Curriculum for

Diploma Programme in

COMPUTER SCIENCE & ENGINEERING

For the State of Uttar Pradesh

Prepared by:

Curriculum Development Centre

National Institute of Technical Teachers Training and Research
Sector 26, Chandigarh - 160 019
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PREFACE

An important issue generally debated amongst the planners and educators world over is how technical education can contribute to sustainable development of the societies struggling hard to come in the same bracket as that of the developed nations. The rapid industrialization and globalization has created an environment for free flow of information and technology through fast and efficient means. This has led to shrinking of the world, bringing people from different culture and environment together and giving rise to the concept of world turning into a global village. In India, a shift has taken place from the forgettable years of closed economy to knowledge based and open economy in the last few decades. In order to cope with the challenges of handling new technologies, materials and methods, we have to develop human resources having appropriate professional knowledge, skills and attitude. Technical education system is one of the significant components of the human resource development and has grown phenomenally during all these years. Now it is time to consolidate and infuse quality aspect through developing human resources, in the delivery system. Polytechnics play an important role in meeting the requirements of trained technical manpower for industries and field organizations. The initiatives being taken by the State Board of Technical Education, UP to revise the existing curricula of 6 diploma programmes as per the needs of the industry and making them NSQF compliant, are laudable. In order to meet the requirements of future technical manpower, we will have to revamp our existing technical education system and one of the most important requirements is to develop outcome-based curricula of diploma programmes. The curricula for diploma programmes have been revised by adopting time-tested and nationally acclaimed scientific method, laying emphasis on the identification of learning outcomes of diploma programme.

The real success of the diploma programme depends upon its effective implementation. However best the curriculum document is designed, if that is not implemented properly, the output will not be as expected. In addition to acquisition of appropriate physical resources, the availability of motivated, competent and qualified faculty is essential for effective implementation of the curricula.

It is expected of the polytechnics to carry out job market research on a continuous basis to identify the new skill requirements, reduce or remove outdated and redundant courses, develop innovative methods of course offering and thereby infuse the much needed dynamism in the system.

Dr. SS Pattnaik
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<div align="right">Coordinator</div>

1. SALIENT FEATURES OF DIPLOMA PROGRAMME IN COMPUTER SCIENCE ANDENGINEERING

1)	Name of the Programme	:	Diploma Programme in Computer Science and Engineering
2)	Duration of the Programme	:	Three years (Six Semesters)
3)	Entry Qualification	:	Matriculation or equivalent NSQF Level as Prescribed by State Board of Technical Education, UP
4)	Intake	:	60 (or as prescribed by the Board)
5)	Pattern of the Programme	:	Semester Pattern
6)	NSQF Level	:	Level - 5
7)	Ratio between theory and	:	45 : 55 (Approx.)

Practice

8) Industrial Training

   Four weeks of industrial training is included after IV semester during summer vacation. Total marks allotted to industrial training will be 50.

9) Ecology and Environment :

   As per Govt. of India directives, a subject on Environmental Studies has been incorporated in the curriculum.

10) Energy Conservation

   A subject on Energy Conservation has been incorporated in the curriculum.

11) Entrepreneurship Development

A full subject on Industrial Management and Entrepreneurship Development has been incorporated in the curriculum.

12) Student Centred Activities

A provision of 3-6 hrs per week has been made for organizing Student Centred Activities for overall personality development of students. Such activities will comprise of co–curricular activities such as expert lectures, self study, games, hobby classes like photography, painting, singing etc. seminars, declamation contests, educational field visits, NCC, NSS and other cultural activities, disaster management and safety etc.

13) Project work

A minor project work in the 5th semester and a major project work in the 6th semester have been included in the curriculum to enable the students to get familiar with the practices and procedures being followed in the industries and provide an opportunity to work on some live projects in the industry.

2. EMPLOYMENT OPPORTUNITIES FOR DIPLOMA HOLDERS IN COMPUTER SCIENCE AND ENGINEERING

Diploma holders in Computer Science and Engineering can find employment in following divisions:

(1) Service Division (IT enabled services, maintenance service and installation of computer services)

(2) Assembly and Quality Control Division

(3) Software Development and Testing Industries

(4) Web Development Industries

(5) Mobile Applications Development

(6) Junior Level Data Analytics

(7) Industry Automation

(8) E-Commerce Support Engineer

(9) News and Newspaper/Agencies, Magazines

(10) Data Entry and MIS/ERP Operator

(11) Lab. Assistant/Technician

(12) Hospitals/Healthcare/Institutions/Schools

(13) Cloud Services Support Engineer

(14) Publishing Industry

(15) Animation Industry

(16) Data Processing Industry

(17) Marketing Division(Corporate Handling, SME, Institutional Segment, Government Tender Business)

(18) Telecommunication Sector

(19) Teaching Organizations (Polytechnics, Vocational Institutions etc)

(20) Networking(LAN, WAN etc)

(21) Defence Services/Police Services/Cyber Services/Forensic Services

(22) Call Centres, BPO etc.

While in employment, the following areas of activity in different organisations (industry and service sector) are visualized for diploma holders in Computer Science and Engineering:

- Assembly and installation of computer systems, peripherals and software
- Programming customer based applications including web page designing
- Testing and maintenance of computer systems
- Marketing of software and hardware
- Teaching and training at educational institutions
- Self employment – call centres, BPO, EPO etc.
- Network installation and maintenance
- Cyber Cafés

Various Designations for Diploma Holders in Computer Science and Engineering

(1) Service engineer/customer support engineer/maintenance engineer in installation, maintenance and service of computer systems and networking
(2) Assembly supervisor in manufacturing and production activity
(3) Data entry operator, computer operator, DTP operator, technician
(4) Technical Assistant/junior engineer in quality control and testing activities of computer systems manufacturing
(5) Junior marketing executive/junior sales executive/sales engineer in marketing activities
(6) Junior/senior technical assistant in R&D laboratories and educational institutions to help in maintaining computers and networks
(7) Test engineers in process industry

3. LEARNING OUTCOMES OF DIPLOMA PROGRAMME IN COMPUTER SCIENCE AND ENGINEERING

After undergoing this programme, students will be able to:

1.	Communicate effectively in English with others
2.	Apply basic principles of mathematics and physics to solve engineering problems
3.	Use cutting tools, equipment and tools for fabrication of jobs by following safe practices at the workplace
4.	Work on different software for word processing, powerpoint presentation, spreadsheets and communicate ideas electronically
5.	Use electronic instruments to measure various engineering parameters
6.	Assemble, troubleshoot and maintain computer and peripherals and install various software
7.	Use appropriate procedures for energy conservation and for preventing environmental pollution
8.	Design page layouts for digital and electronic publications by combining different media elements
9.	Write, compile and debug programmes using different programming constructs
10.	Identify the software process model for specific software application and interpret different phases of software development life cycle

11.	Create, manage and secure database
12.	Design multimedia graphics and create script of multimedia animations using authoring tools
13.	Design, develop and host websites using internet technologies
14.	Plan and execute given task and project as a team member or a leader
15.	Manage resources NIS/ERP effectively at the workplace
16.	Implement OOPS concepts and data structure concepts.
17.	Use various functions and components of different operating systems
18.	Set-up, diagnose problems, troubleshoot computer networks and maintain security of the networks
19.	Write and debug simple as well as complex programmes in Python/PHP/R
20.	Use various mobile technologies and their use in different application scenarios
21.	Use and implement various services on cloud such as SAAS, PAAS, IAAS
22.	Apply the acquired knowledge and skills in solving live problems in the Computer and I.T. industry
23.	Demonstrate appropriate values and attitude.
24.	Apply statistical tools for data analysis and report generation
25.	Maintain hardware and software
26.	Perform data backups
27.	Develop mobile Applications

28.	Use open source tools and software
29.	Manage cloud application
30.	Set up and troubleshoot networks
31.	Handle malware and viruses
32.	Install and manage operating system and application softwares
33.	Perform network cable and fiber optic trouble shooting
34.	Set up IOT devices and wireless networking
35.	Use digital Marketing tools

4. DERIVING CURRICULUM AREAS FROM LEARNING OUTCOMES OF THE PROGRAMME

The following curriculum area subjects have been derived from learning outcomes:

Sr. No.	Learning Outcomes	Curriculum Areas/Subjects
1.	Communicate effectively in English with others	– Communication Skill – Student Centred Activities
2.	Apply basic principles of mathematics and science to solve engineering problems	– Applied Mathematics – Applied Physics
3.	Use cutting tools, equipment and tools for fabrication of jobs by following safe practices at the workplace	Workshop Practice
4.	Work on different software for word processing, powerpoint presentation, spreadsheets and communicate ideas electronically	Fundamentals of Computer and Information Technology
5.	Use electronic instruments to measure various engineering parameters	Basics of Electrical and Electronics Engineering
6.	Assemble, troubleshoot and maintain computer and peripherals and install various software	Computer Architecture and Hardware Maintenance
7.	Use appropriate procedures for energy conservation and for preventing environmental pollution	Environmental Studies
8.	Design page layouts for digital and electronic publications by combining different media elements	Internet and Web Technology
9.	Write, compile and debug programmes using different programming constructs	Concept of Programming Using C

10.	Identify the software process model for specific software application and interpret different phases of software development life cycle	Software Engineering
11.	Create, manage and secure database	Database Management System
12.	Design multimedia graphics and create script of multimedia animations using authoring tools	Multimedia & Animation
13.	Design, develop and host websites using internet technologies	Internet and Web Technology

14.	Plan and execute given task and project as a team member or a leader	Minor and Major Project Work
15.	Manage resources MIS/ERP effectively at the workplace	Industrial Management and Entrepreneurship Development
16.	Implement OOPS concepts and data structure concepts.	Object Oriented Programming Using Java
17.	Use various functions and components of different operating systems	Operating Systems
18.	Set-up, diagnose problems, troubleshoot computer networks and maintain security of the networks	Data Communication and Computer Networks
19.	Write and debug simple as well as complex programmes in Python/PHP/R	– Web Development using PHP – Computer Programming using Python
20.	Use various mobile technologies and their use in different application scenarios	Development of Android Applications
21.	Use and implement various services on cloud such as SAAS, PAAS, IAAS	Cloud Computing
22.	Apply the acquired knowledge and skills in	– Minor Project Work

	solving live problems in the Computer and I.T. industry	– Major Project Work
23.	Demonstrate appropriate values and attitude.	Student Centred Activities
24.	Apply statistical tools for data analysis and report generation	Data Science and Machine Learning
25.	Maintain hardware and software	Computer Architecture and Hardware Maintenance
26.	Perform data backups	Cloud Computing
27.	Develop mobile Applications	Development of Android Applications
28.	Use open source tools and software	– Office Automation Tools – Web Development using PHP – Computer Programming using Python – Development of Android Applications
29.	Manage cloud application	Cloud Computing
30.	Set up and troubleshoot networks	– Data Communication and Computer Networks – Computer Architecture and Hardware Maintenance

31.	Handle malware and viruses	Fundamentals of Computer and Information Technology
32.	Install and manage operating system and application softwares	Fundamentals of Computer and Information Technology
33.	Perform network cable and fiber optic trouble shooting	Data Communication and Computer Networks
34.	Set up IOT devices and wireless networking	Internet of Things

35.	Use digital Marketing tools	E-Commerce and Digital Marketing

5.   ABSTRACT OF CURRICULUM AREAS

a)   General Studies

    1.   Communication Skill

    2.   Environmental Studies

    3.   Energy Conservation

    4.   Industrial Management and Entrepreneurship Development

b)   Applied Sciences

    5.   Applied Mathematics

    6.   Applied Physics

    7.   Applied Chemistry

c)   Basic Courses in Engineering/Technology

    8.   Fundamentals of Computer and Information Technology

    9.   Technical Drawing

    10.   Workshop Practice

    11.   Basics of Electrical and Electronics Engineering

d)   Applied Courses in Engineering/Technology

    12.   Multimedia & Animation

    13.   Concept of Programming Using C

    14.   Office Automation Tools

15. Internet and Web Technology

16. Data Communication and Computer Networks

17. Data Structure Using C

18. Digital Electronics

19. Database Management System

20. Object Oriented Programming Using Java

21. Operating Systems

22. E-Commerce and Digital Marketing

23. Software Engineering

24. Web Development using PHP

25. Computer Programming using Python

26. Computer Architecture and Hardware Maintenance

27. Internet of Things

28. Development of Android Applications

29. Cloud Computing

e) Industrial Training

30. Minor Project Work

31. Major Project Work

f) Elective

32. Advance Java

33.   Dot Net Technologies

34.   Data Science and Machine Learning

6. HORIZONTAL AND VERTICAL ORGANISATION OF THE SUBJECTS

Sr. No.	Subjects	Distribution in Periods per week in Various Semesters					
		I	II	III	IV	V	VI
1.	Communication Skill	6	-		6	-	-
2.	Applied Mathematics	5	5	5	-	-	-
3.	Applied Physics	7	7	-	-	-	-
4.	Applied Chemistry	7	-	-	-	-	-
5.	Fundamentals of Computer and Information Technology	7	-	-	-	-	-
6.	Technical Drawing	6	-	-	-	-	-
7.	Workshop Practice	8	-	-	-	-	-
8.	Basics of Electrical and Electronics Engineering	-	9	-	-	-	-
9.	Multimedia & Animation	-	8	-	-	-	-
10.	Concept of Programming Using C	-	11	-	-	-	-
11.	Office Automation Tools	-	6	-	-	-	-
12.	Internet and Web Technology	-	-	8	-	-	-
13.	Environmental Studies	-	-	5	-	-	-
14.	Data Communication and Computer Networks	-	-	9	-	-	-
15.	Data Structure Using C	-	-	11	-	-	-
16.	Digital Electronics	-	-	8	-	-	-
17.	Database Management System	-	-	-	9	-	-

18.	Object Oriented Programming Using Java	-	-	-	10	-	-
19.	Operating Systems	-	-	-	8	-	-
20.	E-Commerce and Digital Marketing	-	-	-	6	-	-
21.	Energy Conservation	-	-	-	5	-	-
22.	Universal Human Values				3		
23.	Software Engineering	-	-	-	-	6	-
24.	Web Development using PHP	-	-	-	-	10	-
25.	Computer Programming using Python	-	-	-	-	8	-
26.	Computer Architecture and Hardware Maintenance	-	-	-	-	8	-
27.	Internet of Things	-	-	-	-	8	-
28.	Minor Project Work	-	-	-	-	6	-
29.	Development of Android Applications	-	-	-	-	-	12
30.	Cloud Computing	-	-	-	-	-	8
31.	Industrial Management and Entrepreneurship Development	-	-	-	-	-	5
32.	Elective	-	-	-	-	-	12
33.	Major Project Work	-	-	-	-	-	8
34.	Student Centred Activities	2	2	2	1	2	3
	Total	**48**	**48**	**48**	**48**	**48**	**48**

7. STUDY AND EVALUATION SCHEME FOR DIPLOMA PROGRAMMEIN COMPUTER SCIENCE AND ENGINEERING
FIRST SEMESTER

Sr. No.	SUBJECTS	STUDY SCHEME Periods/Week			Credits	MARKS IN EVALUATION SCHEME								Total Marks of Internal & External
						INTERNAL ASSESSMENT			EXTERNAL ASSESSMENT					
		L	T	P		Th	Pr	Tot	Th	Hrs	Pr	Hrs	Tot	
1.1	*Communication Skill-I	4	-	2	4	20	10	30	50	2 ½	20	3	70	100
1.2	*Applied Mathematics-I	5	-	-	4	20	-	20	50	2 ½	-	-	50	70
1.3	*Applied Physics-I	5	-	2	5	20	10	30	50	2 ½	20	3	70	100
1.4	*Applied Chemistry	5	-	2	5	20	10	30	50	2 ½	20	3	70	100
1.5	Fundamentals of Computer and Information Technology	3	-	4	4	20	10	30	50	2 ½	20	3	70	100
1.6	Technical Drawing	-	-	6	2	-	40	40	60	3	-	-	60	100
1.7	Workshop Practice	-	-	8	2	-	40	40	-	-	60	4	60	100
	#Student Centred Activities	-	-	2	1		30	30	-	-	-	-	-	30
	Total	**22**	**-**	**26**	**27**	**100**	**150**	**250**	**310**	**-**	**140**	**-**	**450**	**700**

*   Common course with other diploma programmes.#   Student Centred Activities will comprise of co-curricular activities like extension lectures, games, hobby clubs e.g. photography etc., seminars,   declamation contests, educational field visits, N.C.C., NSS, Cultural Activities, self study etc.

SECOND SEMESTER (COMPUTER SCIENCE AND ENGINEERING)

Sr. No.	SUBJECTS	STUDY SCHEME Periods/Week			Credits	MARKS IN EVALUATION SCHEME								Total Marks of Internal & External
						INTERNAL ASSESSMENT			EXTERNAL ASSESSMENT					
		L	T	P		Th	Pr	Tot	Th	Hrs	Pr	Hrs	Tot	
2.1	*Applied Mathematics-II	5	-	-	4	20	-	20	50	2 ½	-	3	50	70
2.2	*Applied Physics-II	5	-	2	5	20	10	30	50	2 ½	20	3	70	100
2.3	Basics of Electrical and Electronics Engineering	5	-	4	5	20	30	50	50	2 ½	50	3	100	150
2.4	Multimedia & Animation	4	-	4	5	20	30	50	50	2 ½	50	3	100	150
2.5	Concept of Programming Using C	5	-	6	6	20	30	50	50	2 ½	50	3	100	150
2.6	Office Automation Tools	-	-	6	2		30	30	-	-	50	3	50	80
	#Student Centred Activities	-	-	2	1		30	30	-	-	-	-	-	30
	Total	**24**	**-**	**24**	**28**	**100**	**160**	**260**	**250**	**-**	**220**	**-**	**470**	**730**

*Common course with other diploma programmes#   Student Centred Activities will comprise of co-curricular activities like extension lectures, games, hobby clubs e.g. photography etc.,   seminars, declamation contests, educational field visits, N.C.C., NSS, Cultural Activities and self study etc.

THIRD SEMESTER (COMPUTER SCIENCE AND ENGINEERING)

Sr. No.	SUBJECTS	STUDY SCHEME Periods/Week			Credits	MARKS IN EVALUATION SCHEME								Total Marks of Internal & External
			T	P		INTERNAL ASSESSMENT			EXTERNAL ASSESSMENT					
						Th	Pr	Tot	Th	Hrs	Pr	Hrs	Tot	
3.1	*Applied Mathematics-III	5	-	-	4	20	-	20	50	2 ½	-	-	50	70
3.2	Internet and Web Technology	4	-	4	5	20	30	50	50	2 ½	50	3	100	150
3.3	*Environmental Studies	3	-	2	3	20	10	30	50	2 ½	20	3	70	100
3.4	Data Communication and Computer Networks	5	-	4	6	20	30	50	50	2 ½	50	3	100	150
3.5	Data Structure Using C	5	-	6	6	20	30	50	50	2 ½	50	3	100	150
3.6	**Digital Electronics	4	-	4	5	20	30	50	50	2 ½	50	3	100	150
	#Student Centred Activities	-	-	2	1		30	30	-	-	-	-	-	30
	Total	26	-	22	30	120	160	280	300	-	220	-	520	800

FOURTH SEMESTER (COMPUTER SCIENCE AND ENGINEERING)

Sr. No.	SUBJECTS	STUDY SCHEME Periods/Week			Credits	MARKS IN EVALUATION SCHEME								Total Marks of Internal & External
						INTERNAL ASSESSMENT			EXTERNAL ASSESSMENT					
		L	T	P		Th	Pr	Tot	Th	Hrs	Pr	Hrs	Tot	
4.1	*Communication Skill-II	4	-	2	4	20	10	30	50	2 ½	20	3	70	100
4.2	Database Management System	5	-	4	6	20	30	50	50	2 ½	50	3	100	150
4.3	Object Oriented Programming Using Java	4	-	6	6	20	30	50	50	2 ½	50	3	100	150
4.4	Operating Systems	4	-	4	5	20	30	50	50	2 ½	50	3	100	150
4.5	E-Commerce and Digital Marketing	2	-	4	3	20	30	50	50	2 ½	50	3	100	150
4.6	*Energy Conservation	3	-	2	3	20	10	30	50	2 ½	20	3	70	100
4.7	Universal Human Values	2	-	1	1	-	20	20	-	-	30	3	30	50
	# Student Centred Activities	-	-	1	1	-	30	30	-	-	-	-	-	30
	Total	**24**	**-**	**24**	**29**	**120**	**190**	**310**	**300**	**-**	**270**	**-**	**570**	**880**

* Common course with other diploma Programmes

- **4 weeks industrial training will be organised after 4th semester**

\# Student Centred Activities will comprise of co-curricular activities like extension lectures, games, hobby clubs e.g. photography etc., seminars, declamation contests, educational field visits, N.C.C., NSS, Cultural Activities and self study etc.

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FIFTH SEMESTER (COMPUTER SCIENCE AND ENGINEERING)

Sr.No.	SUBJECTS	STUDY SCHEME Periods/Week			Credits	MARKS IN EVALUATION SCHEME								Total Marks of Internal & External
						INTERNAL ASSESSMENT			EXTERNAL ASSESSMENT					
		L	T	P		Th	Pr	Tot	Th	Hrs	Pr	Hrs	Tot	
-	Industrial Training	-	-	-	2	-	-	-	-	-	50	3	50	50
5.1	Software Engineering	4	-	2	4	20	30	50	50	2 ½	50	3	100	150
5.2	Web Development using PHP	4	-	6	6	20	30	50	50	2 ½	50	3	100	150
5.3	Computer Programming using Python	4	-	4	5	20	30	50	50	2 ½	50	3	100	150
5.4	Computer Architecture and Hardware Maintenance	4	-	4	5	20	30	50	50	2 ½	50	3	100	150
5.5	Internet of Things	4	-	4	5	20	30	50	50	2 ½	50	3	100	150
5.6	Minor Project Work	-	-	6	3	-	60	60	-	-	60	-	60	120
#Student Centred Activities		-	-	2	1	-	30	30	-	-	-	-	-	30
	Total	20	**-**	**28**	31	100	**240**	**340**	250	**-**	**360**	**-**	**610**	**950**

\# Student Centred Activities will comprise of co-curricular activities like extension lectures, games, hobby clubs e.g. photography etc., seminars, declamation contests, educational field visits, N.C.C., NSS, Cultural Activities and self study etc

CORRECTED AND APPROVED BY BOARD OF TECHNICAL EDUCATION,U.P,LUCKNOW IN MEETING HELD ON 10.07.2019 @RASHMI SONKAR

SIXTH SEMESTER (COMPUTER SCIENCE AND ENGINEERING)

Sr. No.	SUBJECTS	STUDY SCHEME Periods/Week			Credits	MARKS IN EVALUATION SCHEME								Total Marks of Internal & External
						INTERNAL ASSESSMENT			EXTERNAL ASSESSMENT					
		L	T	P		Th	Pr	Tot	Th	Hrs	Pr	Hrs	Tot	
6.1	Development of Android Applications	6	-	6	7	20	30	50	50	2 ½	50	-	100	150
6.2	Cloud Computing	4	-	4	5	20	30	50	50	2 ½	50	-	100	150
6.3	*Industrial Management and Entrepreneurship Development	5	-	-	4	20	-	20	50	2 ½	-	-	50	70
6.4	**Elective:	6	-	6	7	20	30	50	50	2 ½	50	-	100	150
6.5	Project	-	-	8	3	-	50	50	-	-	100	4	100	150
	#Student Centred Activities	-	-	3	1	-	30	30	-	-	-	-	-	30
	Total	21	-	27	27	80	170	250	200	-	250	-	450	700

*   Common Course with other diploma programmes**   Elective :- Any one of the following:Advanced Java,Dot Net Technologies,Data Science and Machine Learning #   Student Centred Activities will comprise of co-curricular activities like extension lectures, games, hobby clubs e.g. photography etc.,   seminars, declamation contests, educational field visits, N.C.C., NSS, Cultural Activities and self study etc.

8. **GUIDELINES FOR ASSESSMENT OF STUDENT CENTRED ACTIVITIES (SCA)**

It was discussed and decided that the maximum marks for SCA should be 30 as it involves a lot of subjectivity in the evaluation. The marks may be distributed as follows:

    i.   10 Marks for general behavior and discipline

        (by HODs in consultation with all the teachers of the department)

    ii.   5 Marks for attendance as per following:

        (by HODs in consultation with all the teachers of the department)

        a)   75 - 80%   2 Marks

        b)   80 - 85%   4 Marks

        c)   Above 85%   5 Marks

    iii.   15 Marks maximum for Sports/NCC/Cultural/Co-curricular/ NSS activities as per following: (by In-charge Sports/NCC/Cultural/Co-curricular/NSS)

        a)   15   -   State/National Level participation

        b)   10   -   Participation in two of above activities

        c)   5   -   Inter-Polytechnic level participation

Note: There should be no marks for attendance in the internal sessional of different subjects.

1.1   COMMUNICATION SKILLS – I

L T P

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RATIONALE

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

LEARNING OUTCOMES

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

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- Understand the importance of effective communication
- Describe the process of communication
- Communicate effectively in different contexts
- Identify parts of speech
- Write correct sentences using appropriate vocabulary
- Reproduce and match words and sentences in a paragraph
- Write various types of paragraphs, notices for different purposes and composition on picture with appropriate format
- Read unseen texts with comprehension

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DETAILED CONTENTS

1   Basics of Communication   (13 periods)

1.1   Definition and process of communication

1.2   Types of communication - formal and informal, oral and written, verbal and non-verbal

1.3   Communications barriers and how to overcome them

1.4   Barriers to Communication, Tools of Communication

2   Application of Grammar   (18 periods)

    2.1   Parts of Speech (Noun, verb, adjective, adverb) and modals

    2.2   Sentences and its types

    2.3   Tenses

    2.4   Active and Passive Voice

    2.5   Punctuation

    2.6   Direct and Indirect Speech

3   Reading Skill   (10 periods)

Unseen passage for comprehension (one word substitution, prefixes, suffixes, antonyms, synonyms etc. based upon the passage to be covered under this topic)

4   Writing Skill   (15 periods)

    4.1   Picture composition

    4.2   Writing paragraph

    4.3   Notice writing

LIST OF PRACTICALS

Note: Teaching Learning Process should be focused on the use of the language in writing reports and making presentations.

Topics such as Effective listening, effective note taking, group discussions and regular presentations by the students need to be taught in a project oriented manner where the learning happens as a byproduct.

Listening and Speaking Exercises

1.   Self and peer introduction
2.   Newspaper reading
3.   Just a minute session-Extempore
4.   Greeting and starting a conversation
5.   Leave taking
6.   Thanking
7.   Wishing well
8.   Talking about likes and dislikes
9.   Group Discussion
10.   Listening Exercises.

INSTRUCTIONAL STRATEGY

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

MEANS OF ASSESSMENT

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

RECOMMENDED BOOKS

1.   Communicating Effectively in English, Book-I by RevathiSrinivas; Abhishek Publications, Chandigarh.

2.   Communication Techniques and Skills by R. K. Chadha; DhanpatRai Publications, New Delhi.
3.   High School English Grammar and Composition by Wren & Martin; S. Chand & Company Ltd., Delhi.

4.   Excellent General English-R.B.Varshnay, R.K. Bansal, Mittal Book Depot, Malhotra

5.   The Functional aspects of Communication Skills – Dr. P. Prsad, S.K. Katria & Sons, New Delhi
6.   Q. Skills for success – Level & Margaret Books, Oxford University Press.
7.   e-books/e-tools/relevant software to be used as recommended by AICTE/ NITTTR, Chandigarh.

Websites for Reference:

1.   http://www.mindtools.com/ page 8.html – 99k
2.   http://www.letstalk.com.in
3.   http://www.englishlearning.com
4.   http://learnenglish.britishcouncil.org/en/
5.   http://swayam.gov.in

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Periods)	Marks Allotted (%)
1	13	24
2	18	32
3	10	16
4	15	28
Total	**56**	**100**

1.2   APPLIED MATHEMATICS - I

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RATIONALE

Contents of this course provide fundamental base for understanding elementary mathematics and their uses in solving engineering problems. Contents of this course will enable students to use basic mathematical function like logarithms, partial fractions, matrices and basic 2D, curves in solving various engineering problems of all fields.

LEARNING OUTCOMES

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

- apply Binomial theorem to solve engineering problems
- apply determinants properties and Crammer's rule to solve engineering problems
- apply dot & cross product of vectors to find the solution of engineering problems
- use complex numbers in various engineering problems
- apply differential calculus and higher order to solve engineering problems
- find velocity, acceleration, errors and approximation in engineering problems with application of derivatives.

DETAILED CONTENTS

1.   Algebra -I   (12 Periods)

    1.1   Series : AP and GP; Sum, nth term, Mean

    1.2   Binomial theorem for positive, negative and fractional index (without proof). Application of Binomial theorem.

    1.3   Determinants : Elementary properties of determinant of order 2 and 3, Multiplication system of algebraic equation,   Consistency of equation, Crammer's rule

2.   Algebra- II   (12 Periods)

   2.1   Vector algebra : Dot and Cross product, Scaler and vector   triple product.

   2.2   Complex number.

            Complex   numbers, Representation, Modulus   and   amplitude
            Demoivre   theorem, its application in solving algebraic   equations,
            Mod. function and its properties..

3.   Trigonometry   (10 Periods)

   3.1   Relation between sides and angles of a triangle :   Statement of various
            formulae showing relationship between sides and   angle of a triangle.

   3.2   Inverse circular functions : Simple case only

4.   Differential Calculus - I   (18 Periods)

   4.1   Functions, limits, continuity, - functions and their graphs, range   and
            domain, elementary methods of finding limits   (right and left),
            elementary test for continuity and differentiability.

   4.2   Methods   of   finding derivative, Trigonometric functions, exponential
            function, Function of   a   function,   Logaritimic differentiation,
            Differentiation of Inverse trigonometric function, Differentiation   of
            implicit functions.

5.   Differential Calculus - II   (18 Periods)

   5.1   Higher order derivatives, Leibnitz theorem (without proof). Simple
            applications.

   5.2   Application   -   Finding   Tangents,   Normal,   Points   of
            Maxima/Minima, Increasing/Decreasing functions, Rate,   Measure,
            velocity, Acceleration, Errors and approximation.

INSTRUCTONAL STRATEGY

The basic instructional strategy to teach basic mathematics, Binomial theorem,
trigonometry, differential equations etc. should be conceptual with real world applications

of relevant branch. More numerical and theory examples can be used for clear understanding of the content.

MEANS OF ASSESSMENT

- Assignments and Quiz/Class Tests
- Mid-term and End-term Written Tests
- Model/Prototype Making

RECOMMENDED BOOKS

1. Elementary Engineering Mathematics by BS Grewal, Khanna Publishers, New Delhi
2. Engineering Mathematics, Vol I & II by SS Sastry, Prentice Hall of India Pvt. Ltd.,
3 Applied Mathematics-I by Chauhan and Chauhan, Krishna Publications, Meerut.

4. Applied Mathematics-I (A) by Kailash Sinha and Varun Kumar; Aarti Publication, Meerut

SUGGESTED DISTRIBUTION OF MARKS

Topic	Time Allotted (Periods)	Marks Allotted (%)
1.	12	20
2.	12	20
3.	10	12
4	18	24
5	18	24
Total	**70**	**100**

1.3   APPLIED PHYSICS – I

L T P

5 - 2

RATIONALE

Applied physics includes the study of a diversified topics related to 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 behave. Concrete knowledge of physical laws, analysis and applications in various fields of engineering and technology are given prominence in this course content.

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

LEARNING OUTCOMES

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

- Identify the use of S.I. system of measurement with accuracy and how it is used in engineering
- Represent physical quantities as scalars and vectors, applying the physical laws and concepts of linear and circular motion in everyday life.
- Solve difficult problems (walking of man, horse and cart problem, flying of bird/ aircraft, etc.)
- Analyse and design banking of roads/railway tracks and apply conservation of momentum principle to Explain rocket propulsion, recoil of gun etc.
- Derive work, power and energy relationship and solve problems about work and power.
- Define work, energy and power and their units.
- Describe conservation of energy and its applications
- Understand the concept of rotational motion of a rigid body and its applications
- Apply the physical laws and concepts of gravity, its variation with longitude and latitude and its uses in space satellite etc.   .
- Understand the concept of elasticity, surface tension, pressure and the laws governing movement of fluids.
- Express physical work in term of heat and temperature; Measure temperature in various processes on different scales (Celsius, Kelvin, Fahrenheit etc.)

- Distinguish between conduction, convection and radiation, identify the different methods for reducing heat losses
- Understand the laws of thermodynamics, Carnot cycle and their applications.

DETAILED CONTENTS

1. Units and Dimensions   (10 Periods)

    1.1 Need of Measurement in engineering and science, unit of a physical quantities - fundamental and derived units, systems of units (FPS, CGS and SI units)
    1.2 Dimensions and dimensional formulae of physical quantities.
    1.3 Principle of homogeneity of dimensions
    1.4 Dimensional equations and their applications, conversion of numerical values of physical quantities from one system of units into another, checking the correctness of physical equations and deriving relations among various physical quantities
    1.5 Limitations of dimensional analysis
    1.6 Error in measurement, accuracy and precision of instruments, random and systematic errors, absolute error, relative error, and percentage error, Estimation of probable errors in the results of measurement (combination of errors in addition, subtraction, multiplication, division and powers), rules for representing significant figures in calculation.
    1.7 Application of units and dimensions in measuring length, diameter, circumference, volume, surface area etc. of metallic and non metallic blocks, wires, pipes etc (at least two each).

2. Force and Motion   (10 periods)

    2.1 Scalar and vector quantities – examples, representation of vector, types of vectors
    2.2 Addition and Subtraction of Vectors, Triangle and Parallelogram law (Statement only), Scalar and Vector Product.
    2.3 Resolution of Vectors and its application to lawn roller.
    2.4 Force, Momentum, Statement and Derivation of Conservation of linear momentum, its applications such as recoil of gun.
    2.5 Impulse and its Applications

2.6 Circular motion (Uniform and Non-uniform), definition of angular displacement, angular velocity, angular acceleration, frequency, time period.

2.7 Relation between linear and angular velocity, linear acceleration and angular acceleration (related numerical)

2.8 Central force, Expression and Applications of Centripetal and centrifugal forces with examples such as banking of roads and bending of cyclist, Principle of centrifuge.

2.9 Application of various forces in lifts, cranes, large steam engines and turbines

3. Work, Power and Energy   (10 periods)

3.1 Work: and its units, examples of zero work, positive work and negative work, conservative and non-conservative force,

3.2 Friction: modern concept, types, laws of limiting friction, Coefficient of friction and its Engineering Applications.

3.3 Work done in moving an object on horizontal and inclined plane for rough and plane surfaces with its applications

3.4 Energy and its units: Kinetic energy and potential energy with examples and their derivation, work energy theorem.

3.5 Principle of conservation of mechanical energy for freely falling bodies, examples of transformation of energy.

3.6 Power and its units, calculation of power in numerical problems

3.7 Application of Friction in brake system of moving vehicles, bicycle, scooter, car trains etc.

4 Rotational Motion   (10 periods)

4.1 Concept of translatory and rotatory motions with examples

4.2 Definition of torque with examples

4.3 Angular momentum, Conservation of angular momentum (quantitative) and its examples

4.4 Moment of inertia and its physical significance, radius of gyration for rigid body, Theorems of parallel and perpendicular axes (statements only), Moment of inertia of rod, disc, ring and sphere (hollow and solid) (Formulae only). Concept of Fly wheel.

4.5 Rotational kinetic energy, Rolling of sphere on the slant plane,

4.6 Comparison of linear motion and rotational motion.

4.7 Application of rotational motions in transport vehicles, and machines

5 Motion of planets and satellites   (08 periods)

5.1 Gravitational force, Kepler's law of planetary motion,

5.2 Acceleration due gravity and its variation,

5.3 Gravitational Potential and Gravitational potential energy,

5.4 Motion of satellite, orbital velocity and time period of satellite, Total energy and Binding energy of a satellite, Escape energy and escape velocity,

5.5 Types of satellites, Geo-stationary satellite, semi-synchronous, polar satellite (concept only) and their uses in science and technology,

5.6 Concept of Black Holes,

6. Properties of Matter   (12 periods)

6.1 Elasticity: definition of stress and strain, different types of modulii of elasticity, Hooke's law, significance of stress strain curve

6.2 Pressure: definition, its units, atmospheric pressure, gauge pressure, absolute pressure, Fortin's Barometer and its applications

6.3   Surface tension: concept, its units, angle of contact, Capillary action and determination of surface tension from capillary rise method, applications of surface tension, effect of temperature and impurity on surface tension

6.4   Viscosity and coefficient of viscosity: Terminal velocity, Stoke's law and effect of temperature on viscosity, application in hydraulic systems.

6.5   Concept of fluid motion, stream line and turbulent flow, Reynold's number Equation of continuity, Bernoulli's Theorem and their applications.

7.   Heat and Thermodynamics   (10 periods)

7.1   Difference between heat and temperature

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

7.3   Different scales of temperature and their relationship

7.4   Expansion of solids, liquids and gases, coefficient of linear, surface and cubical expansions and relation amongst them

7.5   Heat conduction in a metal rod, Temperature gradient, Concept of Co-efficient of thermal conductivity, Uses and effects of Heat conduction in Daily life.

7.6   Isothermal and Adibatic process

7.7   Zeroth, First and second law of thermodynamics, Heat engine (concept Only), Carnot cycle.

7.8   Application of various systems of thermometry in refrigeration and air-conditioning etc.

LIST OF PRACTICALS (to perform minimum six experiments)

1   To find radius of wire and its volume and the maximum permissible error in these quantities by using both vernier calipers and screw gauge.
2   To find the value of acceleration due to gravity on the surface of earth by using a simple pendulum.
3   To determine the Radius of curvature of (i) convex mirror, (ii) concave mirror by spherometer

4   To verify parallelogram law of forces
5   To study conservation of energy of a ball or cylinder rolling down an inclined plane.
6   To find the Moment of Inertia of a flywheel about its axis of rotation

7   To determine the atmospheric pressure at a place using Fortin's Barometer
8   To determine the viscosity of glycerin by Stoke's method
9   To determine the coefficient of linear expansion of a metal rod
10 To determine force constant of spring using Hooks law

INSTRUCTIONAL STATREGY

Teacher may use various teaching aids like live models, charts, graphs and experimental kits etc. for imparting effective instructions in the subject. The teacher should explain about field applications before teaching the basics to develop proper understanding of the physical phenomenon. Use of demonstration and animations can make the subject interesting and may develop scientific temper in the students. Teacher must plan a tour of Science Park/planetarium available in nearby areas in order to enhance the interest in this course.

MEANS OF ASSEMENTS

– Assignment & Quiz,
– Mid-Term and End-Term written test,
– Model Making,
– Actual Lab & Practical Work,
– VivaVoice

RECOMMENDED BOOKS

1   Text Book of Physics for Class XI (Part-I, Part-II); N.C.E.R.T., Delhi
2   Concepts in Physics by HC Verma, Vol. I & II, Bharti Bhawan Ltd. New Delhi
3   Comprehensive Practical Physics, Vol, I & II, JN Jaiswal, Laxmi Publications (P) Ltd., New Delhi
4   B.Sc.Practical Physics by C L Arora, S. Chand Publication..
5   Engineering Physics by PV Naik, Pearson Education Pvt. Ltd, New Delhi
6   Engineering Physics by DK Bhhatacharya & Poonam Tandan; Oxford University Press, New Delhi
7   Modern Engineering Physics by SL Gupta, Sanjeev Gupta, Dhanpat Rai Publications
8   V. Rajendran,physics-I, Tata McGraw-Hill raw Hill publication, New Delhi

9   Arthur Beiser, Applied Physics, Tata McGraw-Hill raw Hill publication, New Delhi

10   Physics Volume 1, 5th edition, Haliday Resnick and Krane, Wiley publication

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Periods)	Marks Allotted (%)
1	10	15
2	10	15
3	10	15
4	10	15
5	08	10
6	12	16
7	10	14
Total	**70**	**100**

1.4 APPLIED CHEMISTRY

RATIONALE

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

LEARNING OUTCOMES

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

- Classify various substances based on state of aggregation
- Substantiate the laws and principles on which structure of atom is established.
- Explain and predict properties of substances.
- Explain sources of water and various characteristics of water (quantitatively).
- Explain cause and factors which can adversely affecting natural water quality and remedial measures available for water purification
- Think critically, develop and adapt water conservation techniques.
- Explain corrosion of metal and their preventive measures.
- explain chemical nature and causes of corrosion
- apply correct and efficient methods of corrosion prevention.
- explain chemistry of fuels and their relative advantages.
- select most efficient fuel for the engine and engineering applications.
- suggest how to subside air pollution caused by the use of fossil fuels
- explain the chemistry of various polymers and plastics
- verify suitability and select polymer/rubber/plastic materials for engineering applications.

DETAILED CONTENTS

1. Atomic Structure, Periodic Table and Chemical Bonding (14 periods)

    1.1 Fundamental particles- mass and charges of electrons, protons and neutrons with names of the scientists who discovered these fundamental particles.

    1.2 Bohr's model of atom and successes and limitations of atomic theory (qualitative treatment only).

    1.3 Atomic number, atomic mass number isotopes and isobars.

    1.4 Definition of orbit and orbitals, shapes of s and p orbitals only, quantum numbers and their significance,

    1.5 Aufbau's principle, Pauli's exclusion principle and Hund's rule electronic configuration of elements with atomic number (Z) = 30 only. (Electronic configurations of elements with atomic number greater than 30 are excluded).

    1.6 Modern periodic law and periodic table, groups and periods, classification of elements into s, p, d and f blocks (periodicity in properties - excluded)

    1.7 Chemical bonding and cause of bonding and types such as ionic bond in NaCl sigma (σ) and pi (π) covalent bonds in H_2, HCl, Cl_2, elementary idea of hybridization in $BeCl_2$, BF_3, CH_4, NH_3 and H_2O, VSEPR, Molecular orbital Theory

    1.8 States of Matter: Solid, Liquid & Gas, Metallic bonding- explanation with the help of electron gas (sea) model.

2. Fuelsand Lubricants (18 periods)

    2.1 Definition of fuel, classification of fuels, characteristics of good fuel, relative merits of gaseous, liquid and solid fuels

    2.2 Calorific value-higher calorific value, lower calorific value, determination of calorific value of solid or liquid fuel using Bomb calorimeter and numerical examples.

    2.3 Coal - types of coal and proximate analysis of coal

    2.4 Fuel rating – Octane number and Cetane number, fuel-structural influence on Octane and Cetane numbers

    2.5 Gaseous fuels – chemical composition, calorific value and applications of natural gas (CNG), LPG, producer gas, water gas and biogas.

2.6   Elementary ideal on – hydrogen as future fuels, nuclear fuels.

2.7   Lubricants: Definition and properties, mechanism, industrial application and its function in bearings.

2.8   Synthetic lubricants and cutting fluids.

3.   Water   (14 periods)

3.1   Demonstration of water resources on Earth using pie chart.
3.2   Classification of water – soft water and hard water, action of soap on hard water, types of hardness, causes of hardness, units of hardness – mg per liter (mgL^{-1}) and part per million (ppm) and simple numerical, pH and buffer solutions and their applications.
3.3   Disadvantages caused by the use of hard water in domestic and boiler feed water. Primming and foaming and caustic embrittlement in boilers.
3.4   Removal of hardness -Permutit process and Ion-exchange process.
3.5   Physico-Chemical methods for Water Quality Testing
        a) Determination of pH using pH meter, total dissolved solids (TDS)
        b) Testing and Estimation of- alkalinity, indicator their types and application total hardness by EDTA method and O'Hener's Method. (chemical reaction of EDTA method are excluded).
        c) Understanding of Indian Water Quality standards as per WHO
3.6   Natural water sterilization by chlorine and UV radiation and reverse osmosis.

3.7   Municipality waste water treatment. Definition of B.O.D and C.O.D.

4.   Electrochemistry   (4 periods)

Redox Reaction, Electrode Potential, Nernst equation, Electrochemical cell (Galvanic and Electrobytes); Nernst equation.

5.   Corrosion and its Control   (10 periods)

5.1 Definition of corrosion and factors affecting corrosion rate.

5.2 Theories of

    a) Dry (chemical) corrosion- Pilling Bedworth rule

    b) Wet corrosion in acidic atmosphere by hydrogen evolution mechanism

5.3 Definition of passivity and galvanic series

5.4 Corrosion control:

    a) Metal coatings – Cathodic protection, Cementation on Base Metal Steel –Application of Metal Zn (Sheradizing),Cr (Chromozing) and Al (Calorizing), Sacrificial protection and impressed current voltage

    b) Inorganic coatings – Anodizing and phosphating,

    c) Organic coatings - use of paints varnishes and enamels

    d) Internal corrosion preventive measures- alloying (with reference to passivating, neutralizing and inhibition) and heat treatment (quenching, annealing)

6. Organic compounds, Polymers and Plastics   (10 periods)

6.1 Classification of organic compounds and IUPAC Nomenclature

6.2 Definition of polymer, monomer and degree of polymerization

6.3 Brief introduction to addition and condensation polymers with suitable examples (PE, PS, PVC, Teflon, Nylon -66 and Bakelite)

6.4 Definition of plastics, thermo plastics and thermo setting plastics with suitable examples, distinctions between thermo and thermo setting plastics

6.5 Applications of polymers in industry and daily life

LIST OF PRACTICALS

1. Estimation of total hardness of water using standard EDTA solution
2. Estimation of total alkalinity of given water sample by titrating it against standard sulfuric acid solution
3. Proximate analysis of solid fuel)
4. Estimation of temporary hardness of water sample by O' Hener's Method.
5. Determination of flash and fire point of given lubricating oil using Able's flash point apparatus

INSTRUCTIONAL STRATEGY

Teachers may take help of various models and charts while imparting instructions to make the concept clear. More emphasis should be laid on discussing and explaining practical applications of various chemical process and reactions. In addition, students should be encouraged or motivated to study those processes in more details, which may find practical application in their future professional career.

MEANS OF ASSEMENTS

–   Assignment & Quiz,
–   Mid-Term and End-Term written test,
–   Model Making,
–   Actual Lab & Practical Work,
–   Viva Voice

RECOMMENDED BOOKS

1.   Chemistry in Engineering by J.C. Kuricose & J. Rajaram, Tata McGraw Hill, Publishing Company Limited, New Delhi.
2.   Engineering Chemistry by P.C. Jain & Monika Jain, Dhanapat Rai Publishing Company, New Delhi.
3.   Eagle's Applied Chemistry - I by S. C. Ahuja & G. H. Hugar, Eagle Prakashan, Jalandhar.
4.   Engineering Chemistry – A Text Book by H. K. Chopra & A. Parmar, Narosa Publishing House, New Delhi.
5.   Applied Chemistry - I by Dr. P. K Vij & Shiksha Vij, Lords Publications, Jalandhar.
6.   Engineering Chemistry by Dr. Himanshu Pandey, Goel Publishing House, Meerut, India
7.   e-books/e-tools/relevant software to be used as recommended by AICTE/ NITTTR, Chandigarh.

SUGGESTED DISTRIBUTION OF MARKS

Topics	Time Allotted (hrs)	Marks Allotted (%)
1.	14	20
2.	18	24
3.	14	20
4.	4	6
5.	10	15
6.	10	15
Total	**70**	**100**

1.5 FUNDAMENTALS OF COMPUTER AND INFORMATION TECHNOLOGY

L T P
3 - 4

RATIONALE

The diploma holders in Computer Engineering needs to understand computer fundamentalsand information technology. They should be able to operate basic software related to computer. Hence this subject is introduced in the curriculum.

LEARNING OUTCOMES

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

- Understand a computer system that has hardware and software components, which controls and makes them useful.
- Understand the operating system as the interface to the computer system.
- Outline various application of IT
- Differentiate between assembly and high level language
- Identify various web browser
- Use the Internet to send mail and surf the World Wide Web

DETAILED CONTENTS

1. Fundamentals of Computer   (12 Periods)

Historical evolution of computers, Generations of computers, Classification of computers - based on size, processor, Usefulness of Computers. Applications of computers, Block Diagram along its components and characteristics, Interaction between the CPU, Memory Input/output devices, function of CPU and major functional parts of CPU. State the relevance of speed and word length for CPU Performance, Recognize the current family of CPUs used in Computers, Types of Memory- RAM ROM, Monitor, Mouse, Keyboard, Disk, joysticks, Storage Devices, floppy disk, CD, DVD, Pen drive, trackballs, Printers Types of printers, Scanner, Modem, Video, Sound cards, Speakers

2. Data Representation   (08 Periods)

Definition Of Information, difference between data and information ,importance of Binary Number System, various number systems, Conversion from Decimal to Binary, Conversion from Binary to Decimal, binary number into hexadecimal

number, hexadecimal number into binary number System, Memory Addressing and its Importance, ASCII and EBCDIC coding System

3.   DOS & Windows Operating Systems   (10 Periods)

Hardware and Software, Types of Softwares, Introduction and need of operating system, Types of operating system, dos operating system, Types of dos Commands, operating system as a resource manager; BIOS; System utilities - Editor, Loader, Linker, File Manager. Concept of GUI and CUI standards. Directories and files , wild cards, autoexec.bat, config.says, features of Window desktop, components of Window, function of each component of Window, method of starting a program using start button, Understand maximize, minimize, restore down and close button, uses of file and folder, method of viewing the contents of hard disk drive using explore option, control panel,disk defragmentation installation and un installation of the application software.

4.   Fundamentals of Internet   (12 Periods)

Concepts of computer Network, Client Server Model, Peer to Peer Model, Networking Devices: Switch, Router, Hub, Bridge, Gateway, LAN, MAN, WAN, Topology, Internet, Intranet, Extranet, internet service provider and its relevance, role of the modem in accessing the internet, installation procedure of a modem using control panel, purpose of web browser software, URL,URI, URN, WWW, FTP,HTTP,RDC(Remote Desktop Connection), Telnet, Email, process of sending and receiving e-mail, transmission modes, IP address and its format, MAC Address, DNS, search engines, social network sites, internet security, Firewall, Cloud Computing and its services

LIST OF PRACTICALS

1.   Familiarization with Computer System and its peripheral devices
2.   Familiarization with Operating System
3.   Practice of internal and external commands of DOS
4.   Working practice on windows operating system : creating file, folder. Copying, moving, deleting file, folder
5.   Installing and uninstalling of new software using control panel.

6. Installation and uninstallation of new hardware drivers using control panel.

7. Disk defragmentation using system tool

8. Procedure of disk partition and its operation (Shrinking, Extending, Delete, Format).

9. Installation of Operating Systems

10. Changing resolution, colour, appearances, and screensaver option of the display

11. Changing System Date and Time.

12. User Account creation and its feature on Windows Operating System

13. Email Account creation, reading, writing and sending emails with attachments.

14. Internet browsing using browsers.

15. Using of Search Engine to get information from internet

INSTRUCTIONAL STRATEGY

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

MEANS OF ASSESSMENT

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

RECOMMENDED BOOKS

1. Fundamentals of Computer by E Balagurusamy,Tata McGraw Hill EducationPvt. Ltd, New Delhi

2. Fundamentals of Computer by V Rajaraman; Prentice Hall of India Pvt. Ltd., New Delhi

3. Computer Fundamentals by RS Salaria; Khanna Book Publishing Co. (P) Ltd., New Delhi

4. Computers Today by SK Basandara, Galgotia publication Pvtltd. Daryaganj, New Delhi.

5. Computer Fundamentals and Programming in C by ReemaThareja; Oxford University Press, New Delhi

6. Computer Fundamentals by PK Sinha; BPB Publication, New Delhi

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

Websites for Reference:

http://swayam.gov.in

http://spoken-tutorial.orgs

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Periods)	Marks Allotted (%)
1	12	30
2	08	20
3	10	25
4	12	25
Total	**42**	**100**

1.6 TECHNICAL DRAWING

                                                              L T P
                                                              - - 6

RATIONALE

The course is aimed at developing basic graphic skills so as to enable them to use these skills in preparation of engineering drawings, their reading and interpretation. Understand the fundamentals of Engineering Drawing. Read and interpret object drawings.

LEARNING OUTCOMES

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

- Draw orthographic projections of different objects.
- Visualize three dimensional objects and draw Isometric Projections.
- Use the techniques and able to interpret the drawing in Engineering field.
- Draw exploded views of components & assemblies in preparation of service drawing.
- Draw free hand sketches of the schematic diagrams of electronic circuits, using standard symbols.
- Prepare drawing from the rough sketches provide and/or enlarge/reduce the given drawing to the desired scale.

DETAILED CONTENTS

1.   Drawing Instruments and their uses

      Letters and numbers (single stroke vertical), Convention of lines and their applications. Scale (reduced, enlarged & full size) plain scale and diagonal scale. Sheet layout. Geometrical constructions.

2.   Active Devices

      Semiconductor : Rectifier diode, Zener diode, Varacter diode, Tunnel diode, Photo, Light emitting diode (LED), Bipolar transsitor, junction field effect transistor (JFET), Mosfet, Photo transistor, Uni junction transistor (UTJ), Silicon control rectifier (SCR), Diac, Triacs outlines (with their types numbers e.g TO3, TO5, TO18, TO39, TO65 etc) of the different types of semiconductor diodes, Transistors Scrs, Diacs, Triacs and ICs (along with indicators for pin identification etc.)

3.   Orthographic projections

Introduction to Orthographic projections. Conversion of pictorial view into Orthographic, Views (First Angle Projection Method Only), Dimensioning technique as per SP-46

4. Isometric projection

Isometric scale, Conversion of orthographic views into isometric View/projection(Simple objects) Projection of Straight Lines and Planes. (First Angle Projection Method only)

5. Logic gates(With the help of rough sketch/clues given)

Draw standard symbols of NOT, AND, NAND, OR, NOR XOR, Expandable & Tristate gates, Op, Amp, Ic, Flip-flops (Combination of 2,3,4 input gates should be drawn).

6. Graphical Representation of data

General concept, selection of variables & curve fitting, curve indentification zero-point location. Use of various graph paper and preparation of diagram from given data. Bar charts, pie graph, pictorial graph.

7. Circuit Diagram(With the help of rough sketch/clues given**)**

Circuit of UPS, Block diagram of an Electronic multimeter, Circuit of Modem, Circuit diagram of Voltage stabilizers, Connection wiring diagrams, Point to point pictorial, P.C.B layout of a single electronic circuit on a graph sheet. Keeping in view the actual size of the components.

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. Students must use H grade pencils for the first few (10 sheets), till they are familiar with the proper thickness of all type of lines. Relevant IT tools to be used to state that 3D solid modelling, which is to be taught at the starting point. Also how 2D views can be obtained from 3D solid modelling to 2D views rather than the conventional method of making the students visualize the 3D view of an object by mentally constructing it from the 2D views

MEANS OF ASSESSMENT

- Drawing
- Assignments and quiz/class tests
- Mid-term and end-term written tests

RECOMMENDED BOOKS

1. A Text Book of Engineering Drawing by Surjit Singh; DhanpatRai& Co., Delhi

2. Engineering Drawing by PS Gill; SK Kataria& Sons, New Delhi

3. Elementary Engineering Drawing in First Angle Projection by ND Bhatt; Charotar

Publishing House Pvt. Ltd., Anand

4. Engineering Drawing I & II by JS Layall; Eagle Parkashan, Jalandhar

5. Engineering Drawing I by DK Goel, GBD Publication.

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

AICTE/UPBTE/NITTTR.

Websites for Reference:

 http://swayam.gov.in

 http://spoken-tutorial.org

1.7 WORKSHOP PRACTICE

(Common for Computer Science and Engineering and Information Technology)

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RATIONALE

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

LEARNING OUTCOMES

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

- Identify tools and equipment used and their respective functions.
- Identify different types of materials and their basic properties.
- Use and take measurements with the help of basic measuring tools/equipment.
- Select proper tools for a particular operation.
- Select materials, tools, and sequence of operations to make a job as per given specification/drawing.
- Prepare simple jobs independently and inspect the same.
- Follow safety procedures and precautionary measures.
- Use safety equipment and Personal Protection Equipment.

DETAILED CONTENTS (PRACTICAL EXERCISES)

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

The students should prepare sketches of various tools/jobs in their practical Notebook.

The following shops are included in the syllabus:

1. Fitting Shop
2. Sheet Metal Shop
3. Carpentry Shop
4. Painting and Polishing Shop

1. FITTING SHOP

1.1 Use of personal protective equipment and safety precautions while working.

1.2 Basic deburring processes.

1.3 Introduction to fitting shop tools, marking and measuring devices/equipment.

1.4 Identification of materials. (Iron, Copper, Stainless Steel, Aluminium etc.)

1.5 Identification of various steel sections (flat, angle, channel, bar etc.).

1.6 Introduction to various fitting shop operations/processes (Hacksawing, Drilling, Chipping and Filing).

1.7 Job Practice

Job I Marking of job, use of marking tools, filing and use of measuring instruments. (Vernier caliper, Micrometer and Vernier height gauge).

Job II Filing a rectangular/square piece to maintain dimensions within an accuracy of $\pm$.25 mm.

Job III **M**aking a cut-out from a square piece of MS flat using hand hacksaw and chipping

Job IV Drilling and tapping practice on MS Flat.

2. SHEET METAL SHOP

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

2.2 Introduction and demonstration of hand tools used in sheet metal shop.

2.3 Introduction and demonstration of various machines and equipment used in sheet metal shop e.g. Shearing Machine, Bar Folder, Burring Machine,

2.4 Introduction and demonstration of various raw materials used in sheet metal shop e.g. black-plain sheet, galvanized-iron plain sheet, galvanised corrugated sheet, aluminium sheet etc.

2.5 Study of various types of nuts, bolts, rivets, screws etc.

2.6 Job Practice
     Job I: Shearing practice on a sheet using hand shears.
     Job II: Practice on making Single riveted lap joint/Double riveted lap

     Joint.

     Job III:Practice on making Single cover plate chain type, zig-zag type and single rivetted Butt Joint.

3. CARPENTRY SHOP

3.1 General Shop Talk

    3.1.1 Name and use of raw materials used in carpentry shop : wood & alternative materials

    3.1.2 Names, uses, care and maintenance of hand tools such as different types of Saws, C-Clamp, Chisels, Mallets, Carpenter's vices, Marking gauges, Try-squares, Rulers and other commonly used tools and materials used in carpentry shop by segregating as cutting tools, supporting tools, holding tools, measuring tools etc.

3.1.3　Specification of tools used in carpentry shop.

3.1.4　Different types of Timbers, their properties, uses & defects.

3.1.5　Seasoning of wood.

3.2.　Practice

3.2.1　Practices for Basic Carpentry Work

3.2.2　Sawing practice using different types of saws

3.2.3　Assembling jack plane — Planning practice including sharpening of jack plane cutter

3.2.4　Chiselling practice using different types of chisels including sharpening of chisel

3.2.5　Making of different types of wooden pin and fixing methods. Marking measuring and inspection of jobs.

3.3　Job Practice

Job 1　　Marking, sawing, planning and chiselling and their practice

Job II　　Half Lap Joint (cross, L or T – any one)

Job III　　Mortise and Tenon joint (T-Joint)

Job IV　Dove tail Joint (Lap or Bridle Joint)

3.4.　Demonstration of job showing use of Rip Saw, Bow saw and Tenon saw, method of sharpening various saws.

4. PAINTING AND POLISHING SHOP

4.1.　Introduction of paints, varnishes, Reason for surface preparation, Advantages of Painting, other method of surface coating ie. Electroplating etc.

4.2.　Job Practice

Job 1: To prepare a wooden surface for painting apply primer on one side and   to paint the same side. To prepare french polish for wooden surface and polish the other side.

Job II: To prepare metal surface for painting, apply primer and paint the same.

Job III: To prepare a metal surface for spray painting, first spray primer and paint the same by spray painting gun and compressor system.

The sequence of polishing will be as follows:

i)   Abrasive cutting by leather wheel
ii)   Polishing with hard cotton wheel and with polishing material
iii)   Buffing with cotton wheel or buff wheel.

MEANS OF ASSESSMENT

– Workshop jobs
– Report writing
– presentation
– Viva voce

RECOMMENDED BOOKS

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

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RATIONALE

Basic elements of integral calculus, differential calculus, numerical methods, differential equations included in this course will play a vital role in understanding engineering problem mathematically. This will also develop analytical as well as conceptual abilities among students.

LEARNING OUTCOMES

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

- Calculate simple integration by methods of integration
- Evaluate the area under curves, surface by using definite integrals.
- Calculate the area and volume under a curve along areas
- Solve the engineering problems with numerical methods.
- Understand the geometric shapes used in engineering problems by co-ordinate geometry.

DETAILED CONTENTS

1. Integral Calculus - I   (20 Periods)

Methods   of Indefinite Integration:-
1.1   Integration by substitution.
1.2   Integration by rational function.
1.3   Integration by partial fraction.
1.4   Integration by parts.
1.5   Integration of special function

2. Integral Calculus – II   (20 Periods)

2.1   Meaning and properties of definite integrals, Evaluation   of definite integrals..
2.2   Application : Length of simple curves, Finding areas bounded by simple curves Volume of solids of revolution, centre of   mean of plane areas.

2.3 Simposns 1/3rd and Simposns3/8th rule and Trapezoidal Rule : their application in simple cases. Numerical solutions of algebraic equations; Bisections method, Regula-Falsi method, Newton-Raphson's method(without proof), Numerical solutions of simultaneous equations; Gauss elimination method(without proof)

3. Co-ordinate Geometry (2 Dimension) (18 Periods)

   3.1 Circle
   Equation of circle in standard form. Centre - Radius form, Diameter form, Two intercept form.

4. Co-ordinate Geometry (3 Dimension) (12 Periods)

   4.1 Straight lines and planes in space
   Distance between two points in space, direction cosine and direction ratios, Finding equation of a straight line (without proof)

INSTRUCTONAL STRATEGY

Basic elements of Differential Calculus, Integral Calculus and differential equations can be taught conceptually along with real engineering applications in which particular algorithm and theory can be applied. Numerical examples will be helpful in understanding the content of the subject.

MEANS OF ASSESSMENT

- Assignments and Quiz/Class Tests
- Mid-term and End-term Written Tests
- Model/Prototype Making

RECOMMENDED BOOKS

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

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

3 Applied Mathematics-II by Chauhan and Chauhan, Krishna Publications, Meerut**.**

4. Applied Mathematics-I (B) by Kailash Sinha and Varun Kumar; Aarti Publication, Meerut

8. e-books/e-tools/relevant software to be used as recommended by AICTE/ NITTTR, Chandigarh.

SUGGESTED DISTRIBUTION OF MARKS

Topic	Time Allotted (Periods)	Marks Allotted (%)
1.	20	28
2.	20	28
3.	18	24
4	12	20
Total	70	100

2.2 APPLIED PHYSICS – II

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RATIONALE

Applied physics includes the study of a diversified topics related to 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 behave. Concrete knowledge of physical laws, analysis and applications in various fields of engineering and technology are given prominence in this course content.

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

LEARNING OUTCOMES

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

- Define wave motion its types (Transverse and Longitudinal), Periodic and Simple Harmonic Motion, solve simple problems.
- Define the terms: frequency, amplitude, wavelength, velocity of a wave.
- Explain various Engineering, Medical and Industrial applications of Ultrasonics.
- Apply acoustics principles to various types of buildings to get best sound effect
- Explain diffraction, interference, polarization.
- Define capacitance and its unit. They will be able to explain the function of capacitors in simple circuits, solve simple problems using C=Q/V
- Explain the role of free electrons in insulators, conductors and semiconductors, qualitatively the terms: potential, potential difference, electromotive force.
- Explain the concept of electric current, resistance and itsmeasurement.
- List the effects of an electric current and their common applications, State and apply Ohm's law, calculate the equivalent resistance of a variety of resistor combinations, determine the energy consumed by an appliance, distinguish between AC and DC electricity
- Explain Biot-Savart Law, Ampere's law, Lorenz Force.
- State the laws of electromagnetic induction, describe the effect on a current-carrying conductor when placed in a magnetic field
- Explain operation of moving coil galvanometer, simple DC motor
- Apply the knowledge of diodes in rectifiers, adapters IC's and various electronic circuits. Apply the concept of light amplification in designing of various LASER based instruments and optical sources.
- Explain total internal reflection and apply this concept for optical fibre and its uses in Medical field and Communication.

DETAILED CONTENTS

1.   Wave motion and its applications   (12 periods)

    1.1   Wave motion, transverse and longitudinal wave motion with examples, sound and light waves, relationship among wave velocity, frequency and wave length and its application

    1.2   Wave equation $y = r \sin wt$, phase, phase difference, principle of superposition of waves

    1.3   Simple Harmonic Motion (SHM): definition and characteristic, expression for displacement, velocity, acceleration, time period, frequency in S.H.M., Energy of a body executing S. H. M., simple pendulum, concept of simple harmonic progressive wave,

    1.4   Free, Damped and forced oscillations, Resonance with examples, Q-factor

    1.5   Definition of pitch, loudness, quality and intensity of sound waves, intensity level, Echo and reverberation, Sabine formula for reverberation time(without derivation), coefficient of absorption of sound, methods to control reverberation time and their applications, Accoustics of building defects and remedy.

    1.6   Ultrasonics –production, detection, properties and applications in engineering and medical applications.

2.   Wave Optics   (6 periods)

    2.1   Dual nature of light, wave theory of light, laws of reflection and refraction, Snell's law, Power of lens, magnification.

    2.2   ,Two-Source Interference, Double-Slitinterference, Interference dueto thin films, Fresnel's biprism.

    2.3   use of interference making highly efficient solar panel.

    2.4   diffraction, Single Slit diffraction, Intensity calculation etc

    2.5   Polarization of electromagnetic waves,polarizing sheets, polarizing by

Reflection (Brewser's law), Malus law, use of polariods.

3. Electrostatics   (12 periods)

    3.1   Concept of charge, Coulombs law, Electric field of point charges, Electric lines of force and their properties, Electric flux, Electric potential and potential difference.

    3.2   Gauss law of electrostatics: Application of Gauss law to find electric field intensity of straight charged conductor, plane charged sheet and charged sphere.

    3.3   Capacitor and its working principle, Capacitance and its units. Capacitance of parallel plate capacitor. Series and parallel combination of capacitors (numericals), charging and discharging of a capacitor.

    3.4   Dielectric and its effect on capacitance, dielectric break down.

    3.5   Application of electrostatics in electrostatic precipitation of microbes and moisture separation from air and gases in industry for pollution control (Brief explanation only)

4. Current Electricity   (12 periods)

    4.1   Electric Current, Resistance, Specific Resistance, Conductance, Specific Conductance, Series and Parallel combination of Resistances. Factors affecting Resistance, Colour coding of carbon Resistances, Ohm's law. Superconductivity.

    4.2   Kirchhoff's laws, Wheatstone bridge and its applications (meter bridge and slide wire bridge)

    4.3   Concept of terminal potential difference and Electro motive force (EMF), potentiometer.

    4.4   Heating effect of current, Electric power, Electric energy and its units (related numerical problems), Advantages of Electric Energy over other forms of energy

    4.5   Examples of application of DC circuits in various electrical and electronics equipment such as C.R.O, T.V., Audio-Video System, Computers etc.

5. Magneto Statics and Electromagnetism   (12 periods)

  5.1   Magnetic poles, force on a moving charge, circulating charges, force on a current carrying wire, Hall effect, torque on a current loop.

  5.2   Magnetic field due to moving charge(Biot-Savart Law), due to current (Biot-Savart Law), parallel currents, field of a solenoid, Ampere's law.

  5.3   Faraday's law, Lenz' law, motional emf, induced electric fields.

  5.4   Magnetic dipole and force on a magnetic dipole in a non-uniform field, Magnetization, Gauss' law for magnetism.

  5.5   Types of magnetic materials. Dia, para and ferromagnetic materials with their properties,

  5.6   Application of electromagnetism in ac/dc motors and generators.

6. Semiconductor physics   (8 periods)

  6.1   Types of materials (insulator, semi conductor, conductor), intrinsic and extrinsic semiconductors, p-n junction diode and its V-I characteristics

  6.2   Diode as rectifier – half wave and full wave rectifier (centre taped),

  6.3   Semiconductor transistor, pnp and npn (concepts only)

  6.4   Application of semiconductor diodes (Zener, LED) and that of transistor as amplifier and oscillator.

7. Modern Physics   (8 Periods)

  7.1   Lasers: concept of energy levels, ionizations and excitation potentials; spontaneous and stimulated emission; laser and its characteristics, population inversion, Types of lasers; Ruby and He-Ne lasers, engineering and medical applications of lasers.

7.2   Fibre optics: Total internal reflection and its applications, Critical angle and conditions for total internal reflection, introduction to optical fibers, light propagation, types, acceptance angle and numerical aperture, types and applications of optical fibre in communication.

7.3   Introduction to nanotechnology, nanoparticles and nano materials,

LIST OF PRACTICALS (To perform minimum six experiments)

1.   To determine the velocity of sound with the help of resonance tube.
2.   To find the focal length of convex lens by displacement method.
3.   To find the refractive index of the material of given prism using spectrometer.
4.   To find the wavelength of sodium light using Fresnel's biprism.
5.   To verify laws of resistances in series and parallel combination
6.   To verify ohm's laws by drawing a graph between voltage and current.
7.   To measure very low resistance and very high resistances using Slide Wire bridge
8.   Conversion of Galvanometer into an Ammeter and Voltmeter of given range.
9.   To draw hysteresis curve of a ferromagnetic material.
10.   To draw characteristics of a pn junction diode and determine knee and break down voltages.
11.   To find wave length of the laser beam.
12.   To find numerical aperture of an optical fiber.

INSTRUCTIONAL STATREGY

Teacher may use various teaching aids like live models, charts, graphs and experimental kits etc. for imparting effective instructions in the subject. The teacher should explain about field applications before teaching the basics to develop proper understanding of the physical phenomenon. Use of demonstration and animations can make the subject interesting and may develop scientific temper in the students. Teacher must plan a tour of Science Park/planetarium available in nearby areas in order to enhance the interest in this course.

MEANS OF ASSESSMENT

–   Assignment & Quiz,
–   Mid-Term and End-Term written test,
–   Model Making,
–   Actual Lab & Practical Work,
–   Viva-Voice

RECOMMENDED BOOKS

1.   Text Book of Physics (Part-I, Part-II); N.C.E.R.T., Delhi
2.   Concepts in Physics by HC Verma, Vol. I & II, Bharti Bhawan Ltd. New Delhi

3.   A Text Book of Optics, Subramanian and Brij Lal, S Chand & Co., New Delhi
4.   Practical Physics, by C. L. Arora, S Chand publications
5.   Engineering Physics by PV Naik, Pearson Education Pvt. Ltd, New Delhi
6.   Modern Engineering Physics by SL Gupta, Sanjeev Gupta, Dhanpat Rai Publications.
7.   Physics Volume 2, 5th edition, Haliday Resnick and Krane, Wiley publication
8.   Fundamentals of Physics by Haliday, Resnick & Walker 7th edition, Wiley publication
9.   e-books/e-tools/relevant software to be used as recommended by AICTE/ NITTTR, Chandigarh.

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Periods)	Marks Allotted (%)
1	12	18
2	6	8
3	12	18
4	12	16
5	12	16
6	8	12
7	8	12
Total	**70**	**100**

2.3 BASICS OF ELECTRICAL AND ELECTRONICS ENGINEERING

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RATIONALE

The objective of the course is to impart basic knowledge and skills regarding basic electrical engineering, which diploma holders will come across in their professional life. This course will provide the students to understand the basic concepts and principles of d.c. and a.c. fundamentals, electromagnetic induction, batteries, transformers, motors distribution system, domestic installation, electrical safety etc. The students will also learn basic electronics including diodes and transistors and their applications.

LEARNING OUTCOME

After Undergoing the subject, the students will be able to

- Understand the meaning of basic electrical quantities such as voltage, current, power etc.
- Use working principle of transformer.
- Use basic Network Theorem and Kirchoff's laws.
- Understand the concept of Junction Diode, transistor and field effect transistor.

DETAILED CONTENTS

1. Application and Advantages of Electricity   (03 periods)

    Difference between ac and dc, various applications of electricity, advantages of electrical energy over other types of energy

2. Basic Electrical Quantities   (06 periods)

Definition of voltage, current, power and energy with their units, name of instruments used for measuring above quantities, connection of these instruments in an electric circuit

3. AC Fundamentals   (08 periods)

Electromagnetic induction-Faraday's Laws, Lenz's Law; Fleming's rules, Principles of a.c. Circuits; Alternating emf, Definition of cycle, frequency, amplitude and time period. Instantaneous, average, r.m.s and maximum value of sinusoidal wave; form factor and Peak Factor. Concept of phase and phase difference. Concept of resistance, inductance and capacitance in simple a.c. circuit. Power factor and improvement of power factor by use of capacitors. Concept of three phase system; star and delta connections; voltage and current relationship (no derivation)

4. Transformers   (06 periods)

Working, principle and construction of single phase transformer, transformer ratio, emf equation, losses and efficiency, cooling of transformers, isolation transformer, CVT, auto transformer (brief idea), applications.

5. D.C. Circuits   (10 periods)

5.1   Ohm/s law, resistivity, effect of temperature on resistance, heating effect of electric current, conversion of mechanical units into electrical units.
5.2   Kirchoff's laws, application of Kirchoff's laws to solve, simple d.c. circuits
5.3   Thevenin's theorem, maximum power transfer theorem, Norton's theorem and superposition theorem, simple numerical problems.

6. Basic Electronics   (22 periods)

6.1 Basic idea of semiconductors – P and N type; diodes, zener diodes and their applications,

6.2 Introduction to BJT : NPN and PnP transistors, other symbols and mechansim of current flow, explanation of fundamental current relations. Comparison of CB, CE and CC configuration transistor as amplifier in CE configuration.

6.3 Field Effect Transistor (FET) : Construction, Operation and Characteristics of Junction FET, Comparison of SFET, MOSFET & CMOS.

LIST OF PRACTICALS

1. Identification of Resistor, Capacitor, Inductor, Transformer, LBD etc
2. Familiarization with multimeters/CPO etc.
3. Measurement of wave shapes of half wave rectifier and full wave rectifier.
4. Plot the P&T characteristics and determination of its parameter from this characteristics.
5. Connection and reading of an electric energy meter
6. Use of ammeter, voltmeter, wattmeter, and multi-meter
7. Study of different types of fuses, MCBs and ELCBs
8. Study of zener as a constant voltage source and to draw its V-I characteristics
9. To draw V-I characteristics of PN junction diode
10. Verify Theoenin and Neston theorem

INSTRUCTIONAL STRATEGY

The teacher should give emphasis on understanding of concept and various terms used in the subject. Practical exercises will reinforce various concepts.

MEANS OF ASSESSMENT

– Class Test
– Home Assignment
– Attendance
– Sessional Test

RECOMMENDED BOOKS

1. Basic Electrical Engineering by PS Dhongal; Tata McGraw Hill Publishers, New Delhi
2. A Text Book of Electrical Technology, Vol. I and II by BL Thareja; S Chand and Co., New Delhi
3. Basic Electricity by BR Sharma; Satya Prakashan, New Delhi
4. Basic Electrical Engineering by JB Gupta, S Kataria and Sons, Delhi
5. Experiments in Basic Electrical Engineering by SK Bhattacharya and KM Rastogi, New Age International Publishers Ltd., New Delhi
6. Basic Electronics by VK Mehta; S Chand and Co., New Delhi
7. Electrical Machines by SK Bhattacharya; Tata McGraw Hill, New Delhi
8. Basic electronics and Linear circuits by NN Bhargava and Kulshreshta, Tata Mc Graw Hill New Delhi.
9. Electronic principles by SK Sachdev, Dhanpat Rai and Sons, New Delhi.
10. Electronic Devices and circuits by Rama Raddy Narora Publishing House Pvt. Ltd. New Delhi.
11. Principles of electrical and electronics Engineering by VK Mehta; S Chand and Co. New Delhi
12. Digital Electronics by Malvino

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1	03	5
2	06	10
3	09	15
4	06	10
5	10	18
6	22	42
Total	**56**	**100**

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RATIONALE

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

LEARNING OUTCOMES

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

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

DETAILED CONTENTS

1. Introduction to Multimedia Systems   (08Periods)

    What is Multimedia, Evaluation of Multimedia, Multimedia hardware and software Quality criteria and specifications of different capturing devices, Communication devices, Storage devices, Display devices, Applications of multimedia – benefits and problems

2. Architecture & Issues For Distributed Multimedia System   (10Periods)

    Multimedia System Architecture, Distributed Multimedia, Synchronization, Orchestration & QOS Architecture, Framework for Multimedia System

3. Compression/Decompression & File Formats   (08 Periods)

Need, Types, Evaluating & Visibility, Video Compression Technique, Introduction to Standardization of Algorithm, File Formats, History of RIF, TIFF, Introduction to RIFF, AVI, JPEG-objectives, Architecture, JPEG-DCT encoding, Quantization, JPEG-stastical coding, predictive lossless coding, JPEG- performance ,MPEG-objectives, Architecture, BIT stream syntax performance, MPEG2 & MPEG4

4.   Multimedia Authoring and User Interface   (10 Periods)

Multi Media Authoring System and its type, Hypermedia Application Design consideration, User Interface Design, Information Access, Object Display / Playback Issues

5.   Multimedia Tool   (10 Periods)
Introduction to Multimedia tool – Flash, Creating & Modifying elements, Line tool, fill/attributes, different shapes, text tools & pen tool, Selecting lines fill with arrow tool, selecting shapes, using lasso tool ,performing basic editing tools, selecting & deselecting elements, modifying created objects.

6.   Animation Technology   (10 Periods)

Definition, History of Animation, Types of Animation – 2D and 3D , Basic principles of animation. Introduction to Multimedia tool – Flash, Creating & Modifying elements, Line tool, fill/attributes, different shapes, text tools & pen tool, Selecting lines fill with arrow tool, selecting shapes, using lasso tool, performing basic editing tools, selecting & deselecting elements, modifyingcreated objects.

LIST OF PRACTICALS

1.   Installation of various multimedia software like Photoshop/GIMP, Blender, Flash, Director or any open source software

2.   Installing and use of various multimedia devices

-    Scanner
-    Digital camera, web camera
-    Mike and speakers

- Touch screen
- Plotter and printers
- DVD
- Audio CD and Video CD

3. Reading and writing of different format on CD/DVD

4. Transporting audio and video files

5. Using various features of Flash

6. Using various features of Photo-shop/GIMP

7. Using various features of Blender

8. Making multimedia presentations combining, Flash, Photo-shop/GIMP, such as department profile, lesson presentation, games and project presentations.

INSTRUCTIONAL STRATEGY

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

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

RECOMMENDED BOOKS

1. Principles of Multimedia by Parikh, Tata McGraw Hill Education Pvt Ltd , New Delhi
2. Multimedia Technologies by Banerji,Tata McGraw Hill Education Pvt Ltd , New Delhi
3. Multimedia An Introduction by Villam Casanova and Molina; Prentice Hall of India, New Delhi
4. Multimedia Bible by Win Rosch
5. Multimedia Making it work by Vaughan, Tay
6. Photo-shop for Windows Bible by Deke Maclelland IDG Books India Pvt. Ltd., New Delhi
7. Multimedia Technology and Application by Hillman, Galgotia Publications, New Delhi
8. Flash 5 Bible by Rein Hardit, IDG Books India Pvt. Ltd.
9. Flash 5 in easy steps by Vandome IDG Books India Pvt. Ltd.

10. Fundamentals of Multimedia by Li and Drew, Pearson Publications.
11. e-books/e-tools/relevant software to be used as recommended by AICTE/UPBTE/NITTTR.

Websites for Reference:http://swayam.gov.in,http://spoken-tutorial.org

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Periods)	Marks Allotted (%)
1	08	14
2	10	18
3	08	14
4	10	18
5	10	18
6	10	18
Total	**56**	**100**

2.5 CONCEPT OF PROGRAMMING USING C

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RATIONALE

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

LEARNING OUTCOMES

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

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

DETAILED CONTENTS

1. Algorithm and Programming Development   (08 Periods)

    Steps in development of a program, algorithm development, concept of flowcharts, programming and use of programming, various techniques of programming, Structured Programming, Preprocessors, Debugging, Compiling

2.   Program Structure   (08 Periods)

Structure of C program, Writing and executing the first C program, Translator: Assembler, Interpreter, Compiler, I/O statement, assign statement, Keywords, constants, variables and data types, storage classes, operators and expressions, Unformatted and Formatted IOS, Data Type Casting

3.   Control Structures   (10 Periods)

Introduction, decision making with IF – statement, IF – Else and Nested IF, Ladder if-else, Loop: While, do-while, for, Break, Continue, goto and switch statements

4.   Functions   (10 Periods)

Introduction to functions, Global and Local Variables, Function Declaration, Function Call and Return, Types of Functions, Standard functions, Parameters and Parameter Passing, Call - by value/reference, recursive function, function with array, function with string

5.   Arrays   and Strings   (10 Periods)

Introduction to Arrays, Array Declaration, Length of array, Manipulating arrayelements, Single and Multidimensional Array, Arrays of characters, Passing an array to function, Introduction of Strings, String declaration and definition, String Related function i.e. strlen, strcpy, strcmp

6.   Pointers   (08 Periods)

Introduction to pointers, Static and dynamic memory allocation, Address operator and pointers, Declaring and initializing pointers, Single pointer, Pointers to an array

7.   Structures and Unions   (08 Periods)

Declaration of structures, Accessing structure members, Structure Initialization, array of structure variable, Pointer to a structures, Union, Declaration of Union

8.   File Handling   (08 Periods)

Basics of File Handling, opening and closing of File, reading and writing character from a file

LIST OF PRACTICALS

1.   Programming exercises on executing and editing a C program.
2.   Programming exercises on defining variables and assigning values to variables.

3. Programming exercises on arithmetic, logical and relational operators.
4. Programming exercises on arithmetic expressions and their evaluation.
5. Programming exercises on formatting input/output using printf and scanf and their return type values.
6. Programming exercises using if statement.
7. Programming exercises using if – Else.
8. Programming exercises on switch statement.
9. Programming exercises on while and do – while statement.
10. Programming exercises on for – statement.
11. Simple programs using functions and recursive function.
12. Programs on one-dimensional array.
13. Programs on two-dimensional array.
14. (i) Programs for concatenation two strings together.
    (ii) Programs for comparing two strings.
15. Simple programs using pointers.
16. Simple programs using structures.
17. Simple programs using union.
18. Simple programs for File Handling

INSTRUCTIONAL STRATEGY

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

MEANS OF ASSESSMENT

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

RECOMMENDED BOOKS

1. Let us C by Yashwant Kanetkar
2. Programming in ANSI C by E Balaguruswami, , Tata McGraw Hill Education Pvt Ltd , New Delhi
3. Programming in C by Reema Thareja; Oxford University Press, New Delhi
4. Programming in C by Gottfried, Schaum Series, , Tata McGraw Hill Education Pvt Ltd , New Delhi
5. Exploring C by Yashwant Kanetkar; BPB Publications, New Delhi

6. Programmming in C : A Practical Approach by Ajay Mittal, Pearson Publication
7. e-books/e-tools/relevant software to be used as recommended by AICTE/UPBTE/NITTTR.

Websites for Reference:http://swayam.gov.in,http://spoken-tutorial.org

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Periods)	Marks Allotted (%)
1	08	12
2	08	14
3	10	16
4	10	16
5	10	16
6	08	12
7	08	08
8	08	06
Total	**70**	**100**

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RATIONALE

This subject aims to cover the handling of whole field of word processing. It also involves various clerical tasks, such as organizing customer data or creating reports. It enables people with lower skill levels to perform higher-level tasks. In Today's commercial world, automation helps the users with a sophisticated set of commands to format, edit, and print text documents. It is used as valuable and important tools in the creation of application such as newsletters, brochures, charts, presentation, documents, drawings and other graphic images.This will make the students proficient in office automation applications.

LEAR NING OUTCOMES

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

- Use file mangers, word processors, spreadsheets, presentation software's
- Describe the features and functions of the categories of application software.
- Present conclusions effectively, orally and in writing.
- Understand the dynamics of an office environment.
- Demonstrate the ability to apply application software in an office environment.
- Use Google Suite for office data management tasks.

DETAILED CONTENTS

1. Word Processing

MS Word concepts : Creating, saving, closing, Opening an existing document, Using Featured Word Templates, Exploring Template and Formation of Documents, Selecting text, Editing text, Finding and replacing text, Character and Paragraph Formatting, Automatic Formatting And Styles, Inserting and removing page breaks, Header and footers, Page No, Border & Shading, Change Case, Checking Spelling, Working With Tables, Insert Table, Delete Cells, Merge Cell, Graphics And Frames , Page Design and

Layout, Creating and Printing Merged Documents, Encrypting document with a password, Printing documents

2. SpreadSheet

MS Excel Concept: Creating, Saving, closing, Editing a Workbook, Inserting, Deleting Work Sheets, entering data in a cell, Copying and Moving from selected cells, entering formula, handling operators in Formula, Functions: Mathematical, Logical, statistical, text, financial, Date and Time functions, Using Function Wizard. Formatting a Worksheet: Formatting Cells – changing data alignment, changing date, number, character or currency format, changing font, adding borders and colors, Printing worksheets, Charts and Graphs – Creating, Previewing, Modifying Charts, LOOKUP/VLOOKUP

3. Presentation

MS Power Point Concept : Creating, Opening and Saving Presentations, Working in Different Views, Working with Slides, Adding and Formatting Text, Formatting Paragraphs, Checking Spelling and Correcting Typing Mistakes, Making Notes Pages and Handouts, Drawing and Working with Objects, Adding Clip Art and other pictures, Designing Slide Shows using templates, Rehearse timing, Narration, Multimedia effects- Apply Transitions between Slides, Animate Slide Content, Set Timing for Transitions and Animations, Insert and Format Media, Encrypting presentations with a password, Running and Controlling a Slide Show, Printing Presentations

4. Database

MS Access Concepts: Database, Relational Database, Integrity. Operations: Creating, dropping, manipulating table structure. Manipulation of Data: Query, Data Entry Form, Reports

5. Google Office Tools

Creating , saving , downloading , sharing files/folders from Google drive , creating and sharing Google docs, import and export docs, creating and sharing Google sheet, import and export Google sheet, Google forms and form responses ,creating Google slides to present your ideas

LIST OF PRACTICALS

Tools to be used: Microsoft office/ Libre Office / Open Office / G Suite

1. Creating a document using different font, changing font size and color, changing the appearance through bold/italic/underline.
2. Creating a document using subscript and superscript, justification of the document.
3. Create a document using Bullets and Numbering.
4. Create a document using page number, header and footer.
5. Create a document using inserting page breaks and column break, line spacing.
6. How to use mail merge and macro in MS Word.
7. Creating table, formatting cells, use of different border styles, shading in tables, merging of cells, and partition of cells, inserting and deleting a row in a table in MS word document.
8. Apply spelling checker, grammar mistakes, thesaurus in a document.
9. Create a Boucher using templates, page setup and print preview, and then print that document.
10. Working on spreadsheet like adding, deleting, merging cells, layout and style.
11. Create a table and perform operation using predefined function on it.
12. In MS Excel procedure to switching between different spreadsheets and workbook.
13. Create a spreadsheet and print selected as well as full workbook.
14. Create a spreadsheet with LOOKUP/VLOOKUP features.
15. Create different charts in excel and implement formulas(automatic and use defined).
16. Create a Power Point presentation using slide template.
17. Create a Power Point presentation using animation.
18. Create a Power Point presentation using transition
19. Create a Power Point Presentation with Adding movie and sound.
20. Create a Power Point Presentation with Adding tables and chart etc.
21. Changing slide color scheme in presentation.
22. Viewing the presentation using slide navigator.
23. Create, Save, Run and Print the Power Point Presentation.
24. Create a database table using predefined template.
25. Create a database form using form wizard.
26. Create and share files/folders in Google drive
27. Create and share Google docs.
28. Create and share Google sheets.

29. Create and share Google Forms.
30. Create and share Google slides.

INSTRUCTIONAL STRATEGY

As the subject is practice oriented, more stress should be given to students to do the work practically. The features of software packages MS Office/ Libre Office to be demonstrated in class using LCD projector.

MEANS OF ASSESSMENT

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

RECOMMENDED BOOKS

1. Microsoft Office 2010 For Dummies By Wallace Wang
2. 2007 Microsoft Office System Plain & Simple by Jerry Joyce Microsoft Press
3. Office XP : The Complete Reference- Stephen L. Selson - Tata McGraw Hill Education.
4. Working in Microsoft Office - Richard Mansfield - Tata McGraw Hill Education.
5. Websites for Reference

- http://office.microsoft.com/en-us/training/CR010047968.aspx

- https://gsuite.google.com/learning-center
- http://spoken-tutorial.org

3.1   APPLIED MATHEMATICS –III

L T   P

5   -   -

RATIONALE

Contents of this course provide understanding of some elementary and advanced mathematics algorithms and their applications of solving engineering problems. Content of this course will enable students to use some advanced techniques like Beta-Gamma function, Fourier series, Laplace transform and probability distributions in solving complex engineering problems.

LEARNING OUTCOMES

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

- Understand matrix operations and uses of matrix in different problems.
- Apply elementary row and column operations in finding inverse of a matrix.
- Find Eigen values, Eigen vectors of a matrix and their different properties.
- Understand degree/order of differential equations and their solution techniques.
- Use differential equations in engineering problems of different areas.
- Find Fourier series expansion of a function
- Apply Laplace transform and their applications in solving engineering problems.
- Understand concept of probability distribution and their applications.

DETAILED CONTENTS

1. Matrices   (16 Periods)

    1.1   Algebra of Matrices, Inverse
           Addition, Multiplication of matrices, Null matrix and a unit matrix, Square matrix, Symmetric, Skew symmetric, Hermitian,   Skew hermition, Orthagonal, Unitary, diagonal and Triangular matrix, Determinant of a matrix.
           Definition and Computation of inverse of a matrix.

    1.2   Elementry Row/Column Transformation
           Meaning and use in computing inverse and rank of a matrix.

    1.3   Linear Dependence, Rank of a Matrix

Linear dependence/independence of vectors, Definition and computation of rank of matrix. Computing rank through determinants, Elementary row transformation and through the concept of a set of independent vectors, Consistency of equations.

1.4 Eigen Pairs, Cayley-Hamilton Theorem

Definition and evaluation of eign values and eign vectors of a matrix of order two and three, Cayley-Hamilton theorem (without Proof)and its verification, Use in finding inverse and powers of a matrix.

2. Differential Calculus   (15 Periods)

   2.1 Function of two variables, identification of surfaces in space, conicoids
   2.2 Partial Differentiation
       Directional derivative, Gradient, Use of gradient f, Partial derivatives, Chain rule, Higher order derivatives, Euler's theorem for homogeneous functions, Jacobians.
   2.3 Vector Calculus
       Vector function, Introduction todouble and triple integral,differentiation and integration of vector functions, gradient, divergence and curl, differential derivatives.

3. Differential Equation   (15 Periods)

   3.1 Formation, Order, Degree, Types, Solution
       Formation of differential equations through physical, geometrical, mechanical and electrical considerations, Order, Degree of a differential equation, Linear, nonlinear equation.
   3.2 First Order Equations
       Variable seperable, equations reducible to seperable forms, Homogeneous equtions, equations reducible to homogeneous forms, Linear and Bernoulli form exact equation and their solutions.
   3.3 Higher Order Linear Equation :
       Property of solution, Linear differential equation with constant coefficients
       (PI for $X = e^{ax}$, Sinax, Cosax, X^n, $e^{ax}V$, XV
   3.4 Simple Applications
       LCR circuit, Motion under gravity, Newton's law of cooling, radioactive decay, Population growth, Force vibration of a mass point attached to spring with and without damping effect. Equivalence of electrical and mechanical system

4. Integral Calculus-II   (12 Periods)

   4.1 Beta and Gamma Functions
       Definition, Use, Relation between the two, their use in evaluating integrals.
   4.2 Fourier Series
       Fourier series of f(x),-n<x<n, Odd and even function,Half range series.
   4.3 Laplace Transform

Definition, Basic theorem and properties, Unit step and Periodic functions, inverse laplace transform, Solution of ordinary differential equations

5.   Probability and Statistics   (12 Periods)

    5.1   Probability
    Introduction, Addition and Multiplication theorem and simple problem.

    5.2   Distribution
    Discrete and continuous distribution, Bionimal Distribution, Poisson distribution, Normal Distribution.

INSTRUCTONAL STRATEGY

The content of this course is to be taught on conceptual basis with plenty of real world examples. The basic elements of Laplace transform, Differential equations and Applications of differential equations can be taught with engineering applications of relevant branch.

MEANS OF ASSESSMENT

- Assignments and Quiz/Class Tests
- Mid-term and End-term Written Tests
- Model/Prototype Making

RECOMMENDED BOOKS

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

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

3   Applied Mathematics-III by Chauhan and Chauhan, Krishna Publications, Meerut**.**

4.   Applied Mathematics-II by Kailash Sinha and Varun Kumar; Aarti Publication, Meerut.

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

SUGGESTED DISTRIBUTION OF MARKS

Topic	Time Allotted (Periods)	Marks Allotted (%)
1.	16	24
2.	15	20
3.	15	20
4	12	18
5	12	18
Total	**70**	**100**

3.2   INTERNET AND WEB TECHNOLOGY

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4 - 4

RATIONALE

The diploma holders in Computer Science and Engineering needs to understand about Internet, Web Space and how to develop static website. They should be able to develop basic static websites by using different front-end Technologies   . Hence this subject.

LEARNING OUTCOMES

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

- understand working of Internet/ Websites, Client Server Model and Internet Tools.
- understand and develop HTML Web pages.
- provide logics on the web pages by using JavaScript
- use Bootstrapto develop responsive website
- control the Look and feel of web pages by using CSS
- use JQuery for developing the Web Pages
- develop Static webpage/web portal

DETAILED CONTENTS

5. Web Development Introduction   (06 Periods)

Internet, WWW, Browser, Search engine Client Server Model, URL, Web Pages, Website and Web Services, Types of Websites (Static, Dynamic and Responsive), Developer options of Browser (View page source, Developer Tools, Inspect Element etc) ,Need of cyber security & IT Laws

6. HTML   (10 Periods)

Basics:

HTML Document, Basic Structure of HTML, Syntax, HTML Tags and Attributes, Types of HTML Tags, Rules of nesting, Basic Tags (HTML Tag. Head Tag, Title Tag, Body Tags).

Page Formatting:

Adding a new Paragraph, Adding a line break, Inserting a blank space , changing page background , Divand Span tags

Text Formatting:

Html Headings, Formatting elements (<b> Bold text , <strong> Important text ,<i> Italic text , <em> Emphasized text , <mark> Marked text, <small> Small text, <del> Deleted text, <ins> Inserted text, <sub> Subscript text, <sup> Superscript text), Comments, Horizontal Lines

Creating Lists:Ordered List, Unordered Lists, Definition Lists

Others:

Images, Text Links, Image Links, opening a page in New Window or Tab, Linking to an area of same page, Introduction to Table Tags, Advantages and limitations of tables, Frames &IFrame, HTML Forms , XHTML

7. Cascading Style Sheets   (08 Periods)

Introduction, Benefits of CSS, CSS Syntax, CSS Implementation (inline, internal and external), CSS Selectors (ID Selectors, Class Selectors, Grouping Selectors, Universal Selectors, CSS Pseudo-classes), CSS properties (background-color, background-image, border-style, height, width, color, text-align, font-family, font-style, font-size, font-weight), Box Model in CSS(margin, border, padding)

8. Java Scripts   (08Periods)

Java Script Introduction , variables , data types , operators, control flow (if-else, for loop , while loop , do-while loop) , Declaring Functions , Calling functions with parameters, Adding JavaScript to Web Documents, JavaScript Objects , Document Object Models, HTML Events and calling Java Script functions on Events.

9. JQUERY   (09 Periods)

JQuery Concept, Adding JQuery to Web Page, JQuery Selectors, JQuery Event Methods, JQuery Effects (Hide/Show, Fade, Slide), Insertion of header /footer in HTML Pages using JQuery

10.   Bootstrap   (09 Periods)

Color Management, Buttons, Table, drop-down, navigation-bar, images, pagination, jumbotron, alerts, forms, progress bar, grid, utilities & filters

11.   XML & JSON   (06 Periods)

Introduction and use of XML, Difference between XML and HTML, XML Elements, Attribute, Name space, Syntax Rules, XML DTD and XML Schema, RSS FEED, JSON Introduction and uses, JSON v/s XML, JSON Syntax.

LIST OF PRACTICALS

16.   Install, configure and start using developer tools /Code Editor/Browser
17.   Creating Web Pages using different HTML tags
18.   Control the look and feel of Web Page Styling by using CSS.
19.   Write JavaScript functions and control the different companonets of Web page by predeifned javascript objects
20.   Validation of Form fields using Java Script
21.   Use jQuery library to apply different features on web pages.
22.   Use Bootstrap library and icons to develop a responsive websites

INSTRUCTIONAL STRATEGY

Since this subject is practice oriented, the teacher should demonstrate the capabilities of websites/WebPages to students while doing practical exercises. The students should be made familiar with developing web pages by code editor/browsers, working on internet. The student should be made capable of developing static websites by using HTML, JavaScript, CSS and jQuery

MEANS OF ASSESSMENT

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

RECOMMENDED BOOKS

1. Head First HTML and CSS: A Learner's Guide to Creating Standards-Based Web Pages , O Reilly Publications by Elisabeth Robson Eric Freeman
2. Head First JavaScriptProgramming, O Reilly Publications by Eric FREEMAN
3. Head First jQuery, O Reilly by Ryan Benedetti, Ronan Cranley
4. Web Technologies, Black Book ,Kogent Learning Solutions Inc
5. Developing Web Applications, 2ed ,WileyPublications, M.T.Savaliya
6. Mastering Bootstrap 4 ,by Benjamin Jakobus and Jason Marah,Packt Publishing
7. e-books/e-tools/relevant software to be used as recommended by AICTE/UPBTE/NITTTR, Chandigarh.

Websites for Reference:

1. http://swayam.gov.in
2. http://spoken-tutorial.org

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Periods)	Marks Allotted (%)
1	06	10
2	10	18
3	08	15
4	08	15
5	09	16
6	09	16
7	06	10
Total	**56**	**100**

3.3 ENVIRONMENTAL STUDIES

L T P

3 - 2

RATIONALE

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

LEARNING OUTCOMES

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

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

DETAILED CONTENTS

1. Introduction   (04 Periods)
   1.1 Basics of ecology, eco system- concept, and sustainable development, Resources renewable and non renewable.

2. Air Pollution   (04 Periods)

2.1 Source of air pollution. Effect of air pollution on human health, economy, plant, animals. Air pollution control methods.

3. Water Pollution   (08 Periods)

3.1 Impurities in water, Cause of water pollution, Source of water pollution. Effect of water pollution on human health, Concept of dissolved O_2, BOD, COD. Prevention of water pollution- Water treatment processes, Sewage treatment. Water quality standard.

4. Soil Pollution   (06 Periods)

4.1 Sources of soil pollution
4.2 Types of Solid waste- House hold, Hospital, From Agriculture, Biomedical, Animal and human, excreta, sediments and E-waste
4.3 Effect of Solid waste
4.4 Disposal of Solid Waste- Solid Waste Management

5. Noise pollution   (06 Periods)

Source of noise pollution, Unit of noise, Effect of noise pollution, Acceptable noise level, Different method of minimize noise pollution.

6. Environmental Legislation   (08 Periods)

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

7. Impact of Energy Usage on Environment   (06 Periods)

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

LIST OF PRACTICALS

1. Determination of pH of drinking water
2. Determination of TDS in drinking water
3. Determination of TSS in drinking water
4. Determination of hardness in drinking water
5. Determination of oil & grease in drinking water
6. Determination of alkalinity in drinking water

7. Determination of acidity in drinking water
8. Determination of organic/inorganic solid in drinking water
9. Determination of pH of soil
10. Determination of N&P (Nitrogen & Phosphorus) of soil
11. To measure the noise level in classroom and industry.
12. To segregate the various types of solid waste in a locality.
13. To study the waste management plan of different solid waste
14. To study the effect of melting of floating ice in water due to global warming

INSTRUCTIONAL STRATEGY

In addition to theoretical instructions, different activities pertaining to Environmental Studies like expert lectures, seminars, visits to green house, effluent treatment plant of any industry, rain water harvesting plant etc. may also be organized.

MEANS OF ASSESSMENT

−   Assignments and quiz/class tests,
−   Mid-term and end-term written tests

RECOMMENDED BOOKS

1. Environmental and Pollution Awareness by Sharma BR; Satya Prakashan, New Delhi.
2. Environmental Protection Law and Policy in India by Thakur Kailash; Deep and Deep Publications, New Delhi.
3. Environmental Pollution by Dr. RK Khitoliya; S Chand Publishing, New Delhi
4. Environmental Science by Deswal and Deswal; Dhanpat Rai and Co. (P) Ltd. Delhi.
5. Engineering Chemistry by Jain and Jain; Dhanpat Rai and Co. (P) Ltd. Delhi.
6. Environmental Studies by Erach Bharucha; University Press (India) Private Ltd., Hyderabad.
7. Environmental Engineering and Management by Suresh K Dhamija; S K Kataria and Sons, New Delhi.
8. E-books/e-tools/relevant software to be used as recommended by AICTE/ NITTTR, Chandigarh.

Websites for Reference:

http://swayam.gov.in

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Periods)	Marks Allotted (%)
1	04	10
2	04	10
3	08	20
4	06	14
5	06	14
6	08	20
7	06	12
Total	**42**	**100**

3.4   DATA COMMUNICATION AND COMPUTER NETWORKS

L T P

5 - 4

RATIONALE

The future of computer technology is in Data Communication and Computer Networks. Global connectivity can be achieved through computer networks. A diploma holder in Computer Science and Engineering should therefore understand the function of networks and get exposure to different existing and upcoming communication technologies. Knowledge about hardware and software requirements of networks is essential.

LEARNING OUTCOMES

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

- know about signal types, transmission media
- know about different communication methodologies
- setup computer networks
- setup basic wireless network
- diagnose & solve network problems
- diagnose & solve network problems remotely
- provide security to networks
- manage & handle wan
- prevent external network attacks
- identify network troubleshooting methods.

DETAILED CONTENTS

1.   Introduction to Data Communication   (07 Periods)

1.1   Basics of the Communications
    1.2   Direction of the Data flow(simplex, half-duplex, full-duplex)
    1.3   Network Topologies, signals and transmission (analog and digital)
    1.4   Transmission media (guided and unguided)
    1.5   Concept of digital signals, Bit rate, Bit length, Transmission impairment
              (attenuation, distortion, noise.

2.   Communication Methodologies   (10 Periods)

    2.1   Need for modulation in communication system
    2.2   Concepts AM, FM, PM, FSK, TSK, PCM (No Mathematical model)

    2.3   Concept of bandwidth and channel capacity of different communication
              systems such as radio, microwave etc.
    2.4   Multiplexing techniques (TDM, FDM, WDM,CDMA)

3.   Networks Basics   (14 Periods)

    3.1   Concept of network
    3.2   Models of network computing
    3.3   Networking models
    3.4   Peer-to –peer Network
    3.5   Client-Server Network
    3.6   LAN, MAN and WAN
    3.7   Network Services
    3.8   Switching Techniques

4.   Networking Models   (05 Periods)

    4.1   OSI model: Definition, Layered Architecture
              Functions of various layers

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

5.   TCP/IP Addressing   (10 Periods)

5.1 Concept of physical and logical addressing

5.2 IPV4 addresses – Address space, Notations

5.3 Classful Addressing- Different IP address classes, Classes & Blocks, Net-id & Host-Id, Masks, Address depletion

5.4 Classless Addressing – Address blocks, Masks

5.5 Special IP Addresses

5.6 Subnetting and Supernetting

5.7 Loop back concept

5.8 Network Address Translation

5.9 IPV4 Header

5.10 IPV6 Header

5.11 Comparison between IPV4 and IPV6

6. Network Architecture   (04 Periods)

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

7. Network Connectivity   (05 Periods)

7.1 Network connectivity Devices

7.2 NICs

7.3 Hubs, Switches, Routers, Repeaters, Modem, Gateway

7.4 Configuration of Routers & Switches

8. Network Administration   (10 Periods)

8.1 Network Security Principles, Cryptography, using secure protocols

8.2 Trouble Shooting Tools: PING,IPCONFIG, IFCONFIG, NETSTAT, TRACEROOT,

Wireshark, Nmap, TCPDUMP, ROUTEPRINT

    8.3   DHCP Server

    8.4   Workgroup/Domain Networking

9.   Introduction to Wireless Networks.   (05 Periods)

    9.1   Introduction to wireless LAN IEEE 802.11, WiMax and Li-Fi

    9.2   Wireless Security

    9.3   Introduction to bluetooth - architecture, application

    9.4   Comparison between bluetooth and Wifi

LIST OF PRACTICALS

1.   Recognize the physical topology and cabling (coaxial, OFC, UTP, STP) of a network.

2.   Recognition and use of various types of connectors RJ-45, RJ-11,BNC and SCST

3.   Making of cross cable and straight cable

4.   Install and configure a network interface card in a workstation.

5.   Identify the IP address of a workstation and the class of the address and configure the IP Address on a workstation

6.   Managing user accounts in windows and LINUX

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.   Visit to nearby industry for latest networking techniques

12.   Create a network of at least 6 computers.

Required Software

Windows Server/Linux Server

Required Tools and Supplies

Crimping tool, Cable tester,

1) RJ 45 connectors, RJ-11, BNC, SCST
2) Coaxial Cable, UTP, STP, OFC cable
3) Screw Driver Kit

4) Switch/Hub
5) Manageable Switch

INSTRUCTIONAL STRATEGY

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

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

RECOMMENDED BOOKS

1. 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. Computer Network and Communications By V.K. Jain and Narija Bajaj, Cyber Tech Publications, New Delhi.
8. Cloud Computing Bible by Berrie Sarinby
9. E-books/e-tools/relevant software to be used as recommended by AICTE/NITTTR, Chandigarh.

Websites for Reference:

   http://swayam.gov.in

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Periods)	Marks Allotted (%)
1.	07	10
2.	10	15
3.	14	20
4.	05	07
5.	10	15
6.	04	05
7	05	06
8.	10	15
9.	05	07
Total	**70**	**100**

3.5   DATA STRUCTURES USING C

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L   T   P
5   -   6
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RATIONALE

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

LEARNING OUTCOMES

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

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

DETAILED CONTENTS

1.   Fundamental Notations   (08 Periods)

   1.1   Problem solving concept top down and bottom up design, structured programming
   1.2   Concept of data types, variables and constants
   1.3   Concept of pointer variables and constants
   1.4   Categories of Data structure

2.   Arrays   (08 Periods)

   2.1   Concept of Arrays

2.2　　Storage representation of multi-dimensional arrays.

　　　2.3　　Operations on arrays with Algorithms (searching, traversing, inserting, deleting)

3.　　Linked Lists　　　　　　　　　　　　　　　　　　　　(12 Periods)

　　　3.1　　Introduction to linked list
　　　3.2　　Representation of linked lists in Memory
　　　3.3　　Operations on linked list (Insertion, deletion and traversals)
　　　3.4　　Application of linked lists
　　　3.5　　Doubly linked lists
　　　3.6　　Operations on doubly linked lists (Insertion, deletion and traversals)

4.　　Stacks, Queues and Recursion　　　　　　　　　(12 Periods)

　　　4.1　　Introduction to stacks
　　　4.2　　Representation of stacks
　　　4.3　　Implementation of stacks
　　　4.4　　Applications of stacks
　　　4.5　　Introduction to queues
　　　4.6　　Implementation of queues
　　　4.7　　Circular Queues
　　　4.8　　De-queues
　　　4.9　　Application of Queues
　　　4.10　Recursion

5.　　Trees　　　　　　　　　　　　　　　　　　　　　　　(12 Periods)

　　　5.1　　Concept of Trees
　　　5.2　　Representation of Binary tree in memory
　　　5.3　　Traversing Binary Trees (Pre order, Post order and In order)
　　　5.4　　Searching, inserting and deleting binary search trees
　　　5.5　　Introduction to Heap
　　　5.6　　Application of Trees

6.　　Sorting and Searching　　　　　　　　　　　　　　(12 Periods)

　　　6.1　　Introduction to sorting and searching
　　　6.2　　Search algorithm (Linear and Binary)

6.3   Sorting algorithms (Bubble Sort, Insertion Sort, Quick Sort, Selection Sort, Merge Sort, Heap Sort

7.   Graph   (06 Periods)

7.1   Introduction to Graph

7.2   Basic Operations

7.3   Depth First Search

7.4   Breadth First Search

LIST OF PRACTICALS

Write programmes in C to implement

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

INSTRUCTIONAL STRATEGY

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

MEANS OF ASSESSMENT

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

RECOMMENDED BOOKS

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

Websites for Reference:

http://swayam.gov.in

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Periods)	Marks Allotted (%)
1	08	10
2	08	15
3	12	15
4	12	15
5	12	15
6	12	15
7	06	15
Total	**70**	**100**

L T P

4 - 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 background in the broad field of digital systems design and microprocessors.

LEARNING OUTCOMES

After undergoing the subject, student will be able to:

- explain the importance of digitization.
- verify and interpret truth tables for all logic gates.
- realize all logic functions with NAND and NOR gates
- design and demonstrate adder and subtractor circuits
- verify and interpret truth tables of multiplexer, demultiplexer, encoder and decoder ICs
- design and realize different sequential circuit(Flip flops, counters and shift registers)
- verify performance of different A/D and D/A converters.
- explain the features and applications of different memories

DETAILED CONTENTS

1.   Introduction   (03 Periods)

    1.1   Distinction between analog and digital signal.
    1.2   Applications and advantages of digital signals.

2.   Number System   (03 Periods)

    2.1   Binary, octal and hexadecimal number system: conversion from decimal and hexadecimal to binary and vice-versa.
    2.2   Binary addition and subtraction including binary points. 1's and 2's complement method of addition/subtraction.

3.	Codes and Parity					(04 Periods)

3.1	Concept of code, weighted and non-weighted codes, examples of 8421, BCD, excess-3 and Gray code.
3.2	Concept of parity, single and double parity and error detection

4.	Logic Gates and Families				(06 Periods)

4.1	Concept of negative and positive logic
4.2	Definition, symbols and truth tables of NOT, AND, OR, NAND, NOR, EXOR Gates, NAND and NOR as universal gates.
4.3	SSI, MSI, LSI, VLSI (Definition)
4.4	Propagation delay, Noise Margin, Fan in, Fan out, Power dissipation.
4.5	Comparison between TTL, CMOS, ECL, MOS on basis of diff parameter.
4.6	Introduction to Bipolar logic, MOS, ECL, TTL and CMOS logic families
4.7	Basic logic gate using NMOS, PMOS, CMOS

5.	Logic Simplification					(06 Periods)

5.1	Postulates of Boolean algebra, De Morgan's Theorems. Implementation of Boolean (logic) equation with gates
5.2	Karnaugh map (upto 4 variables) and simple application in developing combinational logic circuits

6.	Arithmetic circuits					(03 Periods)

6.1	Half adder and Full adder circuit, design and implementation.
6.2	Half subtractor and Full subtractor or Circuit, design and implementation.

7.	Combinational Circuit					(06 Periods)

7.1	Introduction to combinational circuit
7.2	Multiplexer, De-multiplexer, Encoder, Decoder block diagram and Circuit.
7.3	7 segment decoder
7.4	BCD Encoder Circuit

8.	Introduction to Sequential circuit			(06 Periods)

8.1	Introduction to Sequential
8.2	Copmparison between combinational and sequential circuit

8.3   Concept and types of latch with their working and applications

8.4   Operation using waveforms and truth tables of RS, T, D, Master/Slave JK flip flops.

8.5   Difference between a latch and a flip flop

9.   Counters   (06 Periods)

9.1   Introduction to Asynchronous and Synchronous counters

9.2   Binary counters

9.3   Divide by N ripple counters, Decade counter, Ring counter and twisted Ring counter.

10.   Shift Register   (05 Periods)

10.1   Introduction and basic concepts including shift left and shift right.
       a) Serial in parallel out, serial in serial out, parallel in serial out, parallel in parallel out.
       b) Universal shift register

11.   A/D and D/A Converters   (04 Periods)

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

11.2   Brief idea about different techniques of A/D conversion and study of :
       - Stair step Ramp A/D converter
       - Dual Slope A/D converter
       - Successive Approximation A/D Converter

11.3   Brief idea of :
       - Binary Weighted D/A converter
       - R/2R ladder D/A converter

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

12.   Semiconductor Memories   (04 periods)

Memory organization, classification of semiconductor memories (RAM, ROM, PROM, EPROM, EEPROM), static and dynamic RAM.

LIST OF PRACTICALS

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

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

3. - Design of a half adder using XOR and NAND gates and verification of its

   operation

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

4. Verification of truth table for positive edge triggered, negative edge triggered, level triggered IC flip-flops (At least one IC each of D latch , D flip-flop, JK flip-flops).

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

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

7. To design a 4 bit ring counter and verify its operation.
8. Use of Asynchronous Counter ICs (7490 or 7493)
Note: Above experiments may preferably be done on Bread Boards.

INSTRUCTIONAL STRATEGY

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

MEANS OF ASSESSMENT

– Class test/quizzes
– Home assignments
– Attendance
– Sessional Test
– Practical Tasks

RECOMMENDED BOOKS

1. Digital Logic Designs by Morris Mano, Prentice Hall of India, New Delhi

2. Digital Electronics by RP Jain, Tata McGraw Hill Education Pvt Ltd, New Delhi

3. Digital Electronics by BR Gupta, Dhanpat Rai & Co., New Delhi

4. Digital Systems: Principles and Applications by RJ Tocci, Prentice Hall of India, New Delhi

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

Websites for Reference:

http://swayam.gov.in

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Periods)	Marks Allocation (%)
1.	03	07
2.	03	07
3.	04	07
4.	06	09
5.	06	11
6.	03	11
7.	06	11
8.	06	05
9	06	11
10.	05	11
11.	04	07
12	04	07
Total	**56**	**100**

4.1   COMMUNICATION SKILLS – II

	L	T	P
	4	-	2

RATIONALE

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

LEARNING OUTCOMES

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

- Frame correct sentences with illustrations
- Comprehend the language correctly
- Interpret the language correctly
- Use given material in new situations.
- Correspond effectively using various types of writings like letters, memos etc.
- Communicate effectively in English with appropriate body language making use of correct and appropriate vocabulary and grammar in an organised set up and social context.

DETAILED CONTENTS

1. Functional Grammar   (16 periods)

     1.1   Prepositions

     1.2   Framing Questions

     1.3   Conjunctions

     1.4   Tenses

2   Reading   (16 periods)

   2.1   Unseen Passage for Comprehension (Vocabulary enhancement -
         Prefixes, Suffixes, one word substitution, Synonym and Antonym) based
         upon the passage should be covered under this topic.

3   Writing Skill   (24 periods)

   3.1.   Correspondence

          a)   Business Letters- Floating Quotations, Placing Orders, Complaint
          Letters.

          b)   Official Letters- Letters to Government and other Offices

   3.2.   Memos, Circular, Office Orders

   3.3.   Agenda & Minutes of Meeting

   3.4.   Report Writing

LIST OF PRACTICALS

Note: Teaching Learning Process should be focused on the use of the language in writing
reports and making presentations.

Topics such as Effective listening, effective note taking, group discussions and
regular presentations by the students need to be taught in a project oriented
manner where the learning happens as a byproduct.

Speaking and Listening Skills

   1. Debate
   2. Telephonic Conversation: general etiquette for making and receiving calls
   3. Offering- Responding to offers.

4. Requesting – Responding to requests
5. Congratulating
6. Exploring sympathy and condolences
7. Asking Questions- Polite Responses
8. Apologizing, forgiving
9. Complaining
10. Warning
11. Asking and giving information
12. Getting and giving permission
13. Asking for and giving opinions

INSTRUCTIONAL STRATEGY

Students should be encouraged to participate in role play and other student-centered activities in class rooms and actively participate in listening exercises

MEANS OF ASSESSMENT

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

RECOMMENDED BOOKS

1. Communicating Effectively in English, Book-I by RevathiSrinivas; Abhishek Publications, Chandigarh.

2 Communication Techniques and Skills by R. K. Chadha; Dhanpat Rai Publications, New Delhi.

3 High School English Grammar and Composition by Wren & Martin; S. Chand & Company Ltd., Delhi.

4. e-books/e-tools/relevant software to be used as recommended by AICTE/NITTTR, Chandigarh.

Websites for Reference:

1. http://www.mindtools.com/ page 8.html – 99k
2. http://www.letstalk.com.in
3. http://www.englishlearning.com
4. http://learnenglish.britishcouncil.org/en/
5. http://swayam.gov.in

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Periods)	Marks Allotted (%)
1	16	28
2	16	28
3	24	44
Total	56	100

4.2   DATABASE MANAGEMENT SYSTEM

L T P
5 - 4

RATIONALE

The diploma holders in Computer Science and Engineering need to understand about Relational Data base to manage the data at backend for different applications. They should be able to develop basic table and write query to fetch the required data. Hence this subject.

LEARNING OUTCOMES

After undergoing the subject, the students will be able to:
- understand the concept of Database system and Client Server Architecture
- understand and develop the concepts of Data Modeling, Security and Integrity.
- convert and compare the designs and differentiate between the keys
- understand and execute different SQL queries and PL / SQL programs
- convert database in the form of table
- normalize the database using normal forms.
- understand the concept of query processing and Transaction processing

DETAILED CONTENTS

12.   Database System Concept & Data Modeling   (10 Periods)

Basic concepts, Advantages of a DBMS over file processing system, Data Abstraction, Database Languages, Data Independence. , Components of a DBMS and overall structure of a DBMS. ,Three views of Data (External View, Conceptual View, Internal View), Three level architecture of DBMS, Data Independence, , Client Server Architecture

13. Data Model   (10 Periods)

Define data model, Data Models : Network Model Hierarchical Model, E-R Model, Advantage & Disadvantages of each Data Model

ER Model :

Entity sets and relationship sets- Attributes - Keys in entity and relationship sets : (a) Super Key (b) Candidate Key (c) Primary Key (e) Unique Key - Mapping constraints, Participation Constraint, E-R diagram, Notations. Strong Entity Set and Weak Entity Set

14. Relation Model (10 Periods)

Advantages, Disadvantages, Codd's 12 rules , Definition of Relations, Schema, Sub schema. Relational Model Constraints (Domain, Tuple Uniqueness, Key Constraints, Integrity Constraints, Entity constraints).
Relations algebra (Basic operation: Union intersection difference and Cartesian product), Additional Relational Algebraic Operations (Projection, Selection rows, Division, rename and join) , Converting ER Model to Relational Model.

15. Relational Database Design (11 Periods)

Purpose of Normalization, Data redundancy and updating anomalies, Functional Dependencies and Decomposition, Process of Normalization using 1NF, 2NF, 3NF, multivalued dependencies and BCNF , Forth Normal Form, Fifth Normal Form,

16. MYSQL/SQL (11 Periods)

Data definition language, Data manipulation language, SQL, Object naming conventions, Object naming guidelines, Data types, Tables (Creating , Inserting,Updating and deleting tables and using constraints), Views, Indexes,

SQL Command :- DESCRIBE, SELECT, WHERE CLAUSE, DISTINCT CLAUSE, ORDER BY,HAVING, LOGICAL OPERATIONS, SQL OPERATORS, JOIN

Aggregate functions, String functions and date time functions, Null values

17.   PL-SQL (10 Periods)

User defined function, Control of flow statement of PL/SQL, Procedures/Stored procedures, transaction, triggers, cursors, granting and revoking.

18.   NO-SQL: Inroducton ,Usages,And Application. (03 Periods)

19.   SECURITY (05 Periods)

Authorization and View- Security constraints - Integrity Constraints- Encryption

LIST OF PRACTICALS
STRUCTURED QUERY LANGUAGE

1. Creating Database
    − Creating a database
    − Creating a table
    − Specifying relational data types
    − Specifying constraints
    − Creating indexes

2. Table and Record Handling
    − INSERT statement
    − Using SELECT and INSERT together
    − DELETE, UPDATE, TRUNCATE Statement.
    − DROP, ALTER statement

3. Retrieving Data From a Database
    The SELECT statement
    − Using the WHERE clause
    − Using Logical Operators in the WHERE clause
    − Using In, BETWEEN, LIKE, ORDER BY, GROUP BY & HAVING clause
    − Using Aggregate Functions
    − Combining Tables Using JOINS

4. Design of database for any application.

INSTRUCTIONAL STRATEGY

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

MEANS OF ASSESSMENT

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

RECOMMENDED BOOKS

1. An Introduction to Database System - C. J. Date
2. Database System Concepts - A. Silberschatz, S. Sudarshan& H. F. Korth
3. Database Concepts and Systems - LvanBayroos/SPD
4. Fundamental of Database System - R. Elmashri& S. B. Navathee-books/e-tools/relevant software to be used as recommended by AICTE/UPBTE/NITTTR.

Websites for Reference:

http://swayam.gov.in

http://spoken-tutorial.orgs

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Periods)	Marks Allotted (%)
1	10	15
2	10	15
3	10	15
4	11	17
5	11	17
6	10	10
7	03	04
8	05	07
Total	**70**	**100**

4.3   OBJECT ORIENTED PROGRAMMING USING JAVA

L T P

4 - 6

RATIONALE

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

LEARNING OUTCOMES

After undergoing the subject, students will be able to:

- install Java IDE, Compiler, Java virtual machines
- debug and compile the program written in Java.
- explain and implement class programs.
- explain and execute the language construct concepts.
- explain and execute member functions.
- explain the concepts of OOPS
- describe and implement inheritance concepts.
- explain and implement Polymorphism using Java program.
- explain and implement the abstract class and interface.
- implement the exception handling in projects
- develop and understand multithreaded programs

DETAILED CONTENTS

1.   Introduction and Features   (05 Periods)

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

2.   Language Constructs   (07 Periods)

variables, types and type declarations, data types : Integer, floating point type, character, boolean, all Operators, iteration and jump statement, if then else clause; conditional expressions, input using scanner class and output statement, loops, switch case, arrays, methods.

3.   Classes and Objects   (08 Periods)

Class fundamentals, constructors, declaring objects (Object & Object Reference), creating and accessing variables and methods, static and non static variables/methods defining packages, Creating and accessing a package, Importing packages, Understanding CLASSPATH, auto boxing , String , String Buffer

4.   Inheritance   (06 Periods)

Definition of inheritance, protected data, private data, public data, constructor chaining, order of invocation, types of inheritance, single inheritance, multilevel inheritance, hierarchical inheritance, hybrid inheritance , access control (Private Vs PublicVs Protected Vs Default)

5.	Abstract Class and Interface	(08 Periods)

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

6.	Polymorphism	(06 Periods)

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

7.	Exception Handling	(07 Periods)

Definition of exception handling, implementation of keywords like try, catches, finally, throw& throws, built in exceptions, creating own exception sub classes importance of exception handling in practical implementation of live projects

8.	Multithreading	(09 Periods)

Difference between multi threading and multi tasking, thread life cycle, creating threads, thread priorities, synchronizing threads.

LIST OF PRACTICALS

1.	WAP to create a simple class to find out the area and perimeter of rectangle and box using super and this keyword.
2.	WAP to design a class account using the inheritance and static that show all function of bank (withdrawal, deposit).
3.	WAP to design a class using abstract methods and classes.

4.   WAP to design a string class that perform string method (equal, reverse the string, change case).
5.   Consider we have a Class of Cars under which Santro Xing, Alto and Wagon R represents individual Objects. In this context each Car Object will have its own, Model, Year of Manufacture, Colour, Top Speed, etc. which form Properties of the Car class and the associated actions i.e., object functions like Create(), Sold(), display() form the Methods of Car Class.
6.   In a software company Software Engineers, Sr. Software Engineers, Module Lead, Technical Lead, Project Lead, Project Manager, Program Manager, Directors all are the employees of the company but their work, perks, roles, responsibilities differs. Create the Employee base class would provide the common behaviors of all types of employee and also some behaviors properties that all employee must have for that company.
7.   Using the concept of multiple inheritance create classes: Shape, Circle, Square, Cube, Sphere, Cylinder. Your classes may only have the class variable specified in the table below and the methods Area and/or Volume to output their area and/or volume.

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

8.   WAP to handle the exception using try and multiple catch block.
9.   WAP that implement the Nested try statements.
10.   WAP to create a package that access the member of external class as well as same package.
11.   WAP that show the partial implementation of interface.
12.   WAP to create a thread that implement the Runnable interface.

INSTRUCTIONAL STRATEGY

The subject is totally practical based. Students should be given clear idea about the basic concepts of programming. In practical session student should be asked to draw flow chart

write algorithm and then write program for algorithm and run on computer. It is required that students should maintain records (files with printouts).

MEANS OF ASSESSMENT

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

RECOMMENDED BOOKS

1. Programming with Java: A Primer; E. Balagurusamy
2. Head First Java, O-REILLY, Kathy Sierra & Bert Bates.
3. OCA Java SE Programmer I Certification Guide , Wiley Publisher , Mala Gupta
4. PROGRAMMER'S GUIDE TO JAVA SE 8 , Pearson , Khalid E Mughal
5. e-books/e-tools/relevant software to be used as recommended by AICTE/UPBTE/NITTTR.

Websites for Reference:http://www.spoken-tutorial.org , http://swayam.gov.in

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Periods)	Marks Allotted (%)
1.	5	14
2.	7	12
3.	8	13
4.	6	13
5.	8	13
6.	6	12
7.	7	12
8.	9	11
Total	**56**	**100**

L   T   P
4   -   4

RATIONALE

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

LEARNING OUTCOMES

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

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

DETAILED CONTENTS

1.   Overview of Operating Systems   (10 Periods)

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

2. Process Management (Principles and Brief Concept)   (10 Periods)

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

(SJF), Round Robin (RR), Multiprocessor scheduling, Process Synchronization.

3. Deadlocks (Principles and Brief Concept)   (06 periods)

Deadlock, Conditions for Dead lock, Methods for handling deadlocks,   Dead Prevention, Deadlock Avoidance, Deadlock detection, Recovery from deadlock.

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

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

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

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

6. File Management (Principles and Brief Concept)   (06 periods)

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

7. Linux Operating System   (10 Periods)

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

1. Demonstration of all the controls provided in windows control panel.
2. Exercise on Basics of windows.
3. Installation of Linux Operating System
4. Usage of directory management commands of Linux: ls, cd, pwd, mkdir, rmdir
5. Usage of File Management commands of Linux: cat, chmod,cp, mv, rm, pg, more, find
6. Use the general purpose commands of Linux: wc, od, lp, cal , date, who, whoami
7. Using the simple filters: pr, head, tail, cut, paste, nl, sort
8. Communication Commands: news, write, talk, mseg, mail, wall
9. Write a shell program that finds the factorial of a number.
10. Write a shell program that finds whether a given number is prime or not.
11. Write a shell program to find the average of three numbers.
12. Write a shell program that will convert all the text of the file from lowercase to uppercase.

INSTRUCTIONAL STRATEGY

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

MEANS OF ASSESSMENT

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

RECOMMENDED BOOKS

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

4. Operating Systems by Achyut S Godbole and AtulKahate; Tata McGraw Hill Education Pvt Ltd , New Delhi
5. Unleashed Linux by Tech Media Publishers, New Delhi
6. e-books/e-tools/relevant software to be used as recommended by AICTE/NITTTR, Chandigarh.

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

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Periods)	Marks Allotted (%)
1.	10	18
2.	10	18
3.	06	10
4	10	18
5	04	8
6	06	10
7	10	18
Total	**56**	**100**

4.5 E-COMMERCE AND DIGITAL MARKETING

L T P
2 - 4

RATIONALE

The course is designed to help you master the essential disciplines in digital marketing, including search engine optimization (SEO), social media, conversion optimization, web analytics, content marketing, email and mobile marketing. Digital marketing is one of the world's fastest growing disciplines.

LEARNING OUTCOMES

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

- understand concepts of E-Commerce.
- identify core concepts of digital marketing and the role of digital marketing in business.
- develop marketing strategies based on product, price, place and promotion objectives.
- understand how they can use digital marketing to increase sales and grow their business
- formulate marketing strategies that incorporate psychological and sociological factors which influence consumers.
- hands on experience in using Analytics Tools eg: Google Analytics for report extraction and campaign measurement.
- analyze marketing problems and provide solutions based on a critical examination of marketing information.
- understand the opportunities for deploying emerging digital marketing media and techniques.
- implement online campaigns for your business and marketing problems within the organization by learning AdWords Campaign Management

DETAILED CONTENTS

1. Electronics Commerce, advantages and disadvantages. E-Commerce Business model B2B, B2C, C2C, E-Governance. Four C's (Convergence, collaborative, computer content management and call center), Supply Chain Management.

                                                                      (10 Periods)

2. E-Commerce Payment: (06 Periods)

    Payment Gateway, Modes of Electronic Payment, Threats & protections for e-commerce payment system

3. Principles of Digital Marketing   (06 Periods)

    Defining Digital Marketing , Setting Digital Marketing Objectives, Set of activities of digital marketing: Search Engine Optimization, SEO, Search Engine Marketing – Google AdWords, Social Media Marketing: Facebook, LinkedIn, YouTube, Display Advertising – Contextual, Behavioral, Targeted, Content Marketing & Blogging,

Lead Generation : Marketing Offer – Attractive / Relevant Offer, Landing Page – Offer's details with form, Conversion Page – Thank you page, Email Marketing, Video Marketing, Responsive Design, Google Analytics

4.   Search Engine Optimization   (10 Periods)

What is SEO?, Why SEO?, How Search Engine works?, Essential SEO guidelines for website owner, designer, blogger and content writer : Keyword Research - Creating Content Hierarchy, Brainstorming – Think and discuss them, Google Suggest, Related Searches, Google Keyword Planner, Keyword Tools, Google Trends – Finding Search Trends, Most Search Terms, How to translate keywords?, Organizing the keywords, Writing Headlines (Page Titles) with examples, Writing Summary (META Descriptions) with examples, SEO for Images, Structuring the Content- SEO-friendly Domain Name, SEO-friendly URL Structure, Plan your Site's Hierarchy, Internal Linking – Site Navigation, How Google reads our pages?, Localized SEO, Website Speed Testing, HTML Improvements using Google Search Console, Links from YouTube Videos, Users' Engagement , Links to Related Stories , Enable Social Sharing , Embedding videos , Enabling site search feature

5.   Google AdWords   (06 Periods)

Setting up Google AdWords Campaigns – that avails high ranking at low cost, Content Structuring, Understanding Quality Score, Finding and selecting the right Keywords, Keywords Matching Options, Campaign Setup procedure, Ads and Ad Groups, Organizing Ad Groups, Creating Effective Ads, Optimizing Landing Pages, Bid Management, Negative Keywords, Analytics – Measure and fine-tune, Remarketing Campaigns – How to configure, Setup and Monitor them?, YouTube Video Ad Campaigns

6.   Google Analytics   (08 Periods)

Getting Started with Google Analytics, Understanding Dashboard – Audience | Advertising | Traffic Source | Content | Conversions, Taking decisions based on Analytics Reporting, Defining Business Goals and Objectives, Tracking Social Media Traffic, Tracking SEO Traffic, Integrating your Google AdWords campaigns into Google Analytics, Measuring Tools and Methods, Measuring your Site's ROI, Introduction to Goal Conversion – Tracking the Conversions, Configuring UTMs (Custom URLs), Google Tag Manager – a brief overview.

7.   Social Media Marketing   (10 Periods)

Social Media Marketing Strategy : Setting up Goals- Finding out where your targeted people connect, Popular Social Media Networks, KnowEm – Check Social Media Username Availability, Knowing your Audience - Google Alerts – Monitoring your brands, competitions, and industry trends using, TweetDeck – a monitoring tool similar to Google Alerts for Twitter, Hashtags – Best Practices & Tools, Facebook / Instagram / LinkedIn- Setting up a Facebook Business Page, Facebook Graph Search – SEO for Facebook, Facebook Fans vs Talking about this, Promoting your Page, Boost Post, Facebook/Instagram Advertising using Facebook Ads Manager, Remarketing/Retargeting using Facebook Custom Audiences, LinkedIn Advertising: Text Ads | Sponsored Content, Measuring Success- Fans, Likes, Comments & Share, Track performance using Google Analytics, UTMs – URL Builder, Bounce Rate, Time Spent on Site and Conversions!, Tracking Offline Conversions, Tracking your emails, Viral Videos Examples, Instagram, Facebook and Pinterest – Best Practices, Tips and Tools

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.

MEANS OF ASSESSMENT

- Assignments
- Viva-voce
- Written examination
- Practical Tasks

LIST OF PRACTICALS

1. *Create SEO Friendly Web Pages*
2. *Submit Website in various search Engines*
3. *Content Writing*
4. *Build a Network of Partner Websites to Get Influence on the SERP and Jump up to 30+ Positions*
5. *Develop a Facebook Customized Page Tab*
6. *Create and Write a blog.*
7. *Write an email newsletter*
8. *Make a video and Youtube Channel*
9. *Create infographics*
10. *Create Google Adword Account and make use of Keyword Planner*

11. *Create and Use Google Analytics Account*
12. *Create "refer-a-friend" or "bookmark this page" links on your site*
13. *Create Google Map on Places for Business*
14. *Understanding Plagiarism Checker tools*
15. *Understanding various SEO Tools like woorank, seositecheckup, seoquake, similarweb, siteliner, etc.*
16. *Creating XML Sitemap and robot.txt files*

RECOMMENDED BOOKS

1. Digital Marketing by Vandana Ahuja, published by Oxford Publication
2. Fundamentals of Digital Marketing by Puneet Bhatia, published by Pearson.
3. E-books/e-tools/relevant software to be used as recommended by AICTE/NITTTR, Chandigarh.

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Times Allocated (Hrs.)	Marks Allocated (%)
1.	10	15
2.	06	10
3.	06	08
4.	10	15
5.	06	15
6.	08	15
7.	10	22
Total	**56**	**100**

4.6 ENERGY CONSERVATION

L T P

3 - 2

RATIONALE

The requirement of energy has increased manifolds in last two decades due to rapid urbanization and growth in industrial/service sector. It has become challenging task to meet ever increasing energy demands with limited conventional fuels and natural resources. Due to fast depletion of fossil fuels and a tremendous gap between supply and demand of energy, it is essential to adopt energy conservation techniques in almost every field like industries, commercial and residential sectors etc. Energy conservation has attained priority as it is regarded as additional energy resource. Energy saved is energy produced. This course covers the concepts of energy management and its conservation. It gives the insight to energy conservation opportunities in general industry and details out energy audit methodology and energy audit instruments.

LEARNING OUTCOMES

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

- define principles and objectives of energy management and energy audit.
- understand Energy Conservation Act 2001 and its features.
- understand various forms & elements of energy.
- identify electrical and thermal utilities. Understand their basic principle of operation and assess performance of various equipments.
- identify areas of energy conservation and adopt conservation methods in various systems.
- evaluate the techno economic feasibility of the energy conservation technique adopted.

DETAILED CONTENTS

1.   Basics of Energy

1.1 Classification of energy- primary and secondary energy, commercial and non-commercial energy, non-renewable and renewable energy with special reference to solar energy, Capacity factor of solar and wind power generators.

1.2 Global fuel reserve

1.3 Energy scenario in India and state of U.P. Sector-wise energy consumption (domestic, industrial, agricultural and other sectors)

1.4 Impact of energy usage on climate

2. Energy Conservation and EC Act 2001

2.1 Introduction to energy management, energy conservation, energy efficiency and its need

2.2 Salient features of Energy Conservation Act 2001 & The Energy Conservation (Amendment) Act, 2010 and its importance. Prominent organizations at centre and state level responsible for its implementation.

2.3 Standards and Labeling: Concept of star rating and its importance, Types of product available for star rating

3. Electrical Supply System and Motors

3.1 Types of electrical supply system

3.2 Single line diagram

3.3 Losses in electrical power distribution system

3.4 Understanding Electricity Bill: Transformers Tariff structure, Components of power (kW, kVA and kVAR) and power factor, improvement of power factor, Concept of sanctioned load, maximum demand, contract demand and monthly minimum charges (MMC)

3.5 Transformers: Introduction, Losses in transformer, transformer Loading, Tips for energy savings in transformers

3.6 Electric Motors
Types of motors, Losses in induction motors Features and characteristics of energy efficient motors, Estimation of motor loading, Variation in efficiency and power factor with loading, Tips for energy savings in motors

4. Energy Efficiency in Electrical Utilities

4.1 Pumps: Introduction to pump and its applications, Efficient pumping system operation, Energy efficiency in agriculture pumps, Tips for energy saving in pumps

4.2 Compressed Air System: Types of air compressor and its applications, Leakage test, Energy saving opportunities in compressors.

4.3 Energy Conservation in HVAC and Refrigeration System: Introduction, Concept of Energy Efficiency Ratio (EER), Energy saving opportunities in Heating, Ventilation and Air Conditioning (HVAC) and Refrigeration Systems.

5. Lighting and DG Systems

5.1 Lighting Systems: Basic definitions- Lux, lumen and efficacy, Types of different lamps and their features, Energy efficient practices in lighting

5.2 DG Systems: Introduction, Energy efficiency opportunities in DG systems, Loading estimation

6. Energy Efficiency in Thermal Utilities

6.1 Thermal Basics: Thermal energy, Energy content in fuels, Energy Units and its conversions in terms of Metric Tonne of Oil Equivalent (MTOE)

6.2 Energy Conservation in boilers and furnaces : Introduction and types of boilers, Energy performance assessment of boilers, Concept of stoichiometric air and excess air for combustion, Energy conservation in boilers and furnaces, Do's and Don'ts for efficient use of boilers and furnaces

6.3 Cooling Towers: Basic concept of cooling towers, Tips for energy savings in cooling towers

6.4 Efficient Steam Utilization

7. Energy Conservation Building Code (ECBC)

7.1 ECBC and its salient features

7.2 Tips for energy savings in buildings: New Buildings, Existing Buildings

8. Waste Heat Recovery and Co-Generation

8.1 Concept, classification and benefits of waste heat recovery

8.2 Concept and types of co-generation system

9. General Energy Saving Tips
Energy saving tips in:

9.1 Lighting

9.2 Room Air Conditioner

9.3 Refrigerator

9.4 Water Heater

9.5　Computer

9.6　Fan, Heater, Blower and Washing Machine

9.7　Colour Television

9.8　Water Pump

9.9　Cooking

9.10　　Transport

10.　Energy Audit

10.1　Types and methodology

10.2　Energy audit instruments

10.3　Energy auditing reporting format

PRACTICAL EXERCISES

1.　To conduct load survey and power consumption calculations of small building.
2.　To check efficacy of different lamps by measuring power consumption and lumens using lux meter.
3.　To measure energy efficiency ratio (EER) of an air conditioner.
4.　To measure effect of valve throttling and variable frequency drive (VFD) on energy consumption by centrifugal pump.
5.　To measure and calculate energy saving by arresting air leakages in compressor.
6.　To measure the effect of blower speed on energy consumed by it.

STUDENT ACTIVITIES ON ENERGY CONSERVATION/ENERGY EFFICIENCY

－　Presentations of Case Studies
－　Debate competitions
－　Poster competitions
－　Industrial visits
－　Visual Aids

INSTRUCTIONAL STRATEGY

Teachers are expected to lay considerable stress on understanding the basic concepts in energy conservation, principles and their applications. For this purpose, teachers are expected to give simple problems in the class room so as to develop necessary knowledge for comprehending the basic concepts and principles. As far as possible, the teaching of the subject must be supplemented by demonstrations and practical work in the laboratory. Visits to industries must be carried out. Expert from industry must be invited to deliver talks on energy conservation to students and faculty.

RECOMMENDED BOOKS

1. Guide book on General Aspects of Energy Management and Energy Audit by Bureau of Energy Efficiency, Government of India. Edition 2015
2. Guide book on Energy Efficiency in Electrical Utilities, by Bureau of Energy Efficiency, Government of India. Edition 2015
3. Guide book on Energy Efficiency in Thermal Utilities, by Bureau of Energy Efficiency, Government of India. Edition 2015
4. Handbook on Energy Audit & Environmental Management by Y P Abbi & Shashank Jain published by TERI. Latest Edition

   Important Links:
   (i) Bureau of Energy Efficiency (BEE), Ministry of Power, Government of India. www.beeindia.gov.in.
   (ii) Ministry of New and Renewable Energy (MNRE), Government of India. www.mnre.gov.in.
   (iii) Uttar Pradesh New and Renewable Energy Agency (UPNEDA), Government of Uttar Pradesh. www.upneda.org.in.
   (iv) **Central Pollution Control Board (CPCB),** Ministry of Environment, Forest and Climate Change, Government of India. www.cpcb.nic.in.
   (v) Energy Efficiency Sevices Limited (EESL). www.eeslindia.org.
   (vi) Electrical India, Magazine on power and electrical products industry. www.electricalindia.in.

4.7 Universal Human Values

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Course Objectives

This introductory course input is intended

1. To help the students appreciate the essential complementarily between 'VALUES' and 'SKILLS' to ensure sustained happiness and prosperity, which are the core aspirations of all human beings
2. To facilitate the development of a Holistic perspective among students towards life and profession as well as towards happiness and prosperity based on a correct understanding of the Human reality and the rest of Existence. Such a holistic perspective forms the basis of Universal Human Values and movement towards value-based living in a natural way
3. To highlight plausible implications of such a Holistic understanding in terms of ethical human conduct, trustful and mutually fulfilling human behavior and mutually enriching interaction with Nature

Thus, this course is intended to provide a much needed orientational input in value education to the young enquiring minds.

Course Methodology

1. The methodology of this course is explorational and thus universally adaptable. It involves a systematic and rational study of the human being vis-à-vis the rest of existence.
2. It is free from any dogma or value prescriptions.
3. It is a process of self-investigation and self-exploration, and not of giving sermons. Whatever is found as truth or reality is stated as a proposal and the students are facilitated to verify it in their own right, based on their Natural Acceptance and subsequent Experiential Validation.
4. This process of self-exploration takes the form of a dialogue between the teacher and the students to begin with, and then to continue within the student leading to continuous self-evolution.
5. This self-exploration also enables them to critically evaluate their pre-conditionings and present beliefs.

The syllabus for the lectures is given below:

- After every two lectures of one hour each, there is one hour practice session.
- The assessment for this subject is as follows:
- Sessions Marks (Internal): 20
- Practical Marks (External): 30
- Total Marks: 50

UNIT 1: Course Introduction - Need, Basic Guidelines, Content and Process for Value Education

1. Understanding the need, basic guidelines, content and process for Value Education
2. Self-Exploration–what is it? - its content and process; 'Natural Acceptance' and Experiential Validation- as the mechanism for self-exploration

3. Continuous Happiness and Prosperity- A look at basic Human Aspirations
4. Right understanding, Relationship and Physical Facilities- the basic requirements for fulfillment of aspirations of every human being with their correct priority
5. Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario
6. Method to fulfill the above human aspirations: understanding and living in harmony at various levels

UNIT 2: Understanding Harmony in the Human Being - Harmony in Myself!

1. Understanding human being as a co-existence of the sentient 'I' and the material the Body'
2. *Understanding the needs of Self ('I') and 'Body' - Sukh and Suvidha*
3. Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer)
4. Understanding the characteristics and activities of 'I' and harmony in 'I'
5. Understanding the harmony of I with the Body: *Sanyam* and *Swasthya*; correct appraisal of Physical needs, meaning of Prosperity in detail
6. Programs to ensure *Sanyam* and *Swasthya*
   -Practice Exercises and Case Studies will be taken up in Practice Sessions.

UNIT 3: Understanding Harmony in the Family and Society- Harmony in Human-Human Relationship

1. *Understanding Harmony in the family – the basic unit of human interaction*
2. Understanding values in human-human relationship; meaning of *Nyaya* and program for its fulfillment to ensure *Ubhay-tripti*;
   a. Trust (*Vishwas*) and Respect (*Samman*) as the foundational values of relationship
3. Understanding the meaning of *Vishwas*; Difference between intention and competence

4. Understanding the meaning of *Samman*, Difference between respect and differentiation; the other salient values in relationship
5. Understanding the harmony in the society (society being an extension of family): *Samadhan, Samridhi, Abhay, Sah-astitva*as comprehensive Human Goals
6. Visualizing a universal harmonious order in society- Undivided Society (*AkhandSamaj),* Universal Order (*SarvabhaumVyawastha)*- from family to world family!
    -Practice Exercises and Case Studies will be taken up in Practice Sessions.

UNIT 4: Understanding Harmony in the Nature and Existence - Whole existence as Co-existence

1. Understanding the harmony in the Nature
2. Interconnectedness and mutual fulfillment among the four orders of nature-recyclability and self-regulation in nature
3. Understanding Existence as Co-existence (*Sah-astitva*) of mutually interacting units in all-pervasive space
4. Holistic perception of harmony at all levels of existence
    -Practice Exercises and Case Studies will be taken up in Practice Sessions.

UNIT 5: Implications of the above Holistic Understanding of Harmony on Professional Ethics

1. Natural acceptance of human values
2. Definitiveness of Ethical Human Conduct
3. Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order
4. Competence in professional ethics:
    a) Ability to utilize the professional competence for augmenting universal human order
    b) Ability to identify the scope and characteristics of people-friendly and eco-friendly production systems,
    c) Ability to identify and develop appropriate technologies and management patterns for above production systems.
5. Case studies of typical holistic technologies, management models and production systems

6. Strategy for transition from the present state to Universal Human Order:
    a) At the level of individual: as socially and ecologically responsible engineers, technologists and managers

b) At the level of society: as mutually enriching institutions and organizations
7. To inculcate Human Values among Students:The Role of self ,Parents and Teachers -Practice Exercises and Case Studies will be taken up in Practice Sessions.
Practical Session also Includes Different Yogic Exercises and Meditation Session

INSTRUCTONAL STRATEGY

The content of this course is to be taught on conceptual basis with plenty of real world examples.

MEANS OF ASSESSMENT

- Assignments and quiz/class tests,
- Mid-term and end-term written tests
- Practical assessment

Reference Material

The primary resource material for teaching this course consists of

a. The text book (Latest Edition)

> R.R Gaur, R Asthana, G P Bagaria, A foundation course in Human Values and professional Ethics, Excel books, New Delhi.

b. The teacher's manual (Latest Edition)
> R.R Gaur, R Asthana, G P Bagaria, A foundation course in Human Values and professional Ethics – Teachers Manual, Excel books, New Delhi.

In addition, the following reference books may be found useful for supplementary reading in connection with different parts of the course:

1. B L Bajpai, 2004, *Indian Ethos and Modern Management*, New Royal Book Co., Lucknow. Reprinted 2008.
2. PL Dhar, RR Gaur, 1990, *Science and Humanism*, Commonwealth Purblishers.
3. Sussan George, 1976, *How the Other Half Dies,* Penguin Press. Reprinted 1986, 1991
4. Ivan Illich, 1974, *Energy & Equity,* The Trinity Press, Worcester, and HarperCollins, USA

5. Donella H. Meadows, Dennis L. Meadows, Jorgen Randers, William W. Behrens III,

1972, limits to Growth, Club of Rome's Report, Universe Books.

6. Subhas Palekar, 2000, *How to practice Natural Farming,*Pracheen(Vaidik) Krishi Tantra Shodh, Amravati.
7. A Nagraj, 1998, *Jeevan Vidya ekParichay,*Divya Path Sansthan, Amarkantak.
8. E.F. Schumacher, 1973, *Small is Beautiful: a study of economics as if peoplemattered*, Blond & Briggs, Britain.
9. A.N. Tripathy, 2003, *Human Values*, New Age International Publishers.

Relevant websites, movies and documentaries: Value Education websites, http://uhv.ac.in, *http://www.aktu.ac.in*

1. Story of Stuff, *http://www.storyofstuff.com*
2. Al Gore, *An Inconvenient Truth*, Paramount Classics, USA
3. Charlie Chaplin, *Modern Times*, United Artists, USA
4. IIT Delhi, *Modern Technology–the Untold Story*
5. Case study Hevade Bazar Movie
6. RC Shekhar , Ethical Contradiction ,Trident New Delhi
7. *Gandhi A., Right Here Right Now, Cyclewala Production*

SUGGESTED DISTRIBUTION OF MARKS

Unit	Time Allotted (Periods)	Marks Allotted (%)
1	08	20
2	08	20
3	08	20
4	08	20
5	10	20
Total	**42**	**100**

INDUSTRIAL TRAINING OF STUDENTS

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

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

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

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

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

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

a) Punctuality and regularity   15%
b) Initiative in learning new things   15%
c) Presentation and VIVA   15%
d) Industrial training report   55%

5.1 SOFTWARE ENGINEERING

L T P

4 - 2

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. It is important to know about various aspects of the system analysis and design so that the students will be able to understand the responsibilities while designing and implementing the project.

LEARNING OUTCOMES

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

- understanding the problem and corresponding requirement for development of software.
- describe the various phases of the system development life cycle.
- identify the expected benefits and scope of the projects.
- prepare and develop data flow diagrams and decision tables.
- perform a feasibility study of the system.
- write detailed design specifications for programmes and database.
- select methods for evaluating the effectiveness and efficiency of a system.
- apply different testing techniques on simple programme.

DETAILED CONTENTS

1. Introduction to Software Engineering   (10 periods)

System Concepts: 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

2. Software Life Cycle Models   (12 periods)

Requirement of Life Cycle Model, Classic Waterfall Model, Prototyping Model, Evolutionary Model, Spiral Model, introduction to agile methodology.

Comparison of different Life Cycle Models

3. Software Planning   (10 periods)

Responsibilities of Software Project Manager

- Metrics for Project Size Estimation- LOC(Lines of Code), Function Point Metric

- Project estimation Techniques- Using COCOMO Model.

4. Requirement Analysis and Specification   (06 periods)

Requirement gathering and Analysis, Software Requirement Specifications(SRS), Characteristics of good SRS

5. Software Design and Implementation   (10 periods)

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

6. Software Testing   (08 periods)

Concept of Testing, Testing type cycle (V-Model), Verification v/s Validations, Unit Testing, Black Box Testing, White Box Testing, Integration testing, System testing, Configuration management, Overview of test cases.

MEANS OF ASSESSMENT

–   Assignments and quiz/class tests, mid-term and end-term written tests
–   Software installation, operation, development and viva-voce

LIST OF PRACTICALS

1. Develop a SRS on a given topic/project/problem.
2. Develop DFD Model (level 0 and level 1 DFD) of the problem.
3. Develop sequence diagram
4. Develop class diagrams
5. Use testing tools such as J-meter, Canoo Web Test
6. Use a project management tool such as Microsoft project or Gantt project etc (Team week, Target process, Gantt project)
7. Write test cases for any known application
8. Take any system and study its system specification and report the various bugs.

RECOMMENDED BOOKS

1. Software Engineering by Rajib Mall, PHI Publishers, New Delhi

2. An IntegratedApproach toSoftware 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/NITTTR, Chandigarh.

Websites for Reference:

http://swayam.gov.in

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Periods)	Marks Allotted (%)
1	10	18
2	12	24
3	10	18
4	06	10
5	10	18
6	08	12
Total	**56**	**100**

5.2 WEB DEVELOPMENT USING PHP

L T P
4 - 6

RATIONALE

This course will enable the students to understand and 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 with MySQLStudents 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.

LEARNING OUTCOMES

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

- perform various logical operations in PHP
- create simple programmes to validate forms in PHP
- perform database connectivity using PHP
- apply the basic concepts, principles and practices of Web-site development using server-side technologies (PHP &MySQL)
- install Word Press
- create and manage Blogs,Websites using WordPress

DETAILED CONTENTS

20.   PHP Introduction   (20 Periods)

Introduction to PHP: How PHP Works , The php.ini File, Basic PHP Syntax, PHP variables, statements, operators, decision making, loops, arrays, strings, PHP OOPs concept, PHP forms (form handling , validation) , 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.

21.   PHP and MySQL   (10 Periods)

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

22. Ajax   (08 Periods)

AJAX Introduction, XMLHttp, Request object, server response, AJAX events, Validation, Interaction with API

23. WordPress   (CMS)   (18 Periods)

WordPress Basics:

Introduction to content management systems based on PHP, Introduction to WordPress, How WordPress Works ,Installation of WordPress

Posts&Pages:

Introduction to Blogging, Creating Blogs, Using Images, Wrapping Text Around Images, Comments, Post Formats, Linking to Posts, Pages, and Categories, Using Smilies, Links Manager, WordPress Feeds, Using Password Protection,

Customizing Site Appearance and Themes:

Developing a Color Scheme, Designing Headers, CSS Horizontal Menus, Dynamic Menu Highlighting, Navigation Links, Next and Previous Links, Styling for Print, Designing Your Post Meta Data Section, Separating Categories in your Post Meta Data Section, Customizing the 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

LIST OF PRACTICALS

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/serverdesign using ajax

7. To store a cookie using PHP on client side.

8. To save the user session on server side.

9. Design website using WordPress

10. Creation of basic Blogging website

INSTRUCTIONAL STRATEGY

Since this subject is practice oriented, the teacher should demonstrate the capabilities of websites/WebPages to students while doing practical exercises. 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.

MEANS OF ASSESSMENT

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

RECOMMENDED BOOKS

1. Head First PHP &MySQL , O'Reilly Media, Inc , Michael Morrison, Lynn Beighley
2. Sams Teach Yourself PHP, MySQL, and Apache All in One" by Julie C. Meloni, Publisher: SAMS ,ISBN 0-672-32976-X
3. Web enabled development application by Ivan Byross: Commercial; TMH
4. PHP: The Complete Reference , by Steven HolznerMcgraw Higher Ed
5. PHP and MySQL Web Development , by Luke Welling , Pearson Education india
6. WordPress 3.5 Complete ,Packt Publishing , by karolkrol , Aaron hodge Silver
7. WordPress Web Application Development ,Packt Publishing
8. Professional WordPress: Design and Development, by Brad Williams, David Damstra, and Hal Stern, Wrox Publication
9. Building Web Apps with WordPress: WordPress as an Application Framework , by Brian Messenlehner and Jason Coleman , O'Reilly Media
10. e-books/e-tools/relevant software to be used as recommended by AICTE/UPBTE/NITTTR.

Websites for Reference:http://swayam.gov.in , http://spoken-tutorial.org

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Periods)	Marks Allotted (%)
1	20	36
2	10	18
3	08	14
4	18	32
Total	**56**	**100**

5.3 COMPUTER PROGRAMMING USING PYTHON

L T P

4 - 4

RATIONALE

This course introduces to the students the Python language. Upon completion of this course, 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.

LEARNING   OUTCOMES

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

- execute Python code in a variety of environments
- use correct Python syntax in Python programs
- use the correct Python control flow construct
- write Python programs using various collection data types
- write home grown Python functions
- use standard Python modules such as os, sys, math, and time
- trap various errors via the Python Exception Handling model
- use the IO model in Python to read and write disk files
- create their own classes and use existing Python classes.
- understand and use the Object Oriented paradigm in Python programs
- use the Python Regular Expression capabilities for data verification

DETAILED CONTENTS

1.   Introduction   (04 Periods)

- Brief History of Python
- Python Versions
- Installing Python
- Environment Variables
- Executing Python from the Command Line
- IDLE
- Editing Python Files
- Python Documentation
- Getting Help
- Dynamic Types
- Python Reserved Words
- Naming Conventions

2.   Basic Python Syntax   (04 Periods)

- Basic Syntax
- Comments
- String Values
- String Methods
- The format Method
- String Operators
- Numeric Data Types
- Conversion Functions
- Simple Output
- Simple Input
- The % Method
- The print Function

3.   Language Components   (06 Periods)

- Indenting Requirements
- The if Statement
- Relational and Logical Operators
- Bit Wise Operators
- The while Loop
- break and continue
- The for Loop

4. Collections   (10 Periods)

- Introduction
- Lists
- Tuples
- Sets
- Dictionaries
- Sorting Dictionaries
- Copying Collections
- Summary

5. Functions   (08 Periods)

- Introduction
- Defining Your Own Functions
- Parameters
- Function Documentation
- Keyword and Optional Parameters
- Passing Collections to a Function
- Variable Number of Arguments
- Scope
- Functions - "First Class Citizens"
- Passing Functions to a Function
- map
- filter
- Mapping Functions in a Dictionary
- Lambda
- Inner Functions
- Closures

6.   Modules   (04 Periods)

- Modules
- Standard Modules - sys
- Standard Modules - math
- Standard Modules - time
- The dir Function

7.   Exceptions   (04 Periods)

- Errors
- Runtime Errors
- The Exception Model
- Exception Hierarchy
- Handling Multiple Exceptions
- Raise
- assert

8.   Input and Output   (04 Periods)

- Introduction
- Data Streams
- Creating Your Own Data Streams
- Access Modes
- Writing Data to a File
- Reading Data From a File
- Additional File Methods
- Using Pipes as Data Streams
- Handling IO Exceptions

9.   Classes in Python   (06 Periods)

- Classes in Python

- Principles of Object Orientation
- Creating Classes
- Instance Methods
- File Organization
- Special Methods
- Class Variables
- Inheritance
- Polymorphism

10.   Regular Expressions   (06 Periods)

- Introduction
- Simple Character Matches
- Special Characters
- Character Classes
- Quantifiers
- The Dot Character
- Greedy Matches
- Grouping
- Matching at Beginning or End
- Match Objects
- Substituting
- Splitting a String
- Compiling Regular Expressions
- Flags

LIST OF PRACTICALS

1.   Getting started with Python and IDLE in interactive and batch modes

2.   What do the following string methods do?

- lower
- count
- replace

3.   Write instructions to perform each of the steps below

(a)   Create a string containing at least five words and store it in a variable.

(b)   Print out the string.

(c)   Convert the string to a list of words using the string split method.

(d)   Sort the list into reverse alphabetical order using some of the list methods (you might need to use dir(list) or help(list) to find appropriate methods).

(e)   Print out the sorted, reversed list of words.

4.   Write a program that determines whether the number is prime.

What is your favorite number? 24

24 is not prime

What is your favorite number? 31

31 is prime

5.   Find all numbers which are multiple of 17, but not the multiple of 5, between 2000 and 2500?

6.   Swap two integer numbers using a temporary variable. Repeat the exercise using the code format: a, b = b, a. Verify your results in both the cases.

7.   Find the largest of n numbers, using a user defined function largest().

8.   Write a function myReverse() which receives a string as an input and returns the reverse of the string.

10.   Check if a given string is palindrome or not.
11.   WAP to convert Celsius to Fahrenheit
12.   Find the ASCII value of charades
13.   WAP for simple calculator

INSTRUCTIONAL STRATEGY

Teachers should lay emphasis on practicals and experts from industries may be invited to deliver lectures and share experiences with the students.

MEANS OF ASSESSMENT

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

RECOMMENDED BOOKS

1. Learning Python by Mark Lutz; Pratham Books, Bangalore

2. Foundations of Python Network Programming by John Goerzen and BrandeuRhodes; Apress-eBook distributed by Springer Science and Business Media, New York

3. Dive Into Python by Mark Pilgrim; Pratham Books, Bangalore

4. Think Python by Allen B. Downey; O'Reily Media

5. Python Programming For Beginners: A Must Read Introduction to Python Programming by Robert Richards; Pratham Books, Bangalore

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

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

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Periods)	Marks Allotted (%)
1.	04	06
2.	04	06
3.	06	10
4.	10	20
5.	08	14
6.	04	06
7.	04	06
8.	04	08
9.	06	12
10.	06	12
Total	**56**	**100**

5.4 COMPUTER ARCHITECTURE AND HARDWARE MAINTENANCE

L T P

4 - 4

RATIONALE

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

LEARNING OUTCOMES

After undergoing the subject, students will be able to:

- use CPU, register and stack.
- compare micro programmed and hardwired control.
- compare RISC and CISC architecture.
- understand memory hierarchy and memory types.
- explain the function of BIOS.
- illustrate multi processor systems.
- set-up, diagnose problems troubleshoot & Maintained the computer components.

DETAILED CONTENTS

1. Hardware Organisation of computer system   (10 periods)
    1.1   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.
    1.2   CPU Design:Microprogrammedvs hard wired control.
    1.3   Reduced instruction set computers: CISC characteristics, RISC characteristics, and their comparison.

2. Memory organisation   (10 periods)

2.1   Memory Hierarchy
2.2   RAM and ROM chips, Memory address map, Memory connections to CPU.
2.3   Auxillarymemory: Magnetic disks and magnetic tapes.
2.4   Associative memory
2.5   Cache memory
2.6   Virtual memory
2.7   Memory management hardware
2.8   Read and Write operation

3.   Arithmetic Operations   (08 periods)

3.1   Introduction, Addition, Subtraction, Multiplication and Division algorithm.

4.   I/O Organization   (10 periods)

4.1   Basis Input output system(BIOS)
   - Function of BIOS
   - Testing and initialization
   - Configuring the system
4.2   Modes of Data Transfer
   - Programmed I/O : Synchronous, asynchronous and interrupt initiated.
   - DMA data transfer
5.   8085 Microprocessor: Introduction, Architecture, Pin diagram, Comparison with 8086.
                                                    (6 periods)

6.   Architecture of multi processor systems   (12 periods)

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

LIST OF PRACTICALS

1.   Demonstration of following:
   (i)   motherboard
   (ii)   Key board & Keyboard decoder
   (iii)   Video Adapter & display controllers
   (iv)   Floppy Drive, CD Drive and Hard Disk.
   (v)   Multifunction Input/Output controllers
   (vi)   Assembly of PC

2 Troubleshooting & repair of following equipment:

   (i) Dot Matrix Printer, Laser, Inkjet Printer.

   (ii) Digital Plotter

   (iii) C. P. U.

   (iv) Disk Drive

3. Trouble Shooting of

   (i) Network

   (ii) Power Supplies.

INSTRUCTIONAL STRATEGY

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

MEANS OF ASSESSMENT

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

LIST OF RECOMENEDED BOOKS

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

Websites for Reference:

http://swayam.gov.in

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (in periods)	Marks Allotted (%)
1.	10	20
2.	10	20
3.	08	10
4.	10	20
5.	06	10
6	12	20
Total	**56**	**100**

L T P

4 - 4

RATIONALE

Internet of Things (IoT) is presently a hot technology worldwide. Government, academia, and industry are involved in different aspects of research, implementation, and business with IoT. IoT cuts across different application domain like agriculture, space, healthcare, manufacturing, construction, water, and mining. IoT-based applications such as innovative shopping system, infrastructure management in both urban and rural areas, remote health monitoring and emergency notification systems, and transportation systems, are gradually relying on IoT based systems. Therefore, it is very important to learn the fundamentals of this emerging technology. This introductory syllabus will enable learners to leverage their business and/or technical knowledge across IoT-related functions in the workplace.

LEARNING OUTCOMES

After undergoing the subject, students will be able to:

- understand the concepts of Internet of Things.
- understand what constitutes an IoT design solution
- identify the sensors and other devices needed for different IoT solutions
- understand the component parts of an IoT network and its connections
- build small IoT applications.

DETAILED CONTENTS

1. Introductionto Internet Of Things (IoT)   (10 Periods(

Introduction to IoT, Defining IoT, Things in IoT, Characteristics of IoT, Physical design of IoT, Logical design of IoT, Functional blocks of IoT,IoTProtocols,IoT communication Models, IoT communication API's,IoT enabling Technologies.

2. IoT Devices   (12 Periods)

How electronic devices fit with the Internet of Things, and why they are important

:   Breadboard and its internal connections,   ,LED and its connections ,Tri-color LED **,**Resistor

Introduction to the many 'end devices', sensors and actuators, differentiate between different sensor types

3. IoT Networks   (**12** Periods)

Introduction to the components of basic IoT networks, the types of network connections and how data travels through them, and the role of Internet Protocols.understanding of microcontrollers/Arduino and communication protocols

4.   (**12** Periods)

,feature of arduino device ,Ardunino device introductionComponents of Arduino boardC)Arduino Programming Language   ,Understanding of basic of Arduino IDE**,** function ,control statement ,loops ,datatype ,variables : (Language

5. IoT and M2M   (**1**0 Periods)

Introduction, M2M, Difference between IoT and M2M, SDN and NFV for IoT- Software defined networking, network function virtualization, IoT and WoT.

LIST OF PRACTICALS

- :

13. Installation of Arduino IDE
14. Interfacing Light Emitting Diode (LED)- Blinking LED
15. Interfacing Button and LED – LED blinking when button is pressed**.**
16. Interfacing Light Dependent Resistor (LDR) and LED, displaying automatic night lamp
17. Interfacing Temperature Sensor (LM35) and/or humidity sensor (e.g. DHT11)
18. Interfacing Liquid Crystal Display (LCD) – display data generated by sensor on LCD
19. Interfacing Air Quality Sensor-pollution (e.g. MQ135) - display data on LCD, switch on LED when data sensed is higher than specified value.
20. Interfacing Bluetooth module (e.g. HC05)- receiving data from mobile phone on Arduino and display on LCD
21. Interfacing Relay module to demonstrate Bluetooth based home automation application. (using Bluetooth and relay).

INSTRUCTIONAL STRATEGY

Some of the topics may be taught using question/answer, assignment, seminar or case study method. The teacher will discuss case studies with students   , since this subject is practical oriented, the teacher should demonstrate functioning of various sensors and demonstrate building of IoT applications. Solution to various regression and classification problems should also be built

MEANS OF ASSESSMENT

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

RECOMMENDED BOOKS

1. The Internet of Things: Connecting Objects to the Web,Wiley PublisherHakimaChaouchi
2. Internet of Things: A Hands On Approach, University Press,VijayMadisetti, ArshdeepBahga.
3. 21 Internet Of Things (IOT) Experiments,BPB Publications YashavantKanetkar
4. Arduino Projects For Engineers ,BPB Publications ,Neerparaj Rai
5. Internet of Things – A Hands on Approach, By ArshdeepBahga and Vijay Madisetti Universities Press, ISBN: 9788173719547
6. The Internet of Things , Pearson, By Michael Miller ISBN: 9789332552456
7. e-books/e-tools/relevant software to be used as recommended by AICTE/UPBTE/NITTTR, Chandigarh.

Websites for Reference:http://www.spoken-tutorial.org , http://swayam.gov.in

LIST OF COMPONENTS

1. One kit for 3-4 students : Arduino Uno, sensors(Bluetooth module(HC05), MQ135,

DHT11, breadboard , LCD, 2-relay module etc)

2. Consumables : LED, button, connecting wires, LDR, LM35, battery, etc

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Periods)	Marks Allotted (%)
1.	10	16
2.	12	22
3.	12	22
4.	12	22
5.	10	18
Total	**56**	**100**

5.6   MINOR PROJECT WORK

L   T   P
-   -   6

LEARNING OUTCOMES

After undergoing this subject, the student will be able to:
- Use effectively oral, written and visual communication
- Demonstrate skill and knowledge of current information and technological tools and techniques specific to the professional field of study.
- Identify, analyze and solve problems creatively through sustained critical investigation.
- Develop leadership abilities.
- Apply fundamental and disciplinary concepts and methods in ways appropriate to their areas of study.

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

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

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

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

The teachers along with field supervisors/engineers will conduct performance assessment of students. Criteria for assessment will be as follows:

	Criteria	Weightage
(a)	Attendance and Punctuality	15%
(b)	Initiative in performing tasks/creating	30%

	new things	
(c)	Relation with people	15%
(d)	Report Writing	40%

6.1   DEVELOPMENT OF ANDROID APPLICATIONS

RATIONALE

Knowing the details of Mobile and their working principle are need of the every common man. 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. Hence this subject.

LEARNING OUTCOMES

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

. • illustrate the usage of different components of Android OS in detail

• develop a mobile application using different components of Android

- choose appropriate controls to design the GUI to meet desired needs
- consume JSON data and call web services from Android mobile app.
- write a program in Android to store data in databases
- develop Mobile applications using Android

DETAILED CONTENTS

1. Introduction to ANDROID   (10 periods)

What is Android? Dalvik Virtual Machine & .apk file extension, Fundamentals: Basic Building blocks - Activities, Services, Broadcast Receivers & Content providers, UI Components - Views & notifications, Components for communication -Intents & Intent Filters, Android API levels (versions & version names)

2. Environment Setup and Basic Project Structure   (08 periods)

Setting up development environment Android, Manifest.xml, Gradle, Uses-permission & uses-sdk, Resources & R.java, Assets, Layouts & Drawable Resources, First sample Application, Launching emulator, Editing emulator settings, Emulator shortcuts, Logcat usage, Introduction to DDMS, Hello World App, Creating your first project The manifest file Layout resource, Running your app on Emulator, Debugging the Android App.

3. Android Fundaments and User Interface Design   (12 periods)

Activities and Activity lifecycle, Permission System

Basic UI Components:
Text View, Button, Radio Button , Edit Text, Image View for image, Check Box , Progress Bar, Event Handling in Android

Layouts:
Liner Layout, Relative Layout, Frame Layout, Coordinate Layout, [dip, dp, sip, sp] versus px

Intents:
Intents introduction and importance, Types of Intents (Explicit Intents, Implicit intents)

4. Menus and Preferences   (10 periods)

Introduction to Menus, Types of Menus (Option menu, Context menu), Uses of Shared Preferences

5. Advanced UI Components   (12 periods)

Time and Date, List View, Grid View, Card View, recycler view Adaptors (Base Adaptor, Array Adaptor) & View Holder, Dialogs, Toast, Popup, Fragments, Material Design(Introduction , Navigation, Floating Button , Tool bar).

6. Threads in Android   (12 periods)

Threads running on UI thread (run on UI Thread), Worker thread, Handlers & Runnable, AsynTask , calling web services and consuming JSON data from Web Services.

7. Notifications & Services   (10 periods)

Broadcast Receivers (Introduction, different ways to register a broadcast receiver), Introduction to Notification, Overview & Types of services, implementing a Service, Service lifecycle

8. Storage and Content Provider   (10 periods)

Supported Storage in Android (Internal memory, External memory, Shared Preferences and network), SQLite introduction, CRUD Operations in SQLite database (cursor, content values etc) , Basics of Content Provider

LIST OF PRACTICALS

1.   Install the Android Studio and Setup the Development Environment

2.   Write a program to demonstrate activity (Application 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 button and button
5.   Write a program to develop app having multiple activities and user should be able switch between the activities by using intents.
6.   Write a program to demonstrate list view
7.   Write a program to demonstrate photo gallery
8.   Write a program to demonstrate Date picker and time picker
9.   Develop an simple application with context menu and option menu.
10. Write a program to demonstrate the functionality of Shared Preferences.
11. Develop a sample Android application having navigation items similar to Gmail Application.
12. Write a program to demonstrate a service
13. Write a program to demonstrate the application of intent class
14. Write a program to create a text file in a external memory
15. Write a program to store and fetch data from SQL life database.

INSTRUCTIONAL STRATEGY

Since this subject is practice oriented, the teacher should demonstrate the capabilities of Android app to students while doing practical exercises. The students should be made familiar with developing mobile app and understand the basic concept of Android Platform.

MEANS OF ASSESSMENT

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

RECOMMENDED BOOKS

1. Beginning Android 4 Application Development   by Wei-Meng Lee ; Wiley India

2. Android Apps for Absolute Beginners by Jackson;   Apress

3. Head First Android Development: A Brain-Friendly Guide , by David Griffiths and

DawnGriffiths ,O`Relilly

4. Android Programming for Beginners , by John Horton, Packt Publishing

5. Professional Android, 4th Edition , by Reto Meier, lan Lake , Wrox Press

6. **Beginning Android Programming with Android Studio (Wrox Beginning Guides),**
by   Jerome DiMarzio, Wrox Press

7. E-books/e-tools/relevant software to be used as recommended by AICTE/NITTTR, Chandigarh.

Websites   for   Reference:http://swayam.gov.in   ,   http://spoken-tutorial.org   ,
https://developer.android.com

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Periods)	Marks Allotted (%)
1.	10	14
2.	08	08
3.	12	14
4.	10	12
5.	12	14
6.	12	14
7.	10	12
8.	10	12
Total	**84**	**100**

6.2 CLOUD COMPUTING

L T P

4 - 4

RATIONALE

This course offers a good understanding of cloud computing concepts and challenges faced in implementation of cloud computing.

LEARNING OUTCOMES

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

- explain core concepts of cloud computing paradigm.
- explain various Service Models
- explain various Deployment Models.
- describe SLA management in Cloud Computing
- explain and apply the concept of virtualization.
- describe the scheduling of tasks in cloud.
- illustrate the fundamental concepts of cloud storage.
- describe various security issues in the cloud.
- make use of cloud.

DETAILED CONTENTS

1. Introduction   (08 Periods)

    Evolution of Cloud Computing, Cloud Computing Overview, Characteristics, Applications, Benefits, Challenges.

2. Service and Deployment Models   (08 Periods)

    2.1 Cloud Computing Service Models: Infrastructure as a Service, Platform as a Service, Software as a Service;

    2.2 Cloud Computing Deployment Models: Private Cloud; Public Cloud, Community Cloud, Hybrid Cloud, Major Cloud Service providers.

3. Service Level Agreement (SLA) Management   (06 Periods)

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

4. Virtualization Concepts   (08 Periods)

Overview of Virtualization, Types of Virtualization, Benefits of Virtualization, Hypervisors.

5. Cloud Security   (06 Periods)

Infrastructure Security, Data Security & Privacy Issues, Legal Issues in Cloud Computing.

6. Cloud Storage   (08 Periods)

Overview; Storage as a Service, Benefits and Challenges, Storage Area Networks (SANs).

7. Scheduling in Cloud   (12 Periods)

Overview of Scheduling problem, Different types of scheduling, Scheduling for independent and dependent tasks, Static vs. Dynamic scheduling.

LIST OF PRACTICALS

1. Introduction to Cloud Vendors: Amazon, Microsoft, IBM.
2. Setting up Virtualization using Virtualbox/VMWare Hypervisor
3. Introduction to OwnCloud
4. Installation and configuration of OwnCloud software for SaaS
5. Accessing Microsoft AZURE cloud-services
6. Cloud Simulation Software Introduction: CloudSim

INSTRUCTIONAL STRATEGY

In addition to classroom teaching, the teacher should demonstrate the practical usage of cloud using real cloud services.

MEANS OF ASSESSMENT

− Assignments and Quiz/class tests, mid-term and end-term written tests
− Actual laboratory and practical work and Viva-Voce

RECOMMENDED BOOKS

1. Rajkumar Buyya, James Broberg, Andrzej Goscinski (Editors): Cloud Computing: Principles and Paradigms, Wiley, 2011

2. Kumar Saurabh, Cloud Computing, Wiley, 2012.
3. Barrie Sosinsky: Cloud Computing Bible, Wiley, 2011.
4. Judith Hurwitz, Robin Bloor, Marcia Kaufman,Fern Halper: Cloud Computing for Dummies, Wiley, 2010
5. E-books/e-tools/relevant software to be used as recommended by AICTE/NITTTR, Chandigarh.

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

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Periods)	Marks Allotted (%)
1.	08	14
2.	08	14
3.	06	11
4.	08	14
5.	06	11
6.	08	14
7.	12	22
Total	**56**	**100**

6.3 INDUSTRIAL MANAGEMENT AND ENTREPRENEURSHIP DEVELOPMENT

                                                                    L   T   P
                                                                    5   -   -

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. It may be further added that an entrepreneurial mindset with managerial skills helps the student in the job market. This subject focuses on imparting the necessary competencies and skills of enterprise set up and its management.

LEARNING OUTCOMES

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

- Know about various schemes of assistance by entrepreneurial support agencies
- Conduct market survey
- Prepare project report
- Explain the principles of management including its functions in an organisation.
- Have insight into different types of organizations and their structures.
- Inculcate leadership qualities to motivate self and others.
- Manage human resources at the shop-floor
- Maintain and be a part of healthy work culture in an organisation.
- Use marketing skills for the benefit of the organization.
- Maintain books of accounts and take financial decisions.
- Undertake store management.
- Use modern concepts like TQM, JIT and CRM.

DETAILED CONTENTS

SECTION – A

ENTREPRENEURSHIP

1. Introduction   (04 Periods)

    1.1 Concept /Meaning and its need
    1.2 Qualities and functions of entrepreneur and barriers in entrepreneurship
    1.3 Sole proprietorship and partnership forms and other forms of business organisations

1.4 Schemes of assistance by entrepreneurial support agencies at National, State, District –level, organisation: NSIC, NRDC, DC, MSME, SIDBI, NABARD, NIESBUD, HARDICON Ltd., Commercial Banks, SFC's TCO, KVIB, DIC, Technology Business Incubators (TBI) and Science and Technology Entrepreneur Parks

2. Market Survey and Opportunity Identification/Ideation   (04 Periods)

     2.1 Scanning of the business environment
     2.2 Salient features of National and Haryana State industrial policies and resultant business opportunities
     2.3 Types and conduct of market survey
     2.4 Assessment of demand and supply in potential areas of growth
     2.5 Identifying business opportunity
     2.6 Considerations in product selection
     2.7 Converting an idea into a business opportunity

3. Project report Preparation   (06 Periods)

     3.1 Preliminary project report
     3.2 Detailed project report including technical, economic and market feasibility
     3.3 Common errors in project report preparations
     3.4 Exercises on preparation of project report
     3.5 Sample project report

SECTION –B
MANAGEMENT

4. Introduction to Management   (06 Periods)

     4.1 Definitions and importance of management
     4.2 Functions of management: Importance and process of planning, organising, staffing, directing and controlling
     4.3 Principles of management (Henri Fayol, F.W. Taylor)
     4.4 Concept and structure of an organisation
     4.5 Types of industrial organisations and their advantages
     4.6 Line organisation, staff organisation
     4.7 Line and staff organisation
     4.8 Functional Organisation

5. Leadership and Motivation   (08 Periods)

5.1 Leadership: Definition and Need, Qualities and functions of a leader, Manager Vs leader, Types of leadership, Case studies of great leaders

5.2 Motivation: Definition and characteristics, Importance of self motivation, Factors affecting motivation, Theories of motivation (Maslow, Herzberg, Douglas, McGregor)

6. Management Scope in Different Areas   (14 Periods)

6.1 Human Resource Management: Introduction and objective, Introduction to Man power planning, recruitment and selection, Introduction to performance appraisal methods

6.2 Material and Store Management: Introduction functions, and objectives, ABC Analysis and EOQ

6.3 Marketing and sales: Introduction, importance, and its functions, Physical distribution, Introduction to promotion mix, Sales promotion

6.4 Financial Management: Introductions, importance and its functions, knowledge of income tax, sales tax, excise duty, custom duty, VAT, GST

7. Work Culture   (08 Periods)

7.1 Introduction and importance of Healthy Work Culture in organization
7.2 Components of Culture

7.3 Importance of attitude, values and behavior

7.4 Behavioural Science – Individual and group behavior.

7.5 Professional ethics – Concept and need of Professional Ethics and human values.

8. Basic of Accounting and Finance   (10 Periods)

8.1 Basic of Accounting:Meaning and definition of accounting, Double entry system of book keeping, Trading account, PLA account and balance sheet of a company

8.2 Objectives of Financial Management: Profit Maximization v/s Wealth Maximization

9. Miscellaneous Topics   (10 Periods)

9.1 Total Quality Management (TQM): Statistical process control, Total employees Involvement, Just in time (JIT)

9.2   Intellectual Property Right (IPR) : Introduction, definition and its importance, Infringement related to patents, copy right, trade mark

INSTRUCTIONAL STRATEGY

Some of the topics may be taught using question/answer, assignment, seminar or case study 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 organisations on visit. Approach extracted reading and handouts may be provided.

MEANS OF ASSESSMENT

- Assignments and quiz/class tests
- Mid-term and end-term written tests
- Model/Prototype making.

RECOMMENDED BOOKS

1. A Handbook of Entrepreneurship, Edited by BS Rathore and Dr JS Saini; Aapga Publications, Panchkula (Haryana)
2. Entrepreneurship Development and Management by J.S.Narang; Dhanpat Rai & Sons, Delhi.
3. Entrepreneurship Development by CB Gupta and P Srinivasan, Sultan Chand and Sons, New Delhi
4. Handbook of Small Scale Industry by PM Bhandari
5. Entrepreneurship Development and Management by MK Garg
6. E-books/e-tools/relevant software to be used as recommended by AICTE/ NITTTR, Chandigarh.

Websites for Reference:

http://swayam.gov.in

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Periods)	Marks Allotted (%)
1	04	06
2	04	06
3	06	08
4	06	08
5	08	12
6	14	20
7	08	12
8	10	14
9	10	14
Total	**70**	**100**

6.4.1   ADVANCED JAVA

L T P
6 - 6

RATIONALE

The diploma holders in Computer Science and Engineering need to understand how server side programming can be done using Java/J2EE Technology They should be able to connect the middle layer to backend and frontend by server side programming Hence this subject is introduced in the curriculum.

LEARNING OUTCOMES

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

- Understand Server Side Architecture of Web Applications
- Connect to Database and do the CRUD Database operations using JDBC
- Develop Web Application by using Servlets and JSP
- Manage Session in the web application
- . Understand Ajax Concept and uses

DETAILED CONTENTS

24.   Introduction Server Side Platform   (10 Periods)

Introduction to Web Applications, Dynamic websites, Three Layer Architecture of Web Application , Client Server Architecture , IP Address, Port, URL. Web Server, Introduction to Tomcat Web Server (Installation and its Services), Introduction toJ2EE

25.   Database Programming using JDBC   (14 Periods)

Introduction to JDBC, JDBC Drivers & Architecture, JDBC API
CURD operation Using JDBCAPI:
Database Connection, JDBC Statement, Prepared Statements (Advantages and Disadvantages), Using Result Sets

26.   Java Servlets   (17 Periods)

Servlet introduction, working of servlet, advantage of servlet, servlet terminology, Servlet Container, Life cycle of a servlet, introduction to servlet API, Servlet interface, Generics Servlet class, Http servlet class, RequestDispatcher (include() and forward).

27.   Handling Sessions in Servlets   (14 Periods)

Introductionto Session, Session Tracking mechanism:URL rewriting, Hidden form fields, Cookiesand Http Session (Working, Advantages and Disadvantages of all session tracking mechanism)

28. JSP   (17 Periods)

Introduction to JSP - Architecture, JSP- Life cycle, JSP-syntax, JSP-Directive, JSP-Actions, JSP- Implicit objects, JSP - Client request, JSP - Server response, JSP integration with database, JSP Session

29. AJAX   (12 Periods)

AJAX Introduction, XMLHttp, Request object, server response, AJAX events, Validation, Interaction with API

LIST OF PRACTICALS

1. Exercises related to make JDBC connections and CRUD operations on database by using JDBC APIs
2. Installation and configuration of Web Server Tomcat
3. Exercises related to Java Servlets
4. Exercises related to JSP
5. Exercises related to AJAX.
6. Exercises related to Session and Cookies.

INSTRUCTIONAL STRATEGY

Since this subject is practice oriented, the teacher should demonstrate the capabilities of server-side programming to students while doing practical exercises. The students should be made familiar with web server and dynamic web site development tools and techniques along with three tier architecture concept.

MEANS OF ASSESSMENT

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

RECOMMENDED BOOKS

8.   Head First Servlets And JSP , Bert Bates , O' Reilly
9.   Java Server Programming Java EE 7 (J2EE 1.7), Black Book , Kogent Learning Solutions Inc.
10.   Jdbc, Servlets, And Jsp Black Book, Santosh Kumar KDT Editorial Services , Wiley
11.   J2EE: The Complete Reference, Jim Keogh , McGraw Hill Education
12.   e-books/e-tools/relevant software to be used as recommended by AICTE/UPBTE/NITTTR, Chandigarh.

Websites for Reference:

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Periods)	Marks Allotted (%)
1	10	10
2	14	16
3	16	22
4	14	16
5	16	22
6	14	14
Total	**84**	**100**

6.4.2 .NET TECHNOLOGIES

L T P
6 - 6

RATIONALE

This is an upcoming technology. It is based on object oriented approach and is user friendly. It supports various languages such as C#, Asp.net etc. The demonstration should be given using Net software for describing the various features of Dot Net Technologies.

LEARNING OUTCOMES

After undergoing this subject, students will be able to:

- Know about basics of Net Framework and its working
- Know about C# basics and its programming concepts
- Learn about advanced and latest features of C#
- Know about ADO.net basics and its applications
- Know about programming aspects of ASP.net and its applications
- Design and develop a website using latest features of Asp.net and C# language

DETAIL CONTENTS

1. Net Framework   (15 Periods)

   Introduction, common language routine, common types system, common language specification, the base class library, the .net class library, Intermediate language. Justin-time compilation and assemblies, Introduction to web services, unified classes.

2. C# Basics   (15 Periods)

   Getting started with .net framework, exploring visual studio.net, Inside a C# program, data types, statements, arrays, using strings, objects, classes, struts, events, namespaces and important partial classes.

3. Advance Feature of C#   (09 Periods)

   Collection and data structure, exception handling, Threading using stream and files, assemblies.

4. ADO.net   (15 Periods)

   Introduction to ADO.net, ADO.net benefits, ADO.net compared to classic ADO- datasets, managed providers- data binding; Introducing data source controls- reading and write data using the Sql data source control.

5. ASP.net   (15 Periods)

Introduction to ASP.net, Working with web and HTML controls, using Rich sever controls, login controls, overview of ASP.net validation control using simple validations, using the complex validators, accessing data using ADO.net.

6. ASP.net 6.0   (15 Periods)

Features of ASP.net 6.0, stages in web form processing, Introduction to server controls, data binding controls, session state, ADO.net, database

Note: Use of latest version of Visual Studio (Visual Studio 2017 or above) is strongly recommended

LIST OF PRACTICALS

1. Write a program to check whether empty query string is entered in Asp.net
2. Write a program to change colour or Label text control programmatically in Asp. Net
3. Write a program to Enable-Disable Textbox and change width of TextBox programmatically in Asp.net
4. Write a program to increase and decrease font size programmatically
5. Write C# code to display the asterisk pattern as shown below:
   *****
   *****
   *****
   *****
   *****
6. Write C# code to prompt a user to input his/her name and country name and then the output will be shown as an example below:
   Hello Ram from country India!
7. Write C# code to do the following
   - Convert binary to decimal
   - Convert decimal to hexadecimal
   - Convert decimal to binary
   - Convert decimal to octal
8. Write a C# code to perform Celsius to Fahrenheit Conversion and Fahrenheit to Celsius conversion.
9. Write ASP. Net program to store objects in Session State and Storing Session State in SQL Server.
10. Problems regarding State Management.

RECOMMENDED BOOKS

1. Christan Nagel, Professional C#.net, Publication.
2. Mathew Macdonald and Robert Standefer, ASP.net complete reference, TMH
3. Vijay Mukhi, C# the Basis, BPB Publications
4. E-books/e-tools/relevant software to be used as recommended by AICTE/NITTTR, Chandigarh.

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Periods)	Marks Allotted (%)
1.	15	18
2.	15	18
3.	09	10
4.	15	18
5.	15	18
6.	15	18
Total	**84**	**100**

6.4.3   DATA SCIENCE AND MACHINE LEARNING

L T P

6 - 6

RATIONALE

The diploma holders in Computer Science and Engineering needs to understand about Data Science and Machine Learning and how to implement Machine Learning Algorithms. They should be able to solve real time problems using data science and Machine learning techniques. Hence this subject is introduced in the curriculum.

LEARNING OUTCOMES

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

- Understand the basics of Data Science
- Understand and develop Machine Learning Algorithms.
- Implement Dimensionality Reduction Techniques

DETAILED CONTENTS

Data Science

1. Introductionof data Science and Machine Learning   (12Periods)

    Fundamentalsof Artificial Intelligence, need and applications of Data Science, Data Mining, data preparation,Machine Learning , Types and Applications of Machine learning

2. Data Preprocessing, Analysis and Visualization   (10 Periods)

    Data Pre-processing: Pre-processing Techniques- Mean Removal, Scaling, Normalization, Binarization, One Hot Encoding, Label encoding, Data Analyses: Loading

and summarizing the dataset, Data Visualization:Univariate Plots, Multivariate Plots, Training Data, Test Data,Performance Measures

3. Statistical Inference (12 Periods)

Populations and samples,Types of Statistical modelling, Types of probability distributions. Parametric and Non-Parametric Methods, Distance Metrics

4. Exploratory Data Analysis and the Data Science Process (10 Periods)

Basic tools (plots, graphs and summary statistics) of EDA, Philosophy of EDA, The Data Science Process

5. Machine Learning Algorithms (12 Periods)

Introduction to Supervised Learning Algorithms –Decision Tree,Linear Regression, k-Nearest Neighbours (k-NN), SVM and Introduction to Unsupervised Learning Algorithms - K-means Clustering,MeanShiftAlgorithm,Dimensionality Reduction Techniques, Introduction to Neural Networks,

6. Mining Social-Network Graphs (10 Periods)

Social networks as graphs, Clustering of graphs, Direct discovery of communities in graphs,Partitioning of graphs, Neighbourhood properties in graphs

7. Data Science and Ethical Issues (16 Periods)

Discussions on privacy, security, ethics,A look back at Data Science, Next-generation data scientists

LIST OF PRACTICALS

1. WAP to implement the Decision Tree Algorithm
2. WAP to implement the Linear Regression
3. WAP to implement the k-Nearest Neighbors (k-NN)
4. WAP to implement the SVM Algorithm
5. WAP to implement the K-means Clustering
6. WAP to implement various Distance Metrics
7. WAP to implement Dimensionality Reduction Techniques

INSTRUCTIONAL STRATEGY

The subject is conceptual and practical based. Students should be given clear idea about the basic concepts of Data Science and Machine Learning. In practical session student should be asked to explain the algorithm and then write program for algorithm and run on computer. It is required that students should maintain records (files with printouts).

MEANS OF ASSESSMENT

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

RECOMMENDED BOOKS

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

Websites for Reference:

http://www.spoken-tutorial.org

http://swayam.gov.in

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Periods)	Marks Allotted (%)
1.	14	17
2.	10	12
3.	12	14
4.	10	12
5.	12	14
6.	10	12
7.	16	18
Total	**84**	**100**

6.5   MAJOR PROJECT WORK

RATIONALE

Major Project Work aims at developing innovative skills in the students whereby they apply in totality the knowledge and skills gained through the course work in the solution of particular problem or by undertaking a project. The individual students have different aptitudes and strengths. Project work, therefore, should match the strengths of students. For this purpose, students should be asked to identify the type of project work, they would like to execute. It is also essential that the faculty of the respective department may have a brainstorming to identify suitable project assignments for their students.   The project assignment can be individual assignment or a group assignment. There should not be more than 3 students if the project work is given to a group. The students should identify themselves or accept the given project assignment at least two to three months in advance. The project work identified in collaboration with industry should be preferred. Each teacher is expected to guide the project work of 5–6 students.

The project assignments may consist of:

- Programming customer based applications
- Web page designing (Only dynamic)
- Database applications
- Software Development

LEARNING OUTCOMES

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

- Use effectively oral, written and visual communication
- Demonstrate skill and knowledge of current information and technological tools and techniques specific to the professional field of study.
- Identify, analyze and solve problems creatively through sustainment critical investigation.
- Develop, leadership abilities..
- Apply fundamental and disciplinary concepts and methods in ways appropriate to their areas of study.

A suggestive criterion for assessing student performance by the external (personnel from industry) and internal (teacher) examiner is given in table below:

Sr. No	Performance criteria	Max.** marks	Rating Scale				
			Excellent	Very Good	Good	Fair	Poor
1.	Selection of project assignment	10	10	8	6	4	2
2.	Planning and execution of considerations	10	10	8	6	4	2
3.	Quality of performance	20	20	16	12	8	4
4.	Providing solution of the problems or production of final product	20	20	16	12	8	4
5.	Sense of responsibility	10	10	8	6	4	2
6.	Self expression/ communication skills	5	5	4	3	2	1
7.	Interpersonal skills/human relations	5	5	4	3	2	1
8.	Report writing skills	10	10	8	6	4	2
9.	Viva voce	10	10	8	6	4	2
	Total marks	**100**	**100**	**80**	**60**	**40**	**20**

The overall grading of the practical training shall be made as per following table

	Range of maximum marks	Overall grade

i)	More than 80	Excellent
ii)	79 <> 65	Very good
iii)	64 <> 50	Good
iv)	49 <> 40	Fair
v)	Less than 40	Poor

In order to qualify for the diploma, students must get "Overall Good grade" failing which the students may be given one more chance of undergoing 8 -10 weeks of project oriented professional training in the same industry and re-evaluated before being disqualified and declared "not eligible to receive diploma ". It is also important to note that the students must get more than six "goods" or above "good" grade in different performance criteria items in order to get "Overall Good" grade.

Important Notes

1. **These criteria must be followed by the internal and external examiner and they should see the daily, weekly and monthly reports while awarding marks as per the above criteria.**

2. **The criteria for evaluation of the students have been worked out for 100 maximum marks. The internal and external examiners will evaluate students separately and give marks as per the study and evaluation scheme of examination.**

3. **The external examiner, preferably, a person from industry/organization, who has been associated with the project-oriented professional training of the students, should evaluate the students performance as per the above criteria.**

4. **It is also proposed that two students or two projects which are rated best be given merit certificate at the time of annual day of the institute. It would be better if specific nearby industries are approached for instituting such awards.**

The teachers are free to evolve another criterion of assessment, depending upon the type of project work.

The students must submit a project report of not less than 50 pages (excluding coding). The report must follow the steps of Software Engineering Concepts

It is proposed that the institute may organize an annual exhibition of the project work done by the students and invite leading Industrial organizations in such an exhibition. It is also proposed that two students or two projects which are rated best be given merit certificate at the time of annual day of the institute. It would be better if specific industries are approached for instituting such awards.

10. RESOURCE REQUIREMENT

10.1 Physical Resources

10.1.1 Space Requirement:

Norms and standards laid down by All India Council for Technical Education (AICTE) may be followed to work out space requirement in respect of class rooms, tutorial rooms, drawing halls, laboratories, space required for faculty, student amenities and residential area for staff and students.

10.1.2 Laboratories/Shops

- Communication Skill Lab

- Applied Physics Lab

- Applied Chemistry Lab

- Technical Drawing

- Electrical Engineering Lab

- Carpentry Shop

- Painting and Polishing Shop

- Fitting and Plumbing Shop

- Sheet Metal Shop

- Programming Lab

- Hardware and Networking Lab

- Internet of Things (IoT) Lab

- Environment Engineering Lab

- Energy Conservation Lab

LIST OF EQUIPMENT FOR COMPUTER SCIENCE AND ENGINEERING

Sr. No.	Description	Qty	Total Price (Rs)
COMMUNICATION SKILL LABORATORY			
1.	Stools	40	10,000
2.	Display Board/Screen	2	6,000
3.	Sound recording and playing system	1	6,000
4.	Audio cassettes	60	2,000
5.	Overhead Projector	1	5,000
6.	Transparencies slides	100	500
7.	TV, VCR and camera for video recording	1 each	20,000
8.	English spoken course	1	2,000
9.	A Quiz room equipped with two way audio system, back projection system and slide projector	1	30,000
10.	Miscellaneous	LS	1,500
APPLIED PHYSICS LABORATORY			
1.	Vernier calipers Working length 160 mm, Internal and external dia with locking arrangement	12	2,000
2.	Screw Gauges Working length 15 mm, pitch 0.5 mm, least count .005 mm	12	2,000
3.	Spherometers Distance between legs 2.5 mm, pitch 0.5 mm, least count .005 mm.	12	2,000
4.	Mirrors (convex, concave)	5 Each	1,500
5.	Pendulum Setup	02	4,000
6.	Gravesand's Apparatus	02	3,000

7.	Inclined Plane Setup	02	2,000
8.	Flywheel Setup	02	4,000
9.	Prism	05	1,500
10.	Spectrometer	02	25,000
11.	DC Ammeters Moving coil weston-type ammeter with ebonite stand	10	3,500
12.	DC Miliammeters	2	1,000
13.	DC Microammeters	2	700
14.	DC voltmeters	10	700
15.	DC Millivoltmeters	10	2,000
16.	Sensitivity Galvanometer	2	800

Sr. No.	**Description**	Qty	Total Price (Rs)
17	Student Galvanometers	10	4,000
18.	Demonstration type DC Ammeters Range; 0 to 1 Amp.	2	1,000
19.	D type DC Voltmeter Range : 0 to 1 Volt	2	1,000
20.	D type Galvanometers Sensitivity : 20 microamperes per scale division,	8	8,000
21.	Resistance boxes (dial type) assorted	8	8,000

22.	Rheostats	10	4.000
23.	Miscellaneous items (Spring, Pan, Glycerine, Optic fibre, Ferromagnetic material)	LS	2,000
24.	Fortin's Barometer (Wall type)	2	20,000
25.	Stoke's Apparatus	2	10,000
26.	Gumther's Apparatus	2	16,000
27.	Resonance Tube Apparatus with accessories and Tuning fork set	2	14,000
28.	Sodium Lamp setup with Biprism	2	10,000
29.	Ohmic resistance coil	10	5,00
30.	Slide wire bridge	2	8,000
31.	PN Junction diode Apparatus	2	10,000
32.	Laser (as per requirement)	1	1,00,000
33.	Numerical aperture setup	1	25,000
34.	Miscellaneous	LS	3,000

APPLIED CHEMISTRY LABORATORY

1.	Digital Balance	1	80,000
2.	Burette 50ml	30	3,000
3.	Pipette 25ml	60	4,000
4.	Beakers 100ml	60	4,000
5.	Burette stand	30	30,000
6.	Glazed tile	30	1,000
7.	Conical flask 50ml (Titration flask)	60	4,000
8.	Standard (Measuring) flask (to prepare standard solution) 250ml/100ml	30	6,000
9.	Able's Flash Point apparatus	2	10,000
10.	(1/10)°C thermometer	06	6,000

11.	Candles	20	100
12.	Crucible with lid	06	2,000
13.	Muffle furnace	1	18,000

Sr. No.	Description	Qty	Total Price (Rs)
14.	Decicators	06	8,000
15.	Pair of tongue (small and big)	24 (small) 2 (big)	2,000

16.	Chemicals - EDTA-1 kg - Eriochrome Black-T(solochrome black T)-200g - Buffer solution (NH_3 - 2.5 ltr, NH_4Cl – 1 kg) - Zinc sulphate- 500g - H_2SO_4- 2.5 ltr - Phenolphthalein indicator (as per requirement) - Methyl orange indicator (as per requirement) - Charcoal (as per requirement) - Kerosene- 1 ltr	LS	20,000
17.	Miscellaneous	LS	2,000

TECHNICAL DRAWING

1.	Drawing Boards (700 x 500mm)	60	25,000
2.	Draughtsman Tables	60	1,80,000
3.	Draughtsman Stools	60	40,000
4.	Computer Aided Drawing (CAD) Software	30 User	5,00,000
5.	Model of different wooder joints	1	1,000
6.	Model of different screw threads	1	1,000
7.	Model of various locking devices	1	1,000
8.	Model of various joints	1	1,000
9.	Cut section Model of various couplings	1	3,000
10.	Miscellaneous	LS	5,000

ELECTRICAL ENGINEERING LABORTORY

1.	Voltmeter	5	7,500
2.	Ammeter	5	10,000
3.	CRO	1	15,000
4.	Wattmeter	5	10,000
5.	Multimeter	1	4,000
6.	Resistive load	1	4,000
7.	Regulated supply	1	8,000
8.	Signal generator	1	5,000

9.	Rheostat	2	2,500
10.	Lead acid battery	1	4,000
11.	Cables, Coils, Lamp (as per requirements)	LS	1,500
12.	Resistance, Inductor, Capacitor (as per requirements)	LS	1,500
13.	Miscellaneous	LS	1,500

CARPENTRY SHOP

Sr. No.	Description	Qty	Total Price (Rs)
1	Work benches fitted with carpenter vices	5	20,000
2.	Circular saw grinder	1	6,000
3.	Wood cutting band saw-vertical	1	10,000
4.	Bench grinder	1	5,000
5.	Drilling machine	1	8,000
6.	Wood turning lathe	1	40,000
7.	Wood Planner	1	20,000
8.	Tool accessories measuring and marking Instruments	25	25,000
9.	Band saw blade brazing unit	1	10,000
10.	Miscellaneous	LS	1,500

PAINTING AND POLISHING SHOP

1.	Spray gun with hose pipe	1	1,000
2.	Paint brushes	20	2,000
3.	Paint/Varnish	LS	2,000
4.	Air Compressor with 2 hp motor	1 set	10,000
5.	Miscellaneous	LS	2,000

FITTING AND PLUMBING SHOP

1.	Work benches with vices (4 vices on each bench)	5	30,000
2.	Marking tables with scribers	4	24,000
3.	Surface plates	5	20,000

4.	Accessories like calipers, V blocks, height, gauges steel rules and scribers	25	50,000
5.	Tool kits – taps, dies, drills	25	40,000
6.	Tool kits – chiesels, hammers, files, hacksaw	25	25,000
7.	Drilling machine	2	12,000
8.	Pipe vice	4	1,000
9.	Chain wrenches	5	1,250
10.	Ring spanner set	5	600
11.	Pipe die set 2"	2 set	1,000
12.	Pipe bending device	1	5,000
13.	Various plumbing fittings	LS	2,000
14.	Miscellaneous	LS	1,500
SHEET METAL			
1.	Hammers	8	3,000
2.	Mallets (Hard & Soft)	5	2,000
3.	Sheet and wire Ganges	LS	8,00
4.	Shearing Machine	1	20,000
Sr. No.	**Description**	**Qty**	**Total Price (Rs)**
5.	Bar folding Machine	1	20,000
6.	Burring machine	1	10,000
7.	Various sheet (black plain, galvanized iron, corrugated, Aluminium)	1 Each	1,000
8.	Hand Shears/Snippers	4	2,000
9.	Nuts, Bolts, Rivets, Screw	LS	5,00

10.	Miscellaneous	LS	1,000
PROGRAMMING LAB			
1.	Computer Server (Quad core, intel processor 32 GB RAM)	1	5,00,000/-
2.	Computer Desktop (i7,8th Generation, 1TB Hard disk, 8Gb RAM, Pre loaded window with 5 year warranty)	60	48,00,000/-
3.	Switch with 24 port speed 10/100/1000 (Manageable)	3	1,50,000/-
4.	Multifunctional Laser/Ink tank Printer	3	90,000/-
5.	Multifunctional Printer, A3 size	1	40,000/-
6.	Plotter	1	80,000/-
7.	Scanner	1	65,000/-
8.	Laptop	1	75,000/-
9.	Online UPS, 6KVA	2	2,00,000/-
10.	Digital Camera, HD quality	1	30,000/-
11.	Handy Cam	1	25,000/-
12.	Internet Connectivity	60 Nodes	3,00,000/-
13.	LCD/DLP Projector with Screen	1	25,000/-
14.	Linux Operating System (Open Source)	-	-
15.	Visual Studio Community Edition (Freeware, Open Source)	-	-
16.	Visual Studio Code (Open Source)	-	-
17.	Multimedia Tools – Software - Blender (Freeware) - Gimp Animation Tool (Freeware)	-	-
18.	Mongo DB (Freeware)	-	-
19.	Python IDE (PyCharm/Eclipse with PyDev/VS Code etc) – Freeware	-	-
20.	HTML & CSS, Java Script, Ajax (Open Source)	-	-
21.	PHP IDE XAMPP/WAMPP/VS Code(Freeware)	-	-
22.	Word press (Open Source)	-	-
23.	Oracle XE (Freeware)/MySql(Open Source)	-	-
24.	Corel Draw latest version or equivalent FOSS	10 User	2,00,000/-
Sr. No.	**Description**	**Qty**	**Total Price (Rs)**

25.	Adobe Creative Suite	10 User	2,50,000/- Per year
26.	Rstudio(Open Source)	-	-
27.	Macromedia Director latest version or equivalent FOSS	4 User	2,00,000/-
28.	Multimedia authoring Tools	LS	1,00,000/- Per year
29.	Java for Internet Environment (latest version) – software	-	-
30.	MS Office latest or equivalent FOSS - Libre Office/Open Office (Freeware)	1 -	20,000/- Per year -
31.	Compiler Turbo C, C++ or equivalent FOSS	1	10,000/-
32.	Web camera, Mike and speakers	LS	20,000/-
33.	Air Conditioner 2 ton	2	70,000/-
34.	STARUML(Open Source)	-	-
35.	J-Meter (Performance Testing)- Open Source	-	-
36.	Lucid Chart (Developing DFD Model)- Open Source	-	-
37.	Selenium (functional Testing and Web Application)- Open Source	-	-
38.	J Unit (Java Testing) Open Source	-	-
39.	Cross browser Testing (Compatibility Testing) - Open Source	-	-
40.	Gantt Project (Project Plan)- Open Source	-	-
41.	Video Editing Tools(Open Source)	-	-
42.	- Eclipse IDE for Java programming/JDK (Open Source) - Apache Tomcat Web Server for Advanced Java Web Applications	- -	- -
43.	Antivirus Software	5 Users	10,000/-
44.	Miscellaneous- cables and connectors, computer stationery, printer consumables (inks), toner etc.	LS	30,000/-
HARDWARE AND NETWORKING LAB			
1.	Computer Server (Quad core, intel processor 32 GB RAM)	1	5,00,000/-
2.	Computer Desktop (i7,8th Generation, 1TB Hard disk, 8Gb RAM, Pre loaded window with 5 year warranty)	21	16,00,000/-
3.	Online UPS, 6KVA	1	1,00,000/-

Sr. No.	Description	Qty	Total Price (Rs)
4.	Switch with 24 port speed 10/100/1000 (Manageable)	1	50,000/-
5.	Connectors (RJ-45, RJ-11, BNC, SC, ST)	LS	10,000/-

Sr. No.	Description	Qty	Total Price (Rs)
6.	Cables: (UTP,STP,OFC) - 25 m each	LS	10,000/-
7.	Multifunctional Laser/Ink tank Printer	1	30,000/-
8.	Router	1	40,000/-
9.	Modem cum Router	2	10,000/-
10.	Compact Disk/DVD R/W	100	2000/-
11.	Hardware kit (for computer Assembling/de-assembling)	8	1,50,000/-
12.	External Hard Disk	4	30,000/-
13.	Networking Printer	1	1,25,000/-
14.	Internet Connectivity	21 Nodes	1,00,000/-
15.	Computer System Demonstration Kit	1	1,50,000/-
16.	Printer Demonstration Kit	1	1,00,000/-
17.	SMPS Demonstration Kit	1	20,000/-
18.	LAN Trainer	4	10.000/-
19.	Antivirus Software	5 Users	10,000/-
20.	Unmanaged Switch	4	60,000/-
21.	Hub	2	20,000/-
22.	Air Conditioner 2 ton	2	70,000/-
23.	Miscellaneous- cables and connectors, computer stationery, printer consumables (inks), toner etc.	LS	30,000/-
INTERNET OF THINGS (IoT) LAB (For IoT, Android and Major/Minor Project)			
1.	Computer Desktop (i7,8th Generation, 1TB Hard disk, 8Gb RAM, Pre loaded window with 5 year warranty)	60	48,00,000/-
2.	Switch with 24 port speed 10/100/1000 (Manageable)	1	50,000/-
3.	Multifunctional Laser/Ink tank Printer	1	30,000/-

Sr. No.	Description	Qty	Total Price (Rs)
4.	Online UPS, 6KVA	2	2,00,000/-
5.	Touch screen, 60 inch	1	5,00,000/-
6.	Laptop	1	75,000/-
7.	Internet Connectivity	60 Nodes	3,00,000/-
8.	Photocopier Compatible with Computer System: Colour/Mono Photo-copier	1	1,50,000/-
9.	LCD/DLP Projector with Screen	1	25,000/-
10.	Video Conferencing System	1	2,00,000/-
11.	Android Studio (Open Source)	-	-
12.	Antivirus Software	5 Users	10,000/-

Sr. No.	Description	Qty	Total Price (Rs)
13.	Windows Latest or equivalent FOSS	1	10,000/-
14.	SciLab(Open Source)	-	-
15.	Microsoft Azure/AWS/EC2 (Open Source)	-	-
16.	Own Cloud (Open Source)	-	-
17.	CloudSim(Open Source)	-	-
18.	Digital Board	1	30,000/-
19.	Air Conditioner 2 ton	2	70,000/-
20.	Arduino Uno IDE with built in Wifi	20	20,000/-
21.	Raspberry pi	2	6,000/-
22.	Sensor Kits (e.g. MQ135, DHT11 etc.)	10	1,00,000/-
23.	Bluetooth module HC05	10	3,500/-
24.	Display Screen	5	1,000/-
25.	Relay Module	5	5,000/-
26.	Miscellaneous- cables and connectors, computer stationery, printer consumables (inks), toner etc.	LS	30,000/-
ENVIRONMENT ENGINEERING LABORATORY			

1.	pH Meter	01	500
2.	Turbidity Meter	01	5000
3.	Oven with Temperature Controller and Forced Air Circulation Type	01	20000
4.	B.O.D. Incubator	01	25000
5.	Water Analysis Kit	01	5000
6.	High Volume Sampler	01	40000
7.	Electrical Balance for weighing upto 1/10 of milligram (capacity)	01	1000
ENERGY CONSERVATION LABORATORY			
1	Clamp meter	02	5000
2	Multimeter	02	2000
3	Power Analyser	01	20000
4	Different types of lamps (LS) − 60 W lamp, 230 V , 100 V − 200 W lamp − 500 W lamp − 100 W lamp, 110 V, 150 V	10	500
5	Lux meter	02	5000
6	Centrifugal pump, 1 kW	1	15,000
7	Standard window A.C.	01	20000
8	Anemometer	02	5000
9	Thermometer	03	2000
10	Flow meter	02	10000
11	Pumping set with at least two pumps of different capacity.	1 set	10000
12	Pressure gauge fitted on discharge lines	1 set	2000
13	Variable Frequency Drive	02	50000
14	A small compressor with a small network of pipe line fitted with suitable pipeline, pressure gauge, safety valve	1	3000

	and loading / unloading pressure switch.		
15	Stop watch	2	1000
16	Small blower (1.5 kW motor) with inlet and outlet ducts of approximately one meter length on both sides	1	10000
17	Black Box (for checking lamp efficacy including stand and luxmeter)	1	25000

NOTE

In addition to above laboratories, computer centre will be required for effective implementation of the course.

10.1.3 **Furniture Requirement**

Norms and standards laid down by AICTE be followed for working out furniture requirement for this course.

-        Furniture for laboratories/Computer Centre   15 lacs

10.2 **Human Resources**

Weekly work schedule, annual work schedule, student teacher ratio for various group and class size, staffing pattern, work load norms, qualifications, experience and job description of teaching staff workshop staff and other administrative and supporting staff be worked out as per norms and standards laid down by the AICTE. The website www.aicte.ernet.in may be referred for downloading current norms and standards pertaining to technician courses.

11.   EVALUATION STRATEGY
11.1   INTRODUCTION

Evaluation plays an important role in the teaching-learning process. The major objective of any teaching-learning endeavor is to ensure the quality of the product which can be accessed through learner's evaluation.

The purpose of student evaluation is to determine the extent to which the general and the specific objectives of curriculum have been achieved. Student evaluation is also important from the point of view of ascertaining the quality of instructional processes and to get feedback for curriculum improvement. It helps the teachers in determining the level of appropriateness of teaching experiences provided to learners to meet their individual and professional needs. Evaluation also helps in diagnosing learning difficulties of the students.   Evaluation is of two types: Formative and Summative (Internal and External Evaluation)

Formative Evaluation

It is an on-going evaluation process. Its purpose is to provide continuous and comprehensive feedback to students and teachers concerning teaching-learning process. It provides corrective steps to be taken to account for curricular as well as co-curricular aspects.

Summative Evaluation

It is carried out at the end of a unit of instruction like topic, subject, semester or year. The main purpose of summative evaluation is to measure achievement for assigning course grades, certification of students and ascertaining accountability of instructional process. The student evaluation has to be done in a comprehensive and systematic manner since any mistake or lacuna is likely to affect the future of students.

In the present educational scenario in India, where summative evaluation plays an important role in educational process, there is a need to improve the standard of summative evaluation with a view to bring validity and reliability in the end-term examination system for achieving objectivity and efficiency in evaluation.

11.2 STUDENTS' EVALUATION AREAS

The student evaluation is carried out for the following areas:

- Theory
- Practical Work (Laboratory, Workshop, Field Exercises)
- Project Work
- Professional Industrial Training

A. Theory

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 sessional /class-tests, home-assignments, tutorial-work, seminars, and group discussions etc. For end-term evaluation of theory, the question paper may comprise of three sections.

Section-I

It should contain objective type items e.g. multiple choice, matching and completion type. Total weightage to Section-1 should be of the order of 20 percent of the total marks and no choice should be given in this section. The objective type items should be used to evaluate students' performance in knowledge, comprehension and at the most application domains only.

Section-II

It should contain short answer/completion items. The weightage to this section should be of the order of 40 percent of the total marks. Again, no choice should be given in section-II

Section-III

It may contain two to three essay type questions. Total weightage to this section should be of the order of 40 percent of the total marks. Some built-in, internal choice of about 50 percent of the questions set, can be given in this section

Table II : Suggested Weightage to be given to different ability levels

Abilities	Weightage to be assigned
Knowledge	10-30 percent
Comprehension	40-60 percent
Application	20-30 percent
Higher than application i.e. Analysis, Synthesis and Evaluation	Upto 10 percent

B.   Practical Work

Evaluation of students performance in practical work (Laboratory experiments, Workshop practicals/field exercises) aims at assessing students ability to apply or practice learnt concepts, principles and procedures, manipulative skills, ability to observe and record, ability to interpret and draw conclusions and work related attitudes. Formative and summative evaluation may comprise of weightages to performance on task, quality of product, general behaviour and it should be followed by viva-voce.

C.   Project Work

The purpose of evaluation of project work is to assess students ability to apply, in an integrated manner, learnt knowledge and skills in solving real life problems, manipulative skills, ability to observe, record, creativity and communication skills.   The formative and summative evaluation may comprise of weightage to nature of project, quality of product, quality of report and quality of presentation followed by viva-voce.

D.   Professional Industrial Training

Evaluation of professional industrial training report and viva-voce/ presentation aims at assessing students' understanding of materials, 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.   The formative and summative evaluation may comprise of weightages to performance in testing, general behaviour, quality of report and presentation during viva-voce.

11.3   ASPECTS OF QUESTION PAPER SETTING

Validity and reliability are the most important considerations in the selection and construction of evaluation procedures. First and foremost are the evaluation tools to measure the specific outcomes for which they are intended to measure. Next in importance is reliability, and following that is a host of practical features that can be classified under the heading of usability.

For weightage of marks assigned to formative (internal) and summative (external) evaluation and duration of evaluation has been given in the study and evaluation scheme of the curriculum document. Teachers/Paper-setters/Examiners may use Manual for Students' Evaluation developed by National Institute of Technical

Teachers' Training & Research, Sector-26, Chandigarh to bring objectivity in the evaluation system. The working group found it very difficult to detail out precisely the contents of subject on **languages** and therefore teachers may send guidelines to respective examiners for paper setting to maintain objectivity in evaluation.

12.   RECOMMENDATIONS FOR EFFECTIVE CURRICULUM IMPLEMENTATION

This curriculum document is a Plan of Action (POA) and has been prepared based on exhaustive exercise of curriculum planning and design. The representative sample comprising selected senior personnel (lecturers and HODs) from various institutions and experts from industry/field have been involved in curriculum design process.

The document so prepared is now ready for its implementation. It is the faculty of polytechnics who 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 a proper mix of different teaching methods in all these places of instruction only can bring the changes in stipulated students behaviour as in the curriculum document. It is important for the teachers to understand curriculum document holistically and further be aware of intricacies of teaching-learning process (T-L) for achieving curriculum objectives. Given below are certain suggestions which may help the teachers in planning and designing learning experiences effectively. These are indicative in nature and teachers using their creativity can further develop/refine them. The designers of the programme suggest every course teacher to read them carefully, comprehend and start using them.

(A)   Broad Suggestions:

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.   Punjab State Board of Technical Education (PSBTE) may make the academic plan available to all polytechnics well in advance. The Principals have a great role to play in its dissemination and, percolation upto grass-root level. Polytechnics in

turn are supposed to prepare institutional academic plan by referring state level PSBTE plan.

3. HOD of every Programme Department along with HODs and incharges of other departments viz. English, Maths, Physics, Chemistry etc. are required to prepare academic plan at department level referring institutional academic plan.

4. All lecturers/Senior lecturers are required to prepare course level and class level lesson plans referring departmental academic plan.

(B) Course Level Suggestions

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.

Polytechnic teachers are required to plan various instructional experiences viz. theory lecture, expert lectures, lab/workshop practicals, guided library exercises, field visits, study tours, camps etc. In addition, they have to carry out progressive assessment of theory, assignments, library, practicals and field experiences. Teachers are also required to do all these activities within a stipulated period of 16 weeks which is made available to them in the academic plan at PSBTE 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 to carry out T-L process effectively:

1. Teachers are required to prepare a course plan, taking into account departmental academic plan, number of weeks available, course to be taught, different learning experiences required to be developed etc.

2. Teachers are required to prepare lesson plan for every theory class. This plan may comprise of content to be covered, learning material (transparencies, VCDs, Models etc.) for execution of a lesson plan. They may follow steps for preparing lesson plan e.g. drawing attention, state instructional objectives, help in recalling pre-requisite knowledge, deliver planned subject content, check desired learning outcome and reinforce learning etc.

3. Teachers are required to plan for expert lectures from field/industry. Necessary steps are to plan in advance, identify field experts, make correspondence to invite them, take necessary budgetary approval etc.

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

5. Concept and content based field visits with appropriate releases (day-block) may be planned and executed for such content of course which otherwise is abstract in nature and no other requisite resources are readily available in institute to impart them effectively.

6. There is a dire need for planning practical experiences in right perspective. These slots in a course are the avenues to use problem based learning/activity learning/ experiential learning approach effectively. The development of lab instruction sheets for the course is a good beginning to provide lab experiences effectively.

7. Planning of progressive assessment encompasses periodical assessment in semester, preparation of proper quality question paper, assessment of answer sheets immediately and giving constructive explicit feed back to every student. It has to be planned properly; otherwise very purpose of the same is lost.

8. The co-curricular activities like camp, social gathering, study tour, hobby club etc. may be used to develop generic skills like task management, problem solving, managing self, collaborating with others etc.

9. Where ever possible, it is essential to use activity based learning rather than relying on delivery based conventional teaching all the time.

10. While imparting instructions, emphasis may be laid on the development of cognitive, psychomotor, reactive and interactive skills in the students.

11. Teachers may take working drawings from the industry/field and provide practices in reading these drawings.

12. Considerable emphasis should be laid in discipline specific contracting and repair and maintenance of machines, tools and installations.

13. Teachers may take initiative in establishing liaison with industries and field organizations for imparting field experiences to their students.

14. Case studies and assignments may be given to students for understanding of Enterprise Resource Management (ERM).

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

16. Students may be given relevant and well thought out minor and major project assignments, which are purposeful and develop practical skills. This will help students in developing creativity and confidence for their gainful employment (wage and self).

17.   A Project bank may be developed by the concerned department of the polytechnics in consultation with related Industry, Research Institutes and other relevant field organizations in the state.

13.   LIST OF PARTICIPANTS

The following experts have participated in workshop for Developing the Curricula Structure and Contents of various Diploma Programmes for UP State on 5-6 April, 2018 at NITTTR, Chandigarh:

1. Sh. Pankaj Yadav, Assistant Director, Directorate of Technical Education, Kanpur

2. Sh. Lal Ji Patel, Text Book Officer/CDC Officer, IRDT, Kanpur

3. Mohd. Qamruzzaman, Lecturer English, Government Polytechnic, Kanpur

4. Sh. Anjani Kumar Sharma, HOD, Chemical Engg. Government Polytechnic, Chandari

5. Dr. Balram, Lecturer Maths, Government Polytechnic, Lucknow

6. Sh. Sanjay Kumar Singh, Lecturer, Electrnics, Government Polytechnic, Aurai, Bhadohi, UP.

7. Sh. Nirdosh Kumar, Lecturer, Electrical Engg. Government Polytechnic, Naraini, Banda

8. Sh. Vinod Sonthwal, Lecturer, Civil Engg. NITTTR, Chandigarh

9. Sh. Vikas Choudhary, Lecturer, Civil Engg. Government Polytechnic, Changipur, Bijnor

10. Sh. Ashish Kumar, Head, Mechanical Engg.Government Polytechnic, Narwana Khurd, Meerut

11. Sh. Gopal Chandra Nayak, Assistant Professor, Regional Institute of English, Sector 32-C, Chandigarh.

12. Sh. Amit Doegar, Assistant Professor, Computer Science and Engg. NITTTR, Chandigarh

13. Dr. Kanika Sharma, Assistant Professor, ECE, NITTTR, Chandigarh

14. Mrs. Shano Solanki, Assistant Professor, Computer Science and Engg. NITTTR, Chandigarh

15. Dr. Lini Mathew, Associate Professor, Electrical Engg. NITTTR, Chandigarh

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

17. Mrs. Rama Chhabra, Associate Professor, CDC, NITTTR, Chandigarh

18. Dr. AB Gupta, HOD, CDC, NITTTR, Chandigarh- Coordinator

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20. Dr. P. Sudhakar Rao, Assistant Professor, Mechanical Engg. NITTTR, Chandigarh

21. Sh. Kamal Kumar, Lecturer, Computer, Government Girls Polytechnic, Lucknow

22. Sh. Pravesh Verma, Deputy Secretary, Board of Technical Education, Lucknow

23. Dr. Dinesh Yadav, Lecturer, Physics, Government Polytechnic, Bareilly

24. Dr. Yogendra Singh, Lecturer, Chemistry, Government Polytechnic, Ghaziabad

25. Professor Seema Kapoor, Dr. SSBUICET, Panjab University, Chandigarh

26. Sh. Navdeep Singh, Sr. Lecturer, Computer Sc. Engg. Government Polytechnic, KhuniMajra, Mohali

27. Sh. Gurmail Singh, Sr. Lecturer, ECE, Government Polytechnic, KhuniMajra, Mohali

28. Dr. Shimi S.L., Assistant Professor, Electrical Engg. NITTTR, Chandigarh

The following experts have participated in workshop for Developing the Curricula Structure and Contents of various Diploma Programmes for UP State on 18-19 April, 2018 at NITTTR, Chandigarh:

1. Sh. Ram Partap Singh, Instructor, Drawings, Government Polytechnic, Kanpur

2. Sh. Narendra Kumar, Workshop Superintendent, Government Polytechnic, Kanpur

3. Sh. Rajeev Kumar,Workshop Superintendent, Government Polytechnic, Jaunpur

4.. Vikas Choudhary, Lecturer, Civil Engg. Government Polytechnic, Changipur, Noorpur Bijnor

5. Sh. Rahul Singh, Lecturer, Civil Engg. Government Polytechnic, Changipur, Noorpur Bijnor

6. Sh. Lal Ji Patel, Text Book Officer/CDC Officer, IRDT, Kanpur

7. Sh. Kamal Kumar, Lecturer, Computer, Government Girls Polytechnic, Lucknow

8. Sh. Sheetanshu Krishna, Government Polytechnic, Amethi

9. Sh. Amit Doegar, Assistant Professor, Computer Science and Engg. NITTTR, Chandigarh

10. Sh. Shirish Tripathi, Government Polytechnic, Unnao

11. Sh. Sanjay Kumar Singh, Government Polytechnic, Aurai, Bhadohi, UP

12. Dr. Kanika Sharma, Assistant Professor, ECE, NITTTR, Chandigarh

13. Mrs. Himmi Gupta, Assistant Professor, Civil Engg. NITTTR, Chandigarh

14. Ms. VarshreeGangwar, Lecturer, Chemical Engg. Government Polytechnic, Budaun

15. Dr. Poonam Syal, Associate Professor, Electrical Engg. NITTTR, Chandigarh

16. Dr. P. Sudhakar Rao, Assistant Professor, Mechanical Engg. NITTTR, Chandigarh

17. Sh. PK Singla, Associate Professor, CDC, NITTTR, Chandigarh

18. Mrs. Rama Chhabra, Associate Professor, CDC, NITTTR, Chandigarh

19. Mohd. Rizwanullah Siddiqui, HOD, Electrical Engg. Government Polytechnic, Lucknow

20. Sh. O.P. Choudhary, Lecturer, Electrical Engg. Government Polytechnic, Lucknow

21. Sh. Tushar Kiran, Lecturer, Mechanical Engg. Government Polytechnic, Lucknow

22. Sh. Heera Siddiqui, Lecturer, Chemical Engg. Government Polytechnic, Lakhiurpur

23. Sh. R.P. Bhardwaj, Workshop Superintendent, Aryabhat Institute of Technology, Delhi

24. Dr. AB Gupta, HOD, CDC, NITTTR, Chandigarh- Coordinator

The following experts have participated in workshop for Developing Curriculum Contents for 1st year of 6 diploma programmes for UP State on 4th May, 2018 at State Board of Technical Education, Lucknow:

1. Sh. S.K. Govil, Ex Secretary, SIMT, JEEC

2. Dr. Amrita Mishra, Lecturer, Chemistry, Government Polytechnic, Lucknow

3. Sh. Ashok Kushwaha, Head, Computer, Government Polytechnic, Lucknow

4. Sh. Faizan Ahmad, Lecturer, Chemical Engg., Sanjay Gandhi Polytechnic, Jagdishpur, Amethi

5. Dr. Kalpana Singh, Lecturer, Physics, Government Polytechnic, Lucknow

6. Sh. Alok Srivastava, HOD, Civil Engg. Government Polytechnic, Shahjahanpur

7. Dr. Vinod Kashyap, Lecturer, English, Government Polytechnic, Lucknow

8. Sh. Rakesh Kumar, Lecturer, Electronics, Government Polytechnic, Barabanki

9. Sh. Subhash Chandra Misra, Retired Sr. DDG, BSNL, DOT, GOI

10. Sh. Brijesh Mishra, Softpro India

11. Sh. Ajay Choudhary,,Softpro India

12. Sh. FR Khan, JEEC, UP

13. Sh. K. Ram, Joint Director, (CZ)

14. Sh. Manish Kumar, Lecturer, Government Polytechnic, Unnao

15. Sh. Prabhakar Tiwari, HOD, Electrical Engg. Government Polytechnic, Premdharpatti, Pratapgarh

16. Sh. RK Singh, HOD, Electronics, Government Polytechnic, Pratapgarh

17. Ms. Rashmi Sonkar, HOD, IT, Government Girls Polytechnic, Faizabad

18. Sh. Ankit Gupta, Lecturer, Mechanical Engg. Government Polytechnic, Lucknow

19. Ms. Meenu Dwivedi, Lecturer,Mechanical Engg. Government Polytechnic, Lucknow

20. Sh. Sanjay Kumar Srivastava, Tata Motors Ltd., Lucknow

21. Sh. Kamal Kumar, Lecturer, Computer, Government Girls Polytechnic, Lucknow

22. Sh. Manoj Kumar, Director, IRDT, Technical Education, Kanpur

23. Sh. RC Rajput, Director, Technical Education, Kanpur

24. Sh. Sanjeeva Kumar Singh, Secretary, Board of Technical Education, Lucknow

25. Sh. Pravesh Verma, Electrical Engg. Board of Technical Education, Lucknow

26. Sh. Lal Ji Patel, Text Book Officer/CDC Officer, IRDT, Kanpur

27. Sh,.Ashrapal, Principal, Government Polytechnic, Tundla, Firozabad

28. Sh. Sandeep Kumar, Lecturer, Computer, Government Polytechnic, Allahabad

29. Sh. Umesh Chand Yadav, Government Polytechnic, Lucknow

30. Sh. OP Chaudhari, Lecturer, Government Polytechnic, Lucknow

The following experts have participated in workshop for Developing Curriculum Contents of 2nd year and 3rd year subjects of diploma courses in Computer Science and Engineering for UP State on 1-2 November, 2018 at NITTTR, Chandigarh:

1. Sh. Yeshpal Singh, Lecturer, Government Polytechnic, Baheri, Bareilly.

2. Sh. Anup Kumar Patel, Government Polytechnic, Mohammadidkheri, UP

3. Sh. Kamal Kumar, Lecturer, Computer, Government Girls Polytechnic, Lucknow

4. Sh. SumitBabu, Lecturer, Computer, Government Polytechnic, Kanpur

5. Sh. Harinam, Lecturer, Computer, Government Polytechnic, Lucknow

6. Sh. Sheetanshu Krishna, Lecturer, Computer, Government Polytechnic, Amethi

7. Sh. Neeraj Kumar, Assistant Director, Technical Education, UP

8. Sh. Ashok Kushwaha, Head, Computer, Government Polytechnic, Lu

9. Sh. Amit Doegar, Assistant Professor, CSE, NITTTR, Chandigarh

10. Sh. Munish Gupta, Head, Computer, Government Polytechnic, Ambala City.

11. Sh. Sunil Bhutani, EME Technologies, Mohali.

12. Dr. AB Gupta, Professor & Head, CDC, NITTTR, Chandigarh- Coordinator

The following experts have participated in workshop for diploma course in Computer Science and Engineering for UP State on 28th December, 2018 at NITTTR, Chandigarh

1. Dr. Mukesh Kumar, Assistant Professoor, UIET, Panjab Univerity, Chandigarh.

2. Sh. Ramesh Chander Agnihotri, Ex-Chief Scientist & Principal, Indo Swiss Training Centre, CSIR, CSIO, Sector 30, Chandigarh.

3. Dr. Sunita Mehta, HOD, Computer, CCET, Sector 26, Chandigarh

4. Dr. Poonam Saini, Assistant Professor, CSE, PEC, Chandigarh

5. Er. Amrendra Sharan, Junior System Programmer, NITTTR, Chandigarh.

6. Dr. AB Gupta, Professor & Head, CDC, NITTTR, Chandigarh- coordinator