director, Director of Technical Education, Earned Leave, Efficiency Bar, Estate, Exemption, Executive Engineer, Extraordinary, Employment Exchange, Flying Squad, General Body, Head Clerk, Head Office, High Commission, Inconvenience, Income Tax, Indian Assembly Service, Justify, Legislative Assembly, Negligence, Officiating ,Office Record, Office Discipline, On Probation, Part Time, Performance, Polytechnic, Proof Reader Precautionary, Provisional, Qualified, Regret, Responsibility, Self-Sufficient, Senior, Simultaneous ,Staff, Stenography ,Superior, Slate, Takeover, Target Data Technical Approval, Tenure, Temporary, Timely Compliance, Under Investigation, Under Consideration, Verification, Viva-voce, Write off, Working Committee, Warning, Yours Faithfully , Zero Hour.

UNIT V

Employability Skills

5.1 Presentation Skills: How to prepare and deliver a good presentation

5.2 Telephone Etiquettes

5.3 Importance of developing employable and soft skills

5.4 Resume Writing: Definition, Kinds of Resume, Difference between Bio-data and Curriculum Vitae and Preparing a Resume for Job/ Internship

5.5 Group discussions: Concept and fundamentals of GD, and learning Group Dynamics.

5.6 Case Studies and Role Plays

PRACTICAL EXERCISES

1. Reading Practice of the above lessons in the Lab Activity classes.
2. Comprehension exercises of unseen passages along with the given lessons.
3. Vocabulary enrichment and grammar exercises based on the above selective readings.
4. Situational Conversation: Requesting and responding to requests; Expressing sympathy and condolence.
5. Warning; Asking and giving information.
6. Getting and giving permission.
7. Asking for and giving opinions.
8. A small formal and informal speech.
9. Seminar.
10. Debate.
11. Interview Skills: Preparing for the Interview and guidelines for success in the Interview and significance of acceptable body-language during the Interview.
12. Written Drills will be undertaken in the class to facilitate a holistic linguistic competency among learners.
13. Participation in a GD, Functional and Non-functional roles in GD, Case Studies and Role Plays
14. Presentations, using audio-visual aids (including power-point).
15. Telephonic interviews, face to face interviews.
16. Presentations as Mode of Communication: Persuasive Presentations using multi-media aids.
17. Practice of idioms and phrases on: Above board , Apple of One's eye , At sea, At random, At large, A burning question, A child's play, A wolf in sheep's clothing, A deal, Breath one's last, Bid fair to, Beat about the bush, Blue Blood, Big Gun, Bring to Book, Cut a sorry figure, Call names, Carry weight, Dark Horse, Eat Humble pie, Feel small, French leave, Grease the palm, Go against the grains, Get One's nerves, Hard and Fast, Hue and Cry, Head and ears, In full swing, Jack of all trades, know no bounds, kiss the dust, Keep an eye on, Lion's share, learn by rote, Null and void, on the cards, Pull a long face, Run amuck, Right and Left, Rain on Shine, Small talk, Take to one's heels, Tooth and nail, to take by storm, , Wet blanket, Yearn for.

RECOMMENDED BOOKS

1. Alvinder Dhillon and Parmod Kumar Singla, "Text Book of English and Communication Skills Vol – 1, 2", M/s Abhishek Publications, Chandigarh.

2. J Sethi, Kamlesh Sadanand & DV Jindal, "Course in English Pronunciation", PHI Learning Pvt. Ltd., New Delhi.
3. Wren and Martin, "High School English Grammar and Composition" .
4. NK Aggarwal and FT Wood, "English Grammar, Composition and Usage", Macmillan Publishers India Ltd., New Delhi.
5. RC Sharma, and Krishna Mohan, "Business Correspondence & Report Writing", (4th Edition), by Tata MC Graw Hills, New Delhi.
6. Varinder Kumar, Bodh Raj & NP Manocha, "Business Communication Skills", Kalyani Publisher, New Delhi.
7. Kavita Tyagi & Padma Misra, "Professional Communication", PHI Learning Pvt. Ltd., New Delhi.
8. Nira Konar, "Communication Skills for Professionals", PHI Learning Pvt. Ltd., New Delhi.
9. Krishna Mohan & Meera Banerji, "Developing Communication Skills", (2nd Edition), Macmillan Publishers India Ltd., New Delhi.
10. M. Ashraf Rizwi, "Effective Technical Communication", Tata MC Graw Hills, New Delhi.
11. Andrea J Rutherford, "Basic Communication Skills for Technology", Pearson Education, New Delhi.

INSTRUCTIONAL STRATEGY

This is practice based subject and topics taught in the class should be practiced in the Lab regularly for development of required communication skills in the students. Emphasis should be given on practicing of communication skills. This subject contains five unit of equal weight age.

4.2 COMPUTER ORGANISATION & ARCHITECTURE

L	P
4	-

RATIONALE

The subject plays very important role at this level to give exposure to the students about detailed organization of currently available personal computers in order to understand their functioning. It will further help the students in understanding the architecture of computers. The students will also get familiar with multi-processor systems.

COURSE OUTCOMES

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

CO1: Use CPU, register and stack.
CO2: Describe micro programmed and hardwired control.
CO3: Compare RISC and CISC architecture.
CO4: Study memory hierarchy and memory types.
CO5: Explain and perform the functions of BIOS.
CO6: Demonstrate multi-processor systems.

DETAILED CONTENTS

UNIT I

CPU Organisation

General register organisation, stack organisation, instruction formats (three address, two address, one address, zero address and RISC instruction). Addressing modes: Immediate, register, direct, in direct, relative, indexed.

UNIT II

Memory Organisation

Memory Hierarchy, RAM and ROM chips, Memory address map, Memory connections to CPU. Auxiliary memory: Magnetic disks and magnetic tapes. Associative memory, Cache memory, Virtual memory, Memory management hardware, Read and Write operation

UNIT III

I/O Organisation

Basis Input output system (BIOS) - Function of BIOS, Testing and initialization, Configuring the system, Modes of Data Transfer, Programmed I/O: Synchronous, asynchronous and interrupt initiated. DMA data transfer

UNIT IV

Architecture of Multi-processor systems

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

UNIT V

I/O Interface

Define I/O interface, Input-Output Interface, Explain methods of Asynchronous Data transfer. Synchronous Data Transfer, Strobe Control, Handshaking, Describe Asynchronous Serial Transfer.

RECOMMENDED BOOKS

1. Computer Architecture and Organisation by Moris Mano.
2. Computer Architecture by J. P. Hayes.
3. Structured Computer Organisation By Tanenbaum Andrew S, PHI.

SUGGESTED WEBSITES

1. http://swayam.gov.in
2. https://ekumbh.aicte-india.org/

INSTRUCTIONAL STRATEGY

This is theoretical subject for basic fundamental knowledge and contains five units of equal weight age.

4.3 DATA STRUCTURES USING C

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.

COURSE OUTCOMES

After undergoing the subject, the students will be able to:
CO1: Identify the problem and formulate an algorithm for it.
CO2: Recognize the best data structures to solve the problem
CO3: Store data, process data using appropriate data structures
CO4: Sort the data in ascending or descending order.
CO5: Implement trees and various traversing techniques.
CO6: Develop searching and sorting algorithms and to compare them for checking efficiency.

DETAILED CONTENTS

UNIT I

Fundamental Notations

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

UNIT II

Arrays and Linked Lists

2.1 Concept of Arrays
2.2 Storage representation of multi-dimensional arrays.

2.3 Operations on arrays with Algorithms (searching, traversing, inserting, deleting)
2.4 Introduction to linked list
2.5 Representation of linked lists in Memory
2.6 Operations on linked list (Insertion, deletion and traversals)
2.7 Application of linked lists
2.8 Doubly linked lists
2.9 Operations on doubly linked lists (Insertion, deletion and traversals)

UNIT III

Stacks, Queues and Recursion

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 Application of Queues
3.10 Recursion

UNIT IV

Trees

4.1 Concept of Trees
4.2 Representation of Binary tree in memory
4.3 Traversing Binary Trees (Pre order, Post order and In order)
4.4 Searching, inserting and deleting binary search trees
4.5 Introduction to Heap

UNIT V

Sorting and Searching

5.1 Introduction to sorting and searching
5.2 Search algorithm (Linear and Binary)
5.3 Sorting algorithms (Bubble Sort, Insertion Sort, Quick Sort, Selection Sort, Merge Sort, Heap Sort

PRACTICAL EXERCISES

Write programs in C to implement:

1. Sorting an array.
2. The addition of two matrices using functions.
3. The multiplication of two matrices.
4. Push and pop operation in stack.
5. Inserting and deleting elements in queue.
6. Inserting and deleting elements in circular queue.
7. Insertion and deletion of elements in linked list.
8. Insertion and deletion of elements in doubly linked list.
9. The Factorial of a given number with recursion and without recursion.
10. Fibonacii series with recursion and without recursion.
11. Program for binary search tree operation.
12. The selection sort technique.
13. The bubble sort technique.
14. The quick sort technique.
15. The merge sort technique.
16. The binary search procedures to search an element in a given list.
17. The linear search procedures to search an element in a given list.

RECOMMENDED BOOKS

1. Data Structure using C by Robert Kruse; Prentice Hall of India.
2. Data Structure through C by Yashwant Kanekar; BPB Publications.
3. Data structures – Schaum's Outline Series by Lipschutz; McGraw Hill Education Pvt Ltd, New Delhi.
4. Data Structure using C by ISRD Group ; Tata McGraw Hills Education Pvt Ltd , New Delhi.
5. Expert Data Structures with C by R.B. Patel ; Khanna Publishers, New Delhi.
6. Data Structures and Algorithm Using C by RS Salaria; Khanna Book Publishing Co. (P) Ltd. New Delhi.
7. Data Structure through C in depth by SK Srivastava, Deepali Srivastava; BPB Publications.
8. Data Structure through "C" Language by Sameeran Chattopadhyay, Matangini

Chottopadhyay; BPB Publications
9. Data Structure through “C” Language by DOEACC; BPB Publications
10. Data Structure using “C” Lab Workbook by Shukla; BPB Publications
11. e-books/e-tools/relevant software to be used as recommended by AICTE/HSBTE/NITTTR.

SUGGESTED WEBSITES

1. http://swayam.gov.in

INSTRUCTIONAL STRATEGY

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

4.4 OBJECT ORIENTED PROGRAMMING USING JAVA

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RATIONALE

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

COURSE OUTCOMES

After undergoing the subject, the students will be able to:
CO1: Learn the concepts of OOPS using JAVA.
CO2: Execute the language construct and classes concepts.
CO3: Describe and implement inheritance and polymorphism.
CO4: Install Java IDE, Compiler, Java virtual machines
CO5: Explain and implement the abstract class and interface.
CO6: Implement the exception handling in live projects

DETAILED CONTENTS

UNIT I

Introduction of Features

Fundamentals of object oriented programming – procedure oriented programming Vs. object oriented programming (OOP) Object oriented programming concepts – Classes, object, object reference, abstraction, encapsulation, inheritance and polymorphism
Introduction of eclipse (IDE) for developing programs in Java.

UNIT II.

Language Constructs, Classes and objects

Review of constructs of C used in JAVA : variables, types and type declarations, data types, increment and decrement operators, relational and logical operators; if then else clause;

conditional expressions, input using scanner class and output statement, loops, switch case, arrays, methods. Creation, accessing class member.

UNIT III

Inheritance and Polymorphism

Definition of inheritance, protected data, private data, public data, constructor chaining, order of invocation, types of inheritance, single inheritance, multilevel inheritance, hierarchical inheritance, hybrid inheritance

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

UNIT IV

Abstract class & Interface

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

UNIT V

Exception Handling

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

PRACTICAL EXERCISES

1. Write a program in JAVA to print "Hello" using classes.
2. Write a program to input using Scanner Class.
3. Write a program to print factorial of a Number.
4. Write a program to create a Class and make objects of that class.
5. Create a class with data members Feet, Inches and add them.
6. Create a class using constructors.
7. Create a class and show the use of Single inheritance.
8. Create a class and show the use of multiple inheritance.
9. Create a class and show the use of Multi-level inheritance.
10. Create a class showing the use of Constructor Overloading.
11. Create a program showing the use of Interfaces.
12. Create a program using Try and Catch Block.

RECOMMENDED BOOKS

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

SUGGESTED WEBSITES

1. http://swayam.gov.in

INSTRUCTIONAL STRATEGY

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

4.5 OPEN ELECTIVE

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RATIONALE

Open electives are very important and play major role in implementation of National Education Policy. These subjects provide greater autonomy to the students in the curriculum, giving them the opportunity to customize it to reflect their passions and interests. The system of open electives also encourages cross learning, as students pick and choose subjects from the different streams.

COURSE OUTCOMES

At the end of the open elective, the students will be able to:

CO1: State the basic concepts and principles about the subject of interest.
CO2: Perform in a better way in the professional world.
CO3: Select and learn the subject related to own interest.
CO4: Explore latest developments in the field of interest.
CO5: Develop the habit of self-learning through online courses.

LIST OF OPEN ELECTIVES (The list is indicative and not exhaustive)

1. Computer Application in Business
2. Introduction to NGO Management
3. Basics of Event Management
4. Event Planning
5. Administrative Law
6. Introduction to Advertising
7. Moodle Learning Management System
8. Linux Operating System
9. E-Commerce Technologies
10. NCC
11. Marketing and Sales
12. Graphics and Animations
13. Digital Marketing
14. Human Resource Management
15. Supply Chain Management

16. TQM

GUIDELINES

Open Elective shall be offered preferably in online mode. Online mode open elective shall preferably be through Massive Open Online Courses (MOOCs) from Swayam, NPTEL, Upgrad, Udemy, Khan Academy or any other online portal to promote self-learning. A flexible basket of large number of open electives is suggested which can be modified depending upon the availability of courses at suggested portals and requirements. For online open electives, department coordinators shall be assigned to monitor and guide the group of students for selection of minimum 20 hours duration online course of their choice. For offline open electives, a suitable relevant subject shall be offered by the respective department to the students with minimum 40% of the total class strength as per present and future requirements.

Assessment of MOOCs open elective shall be based on continuous evaluation by the respective coordinator. The coordinator shall consider the submitted assignments by the students from time to time during the conduct of MOOCs. The MOOCs assessment shall be conducted by the coordinator along with one external expert by considering submitted assignments out of 100 marks.

In case, no suitable open elective is available online, only then the course may be conducted in offline mode. The assessment of offline open elective shall be internal and external. The offline open elective internal assessment of 40 marks shall be based on internal sessional tests; assignments etc. and external assessment of 60 marks shall be based on external examination at institute level.

NOTE

The students enrolled under NCC will compulsorily undertake NCC as an open elective subject.

SUGGESTED WEBSITES

1. https://swayam.gov.in/
2. https://www.udemy.com/
3. https://www.upgrad.com/
4. https://www.khanacademy.org/

4.6 MINOR PROJECT

L	P
-	8

RATIONALE

Minor project work will help in developing the relevant skills among the students as per National Skill Qualification Framework. It aims at exposing the students to the present and future needs of various relevant industries. It is expected from the students to get acquainted with desired attributes for industrial environment. For this purpose, students are required to be involved in Minor Project Work in different establishments.

COURSE OUTCOMES

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

CO1: Define the problem statement of the minor project according to the need of industry.
CO2: Work as a team member for successful completion of minor project.
CO3: Write the minor project report effectively.
CO4: Present the minor project report using PPT.

GUIDELINES

Depending upon the interest of the students, they can develop minor projects as per present and future demand of the industry. The supervisors may guide the 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 detailed project report of the observations/processes/activities. The supervisor may create a group of 4-5 students as per their interest to work as a team for successful completion of the minor project.

The supervisor shall evaluate the students along with one external expert by considering the following parameters:

	Parameter	**Weightage**
I	Defining problem statement, focus and approach	20%
ii	Innovation / creativity	20%
iii	Report Writing	20%
iv	Power Point Presentation	20%
v	Viva - voce	20%

THIRD YEAR

NSQF LEVEL - 5

18. STUDY AND EVALUATION SCHEME

FIFTH SEMESTER

Sr. No.	SUBJECTS	STUDY SCHEME Periods/Week		Credits L+P= C	MARKS IN EVALUATION SCHEME						Total Marks of Internal & External
					INTERNAL ASSESSMENT			EXTERNAL ASSESSMENT			
		L	P		Th	Pr	Total	Th	Pr	Total	
5.1	Industrial Training - II	-	2	0+1 =1	-	40	40	-	60	60	100
5.2	Web Technologies	3	4	3+2=5	40	40	80	60	60	120	200
5.3	** Python Programming	3	4	3+2 =5	40	40	80	60	60	120	200
5.4	Computer Networks	3	4	3+2=5	40	40	80	60	60	120	200
5.5	Programme Elective - I	2	2	2+1=3	40	40	80	60	60	120	200
5.6	Multidisciplinary Elective (MOOCs+/Offline)	2	-	2+0=2	40	-	40	60	-	60	100
	# SCA	-	6	-	-	-	-	-	-	-	-
	Total	**13**	**22**	**21**	**200**	**200**	**400**	**300**	**300**	**600**	**1000**

** Common with Automation & Robotics Diploma Programme.

\+ Assessment of Multidisciplinary Elective through MOOCs shall be based on assignments out of 100 marks.

Programme Elective – I **5.5.1.** Cloud Computing (Common with AI & ML and A&R) **5.5.2** Big Data

\# Student Centered Activities will comprise of co-curricular activities like extension lectures on Constitution of India, Electoral Literacy, Motor Vehicles (Driving) Regulations 2017 etc., games, hobby clubs e.g. photography etc., seminars, declamation contests, educational field visits, N.C.C., NSS, Cultural Activities and self-study etc.

SIXTH SEMESTER

Sr. No.	SUBJECTS	STUDY SCHEME Periods/Week		Credits (C) L + P = C	MARKS IN EVALUATION SCHEME						Total Marks of Internal & External
					INTERNAL ASSESSMENT			EXTERNAL ASSESSMENT			
		L	P		Th	Pr	Total	Th	Pr	Total	
6.1	Application Development using Web Framework	-	6	0+3=3	-	40	40	-	60	60	100
6.2	*Entrepreneurship Development & Management	3	-	3+0=3	40	-	40	60	-	60	100
6.3	Software Engineering	3	-	3+0=3	40	-	40	60	-	60	100
6.4	Programme Elective - II	2	2	2+1=3	40	40	80	60	60	120	200
6.5	Major Project/Industrial Training	-	16	0+8=8	-	40	40	-	60	60	100
# Student Centered Activities (SCA)		-	3	-	-	-	-	-	-	-	-
Total		**08**	**27**	**20**	**120**	**120**	**240**	**180**	**180**	**360**	**600**

* Common with other Diploma Courses.

Programme Elective II: 6.4.1 Network Security 6.4.2 Mobile Application Development

Student Centered Activities will comprise of co-curricular activities like extension lectures on Constitution of India, Electoral Literacy, Motor Vehicles (Driving) Regulations 2017 etc., games, hobby clubs e.g. photography etc., seminars, declamation contests, educational field visits, N.C.C., NSS, Cultural Activities and self-study etc.

19. HORIZONTAL AND VERTICAL SUBJECTS ORGANISATION

Sr. No.	Subjects/Areas	Hours Per Week	
		Fifth Semester	Sixth Semester
1.	Industrial Training - II	2	-
2.	Web Technologies	7	-
3.	Python Programming	7	-
4.	Computer Networks	7	-
5.	Programme Elective - I	4	-
6.	Multidisciplinary Elective (MOOCs/Offline)	2	-
7.	Application Development using Web Framework	-	6
8.	Entrepreneurship Development & Management	-	3
9.	Software Engineering	-	3
10.	Programme Elective - II	-	4
11.	Major Project/Industrial Training	-	16
12.	Student Centred Activities	6	3
	Total	**35**	**35**

20. COMPETENCY PROFILE & EMPLOYMENT OPPORTUNITIES

Government and private sectors related to **Computer Engineering** require **supervisors** having well developed skills with clear choice of procedures. They are expected to have complete knowledge and practical skills related to computer engineering field. They shall be able to communicate clearly with others. Diploma holders after passing level 5 shall have understanding of desired mathematical skills and understanding of social and natural environment. They are expected to collect, organize and communicate information effectively.

Work requiring knowledge, skills and aptitudes at level 5 will also be carried out in familiar situations, but also ones where problems may arise. Job holders will be able to make choices about the best procedures to adopt to address problems where the choices are clear. Individuals in jobs which require level 5 qualifications will normally be responsible for the completion of their own work and expected to learn and improve their performance on the job. They will require well developed practical and cognitive skills to complete their work. They may also have some responsibility for others' work and learning.

Computer Engineering diploma pass out students will be expected to understand what constitutes quality in the occupation and will distinguish between good and bad quality in the context of their work. They will be expected to operate hygienically and in ways which show an understanding of environmental issues. They will take account of health and safety issues as they affect the work they carry out or supervise. They are expected have good theoretical and practical knowledge of various web technologies and networking of computers to work efficiently in computer related companies. They are also expected to have good knowledge of cloud computing and big data to meet the Industry 4.0 requirements along with good exposure of python programming.

Computer Engineering diploma students are expected to work as supervisor in organizations like Radar and Wireless, Railways, Defence Services, Para-military Forces**,** Civil Aviation**,** Defence Organizations**,** Electricity Boards and Corporations etc. They have scope in companies related to Computer Assembly, Computer Peripheral, Computer Software, Internet Server Providers**,** D.T.H component and Fabrication**,** EPBX, Telephone Exchange etc**.**

They will also have scope in establishing small start ups in the area of Marketing and Sales, Repair and Maintenance**,** Preparing Simulated Models**,** website development and multimedia application development etc.

21. PROGRAMME OUTCOMES

The programme outcomes are derived from five domains of NSQF Level – 5 namely Process, Professional Knowledge, Professional Skill, Core Skill, Responsibility. After completing this level, the student will be able to:

PO1: Perform task that require well developed skills with clear choice of procedures.

PO2: Acquire knowledge of facts, principles and processes related to computer engineering.

PO3: Demonstrate cognitive and practical skills to complete tasks and solve problems.

PO4: Develop skills to collect, organize and communicate information.

PO5: Accomplish own work and supervise others work.

PO6: Select online multidisciplinary electives of own interest to promote self-learning.

22. ASSESSMENT OF PROGRAMME AND COURSE OUTCOMES

Programme Outcomes to be assessed	Assessment criteria for the Course Outcomes
PO1: Perform task that require well developed skills with clear choice of procedures.	• Develop different portal using HTML. • Perform various logical operations in PHP. • Create database using MySQL. • Install and configure Joomla. • Perform database connectivity using PHP. • Implement Python programs utilizing arithmetic expressions, repetition, file Input and Output. • Demonstrate the use of the built-in data structures in Python. • Employ control structures, functions, and arrays to create Python programs. • Handle different IP address classes. • Connect various networking devices. • Troubleshoot networking related issues. • Illustrate the fundamental concepts of cloud storage and apply the concept of virtualization. • Describe the working of Hadoop. • Handle Map Reduce. • Identify basic aspects of web-frameworks. • Install, create and manage Blogs, Websites using WordPress. • Use PHP & MySql with WordPress. • Install and create Web Application using Moodle. • Manage features of Moodle sites and take backup of site content. • Differentiate and deploy virus protection. • Describe Firewalls and intrusion detection

	systems. • Setup and configure virtual private network. • Develop a mobile application using different components of Android.
PO2: Acquire knowledge of facts, principles and processes related to computer engineering.	• Understand the concepts of object-oriented programming as used in Python. • Define the use of GUI and databases using Python. • Learn about the basic concepts of networking models. • Describe wireless networks and cloud computing. • Explain core concepts of cloud computing paradigm. • Describe various Service and Deployment Models. • Detail SLA management in Cloud Computing. • Learn various trimmings and accessories sourced in garment production. • Learn the concept of big data. • Study Hadoop eco systems. • Learn about different types of systems. • Study various life cycle models. • Describe software requirement specifications. • Explain characteristics and features of good Software. • Define the concept of software testing and verification. • Learn the need of network security. • Study various encryption and decryption techniques.

	• Study the characteristics, basic concepts of mobile computing. • Illustrate architecture and protocols in Mobile computing. • Compare the network protocols governing the mobile communication. • Describe different kinds of mobile OS prevailing in the market.
PO3: Demonstrate cognitive and practical skills to complete tasks and solve problems.	• Implement Python programs utilizing arithmetic expressions, repetition, file Input and Output. • Demonstrate the use of the built-in data structures in Python. • Employ control structures, functions, and arrays to create Python programs. • Handle different IP address classes. • Connect various networking devices. • Troubleshoot networking related issues • Illustrate the fundamental concepts of cloud storage and apply the concept of virtualization. • Describe the working of Hadoop. • Handle Map Reduce. • Identify basic aspects of web-frameworks. • Install, create and manage Blogs, Websites using WordPress. • Use PHP & MySql with WordPress. • Install and create Web Application using Moodle. • Manage features of Moodle sites and take backup of site content. • Differentiate and deploy virus protection. • Describe Firewalls and intrusion detection systems. • Setup and configure virtual private network. • Develop a mobile application using different components of Android.

PO4: Develop skills to collect, organize and communicate information.	• Understand the working environment of industries • Learn about present and future requirement of industries. • Develop writing, speaking and presentations skills. • Observe technological developments as per present and future needs of industries. • Collect, communicate and manage the data from connected devices. • Comprehend the importance of entrepreneurship and its role in nation's development. • Classify the various types of business and business organizations. • Identify the various resources / sources and / or schemes for starting a new venture. • Explain the principles of management including its functions in an organisation. • Conduct market survey and prepare project report. • Define the problem statement of the Major project / Industrial training according to the need of industry. • Write the Major project / Industrial training report effectively. • Present the Major project / Industrial training report using PPT.
PO5: Accomplish own work and supervise others work.	• Take necessary safety precautions and measures. • Work in team for solving industrial problems • Develop competencies and skills required by relevant industries. • Define the problem statement of the Major project/Industrial training according to the need of industry. • Work as a team member for successful completion of Major project / Industrial training. • Write the Major project / Industrial training

	report effectively. • Present the Major project / Industrial training report using PPT.
PO6: Select online multidisciplinary electives of own interest to promote self-learning.	• Apply critical thinking in problem solving. • Demonstrate self and time management. • Display analytical and research abilities. • Integrate multiple knowledge domains. • Enhance the scope and depth of learning.

23. SUBJECTS & CONTENTS

(THIRD YEAR)

FIFTH SEMESTER

5.1 INDUSTRIAL TRAINING - II

L	P
-	2

RATIONALE

Industrial training will help the students to understand the working environmentof relevant industries. The student will learn to work in team to solve the industrial problems. It will also give exposure about the present and future requirements of the relevant industries. This trainingis very important for development of required competencies and skills for employment and start– ups.

COURSE OUTCOMES

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

CO1: Understand the working environment of industries
CO2: Take necessary safety precautions and measures.
CO3: Learn about present and future requirement of industries.
CO4: Work in team for solving industrial problems.
CO5: Develop competencies and skills required by relevant industries.
CO6: Develop writing, speaking and presentations skills.

PRACTICAL EXERCISES

1. Report writing based on industrial training.
2. Preparation of Power Point Slides based on industrial training and presentation by the candidate.
3. Internal Evaluation based on quality of Report, PPT preparation, PPT presentation and answer to queries.
4. External Evaluation based on quality of Report, PPT preparation, PPT presentation and answer to queries.

GUIDELINES

Students will be evaluated based on Industrial training report and their presentation using Power Point about the knowledge and skills gained during the training. The Headof the Department will depute faculty coordinators by assigning a group of students to each. The coordinators will mentor and guide the students in preparing the PPTs for final presentation. The following performance parameters are to be considered for assessment of the students out of 100 marks:

	Parameter	**Weightage**
i	Industrial assessment of the candidate by the trainer	40%
ii	Report Writing	20%
iii	Power Point Presentation	20%
iv	Viva-voce	20%

5.2 WEB TECHNOLOGIES

L	P
3	4

RATIONALE

A computer engineering diploma student should have good exposure of various web technologies. This course will develop competency amongst the students to design professional database backed dynamic and feature based web sites. The course covers the use of programming with PHP and the concepts of database using MySQL.

COURSE OUTCOMES

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

CO1: Develop different portal using HTML.
CO2: Perform various logical operations in PHP.
CO3: Create database using MySQL.
CO4: Install and configure Joomla.
CO4: Perform database connectivity using PHP.

DETAILED CONTENTS

UNIT I
DEVELOPING PORTALS USING HTML

Introduction to HTML 5 and CSS 3. Basic structure of HTML, designing a web page, inserting links images, horizontal rules, comments. Formatting text, title, headings, colors, fonts, sizes, simple tables and forms. HTML tags, hyperlinks. Adding graphics and images, image maps, image files. Using tables, forms, style sheets and frames. Floating of web site/pages.

UNIT II
PHP

Introduction to PHP: How PHP Works , The php.ini File, Basic PHP Syntax, PHP variables, statements, operators, decision making, loops, arrays, strings, forms, get and post methods, functions.

Introduction to cookies, storage of cookies at client side, Using information of cookies. Creating

single or multiple server side sessions. Timeout in sessions, Event management in PHP. Introduction to content management systems based on PHP.

UNIT III

MySQL

Introduction to MySQL, connecting to MySQL, database, creation, insertion, deletion and retrieval of MySQL data using PHP.

UNIT IV

JOOMLA BASICS AND ADMIN

Installing Wamp Server -Installing Joomla on Web Server, Joomla global configuration -Article manager -Archive manager-FrontPage manager -Section manager - Category manager- Media Manager-Menu manager -Component manager -Content Manager-Extensions manager-Module manager-Plugin manager-Template manager-How to install a new module-How to install a new template-How to install a new plugin-How to install a new component-Understanding the concept of Joomla positions -Changing the layout structure by changing the module position.

UNIT V

JOOMLA FRONTEND

Understanding Basic Joomla Template-Customizing Joomla template-Building Custom Joomla Template-Understanding Templatedetails.xml File-Creating Templatedetails.xml File using tmpl_builder Linking CSS-Linking JavaScript-Understanding Include-Displaying Content in Xhtml-Creating Template installation Package-Creating Custom Forms-Changing the Form Appearance using CSS.

PRACTICAL EXERCISES

1. Design PHP based web pages using correct PHP, CSS, and XHTML syntax, structure.
2. Create Web forms and pages that properly use HTTP GET and POST protocol as appropriate.
3 Design SQL language within MySQL and PHP to access and manipulate databases.
4. Install and configure both PHP and MySQL.
5 Create PHP code that utilizes the commonly used API library functions built in to PHP.
6. Design and create a complete web site that demonstrates good PHP/MySQL client/server design.

7. To store a cookie using PHP on client side.
8. To save the user session on server side.
9. Design website using Joomla.

RECOMMENDED BOOKS

1. Sams Teach Yourself PHP, MySQL, and Apache All in One" by Julie C.
2. Meloni, Publisher: SAMS ,ISBN 0-672-32976-X.
3. Web enabled development application by Ivan Byross: Commercial; TMH.
4. HTML, CSS, JavaScript, Perl, Python and PHP by Schafer Textbooks; Wiley India.
5. E-books/e-tools/relevant software to be used as recommended by AICTE/HSBTE/NITTTR.

RECOMMENDED WEBSITES

1. http://swayam.gov.in

INSTRUCTIONAL STRATEGY

This is hands on practice based subject and topics taught in the class should be practiced in the Lab regularly for development of required skills among the students. This subject contains five units of equal weightage.

5.3 PYTHON PROGRAMMING

L	P
3	4

RATIONALE

This subject introduces to the students the Python language. Upon completion of this subject, the student will be able to write non trivial Python programs dealing with a wide variety of subject matter domains. Topics include language components, the IDLE/IDE environment, control flow constructs, strings, I/O, collections, classes, modules, and regular expressions.

COURSE OUTCOMES

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

CO1: Implement Python programs utilizing arithmetic expressions, repetition, file Inputand Output.

CO1: Demonstrate the use of the built-in data structures in Python.

CO3: Employ control structures, functions, and arrays to create Python programs.

CO4: Understand the concepts of object-oriented programming as used in Python.

CO5: Define the use of GUI and databases using Python.

DETAILED CONTENTS

UNIT I

The way of the program: The Python programming language, What is a program? What is debugging?, Syntax errors, Runtime errors, Semantic errors, Experimental debugging.

Variables, Expressions and Statements: Values and data types, Variables, Variable names and keywords, Statements, Evaluating expressions, Operators and operands, Type converter functions, Order of operations, Operations on strings, Input, Composition, The modulus operator.

Conditionals: Boolean values and expressions, Logical operators, Simplifying Boolean Expressions, Conditional execution, Chained conditionals, Nested conditionals, The return statement, Logical opposites.

UNIT II

Iteration: Assignment, Updating variables, The for loop, The while statement, The Collatz 3n + 1

sequence, Tables, Two-dimensional tables, Paired Data, Nested Loops for Nested Data.

Strings: Working with strings as single things, Working with the parts of a string, Length, Traversal and the for loop, Slices, String comparison, Strings are immutable, The in and not in operators, A find function, Looping and counting, Optional parameters, The built-in find method, The split method, Cleaning up your strings, The string format method.

Tuples: Tuples are used for grouping data, Tuple assignment, Tuples as return values, Composability of Data Structures.

Lists: List values, Accessing elements, List length, List membership, List operations, List slices, Lists are mutable, List deletion, Objects and references, Aliasing, Cloning lists, Lists and for loops, List parameters, List methods, Pure functions and modifiers, Functions that produce lists, Strings and lists, list and range, Nested lists, Matrices.

Functions: Functions with arguments and return values.

UNIT III

Modules: Random numbers, The time module, The math module, Creating your own modules, Namespaces, Scope and lookup rules, Attributes and the dot operator.

Files: About files, Writing our first file, Reading a file line-at-a-time, Turning a file into a list of lines, Reading the whole file at once, Working with binary files, Directories, fetching something from the web. **List Algorithms:** Linear search, Binary search, Merging two sorted lists.

UNIT IV

Object oriented programming: Classes and Objects- The Basics, Attributes, Adding methods to our class, Instances as arguments and parameters, Converting an instance to a string, Instances as return values, Objects are mutable, Sameness, Copying.

Exceptions: Catching exceptions, raising our own exceptions, the finally clause of the try statement

Inheritance: Polymorphism, Generalization, Pure functions.

UNIT V

GUI: Creating Graphical User Interfaces, Using Module Tkinter, Building a Basic GUI, Models, Views, and Controllers, Customizing the Visual Style, Few More Widgets.

Databases: Overview, Creating and Populating, Retrieving Data, Updating and Deleting, Using NULL for Missing Data, Using Joins to Combine Tables, Keys and Constraints, Advanced Features.

PRACTICAL EXERCISES

Part A

1. Let list1 and list2 be two lists of integers. Implement function sublist() that takes as input lists list1 and list2 and returns True if list1 is a sublist of list2, and False otherwise.

   >>> sublist([15, 1, 100], [20, 15, 30, 50, 1, 100])

   True

   >>> sublist([15, 50, 20], [20, 15, 30, 50, 1, 100])

   False

2. Write function vowelCount() that takes a string as input and counts and prints the numberof occurrences of vowels in the string.

   >>> vowelCount('Le Tour de France')

   a, e, i, o, and u appear, respectively, 1, 3, 0, 1, 1 times.

3. The cryptography function crypto() takes as input a string (i.e., the name of a file in the current directory). The function should print the file on the screen with this modification: Every occurrence of string 'secret' in the file should be replaced with string 'xxxxxx'.

   >>> crypto('crypto.txt')

   I will tell you my xxxxxx. But first, I have to explainwhy
   it is a xxxxxx.
   And that is all I will tell you about my xxxxxx.

4. Write a function stats() that takes one input argument: the name of a text file. The function should print, on the screen, the number of lines, words, and characters in the file;your function should open the file only once.

   >>>stats('example.txt')
   line count: 3
   word count: 20

   character count: 98

5. Implement function distribution () that takes as input the name of a file (as a string). This one-line file will contain letter grades separated by blanks. Your function should print the distribution of grades, as shown.

   >>> distribution('grades.txt')6
   students got A
   2 students got A-3

students got B+2
students got B 2
students got B-4
students got C 1
student got C- 2
students got F

6. The function censor () takes the name of a file (a string) as input. The function should open the file, read it, and then write it into file censored.txt with this modification: Every occurrence of a four-letter word in the file should be replaced with string 'xxxx'.
>>> censor ('example.txt')

Note that this function produces no output, but it does create file censored.txt in the current folder.

7. Create a dictionary for phones and their prices. Write functions to add a new entry (phone:price) ,search for a particular phone and retrieve it's price, given price findphones with same price , remove an entry, display all phones sorted according to price. [Program must be menu driven]
8. Write a Python program that prompts the user to enter a list of first names and stores them in a list. The program should display how many times the letter 'a' appears within the list.
9. Write a Python program that prompts the user to enter integer values for each of two lists.It then should displays whether the lists are of the same length, whether the elements in each list sum to the same value, and whether there are any values that occur in both lists.
10. Implement and test a Python program that determines if all parentheses in an entered line of code form matching pairs. Note: Pairs of parentheses may be nested.
11. Suppose variable s has been assigned in this way:

s = '"It was the best of times, it was the worst of times; it
was the age of wisdom, it was the age of foolishness; it was the
epoch of belief, it was the epoch of incredulity; it was ..."' Then
do the following, in order, each time:

(a) Write a sequence of statements that produce a copy of s, named newS, in whichcharacters ., ,, ;, and \n have been replaced by blank spaces.
(b) Remove leading and trailing blank spaces in newS (and name the new string newS).
(c) Make the all characters in newS lowercase (and name the new string newS).
(d) Compute the number of occurrences in newS of string 'it was'.

(e) Change every occurrence of was to is (and name the new string newS).

(f) Split newS into a list of words and name the list listS.

12. The function avgavg() takes as input a list whose items are lists of three numbers. Each three-number list represents the three grades a particular student received for a course. For example, here is an input list for a class of four students:
[[95,92,86], [66,75,54],[89, 72,100],[34,0,0]]

The function avgavg() should print, on the screen, two lines. The first line will contain a list containing every student's average grade. The second line will contain just one number: the average class grade, defined as the average of all student average grades.
>>> avgavg([[95, 92, 86], [66, 75, 54],[89, 72, 100], [34, 0, 0]])

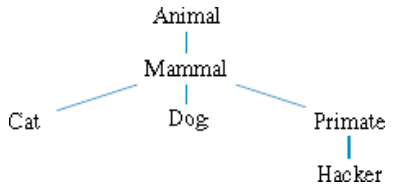
[91.0, 65.0, 87.0, 11.333333333333334]

63.5833333333

13. Implement function names () that takes no input and repeatedly asks the user to enter the first name of a student in a class. When the user enters the empty string, the function should print for every name the number of students with that name.
>>> names ()

Enter next name: Valerie
Enter next name: Bob Enter
next name: ValerieEnter
next name: AmeliaEnter
next name: Bob Enter next
name:
There is 1 student named Amelia
There are 2 students named Bob
There are 2 students named Valerie

14. Consider the class tree hierarchy:



Implement six classes to model this taxonomy with Python inheritance. In class Animal, implement method speak() that will be inherited by the descendant classes of Animal as is.

Complete the implementation of the six classes so they exhibit this behavior:

```
>>> garfield = Cat()
>>> garfield.speak()
Meeow
>>> dude = Hacker()
>>> dude.speak( )
Hello world!
```

Part B

1. Numerologists claim to be able to determine a person's character traits based on the numeric value" of a name. The value of a name is determined by summing up the values of the letters of the name where 'a' is 1, 'b' is 2, 'c' is 3 etc., up to 'z' being 26. For example,the name ""“Zelle""”would have the value 26+5+12+12+5=60 (which happens to be a very auspicious number, by the way). **Write a program that calculates the numeric value of a single name provided as input.** (Hint: Use dictionary, strings and its methods)
2. Expand your solution to the previous problem to allow the **calculation of a complete name** such as “John Marvin Zelle”” or “”John Jacob Jingleheimer Smith”. The total value is just the sum of the numeric values of all the names.
3. **Write a python program with function inner_product(x,y)** that computes the inner product of two (same length) lists. For example: list1=[1,2,3,4,5] and list2=[1,2,3,4,5]. The inner product list is inner_product=[1,4,9,16,25].
4. The **Sieve of Eratosthenes** is an elegant **algorithm** for finding all of the prime numbers up to some limit n. The basic idea is to first create a list of numbers from 2 to n. The first number is removed from the list, and announced as a prime number, and all multiples of this number up to n are removed from the list. This process continues until the list is empty.
    a) For example, if we wished to find all the primes up to 10, the list would originally contain 2, 3, 4, 5, 6, 7, 8, 9, 10.
    b) The 2 is removed and announced to be prime.
    c) Then 4, 6, 8, and 10 are removed, since they are multiples of 2.
    d) That leaves 3, 5, 7, 9.
    e) Repeating the process, 3 is announced as prime and removed, and 9 isremoved because it is a multiple of 3.
    f) That leaves 5 and 7. The algorithm continues by announcing that 5 is prime and removing it from the list.

g) Finally, 7 is announced and removed, and we're done.

Write a program that prompts a user for n and then uses the sieve algorithm to find all the primesless than or equal to n. (Hint: Use list. Remove () method)

5. Write a function that returns the index of the smallest element in a list of integers. If the number of such elements is greater than 1, return the smallest index. Use the following header: def index Of Smallest Element (lst): Write a program that prompts the user to enter a list of numbers, invokes this function to return the index of the smallest element, and displays the index.

6. **(Count occurrences of numbers)** Write a program that reads an unspecified number of integers and finds the ones that have the most occurrences. For example, if you enter 2 3 40 3 5 4 –3 3 3 2 0, the number 3 occurs most often. Enter all numbers in one line. If not one but several numbers have the most occurrences, all of them should be reported. For example, since 9 and 3 appear twice in the list 9 30 3 9 3 2 4, both occurrences should be reported.

7. **Morse Code Encryption/Decryption Program:** Develop and test a Python program that allows a user to type in a message and have it converted into Morse code, and also enter Morse code and have it converted back to the original message. The encoding of Morse code is given below:

Format the original message (containing English words) so that there is one sentence per line.

A	.-	N	-.
B	-...	O	---
C	-.-.	P	.--.
D	-..	Q	--.-
E	.	R	.-.
F	..-.	S	...
G	--.	T	-
H	....	U	..-
I	..	V	...-
J	.---	W	.--
K	-.-	X	-..-
L	.-..	Y	-.--
M	--	Z	--..

Format the Morse code fi le (containing dots and dashes) so that there is one letter per line,

with a blank line following the last letter of each word, and two blank lines following the end of each sentence (except the last).

RECOMMENDED BOOKS

1. A Downey, J. Elkner, and C. Meyers, “How to think like a computer scientist: learning with python. Green Tea Press”, Wellesley, Massachusetts, 2002.
2. J. Campbell, P. Gries, J. Montojo, and G. Wilson, “Practical programming: an introduction to computer science using Python”, Pragmatic Bookshelf, Second Edition, 2013.
3. A. B. Downey, “Python for software design: how to think like a computer scientist”, Cambridge University Press, 2009.
4. Z. A. Shaw, “Learn Python the Hard Way: A Very Simple Introduction to the Terrifyingly Beautiful World of Computers and Code”, Addison-Wesley, 2013.

RECOMMENDED WEBSITES

1. http://swayam.gov.in

INSTRUCTIONAL STRATEGY

This is hands on practice based subject and topics taught in the class should be practiced in the Lab regularly for development of required skills among the students. This subject contains five units of equal weightage.

5.4 COMPUTER NETWORKS

L	P
3	4

RATIONALE

Global connectivity can be achieved through computer networks. After completing the diploma, student should have basic understanding of networking and its models. This subject will help the student in network setup and troubleshooting. It will further give exposure to the students about wireless networks and cloud computing.

COURSE OUTCOMES

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

CO1: Learn about the basic concepts of networking models.

CO2: Handle different IP address classes.

CO3: Connect various networking devices.

CO4: Troubleshoot networking related issues.

CO5: Describe wireless networks and cloud computing.

DETAILED CONTENTS

UNIT I

NETWORKS BASICS

- Concept of network
- Models of network computing
- Networking models
- Peer-to –peer Network
- Client-Server Network
- LAN, MAN and WAN
- Network Services
- Topologies
- Switching Techniques

NETWORKING MODELS

- OSI model: Definition, Layered Architecture

Functions of various layers

- TCP/IP Model: Definition, Functions of various layers
- Comparison between OSI and TCP/IP model

UNIT II

TCP/IP ADDRESSING

- Concept of physical and logical addressing
- IPV4 addresses – Address space, Notations
- Classful Addressing- Different IP address classes, Classes & Blocks, Net-id & Host-Id, Masks, Address depletion
- Classless Addressing – Address blocks, Masks
- Special IP Addresses
- Subnetting and Supernetting
- Loop back concept
- Network Address Translation
- IPV4 Header
- IPV6 Header
- Comparison between IPV4 and IPV6

UNIT III

NETWORK ARCHITECTURE

Ethernet specification and standardization: 10 Mbps (Traditional Ethernet), 10 Mbps(Fast Ethernet) and 1000 Mbps (Gigabit Ethernet)

NETWORK CONNECTIVITY

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

UNIT IV

NETWORK ADMINISTRATION

- Network Security Principles, Cryptography, using secure protocols

- Trouble Shooting Tools: PING, IPCONFIG, IFCONFIG, NETSTAT, TRACEROOT, Wireshark, Nmap, TCPDUMP, ROUTEPRINT
- DHCP Server
- Workgroup/Domain Networking

UNIT V
INTRODUCTION TO WIRELESS NETWORKS

- Introduction to wireless LAN IEEE 802.11, WiMax ad Li-Fi
- Wireless Security
- Introduction to bluetooth - architecture, application
- Comparison between bluetooth and Wifi

CLOUD COMPUTING

- Definition of Cloud Computing and advantages of Cloud Computing.
- Cloud Computing service model- SaaS, PaaS, Iaas.
- Deployment model-Private Cloud, Public Cloud, Hybrid, Community cloud.

PRACTICAL EXERCISES

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. Managing user accounts in windows.
7. Sharing of Hardware resources in the network.
8. Use of Netstat and its options.
9. Connectivity troubleshooting using PING, IPCONFIG, IFCONFIG
10. Installation of Network Operating System (NOS)

11. Demonstration of Cloud Computing in Labs or using Online Videos.

RECOMMENDED BOOKS

1. Computer Networks by Tanenbaum, Prentice Hall of India, New Delhi.
2. Data Communications and Networking by Forouzan, (Edition 2nd and 4th), Tata McGraw Hill Education Pvt. Ltd, New Delhi.
3. Data and Computer Communication by William Stallings, Pearson Education, New Delhi.
4. Local Area Networks by Peter Hudson.
5. Network+ Lab manual,- BPB Publications -by Tami Evanson.
6. Networking Essentials – BPB Publications New Delhi
7. Cloud Computing by Raj Kumar.

RECOMMENDED WEBSITES

1. http://swayam.gov.in

INSTRUCTIONAL STRATEGY

This is hands on practice based subject and topics taught in the class should be practiced in the Lab regularly for development of required skills among the students. This subject contains five units of equal weightage.

5.5PROGRAMME ELECTIVE – I

5.5.1 CLOUND COMPUTING

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2	2

RATIONALE

This course offers a good understanding of cloud computing concepts and challenges faced in implementation of cloud computing. It also offers the concept of Virtualization along with security issues faced in the field of cloud computing.

COURSE OUTCOMES

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

CO1: Explain core concepts of cloud computing paradigm.
CO2: Describe various Service and Deployment Models.
CO3: Detail SLA management in Cloud Computing.
CO4: Learn various trimmings and accessories sourced in garment production.
CO5: Illustrate the fundamental concepts of cloud storage and apply the concept of virtualization.

DETAILED CONTENTS

UNIT I
INTRODUCTION

Evolution of Cloud Computing, Cloud Computing Overview, Characteristics, Applications, Benefits, Challenges. Major Cloud Vendors/Service Provider in the world.

UNIT II
SERVICE AND DEPLOYMENT MODELS

Cloud Computing Service Models: Infrastructure as a Service, Platform as a Service, Software as a Service, Cloud Computing Deployment Models: Private Cloud; Public Cloud, Community Cloud, Hybrid Cloud, Major Cloud Service providers.

UNIT III
SERVICE LEVEL AGREEMENT (SLA) MANAGEMENT

Overview of SLA, Types of SLA, SLA Life Cycle, SLA Management Process.

UNIT IV
VIRTUALIZATION CONCEPTS

Overview of Virtualization, Types of Virtualization, Benefits of Virtualization, Hypervisors and its types.

UNIT V
CLOUD STORAGE &SECURITY

Storage as a Service, Benefits and Challenges, Storage Area Networks (SANs), Infrastructure Security, Network Level Security, Data Security & Privacy Issues, Legal Issues in Cloud Computing.

PRACTICAL EXERCISES

1. Introduction to Cloud Vendors: Amazon, Microsoft, IBM.
2. Setting up Virtualization using Virtualbox/VMWare Hypervisor
3. Introduction to OwnCloud and its features.
4. Installation and configuration of OwnCloud software for SaaS
5. Installing Open Source Cloud simulation software Cloud Sim.

RECOMMENDED BOOKS

1. Rajkumar Buyya, James Broberg, Andrzej Goscinski, " Cloud Computing: Principles and Paradigms, Wiley.
2. Barrie Sosinsky, " Cloud Computing Bible", Wiley, 2011.
3. Judith Hurwitz, Robin Bloor, Marcia Kaufman,Fern Halper, " Cloud Computing for Dummies", Wiley, 2010.

RECOMMENDED WEBSITES

1. http://nptel.ac.in

2. https://ekumbh.aicte-india.org
3. http://swayam.gov.in

INSTRUCTIONAL STRATEGY

This is hands on practice based subject and topics taught in the class should be practiced in the Lab regularly for development of required skills among the students. This subject contains five units of equal weightage.

5.5.2 BIG DATA

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2	2

RATIONALE

The importance of Big Data in various domain disciplines has increased tremendously in recent years. This subject provides an overview of the historical and modern context and operation of Big Data for beginners. It will help the student to study and practice Big Data tools and techniques.

COURSE OUTCOMES

At the end of the open elective, the students will be able to:

CO1: Learn the concept of big data.

CO2: Describe the working of Hadoop.

CO3: Handle Map Reduce.

CO4: Study Hadoop eco systems.

DETAILED CONTENTS

UNIT I

BIG DATA OVERVIEW

Introduction – distributed file system, Big data: definition and taxonomy, Sources of Big Data, characteristics, Benefits of Big Data, Understanding Big Data with Examples. Big data applications, Top 10 industries using Big Data, Big data analytics, Challenges for processing big data.

UNIT II

HADOOP

History of Hadoop, What is Hadoop & Hadoop vendors, Big Data – Apache Hadoop & Hadoop EcoSystem. Hadoop Architecture, How Hadoop clusters work, Hadoop Storage: HDFS Introduction, 5 Dameons of Hadoop and their functionalities: NameNode, Secondary NameNode, DataNode, Job Tracker, and Task Tracker.

MAP REDUCE

MapReduce Introduction, How MapReduce Works, Understanding the Map Reduce architecture - Writing Hadoop MapReduce Word-Count problem - Loading data into HDFS - Executing the Map phase - Shuffling and sorting - Reducing phase execution.

UNIT IV
HADOOP ECO SYSTEMS

Pig: What is Pig. Introduction to Pig Data Flow Engine. Pig and MapReduce. When Pig should be used, Hive: What is Hive, Architecture of Hive, how Hive Differs from Traditional RDBMS.

PRACTICAL EXERCISES

1. Installation of Hadoop.
2. Setting up a Hadoop cluster.
3. Practice of various Hadoop commands.
4. Map Reduce Word Count problem.
5. Map Reduce Tera Sort problem

RECOMMENDED BOOKS

1. Boris lublinsky, Kevin t. Smith, Alexey Yakubovich, “Professional Hadoop Solutions”, Wiley, ISBN: 9788126551071, 2015.
2. Chris Eaton, Dirk deroos et al. , “Understanding Big data ”, McGraw Hill, 2012.
3. Tom White, “HADOOP: The definitive Guide”, O Reilly 2012.
4. Big Data and Analytics by Seema Acharya and Subhashini Chellappan; Wiley India.
5. Jure Leskovec, Anand Rajaraman, Jeffrey D. Ullman, “Mining of Massive Datasets”, Cambridge University Press, 2014.
6. The Big Data Revolution : Kindle Edition, by Jason Kolb (Author), Jeremy Kolb.
7. Big Data:Principles and best practices of scalable realtime data systems (Englisch),von Nathan Marz James Warren.
8. Data Mining Methods and Models: wileyindia ,by Daniel T Larose.

9. Pro Apache Hadoop, 2ed by Sameer Wadkar, Madhu Siddalingaiah, Jason Venner; Wiley india,
10. e-books/e-tools/relevant software to be used as recommended by AICTE/HSBTE/NITTTR.

RECOMMENDED WEBSITES

1. http://nptel.ac.in
2. https://ekumbh.aicte-india.org
3. http://swayam.gov.in

INSTRUCTIONAL STRATEGY

This is hands on practice based subject and topics taught in the class should be practiced in the Lab regularly for development of required skills among the students. This subject contains five units of equal weightage.

5.6 MULTIDISCIPLINARY ELECTIVE

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RATIONALE

Multidisciplinary electives are very important and play major role in implementation of National Education Policy. Multidisciplinary is a subject which is useful for two or more disciplines in which students are asked to understand the concept of multidisciplinary or interdisciplinary. It will help the students to gain an arsenal of skills that are easily transferable across work environments.

COURSE OUTCOMES

At the end of the open elective, the students will be able to:

CO1: Apply critical thinking problem solving.

CO2: Demonstrate self and time management.

CO3: Display analytical and research abilities.

CO4: Integrate multiple knowledge domains.

CO5: Enhance the scope and depth of learning.

LIST OF MULTIDISCIPLINARY ELECTIVES

(The list is indicative and not exhaustive)

1. Introduction to Internet of Things.
2. Introduction to Robotics.
3. Introduction to Embedded System Design.
4. Fundamentals of Artificial Intelligence.
5. Digital Image Processing.
6. Introduction to Machine Learning.

7. Fundamentals of Artificial Intelligence.
8. The Joy of Computing Using Python.
9. Cloud Computing.
10. Introduction to Industry 4.0.
11. Industrial Internet of Things.
12. Object Oriented System Development using UML, Java and Patterns.

GUIDELINES

Multidisciplinary Elective shall be offered preferably in online mode. Online mode multidisciplinary elective shall preferably be through Massive Open Online Courses (MOOCs) from Swayam, NPTEL, Upgrad, Udemy, Khan Academy or any other online portal to promote self-learning. A flexible basket of large number of multidisciplinary electives is suggested which can be modified depending upon the availability of courses at suggested portals and requirements. For online multidisciplinary electives, department coordinators shall be assigned to monitor and guide the group of students for selection of minimum 20 hours duration online course of their choice. For offline multidisciplinary electives, a suitable relevant subject shall be offered by the respective department to the students with minimum 40% of the total class strength as per present and future requirements.

Assessment of MOOCs multidisciplinary elective shall be based on continuous evaluation by the respective coordinator. The coordinator shall consider the submitted assignments by the students from time to time during the conduct of MOOCs. The MOOCs assessment shall be conducted by the coordinator along with one external expert by considering submitted assignments out of 100 marks.

In case, no suitable multidisciplinary elective is available online, only then the course may be conducted in offlinemode. The assessment of offline multidisciplinary elective shall be internal and external. The offlinemultidisciplinary elective internal assessment of 40 marks shall be based on internal sessional tests, assignments etc. and external assessment of 60 marks shall be based on external examination at institute level.

SUGGESTED WEBSITES

1. https://swayam.gov.in/
2. https://www.udemy.com/
3. https://www.upgrad.com/
4. https://www.khanacademy.org/

SIXTH SEMESTER

6.1 APPLICATION DEVELOPMENT USING WEB FRAMEWORK

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RATIONALE

This course will cover the practical aspects of Web App development using various frameworks. The course equips the students with resources for design, development and production of web applications. Students will be introduced to popular web application frameworks for building scalable web applications. The main objective for this course is to motivate student's interest in learning Web-app development by giving them an insight into its possibilities through practical applications. In addition, the course also provides a sufficiently broad but practical introduction to Server-side web technologies

COURSE OUTCOMES

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

CO1: Identify basic aspects of web-frameworks.
CO2: Install, create and manage Blogs, Websites using WordPress.
CO3: Use PHP & MySql with WordPress.
CO4: Install and create Web Application using Moodle.
CO5: Manage features of Moodle sites and take backup of site content.

PRACTICAL EXERCISES:

1. Install WordPress & Create Blogs
2. Manage blogs features e.g. Images, Text Around Images, Comments, Post Formats, Linking, Pages, Categories, Smilies, Feeds, Gravatars, Password Protection
3. Practice various designing features: Colour Scheme, Headers, CSS Horizontal Menus, Dynamic Menu, Highlighting, Navigation Links, Print
4. Read More, Formatting Date and Time, Finding CSS Styles, Creating Individual Pages, Uploading Files, Using WordPress Themes, Templates, Template Tags, Template Hierarchy, Validating a Website, Know Your Sources, WordPress Site Maintenance
5. Integrate PHP & MySql with WordPress

6. Install Moodle & various plugins.
7. Create a Moodle site and Database Schema
8. Design Site appearance, Front page, Front page settings, My Moodle, User profiles, Navigation, Course list, Themes, Theme settings, Header and footer, Language settings, Using web services, Publishing a course, Blogs, RSS feeds
9. Manage Moodle site, Managing authentication, Manual accounts, No login, Email-based self-registration, Account
10. Create Roles and permissions, Assign roles,
11. Implement Password salting.
12. Perform Site backup, Course backup, Course restore, Automated course backup.

RECOMMENDED BOOKS

1. http://www.wpbeginner.com/beginners-guide/how-to-learn-wordpress-for-free-in-a-week-or-less/
2. https://docs.moodle.org/22/en/Table_of_Contents
3. e-books/e-tools/relevant software to be used as recommended by AICTE/HSBTE/NITTTR.

RECOMMENDED WEBSITE

1. http://swayam.gov.in

INSTRUCTIONAL STRATEGY

Since the entire course content is web based, students can practice it online. The teachers should have practice on this framework. Entire course is hands-on based so practicals should be conducted in the laboratory.

6.2 ENTREPRENEURSHIP DEVELOPMENT AND MANAGEMENT

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3	-

RATIONALE

In the present day scenario, it has become imperative to impart entrepreneurship and management concepts to students so that a significant percentage of them can be directed towards setting up and managing their own small enterprises. This subject focuses on imparting the necessary competencies and skills of enterprise set up and its management.

COURSE OUTCOMES

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

CO1: Comprehend the importance of entrepreneurship and its role in nation's development.
CO1: Classify the various types of business and business organizations.
CO3: Identify the various resources / sources and / or schemes for starting a new venture.
CO4: Explain the principles of management including its functions in an organisation.
CO4: Conduct market survey and prepare project report.

DETAILED CONTENTS

UNIT I

Entrepreneurship: Concept and definitions, classification and types of entrepreneurs, entrepreneurial competencies, Traits / Qualities of entrepreneurs, manager v/s entrepreneur, role of Entrepreneur, barriers in entrepreneurship, Sole proprietorship and partnership forms of business organizations, small business vs startup, critical components for establishing a start-up, Leadership: Definition and Need, Manager Vs leader, Types of leadership

UNIT II

Definition of MSME (micro, small and medium enterprises), significant provisions of MSME Act, importance of feasibility studies, technical, marketing and finance related problems faced by new enterprises, major labor issues in MSMEs and its related laws, Obtaining financial assistance through various government schemes like Prime Minister Employment Generation Program (PMEGP) Pradhan Mantri Mudra Yogna (PMMY) , Make in India, Start-up India, Stand up India , National Urban

Livelihood Mission (NULM); Schemes of assistance by entrepreneurial support agencies at National, State, District level: NSIC, NRDC, DC:MSME, SIDBI, NABARD, Commercial Banks, SFC's TCO, KVIB, DIC, Technology Business Incubator (TBI) and Science and Technology Entrepreneur Parks (STEP).

UNIT III

NATURE AND FUNCTIONS OF MANAGEMENT: Definition, Nature of Management, Management as a Process, Management as Science and Art, Management Functions, Management and Administration, Managerial Skills, Levels of Management; Leadership.

PLANNING AND DECISION MAKING: Planning and Forecasting - Meaning and definition, Features, Steps in Planning Process, Approaches, Principles, Importance, Advantages and Disadvantages of Planning, Types of Plans, Types of Planning, Management by Objective. Decision Making-Meaning, Characteristics.

UNIT IV

ORGANISING AND ORGANISATION STRUCTURE: Organizing Process - Meaning and Definition, Characteristics Process, Need and Importance, Principles, Span of Management, Organisational Chart - Types, Contents, Uses, Limitations, Factors Affecting Organisational Chart.

STAFFING: Meaning, Nature, Importance, Staffing process. Manpower Planning, Recruitment, Selection, Orientation and Placement, Training, Remuneration.

CONTROLLING AND CO-ORDINATION Controlling - Meaning, Features, Importance, Control Process, Characteristics of an effective control system, Types of Control. Co-ordination - characteristics, essentials.

UNIT V

Market Survey and Opportunity Identification, Scanning of business environment, Assessment of demand and supply in potential areas of growth, Project report Preparation, Detailed project report including technical, economic and market feasibility, Common errors in project report preparations, Exercises on preparation of project report.

RECOMMENDED BOOKS

1 BS Rathore and Dr. JS Saini, "A Handbook of Entrepreneurship", Aapga Publications, Panchkula (Haryana).

2 Entrepreneurship Development, Tata McGraw Hill Publishing Company Ltd., New Delhi.

3 CB Gupta and P Srinivasan, “Entrepreneurship Development in India”, Sultan Chand and Sons, New Delhi.

4 Poornima M Charantimath, “Entrepreneurship Development - Small Business Enterprises”, Pearson Education, New Delhi.

5 David H Holt, “Entrepreneurship: New Venture Creation”, Prentice Hall of India Pvt. Ltd., New Delhi.

6 PM Bhandari, “Handbook of Small Scale Industry”.

7 L M Prasad, “Principles and Practice of Management”, Sultan Chand & Sons, New Delhi.

SUGGESTED WEBSITES

1. https://ipindia.gov.in/

INSTRUCTIONAL STRATEGY

Some of the topics may be taught using question/answer, assignment or seminar method. The teacher will discuss stories and case studies with students, which in turn will develop appropriate managerial and entrepreneurial qualities in the students. In addition, expert lecturers may also be arranged from outside experts and students may be taken to nearby industrial organizations on visit. Approach extracted reading and handouts may be provided. In addition, different activities like conduct of entrepreneurship awareness camp extension lecturers by outside experts, interactions sessions with entrepreneurs and industrial visits may also be organized. This subject contains five units of equal weightage.

6.3 SOFTWARE ENGINEERING

L	P
3	-

RATIONALE

The system analysis and design is the backbone of Application software development. After studying the subject the students will be able to develop and design the system according to given requirements. It involves various steps in analysis and design of the system. It includes the knowledge of preparing project systematically.

COURSE OUTCOMES

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

CO1: Learn about different types of systems.

CO2: Study various life cycle models.

CO3: Describe software requirement specifications.

CO4: Explain characteristics and features of good Software.

CO5: Define the concept of software testing and verification.

DETAILED CONTENTS

UNIT I
INTRODUCTION TO SOFTWARE ENGINEERING

Concept of systems: Types of systems: open, closed, static and dynamic systems.

Introduction, Programmes v/s Software Products

Emergence of Software Engineering- Early Computer Programming, High-level Language Programming, Control flow based Design, Data Structure Oriented Design, Object Oriented Design.

UNIT II
SOFTWARE LIFE CYCLE MODELS

Iterative Model, Requirement of Life Cycle Model, Classic Waterfall Model, Prototyping Model,

Evolutionary Model, Spiral Model, Introduction to Agile Model.
Comparison of different Life Cycle Models.

UNIT III
SOFTWARE PLANNING

Responsibilities of Software Project Manager
- Metrics for Project Size Estimation- LOC (Lines of Code), Function Point Metric
- Project estimation Techniques- Using COCOMO Model.
Software Requirement Specifications (SRS), Characteristics of good SRS

UNIT IV
SOFTWARE DESIGN AND IMPLEMENTATION

Characteristics and features of good Software Design Cohesion and Coupling, Software design Approaches- Function Oriented Design (Data flow diagrams, Data dictionary, Decision Trees and tables), Object Oriented Design, Structured Coding Techniques, Coding Styles, documentation.

UNIT V
SOFTWARE TESTING

Concept of Testing, Verification v/s Validations, Unit Testing, Black Box Testing, White Box Testing, Integration testing, System testing, Introduction to Configuration Management.

RECOMMENDED BOOKS

1. Software Engineering by Rajib Mall, PHI Publishers, New Delhi.
2. An Integrated Approach to Software Engineering by Pankaj Jalote, Narosa Publishing. House Pvt Ltd, Darya Ganj, New Delhi 110002.
3. Software Engineering, Sangeeta Sabharwal, New Age International, Delhi.
4. Software Engineering by KK Aggarwal and Yogesh Singh.
5. Software Engineering – A Practitioner's Approach by RS Pressman, Tata McGraw Hill Publishers, New Delhi.
6 e-books/e-tools/relevant software to be used as recommended by AICTE/HSBTE/NITTTR.

RECOMMENDED WEBSITES

1. https://swayam.gov.in/

INSTRUCTIONAL STRATEGY

This is theoretical subject and contains five units of equal weightage.

6.4 PROGRAMME ELECTIVE - II
6.4.1 NETWORK SECURITY

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2	2

RATIONALE

This course has been designed keeping in view basic computer users and information system managers. The students are acquainted with the concepts needed to secure a network, understanding risks and how to deal with them. It is hoped that the students will have a wider perspective on security in general and better understanding of how to reduce and manage the security risks.

COURSE OUTCOMES

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

CO1: Learn the need of network security.
CO2: Study various encryption and decryption techniques.
CO3: Differentiate and deploy virus protection.
CO4: Describe Firewalls and intrusion detection systems.
CO5: Setup and configure virtual private network.

DETAILED CONTENTS

UNIT I

INTRODUCTION

Need for securing a network; Principles of Security, Type of attacks, introduction to cyber-crime, cyber law-Indian Perspective (IT Act 2000 and amended 2008), cyber ethics, ethical hacking. Hacking, Skimming, attacker, phreaker , hackivist, bluejacking, bluesnarfing, IOS Jailbreaking.

UNIT II

SECURING DATA OVER INTERNET

Introduction to basic encryption and decryption, concept of symmetric and asymmetric key cryptography, overview of DES, RSA and PGP. Introduction to Hashing: MD5, SSL, SSH, HTTPS, Digital Signatures, Digital certification, IPSec.

UNIT III

VIRUS, WORMS AND TROJANS

Definitions, preventive measures – access central, checksum verification, process configuration, virus scanners, heuristic scanners, application level virus scanners, deploying virus protection, Zombie, Ransomware.

UNIT IV

FIREWALLS

Definition and types of firewalls, firewall configuration, Limitations of firewall. Whitelisting Vs blacklisting.

INTRUSION DETECTION SYSTEM (IDS)/IPS

Introduction; IDS limitations – teardrop attacks, counter measures; Host based IDS set up

UNIT V

HANDLING CYBER ASSETS- Configuration policy as per standards, Disposable policy.

VIRTUAL PRIVATE NETWORK (VPN)

Basics, setting of VPN, VPN diagram, configuration of required objects, exchanging keys, modifying security policy

DISASTER AND RECOVERY

Disaster categories; network disasters – cabling, topology, single point of failure, save configuration files; server disasters – UPS, RAID, Clustering, Backups, server recovery

PRACTICAL EXERCISES

1. Installation and comparison of various antivirus software.
2. Installation and study of various parameters of firewall.
3. Writing program in C to Encrypt/Decrypt using XOR key.
4. Study of VPN.
5. Study of various hacking tools.
6. Practical applications of digital signature.

RECOMMENDED BOOKS

1. Cryptography and Network Security by Forouzon; Tata McGraw Hill Education Pvt Ltd, New Delhi.

2. Cryptography and Network Security by Atul Kahate; Tata McGraw Hill Education Pvt Ltd, New Delhi.

3. Cryptography and Network Security by Padmanabham; Wiley India Pvt Ltd. Daryaganj, New Delhi.

4. Network Security by Eric Cole, Bible; Wiley India Pvt Ltd. Daryaganj, New Delhi.

5. Network Security by William Stalling.

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

RECOMMENDED WEBSITES

1. https://swayam.gov.in/

INSTRUCTIONAL STRATEGY

This is hands on practice based subject and topics taught in the class should be practiced in the Lab regularly for development of required skills among the students. This subject contains five units of equal weightage.

6.4.2. MOBILE APPLICATION DEVELOPMENT

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RATIONALE

Mobile Application development is the very hot business domain. Majority of the corporate have a separate division for the development of mobile applications. It is essential that diploma students must know the way to apply advanced data communicating methods and networking protocols for wireless and mobile devices.

COURSE OUTCOMES

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

CO1: Study the characteristics, basic concepts of mobile computing.
CO2: Illustrate architecture and protocols in Mobile computing.
CO3: Compare the network protocols governing the mobile communication.
CO4: Describe different kinds of mobile OS prevailing in the market.
CO5: Develop a mobile application using different components of Android.

DETAILED CONTENTS

UNIT-I

Architecture of Mobile Computing, 3- Tier Architecture, Presentation (Tier-1), Application (Tier -2), Data (Tier – 3)

UNIT-II

Introduction to SMS, Mobile OS.

Short Message Service (SMS): Mobile computing over SMS, Short Message. Service, Strength of SMS, SMS Architecture, Value added services through SMS.

Mobile Operating Systems: Evaluation of Mobile Operating System-Handset. Manufactures and their Mobile OS- Mobile OS and their features.

UNIT-III

ANDROID : Android Versions, Features of Android, Architecture of Android, Android Market, Android Runtime (Dalvik Virtual Machine)

ANDROID SDK & ADT: Android SDK, Android Development Tool (ADT), Installing and configuring Android, Android Virtual Device (AVD).
ACTIVITIES & INTENTS: Understanding Activities, Activity Life Cycle, Linking activities. and indents, Calling built-in applications using intents, Fragments Displaying Notifications
User Interface: Views and View groups, Layouts, Display Orientation, Action Bar, Listening for UI Notifications.

UNIT-IV

Basic Views: Text view, Button, Image Button, Edit Text, Check Box, Toggle Button, Radio Button and Radio Group Views, Progress Bar View, Auto Complete Text View.

Advanced Views: Time Picker View and Date Picker View, List Views, Image View, Menus, Analog and Digital View, Dialog Boxes.

Displaying Pictures & Menus with Views: Image View, Gallery View, Image Switcher, Grid View - Creating the Helper Methods, Options Menu, Context Menu.

UNIT-V

Location Based Services: Obtaining the Maps API Key, Displaying the Map, Zoom Control, Navigating to a specific location, Adding Marker, Geo Coding and reverse Geo coding

Storage: Store and Retire data's in Internal and External Storage, SQLite, Creating and using databases

PRACTICAL EXERCISES

1. Installation of Android Virtual Studio.
2. Write a program to demonstrate activity (Activity Life Cycle).
3. Write a program to demonstrate different types of layouts.
4. Write a program to implement simple calculator using text view, edit view, option.
5. Write a program to demonstrate photo gallery.
6. Write a program to demonstrate Date picker and time picker.
7. Write a program to send e-mail.
8. Write a program to demonstrate web view to display website.

9. Write a program to display map of given location/position using map view.
10. Write a program to store and fetch data from SQL life database.

RECOMMENDED BOOKS

1. Beginning Android 4 Application Development by Wei-Meng Lee; Wiley India.
2. Android Apps for Absolute Beginners by Jackson; Apress.
3. Mobile Computing by Asoke K Talukder, Hasan Ahmed, Roopa R Yavagal; Tata
4. McGraw Hill.
5. Mobile communications Jochen Schiller; Pearson Education.
6. E-books/e-tools/relevant software to be used as recommended by AICTE/HSBTE/NITTTR.

RECOMMENDED WEBSITES

1. http://swayam.gov.in

INSTRUCTIONAL STRATEGY

This is hands on practice based subject and topics taught in the class should be practiced in the Lab regularly for development of required skills among the students. This subject contains five units of equal weightage.

6.5 MAJOR PROJECT/INDUSTRIAL TRAINING

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RATIONALE

Major project/Industrial training work will help in developing the relevant skills among the students as per National Skill Qualification Framework. It aims at exposing the students to the present and future needs of various relevant industries. It is expected from the students to get acquainted with desired attributes for industrial environment. For this purpose, students are required to be involved in industrial training / Major Project Work in different establishments.

COURSE OUTCOMES

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

CO1: Define the problem statement of the Industrial training/Major project according to the need of industry.

CO2: Work as a team member for successful completion of Industrial training / Major project.

CO3: Write the Internship/Major project report effectively.

CO4: Present the Internship/Major project report using PPT.

GUIDELINES

Depending upon the interest of the students, they can go for Industrial training / Major project as per present and future demand of the industry. The supervisors may guide the students to identify their project work and chalk out their plan of action well in advance. As an Industrial training / Major project activity each student is supposed to study the operations at site and prepare a detailed project report of the observations/processes/activities. The supervisor may create a group of 4-5 students as per their interest to work as a team for successful completion of the Industrial training / Major Project.

The supervisor shall evaluate the students along with one external industry / academic expert by considering the following parameters:

	Parameter	**Weightage**
I	Defining problem statement, focus and approach	20%
ii	Innovation / creativity	20%
iii	Report Writing	20%
iv	Power Point Presentation	20%
v	Viva - voce	20%

24. ASSESMENT TOOLS AND CRITERION

The assessment is carried out by conducting:

1. Formative assessments
2. Summative assessments

1. FORMATIVE ASSESSEMENT

The formative assessment will be evaluated on the basis of the internal assessments for theory subjects and practical by the concerned teachers for evaluating the knowledge and skill acquired by students and the behavioral transformation of the students. This internal assessment is primarily carried out by collecting evidence of competence gained by the students by evaluating them at work based on assessment criteria, asking questions and initiating formative discussions to assess understanding and by evaluating records and reports, and sessional marks are awarded to them.

2. SUMMATIVE ASSESSMENT

The summative assessment will include end semester examination for theory part for each candidate and practical examination with viva voice. Each Performance Criteria will be assigned marks proportional to its importance and proportion of marks for Theory and Skills Practical for each subject should be laid down. The following assessment tools are used for effective student evaluation:

1. Theory
2. Practical
3. Minor & Major Project
4. Massive Open Online Courses (MOOCs)
5. Viva Voce
6. Industrial / In House Training
7. Professional Industrial Training

1. Theory Assessment

Evaluation in theory aims at assessing students' understanding of concepts, principles and procedures related to a course/subject, and their ability to apply learnt principles and solve

problems.

The formative evaluation for theory subjects may be caused through

i. Sessional /class-tests,
ii. Quizzes,
iii. Assignments,
iv. Seminars / Presentations
v. Attendance
vi. Case Studies

For Summative evaluation of theory, the question paper may comprise of three sections.

i. It should contain objective type question and multiple choice questions. The objective type items should be used to evaluate students' performance in knowledge, comprehension and at the most application domains only.

ii. It should contain short answer questions.

iii. Descriptive type questions, with some internal choice of the questions set may be given in this section

2. Practical Assessment

Evaluation of students performance in practical work (Laboratory experiments, Workshop practical /field exercises) aims at assessing students ability to apply or practice the concepts, principles and procedures, manipulative skills, ability to observe and record, ability to interpret and draw conclusions and work related attitudes. This will comprise of a creation of mock environment, wherever applicable in the skill lab which is equipped with all required equipment for development of desired skills. Candidate's soft skills, communication, aptitude, safety consciousness, quality consciousness etc. will be ascertained by observation and will be marked in observation checklist along with the assessment of Job carried out in labs and maintenance of Lab Record Files.

Formative and summative evaluation may comprise of weight ages to performance on task, quality of product, general behavior and it should be followed by viva-voce of the

relevant subject. The end product will be measured against the specified dimensions and standards to gauge the level of skill achievements

3. Minor and Major Project Assessment

The purpose of evaluation of project work is to assess student's ability to apply, in an integrated manner, knowledge and skills in solving real life problems, manipulative skills, ability to observe, record, creativity and communication skills. The project work assigned should be of relevance to the core skill, state of the art topics and the project areas that are pertaining to enhance job skill and enhance occupational opportunities. For both, minor and major project, Formative and summative evaluation may comprise of weight ages to performance on task, quality of product, nature and relevance of project and general behavior.

The formative assessment should include the continuous assessment based on the work allocated and mid semester viva voice or presentation. The final assessment will be the combination of the project undertaken, report submission and should be followed by viva-voce of the relevant subject.

In case of the assessment of this component, the team of examiners should be constituted and half of the examiners in the team should be invited from outside of the institute as expert for conducting the examination.

4. Massive Open Online Courses (MOOCs) Assessment

Open Elective and Multi-Disciplinary Elective may be covered through Massive Open Online Courses (MOOCs) to promote self learning. These platforms promise open, online courses to massive numbers of students as they are free to join; they provide a wide range of courses. They allow for space and time flexibility and their participants can benefit from various online communication tools and access to quality content.

The coordinating Department/Centre/Office shall monitor every student to adopt the courses online of their choice and preference on Swayam portal. The duration of courses will vary depending on the level and credit points. Courses offered in the duration of 4-10 weeks for 2 to 3 credits at diploma level are to be opted. Students can get a certificate after registering and attending the classes and submitting the assignments/quizzes and qualifying nationwide conducted written exam.

On successful completion of each course, the institution offering the MOOCs course would issue the certificate, along with the number of credits and grades, through which the student can get credits transferred into his marks certificate issued by the parent institution. There may be standard norms for the host Institution to conduct the course that may include continuous evaluation through assignments, online quizzes, case studies, online writing exercises, term examinations, student feedback, online forum management, etc. The coordinating Department/Centre/Office of the respective department shall monitor every student and submit to the Office of Examinations, a score sheet before the close of the even semester.

5. Viva Voce Assessment

This tool will be used to assess the conceptual understanding and the behavioral aspects as regards the job role and the specific task at hand. It will also include questions on safety, quality, environment and equipment's etc. Ask questions on non-prescribed tasks to ensure that the learners have complete knowledge on the assessment

6. Industrial/In-house Training Assessment

The two mandatory internships after First and Second Year of are to be assessed in 3rd and 5th semester subsequently. The training should be preferably done in the industry but can also be in house depending upon the stream and availability of resources in and around the institute. Faculty should be assigned each student and made responsible for the evaluation and assessment of the training. Formative assessment should be taken from the industry/institute/ department on the basis of performance, behavior and learning capabilities. Summative evaluation may comprise of weight ages on the basis of report submission / presentation followed by viva-voce of the relevant subject.

7. Professional Industrial Training Assessment

Evaluation of professional industrial training report and viva-voce/ presentation aims at assessing students' understanding of industrial processes, practices in the industry/field and their ability to engage in activities related to problem-solving in industrial setting as well as understanding of application of learnt knowledge and skills in real life situation. Formative and summative evaluation may comprise of weight ages to performance on task, quality of product, general behavior and it should be followed by viva-voce of the relevant subject.

The formative assessment should include the evaluation from the employer where the student is doing his training in the ratio of 40:60. The final assessment will be the combination of the

employer assessment and evaluation by the faculty of the institute which shall include report submission/ presentation/ seminar followed by viva-voce of the relevant subject.

SGPA AND CGPA ASSESSMENT

The UGC recommends the following procedure to compute the Semester Grade Point Average (SGPA) and Cumulative Grade Point Average (CGPA):

i. The SGPA is the ratio of sum of the product of the number of credits with the marks scored by a student in all the courses taken by a student and the sum of the number of credits of all the courses undergone by a student, i.e

$$SGPA\ (Si) = \sum(Ci \times Gi) / \sum Ci$$

where Ci is the number of credits of the ith course and Gi is the marks scored by the student in the ith course.

ii. The CGPA is also calculated in the same manner taking into account all the courses undergone by a student over all the semesters of a programme, i.e.

$$CGPA = \sum(Ci \times Si) / \sum Ci$$

where Si is the SGPA of the ith semester and Ci is the total number of credits in that semester.

iii. The SGPA and CGPA shall be rounded off to 2 decimal points and reported in the transcripts.

25. TEACHING LEARNING TOOLS FOR EFFECTIVE IMPLEMENTATION

For effective implementation of curriculum, the faculty and staff of institutions have to play a vital role in planning instructional experiences for the courses in four different environments viz. class-room, laboratory, library and field and execute them in right perspective. It is emphasized that only a proper mix of different teaching methods in all these places of instruction can bring the changes in students behaviour as stipulated in the curriculum document. It is important to understand curriculum document holistically and further be aware of intricacies of Teaching-Learning Tools for achieving curriculum objectives. Given below are certain recommendations which may help in carrying out teaching-learning effectively:

PROGRAMME LEVEL RECOMMENDATIONS

1. Curriculum implementation takes place at programme, course and class-room level respectively and synchronization among them is required for its success. The first step towards achieving synchronization is to read curriculum document holistically and understand its rationale and philosophy.

2. An academic plan needs to be prepared at institute level. The Head of the institute has a great role to play in its dissemination and percolation up to grass-root level.

3. Heads of Department are required to prepare academic plan at department level referring to institutional academic plan.

COURSE LEVEL RECOMMENDATIONS

Teachers are educational managers at class room level and their success in achieving course level objectives lies in using course plan and their judicious execution which is very important for the success of programme by achieving its objectives. Teachers are required to plan various instructional experiences viz. theory lecture, expert lectures, lab/workshop practical's, guided library exercises, field visits, study tours, camps etc. In addition, they have to carry out progressive assessment of theory, assignments, library, practical's and field experiences. Teachers are also required to do all these activities within a stipulated period which is made available to them in the academic plan at Board level. With the amount of time to their credit, it is essential for them to use it judiciously by planning all above activities properly and ensure

execution of the plan effectively. Following is the gist of suggestions for subject teachers for effective utilization of Teaching Learning Tools to achieve the course objectives:

1. Teachers need to ensure attainment of course outcomes so as to help the students achieve program outcomes and also meet the desired learning outcomes in five domains of NSQF i.e. Process, Professional knowledge, Professional skills, Core skills and Responsibility.

2. Teachers are required to prepare a course plan, taking into account number of weeks available and courses to be taught.

3. Teachers are required to prepare lesson plan for every theory class. This plan may comprise of contents to be covered, learning material for execution of a lesson plan.

4. Teachers are required to plan for expert lectures from field/industry. For this, necessary steps need to be taken such as planning in advance, identifying field experts, making correspondence to invite them, taking necessary budgetary approval etc.

5. Teachers are required to plan for guided library exercises by identification of course specific experience requirement, setting time, assessment, etc. The assignments and seminars can be thought of as terminal outcome of library experiences.

6. Concept based industrial/field visits may be planned and executed for such contents of course which are abstract in nature and no other requisite resources are readily available in institute to impart them effectively.

7. Lot of focus needs to be laid on skill development. There is need for planning practical experiences in right perspective. These slots in a course are the avenues to use problem based learning and experiential learning effectively. The development and use of lab manuals will enable the institutes to provide lab experiences effectively.

8. Emphasis should to laid on developing soft skills like communication skills, personality Development, self-learning, inter personal skills, problem solving, and creativity etc.

9. Where ever possible, it is essential to use activity based learning rather than relying on delivery based conventional teaching all the time. While teaching, the teacher should make extensive use of audio visual aids such as video films, power point presentations and IT tools.

10. Teachers may take an initiative in establishing liaison with industries and field organizations for imparting field experiences to the students.

11. To enhance digital learning, open electives and multi-disciplinary electives have been provided in the curriculum to be taken up in the form of MOOCs. For Open electives, some courses may be identified out of the prescribed list given in the curriculum keeping in mind the interest of students. Similarly, for multi-disciplinary electives, courses to be offered may be identified by considering their relevance and utility. Every year SWAYAM is notifying the list of courses which are going to be offered in forthcoming even and odd semester. The institute needs to select the courses that are offered on SWAYAM platform or any other online platform.

12. For effective implementation of Massive Open Online Courses (MOOCs), a faculty member in the department may be identified and given the responsibility to coordinate various activities related to MOOCs. The concerned faculty member will facilitate in registration of students for MOOCs. The faculty member will also be responsible for compiling the result of students on the completion of MOOCs and pass on the information to the concerned authority.

13. Flexibility has been provided in the curriculum for the students to choose a course related to the discipline as per their interest. For effective implementation of discipline-specific electives, the institute should identify some courses from the list of courses prescribed in the curriculum. The courses should be selected and offered keeping in mind the interest of students, infrastructure and expertise available in and around the institute related to the courses. Option for discipline-specific elective may be taken from students through a form and a course, with more than 10 students opting for it, may be run.

14. Students should be made aware about issues related to ecology and environment, safety, concern for wastage of energy and other resources etc.

15. Any relevant contents beyond the syllabus may be covered by the teacher or experts in extra time.

16. Minor project should be identified and allocated taking into consideration the inputs from industry stake-holders, and departmental faculty. The minor project work should be such

that it enhances the fundamental skill-sets of the students from industry perspective and subsequently helps them to handle major project.

17. For major project work, students may be given relevant and well thought out problems, which are purposeful and develop practical skills. This will help the students in developing creativity and confidence for their gainful employment.

18. A Project bank may be developed in consultation with related industry, research institutes and other relevant field organizations. It may be ensured that that the students take up some live problems being faced by industry as part of project work.

26. LIST OF EXPERTS

1. Controller of Examination, Haryana State Board of Technical Education, Panchkula.

2. Controller of Administration & Finance, Haryana State Board of Technical Education, Panchkula.

3. Joint Secretary, Haryana State Board of Technical Education, Panchkula.

4. Deputy Secretary, Training & Placement, Haryana State Board of Technical Education, Panchkula.

5. Deputy Secretary, Examination, Haryana State Board of Technical Education, Panchkula.

6. Deputy Secretary, Academic, Haryana State Board of Technical Education, Panchkula.

7. Assistant Secretary, Academic, Haryana State Board of Technical Education, Panchkula.

8. Mr. Munish Gupta, HOD, Department of Computer Engineering, Government Polytechnic, Ambala.

9. Mr. Sanjeev Sehgal, HOD, Department of Computer Engineering, Seth Jai Parkash Polytechnic, Damla.

10. Mr. Dharamvir Saini, Lecturer, Department of Computer Engineering, Government Polytechnic for Women, Nanakpur.

11. Ms. Poonam Jain, Lecturer, Department of Computer Engineering, Government Polytechnic for Women, Ambala.

12. Mr. Mandeep Singh, Lecturer, Department of Computer Engineering, Seth Jai Parkash Polytechnic, Damla.

13. Mr. Kararnbir Singh, Lecturer, Department of Computer Engineering, Seth Jai Parkash Polytechnic, Damla.

14. Mr. Rohit Mandhar, Lecturer, Department of Computer Engineering, Seth Jai Parkash Polytechnic, Damla.

15. Er. Yogindra Kaushik, Assistant General Manager, Hartron, Gurgaon.

16. Dr. Neeraj Gupta, Associate Professor & Head Curriculum Design Committee, KR Mangalam University, Gurgaon

17. Mr. Nitin Goel, Ex VP Daffodil Softwares, Repozitory Technologies Pvt. Ltd.,

18. Mr. Ashok Kumar Sangwan, HOD, Cost of Delivery Department, Wipro Limited, Gurgaon.

19. Mr. Mahender Singh, Deputy Secretary (IT), Haryana State Board of Technical Education, Panchkula.

20. Dr. Bhajan Lal, Lecturer, Applied Science Department, Government Polytechnic for Women, Sirsa, Haryana.

21. Sh. Anil Nain, Lecturer, Applied Science Department, Government Polytechnic, Hisar, Haryana.

22. Dr. Sarita Mann, Lecturer, Applied Science Department, Government Polytechnic, Ambala, Haryana.

23. Smt. Bindu Verma, Lecturer, Applied Science Department, Seth Jai Parkash Polytechnic, Damla, Haryana.

24. Smt. Pushpa Rani, Senior Lecturer, Applied Science Department, Government Polytechnic, Sonipat, Haryana.

25. Smt. Krishna Bhoria, Lecturer, Applied Science Department, Government Polytechnic, Ambala, Haryana.

26. Smt. Preetpal Kaur, Guest Faculty, Applied Science Department, Government Polytechnic, Ambala, Haryana.

27. Ms. Monika, Lecturer, Applied Science Department, Seth Jai Parkash Polytechnic, Damla, Haryana.

28. Dr Neena Sharma, English Department, MCM College, Chandigarh.

29. Mr. Satyawan Dhaka, Senior Lecturer, Applied Science Department, Government Polytechnic, Nilokheri.

30. Mrs. Sapna Sang, Lecturer, Applied Science Department, Seth Jai Parkash Polytechnic, Damla.

31. Mr. Ravi Bansal, Lecturer, Applied Science Department, Government Polytechnic, Manesar.

32. Mrs. Kiran, Lecturer, Applied Science Department, Government Polytechnic, Sonepat.

33. Dr. Naveen Jha, Assistant Professor, Department of Mathematics, Government Engineering College, Bharatpur.

34. Dr. Vidhi Grover, Lecturer, Applied Science Department, Seth Jai Parkash Polytechnic, Damla.

35. Mr. Tavinder Singh, Lecturer, Applied Science Department, Government Polytechnic, Sirsa.

36. Ms. Sunita Rani, Lecturer, Applied Science Department, Government Polytechnic, Ambala.

37. Mr. Subhash Chandra Bhoria, Senior Lecturer, Mechanical Engineering Department, Government Polytechnic, Hisar.

38. Mr. Jagjit Singh Narang, Senior Lecturer, Mechanical Engineering Department, Government Polytechnic, Ambala.

39. Mr. Pardeep Kumar, Senior Lecturer, Mechanical Engineering Department, Government Polytechnic, Nilokheri.

40. Mr. KG Srinivasa, Professor CSE, IIIT-Naya Raipur.

41. Dr. Mala Kalra, Assisstant Professor, Computer Science Engineering Department, NITTTR, Chandigarh.

42. Dr. R B Patel, Professor, Computer Department, CCET, Chandigarh

43. Dr. Vishal Bhatnagar, Professor, Computer Department, AIT, Delhi.

44. Dr. Pankaj Sharma, Professor, Applied Science Department, NITTTR, Chandigarh.

45. Dr. Ashok Kumar, Associate Professor, Applied Science Department, NITTTR, Chandigarh.

46. Dr. KC Lachhwani, Assistant Professor, Applied Science, NITTTR, Chandigarh

47. Dr. Rajesh Mehra, Professor and Head, Curriculum Development Centre, NITTTR, Chandigarh.

48. Dr. AB Gupta, Professor and Head, Education & Educational Management Department, NITTTR, Chandigarh.

49. Sh. PK Singla, Associate Professor, Curriculum Development Centre, NITTTR, Chandigarh.

50. Dr. SK Gupta, Associate Professor, Curriculum Development Centre, NITTTR, Chandigarh.

51. Dr. Meenakshi Sood, Associate Professor, Curriculum Development Centre, NITTTR, Chandigarh.

27. APPENDIX

Sr. No.	List of Equipment
1.	Computer Systems
2.	Network Switch
3.	Connectors (RJ-45) Cables: (UTP,STP)
4.	Multifunction Printer
5.	Colour Laser Printer
6.	Router
7.	Antivirus
8.	Java
9.	CAD/CAM Software IDEAS Artisan Series (latest version) – software
10.	Operating System DOS - Non DOS
11.	MS or Open Office
12.	C / C++
13.	Photo shop
14.	Bread Board
15.	Integrated Circuits (IC's)
16.	CROs
17.	Adobe Animate
18.	Python
19.	PHP
20.	Word Press
21.	MOODLE
22.	Android Virtual Studio
23.	Joomla
24.	Digital Signature
25.	WAMP / XAMPP
26.	MySQL


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