

REVISED CURRICULUM FOR DIPLOMA PROGRAMME IN COMPUTER ENGINEERING

FOR THE STATE OF HIMACHAL PRADESH



Prepared by:-

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FOREWORD

Globalization, liberalization and privatization have been sweeping the developing world over the last few decades. They have removed barriers of distances, state boundaries, culture, language etc. for trade and commerce, so that a person or a firm with superior quality product and services can reach any where in the world, trade and prosper. Emergence of Indian multinationals viz. Infosys, Tata etc. is evidence to this phenomenon. This has resulted into an era where the moto of “survival of the fittest” works. We as a country have been exposed to the competition of ever lasting nature, affecting our society, industry as well as individuals. Moreover it has broken monopolistic trade practices that industries use to enjoy before.

Coupled with globalization are advancements in science and technology affecting economical and socio-political systems at various levels viz. international, continental, national and regional. The emergence of new bodies of knowledge has been posing a great threat to existing manufacturing and related trade practices. There is a visible growth drift from manufacturing sector to service sector giving rise to knowledge economy.

The knowledge economy, a recently known term uses knowledge as a major resource for national growth in production and services, and in increasing its Gross Domestic Product. The economy where emphasis is laid on new ideas instead of exploiting labour, where life-long learning is preferred over traditional learning, where inter-disciplinary research is promoted resulting into short product development cycle.

Under such circumstances the importance and requirement of technical manpower that is well-qualified and equipped with higher order competencies has increased manifold. Such a manpower is being considered as “Human Capital” globally and the countries based on knowledge economy are treating it (Human Capital) as a prime resource to compete at international level and for keeping an edge over the others.

Under prevailing situation where India is emerging as a global economy, technical education of our country has a great role to play. The polytechnics in the country are supposed to cater to national need of human capital at middle level managers by way of developing diploma graduates having requisite technical as well as generic skill sets. This is the only way through which we can realize our dream of becoming knowledge society by 2020.

Composite Curriculum Development Centre (CCDC) of our State has been extending expert services to polytechnic education system of the states in northern region. It has track record of precisely sensing contemporary techno-socio-politico-economical context, and deriving aims and objectives of a given programme and finally design its curriculum for its implementation for satisfying societal need.

This curriculum document is the result of the judicious/exhaustive exercise undertaken by CCDC considering the prevailing context as stated above. In order to meet the present day need of our national human capital, a course on Generic Skill Development is appropriately introduced in this curriculum of diploma programme along with other requisite changes in various technical courses.

It is now upto the managers of the technical education system to transform this scheme into reality by planning, developing and implementing learning experiences at various levels.

The attention of all concerned educational managers is solicited to strive hard and convert this plan into reality. I wish them good luck.

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Director**

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PREFACE

Curriculum Document is a comprehensive plan or a blue print for developing various curriculum materials and implementing given educational programme to achieve desired and formally pre-stated educational objectives. Moreover it (the document) is the output of exhaustive process of curriculum planning and design, undertaken by the implementers under the expert guidance of curriculum designer.

Technical Education Department of Himachal Pradesh has undertaken restructuring of the diploma programmes offered by the polytechnics in the State. Consequently H.P. State Board of Technical Education assigned the project for revision of six existing diploma programmes to this institute in the month of April 2007 with a view to update the courses and their contents as per employment needs of the world of work. A series of workshops were held in the months of April-May, 2007 and 1st Year curriculum of diploma programmes was handed over to the H.P. State Board of Technical Education for its implementation from July, 2007. Subsequently another series of workshops were held for the revision of 2nd and 3rd Year curriculum of all these courses during September – December 2007.

While working out the detailed contents and study and evaluation scheme, the following important elements have been kept in mind:

- i) Major employment opportunities of the diploma holders*
- ii) Modified competency profile of the diploma holders with a view to meet the changing needs due to technological advancement and requirements of various employment sectors.*
- iii) Vertical and horizontal mobility of diploma passouts for their professional growth*
- iv) Pragmatic approach in implementing all the curricula of diploma programmes in engineering and technology in the state of H.P.*

The document is an outcome of the feedback received from industry/field organizations of different categories viz. small, medium and large scale which offer wage employment for the diploma passouts. In every stage of planning and designing of this curriculum, suggestions and advice of experts representing industry, institutions of higher learning, research organizations etc. were sought. Moreover, the representative sample of polytechnic faculty from H.P. state, who are the actual implementers of these programmes were drawn for the revision to ensure seamless curriculum implementation. The document contains the study and evaluation scheme and detailed subject/course contents for all the three years to enable the H.P. Polytechnics to implement revised curriculum to achieve the desired objectives.

We have taken cognizance of recommendation of experts both from industry and academic institutions and have adequately incorporated segments of Entrepreneurship Development, Environment and Safety Awareness, Industry Oriented Practice Based Minor and Major Projects, Industrial Training etc. Time has specifically been allocated for undertaking extra-curricular activities. Emphasis has been laid on developing and improving communication skills in the students for which Communication Lab has been introduced during the first year itself.

We hope that this revision will prove useful in producing competent diploma holders in the state of Himachal Pradesh. The success of this curriculum depends upon its effective

implementation and it is expected that the managers of polytechnic education system in Himachal Pradesh will make efforts to create better facilities, develop linkages with the world of work and foster conducive and requisite learning environment as prescribed in the curriculum document.

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DIPLOMA PROGRAMME IN COMPUTER ENGINEERING

(For the State of Himachal Pradesh)

1. SALIENT FEATURES

- 1) Name of the Programme : Diploma Programme in
Computer Engineering
- 2) Duration of the Programme : Three years (Six Semesters)
- 3) Entry Qualification : 10 +
- 4) Intake : 30
- 5) Pattern of the Programme : Semester Pattern
- 6) Number of Semesters : Six
- 7) Ratio between theory and Practice : 40 : 60

8) **Industrial Training:**

Four weeks of industrial training is included after IV semester during summer vacation. Internal assessment out of 50 marks and external assessment out of another 50 marks are added in 5th semester. Total 100 marks are allotted to industrial training.

Distribution of Marks:

- Daily diary and reports of training - 50 Marks
- Viva Voce (External) - 50 Marks

9) **Ecology and Environment :**

As per Govt. of India directives, an awareness camp on Ecology and Environment has been incorporated during second semester.

10) **Entrepreneurship Development:**

An Entrepreneurial Awareness Camp and a full subject on Generic Skill and Entrepreneurship Development has been incorporated in the scheme.

11) **Student Centred Activities:**

A provision of 3-4 hrs per week has been made for organizing Student Centred Activities for overall personality development of students. These activities will comprise of co-curricular activities such as expert lectures, games, hobby classes like photography, painting, singing etc. seminars, declamation contests, educational field visits, NCC, NSS and cultural activities etc.

2. GUIDELINES

2.1 GUIDELINES FOR ASSESSMENT OF STUDENT CENTRED ACTIVITIES (SCA)

Distribution of 25 marks for SCA will be as follows:

- i. 5 Marks shall be given for general behaviour
- ii. 5 Marks for attendance shall be based on the following distribution:
 1. Less than 75% Nil
 2. 75-79.9% 3 Marks
 3. 80-84.9% 4 Marks
 4. Above 85% 5 Marks
- iii. 15 Marks shall be given for the Sports/NCC/Cultural and Co-curricular activities/other activities after due consideration to the following points:
 1. For participation in sports/NCC/Cultural/Co-curricular activities at National or above level, shall be rewarded with minimum of 10 marks
 2. For participation in sports/NCC/Cultural/Co-curricular activities at Inter-polytechnic level, shall be rewarded with minimum of 08 marks
 3. For participation in two or more of the listed activities, 5 extra marks should be rewarded

2.2 GUIDELINES FOR INTERNAL ASSESSMENT

- The distribution of marks for Internal Assessment in theory subjects and drawing shall be made as per the following guidelines:
 - i. 60% of internal assessment shall be based on the performance in the house tests. At least three such tests shall be conducted during the semester out of which at least one house test should be conducted. 30% weight age will be given to house test and 30% to class test(One best out of two).
 - ii. 20% marks shall be given to home assignments, class assignments, seminars etc.
 - iii. 20% marks shall be given for attendance/punctuality in the subject concerned.
- The distribution of marks for Internal Assessment in practical subjects shall be made as per the following guidelines:
 - i. 60% marks shall be awarded for performance in practical
 - ii. 20% marks shall be given for Report/Practical book and punctuality in equal proportion.
 - iii. 20% marks shall be for Viva-voce conducted during the practical.

3. EMPLOYMENT OPPORTUNITIES FOR DIPLOMA HOLDERS IN COMPUTER ENGINEERING

Diploma holders in computer engineering can find employment in following divisions:

- (1) Service Division (IT enabled services, maintenance service and installation of computers)
- (2) Assembly and Quality Control Division
- (3) Marketing Division(Corporate Handling, SME, Institutional Segment, Government Tender Business)
- (4) Telecommunication Sector
- (5) Teaching Organizations (Polytechnics, Vocational Institutions etc)
- (6) Networking(LAN, WAN etc)
- (7) Defense services
- (8) 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 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 Engineering

Wage Employment

- (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

Self Employment

- (1) Small scale unit doing third party service and maintenance of computer systems and networks
- (2) Small scale vendor of computer cards, computer peripherals and electronic components and devices
- (3) Setting up of computer assembly unit (small scale)
- (4) Setting up of training institute for computer assembly, maintenance and networking

4. COMPETENCY PROFILE OF DIPLOMA HOLDERS IN COMPUTER ENGINEERING

Keeping the job opportunities, activity profile and domains of learning of diploma holders in Computer Engineering in view, the course is aimed at developing following competency profile in terms of knowledge and skills in the students:

- (1) Understanding the working of computers and peripherals
- (2) Ability of installing computer system including software loading
- (3) Understanding of the functioning and administration of various operating systems
- (4) Understanding architecture of microprocessor, interfacing techniques (memory I/O) and interrupts
- (5) Knowledge about computer system architecture and organization
- (6) Ability of writing computer programs in high level languages and in assembly language
- (7) Knowledge of data structure and programming techniques
- (8) Understanding of databases and knowledge of database management system
- (9) Competency of operating computer systems and ability to use various application software
- (10) Knowledge of principles of digital data transmission, communication methodologies, protocols and networking equipment used in data transmission and concept of network security
- (11) Ability of assembling computers

- (12) Competency in preparing layout and environmental specifications for site, supervise the installation and testing of computers systems
- (13) Competency in preparing specifications for computer systems, evaluating the specification and testing computer system for specifications
- (14) Ability to develop multimedia applications using 3D graphics and animation tools
- (15) Proficiency in developing a software using systematic steps
- (16) Competency of using diagnostic test programmes to test hardware and modifying hardware
- (17) Understanding of the basic concept of network technology local area network (LAN) and wide area network (WAN)
- (18) Establish local area networks
- (19) Understanding of system software and ability to design and use applications software
- (20) Awareness about technological advancements and forthcoming areas of development
- (21) Knowledge of current trends in Information Technology
- (22) Understanding of multimedia and its applications
- (23) Knowledge of principles of management and entrepreneurship to manage resource optimally, various techniques of economy and quality and Awareness of opportunity available for setting up one's own enterprise and its benefit
- (24) Development of generic skills of thinking, problem solving, communication and interpersonal skills for effective functioning in the world of work
- (25) Understanding of principles of Applied Sciences and Mathematics for developing scientific temper
- (26) Understanding basic principles of management
- (27) Basic manual and machining skills as an aid to function effectively in process industry
- (28) Ability to read and interpret drawing related to plant layout, process equipment and components.

5. CURRICULUM AREAS DERIVED FROM COMPETENCY PROFILE

The following curriculum area have been derived from competency profile:

Sr. No	Competency Profile	- Curriculum Areas/Subjects
1.	Understanding of the working of computers and peripherals	<ul style="list-style-type: none"> - Electrical Engineering - Basic Electronics Engineering - Computer Fundamentals and I.T.
2.	Ability of installing computer system including loading software	<ul style="list-style-type: none"> - Computer Workshop
3.	Understanding of the functioning and administration of various operating systems	<ul style="list-style-type: none"> - Operating System
4.	Understanding architecture of microprocessor, interfacing techniques (memory I/O) and interrupts	<ul style="list-style-type: none"> - Digital Electronics - Computer Peripherals and Interfacing - Microprocessor
5.	Knowledge about computer system architecture and organization	<ul style="list-style-type: none"> - Computer Architecture
6.	Ability of writing computer programs in high level languages	<ul style="list-style-type: none"> - Visual Programming (Using VB) - Computer Programming Using C
7.	Knowledge of data structure and programming techniques	<ul style="list-style-type: none"> - Data Structures using C - Object Oriented Programming Using C++
8.	Understanding of databases and knowledge of database management system	<ul style="list-style-type: none"> - RDBMS
9.	Competency of operating computer systems and ability to use application software	<ul style="list-style-type: none"> - Operating Systems - DTP Fundamentals
10.	Knowledge of principles of digital data transmission, communication methodologies, protocols and networking equipment used in data transmission and concept of network security	<ul style="list-style-type: none"> - Data Communication - Computer Networks - Network Security
11.	Ability of assembling the computers	<ul style="list-style-type: none"> - Computer Workshop
12.	Competency in preparing layout and environmental specifications for site, supervise the installation and testing of computer systems	<ul style="list-style-type: none"> - Installation, maintenance and trouble-shooting of computers and networks
13.	Competency in preparing specifications for computer systems, evaluating the specification and testing computer system for specifications	<ul style="list-style-type: none"> - Installation, Maintenance of Computers - Computer workshop
14.	Ability to develop multimedia applications using 3D graphics and animation tools	<ul style="list-style-type: none"> - Multimedia Applications - Computer Graphics

Sr. No	Competency Profile	Curriculum Areas/Subjects
15.	Proficiency in developing software using systematic steps	- System Analysis and Design
16.	Competency of using diagnostic test programmes to test hardware and modifying hardware	- Digital Electronics - Microprocessor
17.	Understanding of the basic concept of network technology local area network (LAN) and wide area network (WAN)	- Computer Networks
18.	Establish local area networks	- Computer Networks
19.	Understanding of system software and ability to design and use applications software	- Software engineering
20.	Awareness about technological advancements and forthcoming areas of development	- Computer based Instrumentation and Control - Distributed Systems - Mobile Computing - Wireless Communication - .Net Technologies - Network Operating System - Data Warehousing and Mining - Java Programming
21.	Knowledge of current trends in Information Technology	- Internet and Web Technologies
22.	Understanding of Multimedia and its applications	- Multimedia applications
23.	Knowledge of principles of management and entrepreneurship to manage resource optimally, various techniques of economy and quality and Awareness of opportunity available for setting up one's own enterprise and its benefit	- Generic Skills and Entrepreneurship Development
24.	Development of generic skills of thinking, problem solving, communication and interpersonal skills for effective functioning in the world of work	- Communication Skills - Project Work - Industrial visits
25.	Understanding of principles of Applied Sciences and Mathematics for developing scientific temper	- Applied Mathematics - Applied Physics - Applied Chemistry
26.	Understanding basic principles of management	- Basics of Management
27.	Basic manual and machining skills as an aid to function effectively in process industry	- General Workshop Practice
28.	Ability to read and interpret drawing related to plant layout, process equipment and components	- Engineering Drawing

6. ABSTRACT OF THE CURRICULUM AREAS

a) General Studies

1. English and Communication Skills – I&II
2. Generic Skills and Entrepreneurship Development
3. Basics of Management

b) Applied Sciences

4. Applied Mathematics – I&II
5. Applied Physics – I&II
6. Applied Chemistry – I

c) Basic Courses in Engineering/Technology

7. Engineering Drawing – I
8. Workshop Practice – I&II

d) Applied Courses in Engineering/Technology

9. DTP fundamentals
10. Basic Electrical Engineering
11. Basic Electronics
12. Computer Fundamentals and I.T.
13. Digital Electronics
14. Computer Programming Using C
15. System analysis and Design
16. RDBMS
17. Multimedia and Applications
18. Computer Workshop
19. Data Structure Using C
20. Computer Networks
21. Computer Architecture
22. Microprocessor
23. **Visual Programming(Using VB)**
24. Computer Peripheral and Interfacing
25. Internet and Web Technologies
26. Object Oriented Programming Using C++
27. Operating System(OS)
28. Computer Graphics
29. Mobile Computing
30. Installation, Maintenance and Troubleshooting of Computer Networks
31. Minor Project
32. Major Project

e) Specialized Courses in Engineering/Technology (Electives)

33. Elective – I: To choose one from the following subjects:
(a) .Net Technologies b) Network Operating System
(c) Java Programming d) Computer Based
 Instrumentation and Control
34. Elective – II : To choose one from the following subjects:
a) Data Warehousing and Data Mining b) Software Engineering
(c) Wireless Communication d) Distributed Systems

7. HORIZONTAL AND VERTICAL ORGANISATION OF THE SUBJECTS

Sr. No.	Subjects	Distribution in Hours per week in Various Semesters					
		I	II	III	IV	V	VI
1.	English and Communication Skills	5	5	-	-	-	-
2.	Applied Mathematics	5	5	-	-	-	-
3.	Applied Physics	6	5	-	-	-	-
4.	Applied Chemistry	6	-	-	-	-	-
5.	Engineering Drawing	7	-	-	-	-	-
6.	Basic Electrical Engineering	-	6	-	-	-	-
7.	Basic Electronics	-	6	-	-	-	-
8.	Workshop Practice	4	6	-	-	-	-
9.	Basic of Information Technology	-	4	-	-	-	-
10.	DTP Fundamental-I	4	-	-	-	-	-
11.	Digital Electronics	-	-	7	-	-	-
12.	Computer Programming Using C	-	-	7	-	-	-
13.	Data Communication & Networks	-	-	5	-	-	-
14.	RDBMS	-	-	-	7	-	-
15.	Multimedia Applications	-	-	-	-	-	7
16.	Computer Workshop	-	-	4	-	-	-
17.	Generic Skills and Entrepreneurship Development	-	-	-	3	-	-
18.	Data Structure Using C	-	-	-	7	-	-
19.	Computer Networks	-	-	-	6	-	-
20.	Computer Architecture	-	-	-	-	3	-
21.	Microprocessor & Interfacing Devices	-	-	-	6	-	-
22.	Visual Programming(Using VB)	-	-	-	6	-	-
23.	Computer Peripheral and Interfacing	-	-	7	-	-	-
24.	Internet and Web Technologies	-	-	-	-	7	-
25.	Object Oriented Programming Using C++	-	-	-	-	7	-
26.	Operating System(OS)	-	-	7	-	-	-
27.	Elective-I	-	-	-	-	7	-
28.	Basics of Management	-	-	-	-	-	3
29.	Computer Graphics	-	-	-	-	-	7
30.	Java Programming	-	-	-	-	-	8
31.	Installation, Maintenance and Troubleshooting of Computer Networks	-	-	-	-	7	-
32.	Elective – II	-	-	-	-	-	4
33.	Minor Project	-	-	-	-	4	-
34.	Major Project Work	-	-	-	-	-	8
35.	Practice in Communication Skills	-	-	-	-	-	2
36.	Student Centred Activities	3	3	3	5	5	1
Total		40	40	40	40	40	40

**1. STUDY AND EVALUATION SCHEME FOR DIPLOMA PROGRAMME IN
COMPUTER ENGINEERING
(HIMACHAL PRADESH)**

FIRST SEMESTER (COMPUTER ENGINEERING)

SR. NO.	SUBJECTS	STUDY SCHEME <i>Hrs/Week</i>		MARKS IN EVALUATION SCHEME								Total Marks of Int. & Ext.
				INTERNAL ASSESSMENT			EXTERNAL ASSESSMENT					
		Th	Pr	Th	Pr	Tot	Th	Hrs	Pr	Hrs	Tot	
1.1	*English and Communication Skills – I	3	2	30	20	50	100	3	50	3	150	200
1.2	*Applied Mathematics - I	5	-	50	-	50	100	3	-	-	100	150
1.3	*Applied Physics – I	4	2	30	20	50	100	3	50	3	150	200
1.4	*Applied Chemistry – I	4	2	30	20	50	100	3	50	3	150	200
1.5	*Engineering Drawing – I	-	7	-	50	50	100	4	-	-	100	150
1.6	Workshop Practice – I	-	4	-	50	50	-	-	50	4	50	100
1.7	DTP Fundamentals	-	4	-	50	50	-	-	50	3	50	100
#Student Centred Activities		-	3	-	-	-	-	-	-	-	-	-
Total		16	24	140	210	350	500	-	250	-	750	1100

* Common with other diploma programmes

Will comprise of co-curricular activities like games, hobby clubs, including photography, seminars, declamation contests, extension lectures, educational field visits, N.C.C., NSS, cultural activities etc.

2. STUDY AND EVALUATION SCHEME SECOND SEMESTER (COMPUTER ENGINEERING)

SR. NO	SUBJECTS	STUDY SCHEME <i>Hrs/Week</i>		MARKS IN EVALUATION SCHEME								Total Marks of Int. & Ext.
				INTERNAL ASSESSMENT			EXTERNAL ASSESSMENT					
		Th	Pr	Th	Pr	Tot	Th	Hrs	Pr	Hrs	Tot	
2.1	*English and Communication Skills - II	3	2	30	20	50	100	3	50	3	150	200
2.2	*Applied Mathematics – II	5	-	50	-	50	100	3	-	-	100	150
2.3	* Applied Physics-II	3	2	30	20	50	100	3	50	3	150	200
2.4	Basic Electrical Engineering	4	2	30	20	50	100	3	50	3	150	200
2.5	Basic Electronics	4	2	30	20	50	100	3	50	3	150	200
2.6	*Basics of Information Technology	-	4	-	50	50	-	-	50	3	50	100
2.7	*General Workshop Practice – II	-	6	-	100	100	-	-	50	4	50	150
#Student Centred Activities		-	3	-	-	-	-	-	-	-	-	-
<i>Total</i>		19	21	170	230	400	500	15	300	19	800	1200

* Common with other diploma programmes

Will comprise of co-curricular activities like games, hobby clubs, including photography, seminars, declamation contests, extension lectures, educational field visits, N.C.C., NSS, cultural activities etc.

3. STUDY AND EVALUATION SCHEME THIRD SEMESTER (COMPUTER ENGINEERING)

SR. NO	SUBJECTS	STUDY SCHEME <i>Hrs/Week</i>		MARKS IN EVALUATION SCHEME								Total Marks of Int. & Ext.
				INTERNAL ASSESSMENT			EXTERNAL ASSESSMENT					
		Th	Pr	Th	Pr	Tot	Th	Hrs	Pr	Hrs	Tot	
3.1	*Digital Electronics	5	2	30	20	50	100	3	50	3	150	200
3.2	Computer Programming Using C	3	4	30	20	50	100	3	50	3	150	200
3.3	Data Communication & Networks	3	2	30	20	50	100	3	50	3	150	200
3.4	Computer Peripherals and Interfacing	3	4	30	20	50	100	3	50	3	150	200
3.5	Operating Systems	3	4	30	20	50	100	3	50	3	150	200
3.6	Computer Workshop	-	4	-	50	50	-	-	50	3	50	100
# Student Centred Activities (including Ecology and Environmental Awareness Camp)		-	3	-	25	25	-	-	-	-	-	25
<i>Total</i>		17	23	150	175	325	500	-	300	-	750	1125

* Common with diploma programme in ECE

Will comprise of co-curricular activities like games, hobby clubs, including photography, seminars, declamation contests, extension lectures, educational field visits, N.C.C., NSS, cultural activities etc.

FOURTH SEMESTER (COMPUTER ENGINEERING)

SR. NO	SUBJECTS	STUDY SCHEME <i>Hrs/Week</i>		MARKS IN EVALUATION SCHEME								Total Marks of Int. & Ext.
				INTERNAL ASSESSMENT			EXTERNAL ASSESSMENT					
		Th	Pr	Th	Pr	Tot	Th	Hrs	Pr	Hrs	Tot	
4.1	*Generic Skills and Entrepreneurship Development	3	-	50	-	50	100	3	-	-	100	150
4.2	Data Structure Using C	3	4	30	20	50	100	3	50	3	150	200
4.3	**RDBMS	4	3	30	20	50	100	3	50	3	150	200
4.4	Computer Networks	4	2	50	-	50	100	3	-	-	100	150
4.5	**Microprocessor & Interfacing Devices	4	2	30	20	50	100	3	50	3	150	200
4.6	Visual Programming (Using VB)	2	4	30	20	50	100	3	50	3	150	200
# Student Centred Activities (including Entrepreneurial Awareness Camp)		-	5	-	25	25	-	-	-	-	-	25
Total		20	20	220	105	325	600		200		800	1125

* Common with other diploma programmes

** Common with diploma programme in ECE

Will comprise of co-curricular activities like games, hobby clubs, including photography, seminars, declamation contests, extension lectures, educational field visits, N.C.C., NSS, cultural activities etc.

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

FIFTH SEMESTER(COMPUTER ENGINEERING)

SR. NO.	SUBJECTS	STUDY SCHEME		MARKS IN EVALUATION SCHEME								Total Marks of Int. & Ext.
				INTERNAL ASSESSMENT			EXTERNAL ASSESSMENT					
		<i>Hrs/Week</i>		Th	Pr	Tot	Th	Hrs	Pr	Hrs	Tot	
5.1	Computer Architecture	3	-	30	20	50	100	3	50	3	150	200
5.2	Internet and Web Technologies	3	4	30	20	50	100	3	50	3	150	200
5.3	Object Oriented Programming Using C++	3	4	30	20	50	100	3	50	3	150	200
5.4	Installation, Maintenance and Troubleshooting of Computer & Networks	3	4	30	20	50	100	3	50	3	150	200
5.5	Elective – I	3	4	30	20	50	100	3	50	3	150	200
5.6	Minor Project Work	-	4	-	50	50	-	-	50	3	50	100
Industrial Training		-	-	-	50	50	-	-	50	-	50	100
# Student Centred Activities		-	5	-	25	25	-	-	-	-	-	25
Total		15	25	150	225	375	500		350		850	1225

- **There will be a compulsory industrial/educational tour for one week after the semester**
- # Will comprise of co-curricular activities like games, hobby clubs, including photography, seminars, declamation contests, extension lectures, educational field visits, N.C.C., NSS, cultural activities etc.

SIXTH SEMESTER (COMPUTER ENGINEERING)

SR. NO.	SUBJECTS	STUDY SCHEME		MARKS IN EVALUATION SCHEME								Total Marks of Int. & Ext.
				INTERNAL ASSESSMENT			EXTERNAL ASSESSMENT					
		<i>Hrs/Week</i>		Th	Pr	Tot	Th	Hrs	Pr	Hrs	Tot	
6.1	*Basics of Management	3	-	50	-	50	100	3	-	-	100	150
6.2	Computer Graphics	3	4	30	20	50	100	3	50	3	150	200
6.3	Java Programming	4	4	50	-	50	100	3	-	-	100	150
6.4	Multimedia Applications	2	4	30	20	50	100	3	50	3	150	200
6.5	Elective – II	4	-	50	-	50	100	3	-	-	100	150
6.6	Major Project	-	8	-	100	100	-	-	100	3	100	200
6.7	*Practice in Communication Skills	-	2	-	50	50	-	-	50	3	50	100
# Student Centred Activities		-	2	-	25	25	-	-	-	-	-	25
Total		16	24	210	215	425	500	-	250	-	750	1175

* Common with other diploma programmes

Will comprise of co-curricular activities like games, hobby clubs, including photography, seminars, declamation contests, extension lectures, educational field visits, N.C.C., NSS, cultural activities etc.

9. INDUSTRIAL TRAINING OF STUDENTS

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

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

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

An internal assessment of 50 and external assessment of 50 marks have been provided in the study and evaluation scheme of V Semester. Evaluation of professional industrial training report through viva-voce/presentation aims at assessing students understanding of materials, industrial process, practices in industry/field organization and their ability to engage in activities related to problem solving in industrial setup as well as understanding of application of knowledge and skills learnt in real life situations. The formative and summative evaluation may comprise of weightage to performance in testing, general behaviour, quality of report and presentation during viva-voce examination. It is recommended that such evaluations may be carried out by a team comprising of concerned HOD, teachers and representative from industry.

Teachers and students are requested to see the footnote below the study and evaluation scheme of IV Semester for further details.

2. DETAILED CONTENTS OF SEMESTERWISE SUBJECTS

1.1 ENGLISH AND COMMUNICATION SKILLS – I

L T P
3 - 2

RATIONALE

*Language is the most commonly used medium of self-expression in all spheres of human life – personal, social and professional. A student must have a fair knowledge of English language and skills to communicate effectively to handle the future jobs in industry. The objective of this course is to enable the diploma holders to acquire proficiency, both in spoken (oral) and written language. At the end of the course, the student will be able to develop comprehension skills, improve vocabulary, use proper grammar, acquire writing skills, correspond with others and enhance skills in spoken English. It is expected that each polytechnic will establish a **communication skill laboratory** for conducting practicals mentioned in the curriculum.*

DETAILED CONTENTS

1. **Facets of Literature** (14 hrs)
 - 1.1 **Short Stories**
 - 1.1.1 Homecoming – R.N. Tagore
 - 1.1.2 The Selfish Giant - Oscar Wilde
 - 1.1.3 The Diamond Necklace- Guy- De Maupassant
 - 1.2 **Prose**
 - 1.2.1 I Have A Dream – Martin Luther King
 - 1.2.2 On Habits – A. G. Gardiner
 - 1.2.3 My struggle for An Education- Booker T Washington
 - 1.3 **Poems**
 - 1.3.1 Ozymandias – P.B. Shelley
 - 1.3.2 Daffodils – William Wordsworth
 - 1.3.3 Stopping by Woods on a Snowy Evening – Robert Frost
2. **Grammar and Usage** (10 hrs)
 - 2.1 Parts of speech
 - 2.1.1 Nouns
 - 2.1.2 Pronouns
 - 2.1.3 Adjectives
 - 2.1.4 Articles
 - 2.1.5 Verbs
 - 2.1.6 Adverbs
 - 2.1.7 Prepositions
 - 2.1.8 Conjunction
 - 2.1.9 Interjection
 - 2.1.10 Identifying parts of speech
 - 2.2 Pair of words (Words commonly confused and misused)
 - 2.1 Tenses
 - 2.2 Correction of incorrect sentences
 - 2.3 One word Substitution

3. **Translation** (04 hrs)
 - 3.1 Glossary of Administrative Terms (English and Hindi)
 - 3.2 Translation from Hindi into English and English to Hindi.
4. Paragraph of 100-150 words from outlines (08 hrs)
5. **Comprehension** (04 hrs)

Unseen passages of literacy, scientific, data/graph based for comprehension exercises
6. **Communication** (08 hrs)
 - 6.1 Definition, Introduction and Process of Communication
 - 6.2 Objectives of Communication

LIST OF PRACTICALS

1. Locating a Book in Library
2. How to look up words in a Dictionary: meaning and pronunciation of words as given in the standard dictionary using symbols of phonetics,
3. How to Seek Information from an Encyclopedia
4. Listening pre-recorded English language learning programme
5. Paper Reading before an audience (reading unseen passages)
6. Study of spelling Rules
7. Study of essentials of a Good Speech to respond and comprehend visual, oral themes, situations or stimulus and practice before select gathering
8. Exercises on use of different abbreviations
9. Greetings for different occasions
10. Introducing oneself, others and leave taking
11. Exercises on writing sentences on a topic

Note:

1. *The Text Book on “English and Communication Skills, Book-I By Kuldip Jaidka et. al. developed by NITTTR, Chandigarh is recommended to be used for teaching and setting-up the question papers.*
2. *A communication laboratory may be set up consisting of appropriate audio-video system with facility of playing CDs/DVDs and a video camera for recording the performance of each student with play back facility. A set of CDs from any language training organization e.g. British Council etc. may be procured for use of students.*
3. *Elements of body language will be incorporated in all practicals*
4. *The practical exercises involving writing may also be included in Theory Examination.*

RECOMMENDED BOOKS

1. English and Communication Skills, Book-I By Kuldip Jaidka, Alwinder Dhillon and Parmod Kumar Singla, Prescribed by NITTTR, Chandigarh Published By Abhishek Publication, 57-59, Sector-17, Chandigarh
2. Essentials of Business Communication by Pal and Rorualling; Sultan Chand and Sons
3. The Essence of Effective Communication, Ludlow and Panthon; Prentice Hall of India

4. New Design English Grammar, Reading and Writing Skills by AL Kohli (Course A and course B), Kohli Publishers, 34 Industrial Area Phase-II, Chandigarh,
5. New Design English Reading and Advanced Writing Skills for Class XI and XII by MK Kohli and AL Kohli; Kohli Publishers, 34 Industrial Area Phase-II, Chandigarh,
6. A Practical English Grammar by Thomson and Marlinet
7. Spoken English by V Sasikumar and PV Dhamija; Tata McGraw Hill
8. English Conversation Practice by Grount Taylor; Tata McGraw Hill
9. Developing Communication Skills by Krishna Mohan and Meera Banerji; MacMillan India Ltd., Delhi
10. Business Correspondence and Report Writing by RC Sharma and Krishna Mohan; Tata McGraw Hill Publishing Company Ltd. New Delhi
11. Communication Skills by Ms R Datta Roy and KK Dhir; Vishal Publication, Jalandhar

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1	14	40
2	10	15
3	4	10
4	8	10
5	4	10
6	8	15
Total	48	100

Glossary of Administrative Terms

1.	Senior	वरिष्ठ
2.	Cashier	खजान्ची
3.	Consent	सहमती
4.	Earned Leave	जमा छुट्टी
5.	Under Consideration	विचार अधीन
6.	Criterion	कसौटी
7.	Staff	कर्मचारी
8.	Tenure	कार्यकाल
9.	Working Committee	कार्य समिति
10.	Estate	सम्पदा
11.	Self-Sufficient	आत्मनिर्भर
12.	Emergency	आपात्तकाल
13.	General Body	आम सभा
14.	Exemption	छूट
15.	Daily wages	दिहाड़ीदार
16.	Death-Cum Retirement	मृत्यु और निवृत्ती
17.	Despatch Register	रवानगी रजिस्टर
18.	Despatch	रवानगी
19.	Stenography	आशुलिपिक
20.	Assurance	दिलासा
21.	Justify	सही साबित करना
22.	Superior	बढ़िया
23.	High Commission	उच्चायुक्त
24.	Simultaneous	साथ - साथ
25.	Precautionary	एहतियाती
26.	Commanding Office	कमांडिंग अफसर
27.	Negligence	लापरवाही
28.	Performance	पुरा करना
29.	Proof Reader	पुफ रीडर
30.	Take Over	काम सभालना
31.	Timely Compliance	समय दौरान पुरा करना
32.	Responsibility	जिमेदारी
33.	Chief Justice	मुख्य न्यायधिेश
34.	Disciplinary Action	अनुशासनिक कारवाई
35.	Efficiency Bar	दक्षता रोक
36.	Flying Squad	उड़न दस्ता
37.	Regret	खेद
38.	Inconvenience	असुविधा
39.	Ambiguous	अस्पष्ट
40.	Part Time	अर्धकालीन
41.	Academy	अकादमी
42.	Disparity	असमानता
43.	Extraordinary	असाधारण
44.	Provisional	अस्थायी
45.	Income Tax	आयकर
46.	Bonafide	असली
47.	Acting in Official Capacity	बतौर अधिकारिक हैसियत
48.	Contractor	ठेकेदार
49.	On probation	परिवीक्षाधीन
50.	State	राज्य

51.	Administrator	प्रशासक
52.	Admission	प्रवेश
53.	Aforesaid	पूर्वोक्त, उपरोक्त
54.	Affidavit	शपथपत्र
55.	Agenda	कार्यसूची
56.	Alma Mater	विद्यालय जहां किसी व्यक्ति ने शिक्षा प्राप्त
57.	Appointing Authority	मनोनित अधिकारी
58.	Apprentice	शिल्पकारू
59.	Additional	अतिरिक्त
60.	Advertisement	विज्ञापन
61.	Assistant	सहायक
62.	Assumption of Charge	अधिकार ग्रहण करना
63.	Attested Copy	सत्यापित प्रति
64.	Chief Minister	मुख्यमन्त्री
65.	Clerical Error	लेखन सम्बन्धी भ्रम
66.	Code	कानून की किताब, गुप्त भाषा
67.	Corruption	नैतिक भ्रष्टाचार, खोटापन
68.	Craftsman	कारीगर
69.	Compensation	हरजाना
70.	Compensatory Allowance	क्षतिपूरक भत्ता
71.	Compile	संकलन करना, संग्रह करना
72.	Confidential Letter	गुप्त पत्र
73.	Chief Engineer	मुख्य अभिन्यता
74.	Data	स्वीकृत तत्त्व (आंकड़े)
75.	Dearness Allowance	संहर्गाई भत्ता
76.	Department	विभाग
77.	Dictionary	शब्द कोष
78.	Director	निदेशक, संचालन
79.	Director of Tech. Edu.	तकनीकी शिक्षा निदेशक
80.	Executive Engineer	अधिशाली अभिन्यता
81.	Employment Exchange	व्यवसाय केन्द्र
82.	Head Office	मुख्य कार्यालय
83.	Head Clerk	प्रधान लिपिक
84.	Indian Admn. Service	भारतीय प्रशासनिक सेवा
85.	Legislative Assembly	विधान सभा
86.	Officiating	स्थानापन्न
87.	Office Record	कार्यालय रिकार्ड
88.	Office Discipline	कार्यालय अनुशासन
89.	Polytechnic	बहुतकनीकी
90.	Temporary	अस्थायी
91.	Qualified	योग्यता प्राप्ति
92.	Under Investigation	जांच अधीन
93.	Sub-treasury	उप-खजाना
94.	Target Date	लक्ष्य तिथि
95.	Technical Approval	तकनीकी मान्यता
96.	Verification	जांच पड़ताल
97.	Viva-voce	मौखिक परीक्षा
98.	Write off	बटटेखाते डालना
99.	Warning	चेतावनी
100.	Yours faithfully	भवदीय

1.2 APPLIED MATHEMATICS - I

L T P

5 - -

RATIONALE

Applied Mathematics forms the backbone of engineering students. Basic elements of algebra, trigonometry, coordinate geometry have been included in the curriculum as foundation course. This course will develop analytical abilities to make exact calculations and will provide continuing educational base to the students.

DETAILED CONTENTS

1. **Algebra** (30 hrs)
 - 1.1 Complex Numbers: Complex number, representation, modulus and amplitude. De-moivre's theorem, its application in solving algebraic equation.
 - 1.2 Geometrical progression, its nth term and sum of n terms and to infinity. Application of Arithmetic progression and Geometrical progression to Engineering problem.
 - 1.3 Partial fractions (linear factors, repeated linear factors)
 - 1.4 Permutations and Combinations: Value of ${}^n P_r$ ${}^n C_r$. Simple problems
 - 1.5 Binomial theorem (without proof) for positive integral index (expansion and general form); binomial theorem for any index (expansion without proof) first and second binomial approximation with applications to engineering problems
2. **Trigonometry** (20 hrs)
 - 2.1 Concept of angles, measurement of angles in degrees, grades and radians and their conversions.
 - 2.2 T-Ratios of Allied angles (without proof), Sum, difference formulae and their applications (without proof). Product formulae (Transformation of product to sum, difference and vice versa). T-Ratios of multiple angles, sub-multiple angles (2A, 3A, A/2).
 - 2.3 Graphs of Sin x, Cos x, Tan x and e^x

3. **Differential Calculus** (30 hrs)

3.1 Definition of function; Concept of limits.

$$\text{Lt } x \rightarrow a \frac{x^n - a^n}{x - a}$$

Four standard limits

$$\text{Lt } x \rightarrow 0 \frac{\sin x}{x}, \quad \text{Lt } x \rightarrow 0 \frac{a^x - 1}{x}, \quad \text{Lt } x \rightarrow 0 (1+x)^{1/x}$$

3.2 Differentiation by definition of x^n , $\sin x$, $\cos x$, $\tan x$, e^x , $\log_a x$

3.3 Differentiation of sum, product and quotient of functions. Differentiation of function of a function.

3.4 Differentiation of trigonometric inverse functions. Logarithmic differentiation. Exponential differentiation Successive differentiation (excluding nth order).

3.5 Applications:

(a) Errors and increments

(b) Maxima and minima

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

RECOMMENDED BOOKS

1. *Elementary Engineering Mathematics* by BS Grewal, Khanna Publishers, New Delhi
2. *Engineering Mathematics* by Vol. I & II by S Kohli, IPH, Jalandhar
3. *Applied Mathematics* by Dr. RD Sharma
4. *Applied Mathematics, Vol. I & II* by SS Sabharwal & Sunita Jain, Eagle Parkashan, Jalandhar
5. *Comprehensive Mathematics, Vol. I & II* by Laxmi Publications
6. *Engineering Mathematics* by Dass Gupta
7. *Engineering Mathematics* by C Dass Chawla, Asian Publishers, New Delhi
8. *Comprehensive Mathematics, Vol. I & II* by Laxmi Publications
9. *Engineering Mathematics, Vol I, II & III* by V Sundaram et al, Vikas Publishing House (P) Ltd., New Delhi
10. *Engineering Mathematics* by N.Ch.S.N Iyengar et.al, Vikas Publishing House (P) Ltd., New Delhi
11. *Engineering Mathematics, Vol I & II* by SS Sastry, Prentice Hall of India Pvt. Ltd.,
12. *Engineering Mathematics, Vol I & II* by AK Gupta, MacMillan India Ltd., New Delhi

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1	30	30
2	20	30
3	30	40
Total	80	100

1.3 APPLIED PHYSICS– I

L T P
4 - 2

RATIONALE

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

DETAILED CONTENTS

1. **Units and Dimensions** (08 hrs)
 - 1.1 Physical quantities
 - 1.2 Units - fundamental and derived units, systems of units (FPS, CGS, MKS and SI units)
 - 1.3 Dimensions and dimensional formulae of physical quantities
 - 1.4 Dimensional equations and principle of homogeneity, applications to conversion from one system of units to another, checking the correctness of physical relations and derivation of simple physical relations, limitations of dimensional analysis
 - 1.5 Significant figures and error analysis

2. **Force and Motion** (12 hrs)
 - 2.1 Scalar and vector quantities – examples, addition and multiplication (scalar product and vector product) of vectors
 - 2.2 Force, resolution and composition of forces – resultant, parallelogram law of forces, equilibrium of forces, Lami's theorem
Force, type of forces, gravitational electromagnetic weak and strong force, conservative and non-conservative forces with simple examples.
 - 2.3 Newton's Laws of motion – concept of momentum, Newton's laws of motion and their applications, determination of force equation from Newton's second law of motion; Newton's third law of motion, conservation of momentum, impulse, simple numerical problems
 - 2.4 Circular motion – angular displacement, angular velocity and angular acceleration
 - 2.5 Relation between linear and angular variables (velocity and acceleration)
 - 2.6 Centripetal force (derivation) and centrifugal force
 - 2.7 Banking of roads

3. **Work, Power and Energy** (12 hrs)
 - 3.1 Work: definition and its SI units
 - 3.2 Work done in moving an object on horizontal and inclined plane (incorporating frictional forces)
 - 3.3 Power: definition and its SI units, calculation of power in simple cases

- 3.4 Energy: Definition and its SI units: Types: Kinetic energy and Potential energy with examples and their derivation
 - 3.5 Principle of conservation of mechanical energy (for freely falling bodies), transformation of energy from one form to another
 - 3.6 Relation between work, heat and energy
 - 3.7 Concept of friction, cause and types, applications of friction in daily life
4. **Rotational Motion** (06 hrs)
- 4.1 Definitions of torque, angular momentum, their relationship
 - 4.2 Conservation of angular momentum (qualitative) and its examples
 - 4.3 Moment of inertia and its physical significance, radius of gyration
 - 4.4 Theorems of parallel and perpendicular axes (statements)
 - 4.5 Moment of inertia of rod, disc, ring and sphere
5. **Properties of Matter** (10 hrs)
- 5.1 Elasticity, definition of stress and strain, different types of modulus of elasticity, stress – strain diagram, Hooke’s law
 - 5.2 Pressure – its units, gauge pressure, absolute pressure, atmospheric pressure, Pascal law and its applications.
 - 5.3 Surface tension – its units, measurement of surface tension by capillary tube method, applications of surface tension, effect of temperature and impurity on surface tension
6. **Thermometry** (10 hrs)
- 6.1 Principles of measurement of temperature and different scales of temperature
 - 6.2 Difference between heat and temperature on the basis of K.E. of molecules
 - 6.3 Types of thermometers, Physical properties on which they are based
(No description of individual thermometer)
 - 6.4 Co-efficient of linear, surface and cubical expansions and relation amongst them
 - 6.5 Modes of transfer of heat (Conduction, convection and radiation with examples)
 - 6.6 Co-efficient of thermal conductivity, determination of thermal conductivity of good conductor (Searle’s method) and bad conductor (Lee’s disc method)
7. **Space Exploration and Radio-activity** (06 Hrs)
- Concept of Natural, artificial satellite, equatorial orbit, Geo-Stationary orbit, Polar orbit, Apogee, Perigee, inclination, purpose of space research, space science in India, Indian satellite, Application of space science, Useful life of satellite, Natural radioactivity, units, concept of nuclear fission, fusion and nuclear reactor. Applications of Radioisotopes in Agriculture industry and medicine.

LIST OF PRACTICALS (to perform minimum eight experiments)

1. To find the diameter of wire using a screw gauge
2. To find volume of solid cylinder and hollow cylinder using a vernier caliper
3. To determine the thickness of glass strip and radius of curvature of a concave surface using a spherometer
4. To verify the parallelogram law of forces
5. To verify conservation of energy of a rolling solid sphere/cylinder
6. To find the diameter of a capillary tube using Travelling Microscop
7. To find the time period of a simple pendulum
8. To find the time period of cantilever
9. To determine the atmospheric pressure at a place using Fortin's Barometer
10. To find the coefficient of thermal conductivity of copper using Searle's conductivity apparatus

RECOMMENDED BOOKS

1. *Test Book of Physics for Class XI (Part-I, Part-II) N.C.E.R.T /C.B.S.E.*
2. *Test Book of Physics for Class XII (Part-I, Part-II) N.C.E.R.T /C.B.S.E.*
3. *Applied Physics, Vol. I and Vol. II, TTTI Publications, Tata McGraw Hill, Delhi*
4. *Concepts in Physics by HC Verma, Vol. I & II, Bharti Bhawan Ltd. New Delhi*
5. *Fundamentals of Physics by Resnick and Halliday & Walker, Asian Book Pvt. Ltd., New Delhi*
6. *Berkeley Physics Course, Vol. I, II & III, Tata McGraw Hill, Delhi*
7. *The Feynman Lectures on Physics by Feynman, Leighton and Sands, Vol. I & II, Narosa Publishing House, Delhi*
8. *Fundamentals of Optics by Francis A. Jenkins & Harvey E White, McGraw Hill International Editions, Physics Series*
9. *A Text Book of Optics by Subramanian and Brij Lal, S Chand & Co., New Delhi*
10. *Comprehensive Practical Physics, Vol, I & II, JN Jaiswal, Laxmi Publishers*
11. *Engineering Physics by PV Naik, Pearson Education Pvt. Ltd, New Delhi*
12. *Applied Physics I & II by RA Banwait & R Dogra, Eagle Parkashan, Jalandhar*

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1	08	10
2	12	20
3	14	25
4	06	10
5	10	15
6	10	15
7	04	05
Total	64	100

1.4 APPLIED CHEMISTRY - I

L T P
4 - 2

RATIONALE

The role of chemistry and chemical products in every branch of engineering is expanding greatly. Now a days various products of chemical industries are playing important role in the field of engineering with increasing number of such products each successive years. The strength of materials, the chemical composition of substances, their behavior when subjected to different treatment and environment, and the laws of heat and dynamic energy have entered in almost every activity of modern life. Chemistry is considered as one of the core subjects for diploma students in engineering and technology for developing in them scientific temper and appreciation of chemical properties of materials, which they have to handle in their professional career. Effort should be made to teach this subject through demonstration and with the active involvement of students.

DETAILED CONTENTS

1. **Basic concepts of Chemistry** (10 hrs)
 - 1.1 Units and Dimensions, derived units (with special reference to pressure, volume, temperature, density, specific gravity, surface tension, viscosity and conductivity)
 - 1.2 Matter, element, compound and mixtures, atom, molecule, ion, symbols and formulae (recapitulation only)
 - 1.3 Atomic mass (A), molar mass, mole concept, molar volume of gases
 - 1.4 Solution, strength of solutions in grams per liter, molarity (M), molality (m), mass fraction and mole fraction (numerical problems)
 - 1.5 Chemical equations, thermo-chemical equations, balancing of chemical equations (using partial equation method)
 - 1.6 Numerical problems based on mole concept
 - 1.7 Brief introduction and concept of Volumetry Analysis
2. **Atomic structure and Chemical Bonding** (10 hrs)
 - 2.1 Fundamental particles i.e. electron, proton and neutron (their masses and charges)
 - 2.2 Postulates of Bohr model of atom, success and failures of Bohr model of atom
 - 2.3 Heisenberg's uncertainty principle
 - 2.4 Elementary idea of modern concept of atom, quantum numbers (significance only), definition of shells, sub shells and orbitals, concept of orbitals, shapes of s & p orbitals only. Electronic configuration of elements (atomic number 1 to 30 only) on the basis of Aufbau principle, Pauli's principle and Hund's rule
 - 2.5 Modern periodic law, introduction of periodic table, periods and groups,
 - 2.6 Division of the periodic table into s, p, d, and f blocks (details excluded)
 - 2.7 Chemical bond and cause of bonding
 - 2.8 Ionic bond, covalent bond, orbital concept of covalent bonding, valence bond theory, sigma (σ) and pi (π) bonds.
 - 2.9 Metallic bonding (electron sea model)
 - 2.10 Coordinate bond with examples of ozone, ammonium chloride, $\text{H}_3\text{N}-\text{BF}_3$ complex

3. **Water** (10 hrs)
- 3.1 Sources of water
 - 3.2 Hard water, soft water, types of hardness, action of soap on hard water
 - 3.3 Degree of hardness in terms of calcium carbonate, Units of hardness in Clark degree, French degree and ppm
 - 3.4 Estimation of hardness by EDTA method,
 - 3.5 Disadvantages of hard water in domestic and industrial uses
 - 3.6 Boiler water: causes and prevention of scale and sludge formation, corrosion, priming & foaming and caustic embitterment
 - 3.7 Softening of hard water by premitit and ion exchange processes
 - 3.8 Qualities of drinking water and purification of available water for drinking purposes
 - 3.9 Chemical analysis: Estimation of alkalinity, estimation of total dissolved solids (TDS), free chlorine, chloride, and dissolved oxygen
 - 3.10 Numerical problems
4. **Equilibrium, Acids and Bases.** (10 hrs)
- 4.1 Equilibrium state, equilibrium constant and statement of Le-chatelier's principle with illustration
 - 4.2 Ionization of electrolyte in aqueous solution, ionic equilibrium, degree of ionization, self-ionization of water and ionic product of water (K_w)
 - 4.3 Concept of pH and pH scale
 - 4.4 Arrhenius concept of acids/bases; strong acids/bases, weak acids/bases, dissociation constants of acids/bases. Neutralization, acid base titration, choice of indicators for acid base titration
 - 4.5 Hydrolysis of salts, buffer solutions (acidic and basic), buffer action of a buffer solution, applications of buffer solution
 - 4.6 Simple numerical problems
5. **Electrochemistry.** (10 hrs)
- 5.1 Electronic concept of oxidation and reduction, redox reactions
 - 5.2 Electrolytes and non electrolytes
 - 5.3 Electrolysis, Faradays laws of electrolysis
 - 5.4 Applications of electrolysis in electrometallurgy, electro-refining and electroplating (numerical)
 - 5.5 Galvanic cells (elementary idea) brief description of Daniel cell, Ni-Cd cell, dry cell and lithium iodide cell
 - 5.6 Lead storage batteries and maintenance free batteries
 - 5.7 Simple numerical problems related to Faraday's laws
6. **Organic Chemistry.** (08 hrs)
- 6.1 Tetra covalency of carbon, catenation (definition only)
 - 6.2 Structural and condensed formulae of organic compounds
 - 6.3 Homologous series, functional groups and following organic families: (a) alkanes (b) alkenes (c) alkynes (d) alcohols (e) ethers (f) aldehydes and ketones (g) Carboxylic acids (h) esters (i) amides (with structure, IUPAC names and method of preparation of first member of the series)
7. **Environmental Pollution and its control** (06 hrs)
- 7.1 Introduction
 - 7.2 Causes and control of air, water, and soil pollutions

- 7.3 Noise pollution
- 7.4 Radio active pollution and its control
- 7.5 Sewage and its treatment

LIST OF PRACTICALS

1. *Introduction to volumetric analysis, apparatus used and molarity based calculations*
 2. *To determine strength of given solution of sodium hydroxide by titrating against standard solution of oxalic acid using phenolphthalein indicator.*
 3. *To determine strength of given solution of sulphuric acid by titrating against standard solution of sodium carbonate using methyl orange indicator (or by conductometrically).*
 4. *Estimation of hardness of water by EDTA method.*
 5. *Estimation of total alkalinity in the given sample of water by titrating against standard solution of sulfuric acid.*
 6. *Determination of the dosage of bleaching powder required for sterilization or disinfection of different samples of water, using standard sodium thiosulfate solution*
 7. *Estimation of chloride ions in the given sample of water by titrating against standard solution of silver nitrate.*
 8. *To determine %age purity of ferrous sulphate in given solution of known strength using potassium permanganate solution.*
 9. *To distinguish between aldehyde and ketone by Tollen's reagent (benzaldehyde and acetone may be used)*
 10. *To prepare iodoform from ethanol or acetone*
- OR
11. *To prepare the Mohr's salt from ferrous sulphate and ammonium sulphate.*

RECOMMENDED BOOKS

1. Chemistry in Engineering by J.C. Kuricose And J. Rajaram, Tata McGraw Hill, Publishing Company Limited, New Delhi.
2. Engineering Chemistry by P.C.Jain and Monika Jain, Dhanapat Rai Publishing Company New Delhi.
3. Engineering Chemistry by Shashi Chawla.
4. Progressive Applied Chemistry – I by Dr. G.H. Hugar Eagle Prakashan Jalandhar

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1	10	15
2	10	15
3	10	10
4	10	20
5	10	20
6	08	10
7	06	10
Total	64	100

1.5 ENGINEERING DRAWING - I

L T P
- - 7

RATIONALE

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

Note:

- i) First angle projection is to be followed*
- ii) Minimum of 14 sheets to be prepared*
- iii) Instructions relevant to various drawings may be given along with appropriate demonstrations, before assigning drawing practice to students*

DETAILED CONTENTS

1. **Handling, Use and Care of Drawing Instruments and Materials**
 - 1.1 Drawing Instruments
 - 1.2 Materials
 - 1.3 Layout of drawing sheets

2. **Free Hand Sketching and Lettering** (01 sheets)
 - 2.1 Different types of lines in Engineering drawing as per BIS specifications
 - 2.2 Practice of free hand sketching of vertical, horizontal and inclined lines, geometrical figures such as triangles, rectangles, circles, ellipses and curves

3. **Lettering Technique and Practice** (02 sheets)
 - 3.1 Instrumental single stroke lettering of 35 mm and 70 mm height in the ratio of 7:4
 - 3.2 Free hand lettering (Alphabet and numerals)- lower case and upper case, single stroke, vertical and inclined at 75 degree in different standards, series of 3, 5, 8 and 12 mm heights in the ratio of 7:4

4. **Dimensioning Technique** (01 sheet)
 - 4.1 Necessity of dimensioning, method and principles of dimensioning (mainly theoretical instructions)
 - 4.2 Dimensioning of overall sizes, circles, threaded holes, chamfered surfaces, angles, tapered surfaces, holes, equally spaced on P.C.D., counter sink holes, counter bored holes, cylindrical parts, narrow spaces and gaps, radii, curves and arches

5. **Scales** (02 sheets)
 - 5.1 Scales - their need and importance (Theoretical instructions).
 - 5.2 Drawing of plain and diagonal scales

6. **Projection** (04 sheets)
- 6.1 Theory of projections (Elaborate theoretical instructions)
 - 6.2 Drawing 3 views of given objects (Non-symmetrical objects may be selected for this exercise)
 - 6.3 Drawing 6 views of given objects (Non-symmetrical objects may be selected for this exercise)
 - 6.4 Identification of surfaces on drawn views and objects drawn
 - 6.5 Exercises on missing surfaces and views
 - 6.6 Introduction to third angle projections
7. **Sections** (02 sheets)
- 7.1 Importance and salient features, Methods of representing sections, conventional sections of various materials, classification of sections, conventions in sectioning
 - 7.2 Drawing of full section, half section, partial or broken out sections, Offset sections, revolved sections and removed sections.
 - 7.3 Drawing of different conventions for materials in section, conventional breaks for shafts, pipes, rectangular, square, angle, channel, rolled sections
 - 7.4 Exercises on sectional views of different objects.
8. **Isometric Views** (02 sheets)
- 8.1 Fundamentals of isometric projections (Theoretical instructions)
 - 8.2 Isometric views from 2 or 3 given orthographic views.
9. **Symbols and Conventions** (02 sheets)
- 9.1 Civil engineering, sanitary fitting symbols
 - 9.2 Electrical fitting symbols for domestic interior installations
 - 9.3 Building plan drawing with electrical and civil engineering symbols, Material symbols and conventions.

RECOMMENDED BOOKS

1. *A Text Book of Engineering Drawing by Surjit Singh, Dhanpat Rai & Co., Delhi*
2. *Engineering Drawing by PS Gill, SK Kataria & Sons, New Delhi*
3. *Elementary Engineering Drawing in First Angle Projection by ND Bhatt, Charactar Publishing House*
4. *Engineering Drawing I & II by JS Layall, Eagle Parkashan, Jalandhar*

1.6 WORKSHOP PRACTICE - I

L T P
- - 4

RATIONALE

In order to have a balanced overall development of diploma engineers, it is necessary to integrate theory with practice. workshop practices are included in the curriculum in order to provide hand on experience about use of different tools and basic manufacturing practices.

This course aims at developing general manual and machining skills in the students. Besides above, the development of dignity of labour, precision, safety at work place, team working and development of right attitude are the other objectives.

DETAILED CONTENTS (PRACTICALS)

The following shops are included in the syllabus:

1. Carpentry and Painting Shop
2. Fitting Shop
3. Electric Shop

Note:

The contents of shops prescribed under Workshop Practice-I are same as that of General Workshop Practice-I which is common for most of engineering diploma courses except Computer Engineering.

1. Carpentry and Painting Shop

- 1.1 Introduction to various types of wood such as Deodar, Kail, Partal, Teak, Hollack, Sheesham, Champ, etc. (Demonstration and their identification).
- 1.2 Demonstration, function and use of commonly used hand tools. Care, maintenance of tools and safety measures to be observed.
Job I Marking, sawing and planing practice
Job II Extensive planing practice on soft wood
Job III Chiseling practice
- 1.3 Introduction to various types of wooden joints, their relative advantages and uses.
Job IV Preparation of half lap joint
Job V Preparation of Mortise and Tenon Joint
- 1.4 Demonstration of various methods of painting wooden items.
Job V Preparation of surface before painting.
Job VI Application of primer coat
Job VII Painting wooden items by brush/roller/spray

2. Fitting Shop

- 2.1 Introduction to fitting shop, common materials used in fitting shop, Identification of materials. (e.g. Steel, Brass, Copper, Aluminium etc.) Identification of various sections of steel such as Flat, Angle, Tee, Channel, Bar Girder, Square, Z-Section, etc.

- 2.2 Description and demonstration of various types of work benches. Holding devices and files, Precautions while filing
Job I Filing practice (Production of flat surfaces) Checking by straight edge.
Job II Marking of jobs, use of marking tools and measuring instruments.
Job III Filing a dimensioned rectangular or Square piece of an accuracy of $\pm 0.25\text{mm}$.
- 2.3 Introduction to chipping, Demonstration on chipping and its applications. Demonstration and function of chipping tools.
Job IV Chipping practice
- 2.4 Description and demonstration of simple operation of hack-sawing, demonstration and description of various types of blades and their specifications, uses and method of fitting the blade.
Job V Making a cutout from a square piece of MS Flat using Hand hacksaw.
- 3. Electric Shop**
- 3.1 Study, demonstration and identification of common electrical materials such as wires, cables, switches, fuses, ceiling roses, battens, cleats and allied items, tools and accessories.
- 3.2 Study of electrical safety measures and demonstration about use of protective devices.
Job I Identification of phase, neutral and earth of domestic appliances and their connection to two pin/three pin, plugs.
Job II Lay out of complete wiring of a house (i) batten wiring (ii) plastic casing and capping.
- 3.3 Study of common electrical appliances such as electric iron, electric kettle, ceiling fan/ table fan, electric mixer, electric Geyser, desert cooler etc.
Job III Testing and rectification of simulated faults in above said electrical appliances.
- 3.4 Introduction to a Lead-acid battery and its working.
Job IV Installation of a battery and to connect in series and parallel
Job V Charging a battery and testing it with the help of hydrometer and cell tester.

RECOMMENDED BOOKS

1. *Workshop Technology I,II,III*, by S K Hajra, Choudhary and A K Chaoudhary. Media Promoters and Publishers Pvt. Ltd., Bombay
2. *Workshop Technology by Manchanda Vol. I,II,III* India Publishing House, Jalandhar.
3. *Manual on Workshop Practice* by K Venkata Reddy, KL Narayana et al; MacMillan India Ltd. New Delhi
4. *Basic Workshop Practice Manual* by T Jeyapoovan; Vikas Publishing House (P) Ltd., New Delhi

1.7 DESK TOP PUBLISHING (DTP) FUNDAMENTALS

L T P

- - 4

RATIONALE

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

Note: *Since this is a practical oriented subject, there will be no theory paper. Relevant theory/ instruction may be given in practical class/session*

DETAILED CONTENTS

1. Introduction

Overview of Desk Top Publishing (DTP), Introduction of various keys in the keyboard and their functions.

2. Page Maker

Document needs, creating a document, editing and formatting a document, saving and printing a document, inserting text and graphics, inserting columns, fonts and styles, integrating images and graphics from a drawing package in the document, making transparencies, elements, frame option, arrange text, image control, expert tracking, indent/tabs, styles, type styles, layout, tool bar (page setting)

3. Corel Draw

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

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

3.2 Formatting objects

- Arranging objects: align, order, group, ungroup
- Arranging objects: combine, break apart, weld, intersection, trim, separate

- Mode edit: to line, to curve, stretch, rotate, align, convert to curves
- Creating special effects: Transform roll up, clear transformation, add perspective, envelope roll up
- Creating special effects: blend roll-up, extrude roll up, counter roll up, power line, power-clip clear effects
- Working with text: Character, paragraph text, frame, setting of tabs, indents, bullets, spacing in paragraph text

LIST OF PRACTICALS

1. Using window explorer and other window elements
2. Creating and opening a document in page maker
3. Formatting and editing a document
4. Saving and printing a given document
5. Insertion of text and graphics in a given document from external source
6. Using columns utility, to give the document column look
7. Using various fonts and styles to make a document more beautiful
8. Use of page maker to make transparencies
9. Saving and printing a file that has been created
10. Formatting a given file by using undo/redo, repeat, cut, copy, paste, delete, duplicate and clone utilities
11. Inserting objects in the drawing, aligning, ordering, grouping and ungrouping of those objects
12. Use of combine, break apart, weld, intersection, trim and separate tools in a given drawing
13. Use of mode edit tools i.e. to line, to curve, to stretch, and rotate
14. Creating special effects i.e. transform roll-up, envelop roll up, add perspective, extrude roll up, contour roll up, power line, power clip, clear effects
15. To insert character and paragraph text in a drawing and frame, setting of tabs, indents, bullets and spacing in paragraph text
16. Filling of text to a given path, aligning it to base line, straighten text and edit text
17. Using tools such as spell checker, and thesaurus
18. Using find and replace text utility and type assist
19. Adding various symbols to a drawing and creating different pattern

INSTRUCTIONAL STRATEGIES

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

RECOMMENDED BOOKS

1. Desk Top Publishing From A to Z by Bill Grout and Osborne; McGraw Hill
2. DTP(Desk Top Publishing) for PC user by Houghton; Galgotia Publishing House Pvt. Ltd., Daryaganj, New Delhi.

2.1 ENGLISH AND COMMUNICATION SKILLS - II

L T P
3 - 2

RATIONALE

*Language is the most commonly used medium of self-expression in all spheres of human life – personal, social and professional. A student must have a fair knowledge of English language and skills to communicate effectively to handle the future jobs in industry. The objective of this course is to enable the diploma holders to acquire proficiency, both in spoken (oral) and written language. At the end of the course, the student will be able to develop comprehension skills, improve vocabulary, use proper grammar, acquire writing skills, correspond with others and enhance skills in spoken English. It is expected that each polytechnic will establish a **communication skill laboratory** for conducting practicals mentioned in the curriculum.*

DETAILED CONTENTS

1. **Facets of Literature** (12 hrs)
 - 1.1 Short stories
 - 1.1.1 The Portrait of a Lady - Khushwant Singh
 - 1.1.2 The Refugees – Pearl S. Buck
 - 1.2 Prose
 - 1.2.1 Forgetting- Robert Lynd.
 - 1.2.2 Walking Tours- Robert Louis Stevenson
 - 1.3 Poems
 - 1.3.1 All The World's A Stage – W. Shakespeare
 - 1.3.2 No Men are Foreign- James Kirkup
2. **The Art of Précis Writing** (04 hrs)
3. **Grammar and Usage** (08 hrs)
 - 3.1 Narration
 - 3.2 Voice
 - 3.3 Idioms and Phrases
4. **Correspondence** (06 hrs)
 - 4.1 Business Letters
 - 4.2 Personal letters
 - 4.3 Application for Job
5. **Drafting** (08 hrs)
 - 5.1 Report Writing
 - 5.2 Inspection Notes
 - 5.3 Memos, Circulars
 - 5.4 Telegrams
 - 5.5 Press Release
 - 5.6 Agenda and Minutes of Meetings

- | | | |
|----|---|----------|
| 6. | Glossary of Technical & Scientific Terms | (02 hrs) |
| 7. | Communication | (08 hrs) |
| | 7.1 Media and Modes of Communication | |
| | 7.2 Channels of Communication | |
| | 7.3 Barriers to Communication | |
| | 7.4 Listening Skills- Types of Listening | |
| | 7.5 Body language | |

LIST OF PRACTICALS

1. Practice on browsing information from Internet
2. Group Discussions
3. Mock Interviews
4. Telephone Etiquette – demonstration and practice
5. Situational Conversation with feedback through video recording
6. Presentation on a given theme (using PowerPoint)
7. Exercises leading to personality development like mannerism, etiquettes, body language etc.
8. Reading unseen passages
9. Writing (developing) a paragraph
10. Exercises on writing notices and telephonic messages

Note:

1. *The Text Book on “English and Communication Skills, Book-II By Kuldip Jaidka et. al. developed by NITTTR, Chandigarh is recommended to be used for teaching & setting-up the question papers.*
2. *A communication laboratory may be set up consisting of appropriate audio-video system with facility of playing CDs/DVDS and a video camera for recording the performance of each student with play back facility. A set of CDs from any language training organization e.g. British Council etc. may be procured for use of students.*
3. *Elements of body language will be incorporated in all practicals*
4. *The practical exercises involving writing may also be included in Theory Examination.*

RECOMMENDED BOOKS

1. English and Communication Skills, Book-II By Kuldip Jaidka, Alwinder Dhillon and Parmod Kumar Singla, Prescribed by NITTTR, Chandigarh & Published By Abhishek Publication, 57-59, Sector-17, Chandigarh
2. Essentials of Business Communication by Pal and Rorualing; Sultan Chand and Sons
3. The Essence of Effective Communication, Ludlow and Panthon; Prentice Hall of India
4. New Design English Grammar, Reading and Writing Skills by AL Kohli (Course A and course B), Kohli Publishers, 34 Industrial Area Phase-II, Chandigarh,

5. New Design English Reading and Advanced Writing Skills for Class XI and XII by MK Kohli and AL Kohli; Kohli Publishers, 34 Industrial Area Phase-II, Chandigarh,
6. A Practical English Grammar by Thomson and Marlinet
7. Spoken English by V Sasikumar and PV Dhamija; Tata McGraw Hill
8. English Conversation Practice by Grount Taylor; Tata McGraw Hill
9. Developing Communication Skills by Krishna Mohan and Meera Banerji; MacMillan India Ltd., Delhi
10. Business Correspondence and Report Writing by RC Sharma and Krishna Mohan; Tata McGraw Hill Publishing Company Ltd. New Delhi
11. Communication Skills by Ms R Datta Roy and KK Dhir; Vishal Publication, Jalandhar

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1	14	40
2	4	10
3	8	15
4	4	10
5	6	10
6	4	5
7	8	10
Total	48	100

GLOSSARY OF TECHNICAL & SCIENTIFIC TERMS

1. Absolute	परम, अचर, पूर्ण, स्थिर
2. Acceleration	त्वरण, प्रवेग
3. Acid	अम्ल
4. Alkaline	क्षारीय, खारा
5. Air Compressor	वायु - संपीडक
6. Air Conditioning	वातानुकूलन
7. Alignment	सरेखन
8. Alternating Current	प्रत्यावर्ती धारा
9. Altimeter	ऊँचाई मापने का यंत्र
10. Alum	फिटकरी
11. Ammeter	अम्मीटर
12. Ampere	ऐम्पियर
13. Amplification	प्रवर्धन
14. Amplitude	आयाम
15. Angle	कोण
16. Angular Velocity	कोणीय वेग
17. Angular Momentum	कोणीय संवेग
18. Annealing	तापानुशीतन
19. Anode	अनोड
20. Apex	शीर्ष, शिखर, शिखाग्र
21. Apparent	स्पष्ट
22. Applied Mechanics	अनुप्रयुक्त यंत्रिकी
23. Applied Science	अनुप्रयुक्त विज्ञान
24. Archimedes's Principle	आर्किमिडीज़ का सिद्धांत
25. Architecture	वास्तुकला, स्थापत्यकला
26. Armature	आर्मेचर
27. Atom	परमाणु
28. Automatic	स्वचलित
29. Axis	अक्ष
30. Axle	धुरी
31. Balance (Scale)	तुला, तराजू
32. Ball Bearing	बाल - बेयरिंग
33. Bar magnet	छड़ - चुम्बक
34. Barometer	वायुदाबमापी
35. Base	आधार
36. Base Plate	आधार पट्टिका
37. Battery	बैटरी
38. Beaker	बीकर
39. Bending Moment	वक्रण आघूर्ण
40. Blast Furnace	झोंका भट्टी
41. Bleach	विरंजक
42. Boiler	उबालक
43. Bridge	पुल
44. Burette	ब्यूरेट
45. Callipers	कैलिपर्स
46. Calorie	कैलोरी
47. Canal	नहर
48. Capacitance	धारिता
49. Carburettor	कार्बुरेटर
50. Cast Iron	ढलवा लोहा

51.	Catalyst	उत्प्रेरक
52.	Cathode	कैथोड
53.	Centre of Gravity	गुरुत्वाकर्षण - केन्द्र
54.	Centrifugal	उपकेन्द्रीय
55.	Centripetal	अभिकेन्द्रीय
56.	Centroid	केन्द्रीय
57.	C.G.S. System	सी.जी.एस. पद्धति
58.	Chemical Action	रासायनिक क्रिया
59.	Chai	श्रृंखला, माला
60.	Change of State	अवस्था परिवर्तन
61.	Characteristics	लक्षण
62.	Charge (n)	आवेश
63.	Choke	चोक
64.	Chord, Major	गुरु स्वर - संघात
65.	Chord, Minor	लघु स्वर - संघात
66.	Circular	वृत्ताकार, वर्तुल
67.	Clock-wise	दक्षिणा वर्त
68.	Coagulation	स्कंदन
69.	Coefficient of Expansion	प्रसार गुणांक
70.	Coil	कुंडली
71.	Combustion	दहन
72.	Compass	दिशासूचक
73.	Compound	यौगिक
74.	Concave	अवतल
75.	Convex	उत्तल
76.	Concentrated (Solution)	गाढ़ा, सांद्रित (घोल)
77.	Concrete	कंकरीट
78.	Conduction	चालन
79.	Conductor	चालक
80.	Cone	शंकु
81.	Connection	सम्बंध, जोड़
82.	Constant (Adj.)	स्थिर, अचल, एकसमान
83.	Convection	संवहन
84.	Coulomb	कूलोम (विद्युत शक्ति की इकाई)
85.	Couple	बल युग्म
86.	Crane	क्रेन
87.	Crystalline	रवेदार
88.	Dehydrate	निर्जल करना
89.	Distil	आसहन करना
90.	Effervescence	बुदबुदाहट
91.	Element	तत्त्व, मूलतत्त्व
92.	Empirical Formula	मूलअनुपाती सूत्र
93.	Equivalent Weight	तुल्यांकी - भार
94.	Flame Test	ज्वाला - परीक्षण
95.	Flash Point	प्रज्वलन - ताप
96.	Flask	फ्लास्क
97.	Spring Balance	कमानी तुला
98.	Soluble	विलयशील
99.	Viscosity	गाढ़ापन
100.	Volumetric Analysis	आयतनी विश्लेषण

2.2 APPLIED MATHEMATICS - II

L T P
5 - -

RATIONALE

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

DETAILED CONTENTS

1. **Algebra** (12 hrs)
 - 1.1 Determinants: Elementary properties of determinants up to 3rd order, consistency of equations, Cramer's rule.
 - 1.2 Matrix: Algebra of matrices, Inverse of a matrix, matrix inverse method to solve a system of linear equations in 3 variables.

2. **Co-Ordinate Geometry** (20 hrs)
 - 2.1 Cartesian and Polar coordinates (two dimensional), conversion from cartesian to polar coordinates and vice-versa, distance between two points (cartesian co-ordinates), section formulae
 - 2.2 Area of triangle when its vertices are given, co-ordinates of centroid, in center of a triangle when the vertices are given, simple problems on locus.
 - 2.3 Equation of straight line in various standard forms (without proof), inter section of two straight lines, angle between two lines. Parallel and perpendicular lines, perpendicular distance formula
 - 2.4 General equation of a circle and its characteristics. To find the equation of a circle, given:
 - * Centre and radius
 - * Three points lying on it
 - * Coordinates of end points of a diameter;

3. **Integral Calculus** (30 hrs)
 - 3.1 Integration as inverse operation of differentiation
 - 3.2 Simple integration by substitution, by parts and by partial fractions (for linear factors only)
 - 3.3 Applications of integration for :
 - (a) Simple problem on evaluation of area bounded by a curve and axes.
 - (b) Calculation of Volume of a solid formed by revolution of an area about axes. (Simple problems).
 - (c) To calculate average and root mean square value of a function

4. **Vector Algebra** (12 hrs)
 a) Definition notation and rectangular resolution of a vector.
 b) Addition and subtraction of vectors.
 c) Scalar and vector products of 2 vectors.
 d) Simple problems related to work, moment and angular velocity
5. **Differential Equations** (06 hrs)
 Solution of first order and first degree differential equation by variable separation method (simple problems)

RECOMMENDED BOOKS

1. *Elementary Engineering Mathematics* by BS Grewal, Khanna Publishers, New Delhi.
2. *Engineering Mathematics* by Vol. I & II by S Kohli, IPH, Jalandhar
3. *Applied Mathematics* by Dr. RD Sharma
4. *Applied Mathematics, Vol. I & II* by SS Sabharwal & Sunita Jain/ M.L. Moudgil & P.C. Chopra, Eagle Parkashan, Jalandhar
5. *Comprehensive Mathematics, Vol. I & II* by Laxmi Publications
6. *Engineering Mathematics* by Dass Gupta
7. *Engineering Mathematics* by C Dass Chawla, Asian Publishers, New Delhi
8. *Comprehensive Mathematics, Vol. I & II* by Laxmi Publications
9. *Engineering Mathematics, Vol I, II & III* by V Sundaram et.al, Vikas Publishing House (P) Ltd., New Delhi
10. *Engineering Mathematics* by N.Ch.S.N Iyengar et.al, Vikas Publishing House (P) Ltd., New Delhi
11. *Engineering Mathematics, Vol I & II* by SS Sastry, Prentice Hall of India Pvt. Ltd.,
12. *Engineering Mathematics, Vol I & II* by AK Gupta, Macmillan India Ltd., New Delhi

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1	12	20
2	20	20
3	30	40
4	12	10
5	06	10
Total	80	100

2.3 APPLIED PHYSICS – II

L T P
3 - 2

RATIONALE

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

DETAILED CONTENTS

Section – A : Waves and Applications

1. **Waves and vibrations** (10 hrs)
 - 1.1 Wave motion with examples, generation of waves by vibrating particles
 - 1.2 Types of wave motion - transverse and longitudinal wave motion with examples, sound and light waves, velocity, frequency and wave length of a wave. Relationship between wave velocity, frequency and wave length.
 - 1.3 Simple harmonic motion: definition, expression for displacement, velocity, acceleration, time period, frequency in S.H.M.
 - 1.4 Vibration of cantilever and beam, determination of time period of a cantilever
 - 1.5 Free, forced and resonant vibrations with examples
2. **Applications of sound waves** (05 hrs)
 - 2.1 Acoustics of buildings – reverberation, reverberation time, echo, noise, coefficient of absorption of sound, methods to control reverberation time
 - 2.2 Ultrasonics – production (magnetostriction and piezoelectric methods) and their engineering applications
3. **Light** (10 hrs)

Electromagnetic Waves, properties of Electromagnetic waves, Electromagnetic Spectrum interference of light, types of interference, young's double slit experimentm Coherent source of Light, Diffraction of light, Difference between diffraction and interference.

Section – B : Electrical Circuits and Electromagnetism

4. **Electrostatics** (08 hrs)
- 4.1 Coulombs law, unit charge
 - 4.2 Electric flux and Gauss's Law, Electric field intensity and electric potential
 - 4.3 Electric field of point charge, charged sphere (conducting and non-conducting), straight charged conductor, plane charged sheet
 - 4.4 Capacitance, types of capacitors, capacitance of parallel plate capacitor, series and parallel combination of capacitors, charging and discharging of capacitor, their behaviour under AC and DC
 - 4.5 Dielectric and its effect on capacitors, dielectric constant and dielectric break down
5. **DC Circuits** (08 hrs)
- 5.1 Concept of electricity, various applications of electricity
 - 5.2 Current, voltage and resistance, potential difference, power, electrical energy and their units, advantages of electrical energy over other forms of energy
 - 5.3 Ohm's law
 - 5.4 Series and parallel combination of resistors, specific resistance, effect of temperature on resistance, co-efficient of resistance
 - 5.5 Kirchhoff's laws, wheatstone bridge principle and its applications
 - 5.6 Heating effect of current and concept of electric power
6. **Electromagnetism** (08 hrs)
- 6.1. Magnetic field and its units
 - 6.2. Biot-Savart Law, magnetic field around a current carrying straight conductor, circular loop and solenoid
 - 6.3. Force on a moving charge and current in a magnetic field, force between two current carrying parallel conductors
 - 6.4. Moving coil galvanometer, conversion of galvanometer into ammeter and voltmeter
 - 6.5. Permeability, dia, para and ferro-magnetic materials

Section – C : Advanced Physics

7. **Semiconductor physics** (05 hrs)
- 7.1 Energy bands, intrinsic and extrinsic semiconductors, p-n junction diode and its characteristics
 - 7.2 Diode as rectifier – half wave and full wave rectifier
8. **Modern Physics** (10 hrs)
- 8.1 Lasers: concept of energy levels, ionization and excitation potentials; spontaneous and stimulated emission; lasers and its characteristics, population inversion, types of lasers, helium – neon and ruby lasers and applications
 - 8.2 Fibre optics: introduction, optical fiber materials, types, light propagation and applications
 - 8.3 Superconductivity: phenomenon of superconductivity, effect of magnetic field, critical field, type I and type II superconductors and their applications

LIST OF PRACTICALS (To perform minimum eight experiments)

1. To determine and verify the time period of cantilever by drawing graph between load (w) and depression (d)
2. To verify Ohm's law
3. Determination of voltage-current relationship in a dc circuit under specific physical conditions and to draw conclusions
4. To verify laws of resistances in series and in parallel
5. To convert a galvanometer into an ammeter of a given range
6. To convert a galvanometer into a voltmeter of a given range
7. To study the capacitance of a parallel plate capacitor
8. To study characteristics of a pn junction diode
9. To find the wavelength of a He-Ne laser
10. To compare capacitance using DeSauty bridge
11. To determine ionization potential of Mercury
12. To determine high resistance by substitution method
13. To plot sine wave, square wave on CRO and to determine wavelength and velocity of waves

RECOMMENDED BOOKS

1. Test Book of Physics for Class XI (Part-I, Part-II) N.C.E.R.T
2. Test Book of Physics for Class XII (Part-I, Part-II) N.C.E.R.T
3. Applied Physics, Vol. I and Vol. II, TTTI Publications, Tata McGraw Hill, Delhi

4. Concepts in Physics by HC Verma, Vol. I & II, Bharti Bhawan Ltd. New Delhi
5. Fundamentals of Physics by Resnick, Halliday and Walker, Asian Book Pvt. Ltd., New Delhi
6. Berkeley Physics Course, Vol. I, II & III, Tata McGraw Hill, Delhi
7. The Feynman Lectures on Physics by Feynman, Leighton and Sands, Vol. I & II, Narosa Publishing House, Delhi
8. Fundamentals of Optics by Francis A. Jenkins & Harvey E White, McGraw Hill International Editions, Physics Series
9. A Text Book of Optics, Subramanian and Brij Lal, S Chand & Co., New Delhi
10. Comprehensive Practical Physics, Vol, I & II, JN Jaiswal, Laxmi Publishers
11. Engineering Physics by PV Naik, Pearson Education Pvt. Ltd, New Delhi
12. Applied Physics I & II by RA Banwait & R Dogra, Eagle Parkashan, Jalandhar

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1	10	15
2	05	10
3	10	15
4	08	10
5	08	10
6	08	15
7	05	10
8	10	15
Total	64	100

2.4 BASIC ELECTRICAL ENGINEERING

L T P
4 - 2

RATIONALE

This course will enable the students to understand the basic concepts and principles of d.c and a.c fundamental, a.c circuits, batteries, electromagnetic induction etc. including constant voltage and current sources. A diploma holder may be involved in various jobs ranging from preventive maintenance of electrical installation to fault location etc. In addition, he may be working in testing laboratories where he uses measuring instruments. To carry out these and similar jobs effectively, knowledge of basic concepts, principles and their applications is very essential.

DETAILED CONTENTS

1. **Overview of DC Circuits** (08 hrs)
 - 1.1 Simple problems on series and parallel combination of resistors with their wattage consideration,
 - 1.2 Application of Kirchhoff's current law and Kirchhoff's voltage law to simple circuits. Conversion of circuits from Star to Delta and Delta to Star.
2. **DC Circuit Theorems** (06 hrs)

Thevenin's theorem, Norton's theorem, application of network theorem in solving d.c circuit problems.
3. **Constant Voltage and Constant Current Sources** (04 hrs)
 - a) Concept of constant voltage source, symbol and graphical representation characteristics of ideal and practical sources.
 - b) Concept of constant current sources, symbol, characteristics and graphical representation of ideal and practical current sources.
4. **Electro Magnetic Induction** (10 hrs)
 - a) Concept of magnetic field produced by flow of current, Magnetic circuit, concept of magneto-motive force (MMF), flux, reluctance, permeability, analogy between electric and magnetic circuit.
 - b) Faraday's law and rules of electro-magnetic induction, principles of self and mutual induction, self and mutually induced e.m.f, simple numerical problems.
 - c) Concept of current growth, decay and time constant in an inductive (RL) circuit.
 - d) Energy stored in an inductor, series and parallel combination of inductors.
5. **Batteries** (06 hrs)
 - 5.1 Basic idea about primary and secondary cells
 - 5.2 Construction, working and applications of Lead-Acid, Nickel-Cadmium and Silver-Oxide batteries
 - 5.3 Charging methods used for lead-acid battery (accumulator)
 - 5.4 Care and maintenance of lead-acid battery
 - 5.5 Series and parallel connections of batteries
 - 5.6 General idea of solar cells, solar panels and their applications

6. **AC Fundamentals** (10 hrs)
- 6.1 Concept of alternating voltage and current
 - 6.2 Difference between a.c and d.c
 - 6.3 Concept of cycle, frequency, time period, amplitude, instantaneous value, average value, r.m.s. value, maximum value, form factor and peak factor.
 - 6.4 Representation of sinusoidal quantities by phasor diagrams.
 - 6.5 Equation of sinusoidal wave form (with derivation)
 - 6.6 Effect of alternating voltage applied to a pure resistance, pure inductance and pure capacitance.
7. **AC Circuits** (20 hrs)
- 7.1 Inductive reactance and Capacitive reactance
 - 7.2 Alternating voltage applied to resistance and inductance in series.
 - 7.3 Alternating voltage applied to resistance and capacitance in series.
 - 7.4 Impedance triangle and phase angle
 - 7.5 Solutions and phasor diagrams for simple RLC circuits (series and parallel).
 - 7.6 Introduction to series and parallel resonance and its conditions
 - 7.7 Power in pure resistance, inductance and capacitance, power in combined RLC circuits. Power factor, active and reactive power and their significance, importance of power factor.
 - 7.8 j-notation and its application in solving a series and parallel a.c circuits
 - 7.9 Definition of conductance, susceptance and admittance

LIST OF PRACTICALS

1. Familiarization of measuring instruments viz voltmeter, ammeter, CRO, Wattmeter and multi-meter and other accessories
2. Determination of voltage-current relationship in a dc circuit under specific physical conditions and to draw conclusions.
3. To measure (very low) resistance of an ammeter and (very high) resistance of a voltmeter
4. To verify in d.c circuits:
 - a.. Thevenin's theorem,
 - b. Norton's theorem,
5. To observe change in resistance of a bulb in hot and cold conditions, using voltmeter and ammeter.
6. Verification of Kirchhoff's Current Law and Kirchhoff's Voltage Laws in a dc circuit
6. To find the ratio of inductance of a coil having air-core and iron-core respectively and to observe the effect of introduction of a magnetic core on coil inductance
8. To find the voltage current relationship in a single phase R-L and R-C Series circuits, draw their impedance triangles and determination of the power factor in each case .
9. To test a lead - acid storage battery and to charge it.
10. Measurement of power and power factor in a single phase R.L.C. circuit and to calculate active and reactive power.

INSTRUCTIONAL STRATEGIES

This being a prerequisite and foundation subject, the teacher should give emphasis on understanding of concepts and explanation of various terms used in the subject. Practical exercises will reinforce various concepts. Industrial/field exposure must be given by organizing visits(s)

RECOMMENDED BOOKS

1. *Electrical Technology, Fifth Edition by Edward Hughes, Longman Publishers*
2. *Basic Electrical and Electronics Engineering by SK Sahdev; Dhanpat Rai and Sons, New Delhi*
3. *Experiments in Basic Electrical Engineering by SK Bhattacharya, KM Rastogi; New Age International (P) Ltd.; Publishers New Delhi*
4. *Electrical Science by Choudhury S.; Narosa Publishing House Pvt Ltd, Daryaganj, New Delhi*
5. *Basic Electrical and Electronics Engineering by Kumar KM, Vikas Publishing House Pvt Ltd, Jang pura, New Delhi*
6. *Basic Electrical Science and Technology by Kumar KM, Vikas Publishing House Pvt Ltd, Jang pura, New Delhi*
7. *Electrical Technology by BL Theraja, S Chand and Co, New Delhi*
8. *Basic Electricity by BR Sharma; Satya Prakashan; New Delhi*
9. *Principles of Electrical Engineering by BR Gupta, S Chand and Co, New Delhi*
10. *Basic Electrical Engineering by PS Dhogal, Tata Mc Graw Hill, New Delhi*
11. *Basic Electrical Engineering by JB Gupta; SK Kataria and Sons, New Delhi*
12. *Experiments in Basic Electrical Engineering by GP Chhalhotra, Khanna Publishers, New Delhi*

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1.	08	10
2.	06	10
3.	04	08
4.	10	15
5.	06	12
6.	10	15
7.	20	30
Total	64	100

2.5 BASIC ELECTRONICS

L T P
4 - 2

RATIONALE

This subject gives the knowledge of fundamental concepts of basic electronics and aims at providing the students with basic understanding of conductors, semiconductors and insulators, extrinsic and intrinsic semi-conductors, p-n junction, need of rectifiers in electronics, understanding of filters in rectifiers, tunnel diodes, LEDs, varactor diodes, LCD; understanding the working of transistors in various configurations; understanding of FETs and MOSFET etc. for effective functioning in the field of electronic service industry. The teacher should give emphasis on understanding of concepts and explanation of various term used in the subject. Practical exercises will reinforce various concepts. Industrial/field exposure must be given by organizing visit.

DETAILED CONTENTS

1. **Semi conductor physics:** (12 hrs)
 - Review of basic atomic structure and energy levels, concept of insulators, conductors and semi conductors, atomic structure of Germanium (Ge) and Silicon (Si), covalent bonds
 - Concept of intrinsic and extrinsic semi conductor, P and N impurities, doping of impurity.
 - P and N type semiconductors and their conductivity. Effect of temperature on conductivity of intrinsic semi conductor.
 - Energy level diagram of conductors, insulators and semi conductors; minority and majority carriers.

2. **Semi conductor diode:** (12 hrs)
 - PN junction diode, mechanism of current flow in PN junction, Drift and diffusion current, depletion layer, forward and reverse biased PN junction, potential barrier, concept of junction capacitance in forward and reverse bias condition.
 - V-I characteristics, static and dynamic resistance and their calculation from diode characteristics.
 - Diode as half wave, full wave and bridge rectifier. PIV, rectification efficiencies and ripple factor calculations, shunt capacitor filter, series inductor filter, LC filter and RC filter.
 - Types of diodes, characteristics and applications of Zener diodes. Zener and avalanche breakdown.

3. **Introduction to Bipolar transistor:** (12 hrs)
 - Concept of bipolar transistor, structure, PNP and NPN transistor, their symbols and mechanism of current flow; Current relations in transistor; concept of leakage current;
 - CB, CE, CC configuration of the transistor; Input and output characteristics in CB and CE configurations; input and output dynamic resistance in CB and CE configurations; Current amplification factors. Comparison of CB CE and CC Configurations;
 - Transistors as an amplifier in CE Configurations; d.c load line and calculation of current gain, voltage gain using d.c load line.

4. **Transistor biasing Circuits:** (06 hrs)
Concept of transistor biasing and selection of operating point. Need for stabilization of operating point. Different types of biasing circuits.
5. **Single stage transistor amplifier:** (10 hrs)
Single stage transistor amplifier circuit, a.c load line and its use in calculation of currents and voltage gain of a single stage amplifier circuit. Explanation of phase reversal of output voltage with respect to input voltage. H- parameters and their significance.
6. **Field effect Transistors** (12 hrs)
Construction, operation and characteristics of FET and its application.
 - Construction, operation and characteristics of MOSFET in depletion and enhancement modes and its applications.
 - C MOS - advantages and applications
 - Comparison of JFET, MOSFET and BJT
 - FET amplifier circuit and its working principle. (No analysis).

LIST OF PRACTICALS

1. Familiarization with operation of following instruments.
Multi-meter, CRO, Signal generator, Regulated Power Supply by taking readings of relevant quantities with their help.
2. Plot V-I characteristics for PN junction diode
3. Plot V-I characteristics of Zenor diode
4. Observe the wave shape of following rectifier circuit
 - a. Half wave rectifier
 - b. Full wave rectifier
 - c. Bridge rectifier
5. Plot the wave shape of full wave rectifier with
 - a. Shunt capacitor filter
 - b. Series inductor filter
 - c. RC filter
6. Plot input and output characteristics and calculate parameters of transistors in CE configuration.
7. Plot input and output characteristics and calculate of parameters of transistors in CB configuration.
8. Plot V-I characteristics of FET amplifier.
9. Measure the Q-Point and note the variation of Q-Point.
 - a. By increasing the base resistance in fixed bias circuit.
 - b. By changing out of bias resistance in potential divider circuit.
10. Measure the Voltage Gain, input, output impedance in single state CE amplifier circuit.

INSTRUCTIONAL STRATEGIES

This being a prerequisite and foundation subject, the teacher should give emphasis on understanding of concepts and explanation of various terms used in the subject. Practical exercises will reinforce various concepts. Industrial/field exposure must be given by organizing visits(s).

RECOMMENDED BOOKS

1. *Basic Electronics and Linear Circuit* by NN Bhargava and Kulshreshta, Tata McGraw Hill, New Delhi.
2. *Principles of Electrical and Electronics Engineering* by VK Mehta; S Chand and Co., New Delhi
3. *Electronic Components and Materials* by SM Dhir, Tata McGraw Hill, New Delhi
4. *Electronics Devices and Circuits* by Millman and Halkias; McGraw Hill.
5. *Principles of Electronics* by Albert Paul Malvino; Tata McGraw Hill, New Delhi

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1	12	20
2	12	20
3	12	20
4	6	8
5	10	12
6	12	20
Total	64	100

2.6 BASICS OF INFORMATION TECHNOLOGY

L T P
- - 4

RATIONALE

Information technology has great influence on all aspects of life. Almost all work places and living environment are being computerized. In order to prepare diploma holders to work in these environments, it is essential that they are exposed to various aspects of information technology such as understanding the concept of information technology and its scope; operating a computer; use of various tools of MS office; using internet etc. form the broad competency profile of diploma holders. This exposure will enable the students to enter their professions with confidence, live in a harmonious way and contribute to the productivity.

Note:

1. There will be no theory examination.
2. Explanation of Introductory part should be dovetailed with practical work so that following topics may be explained in the laboratory along with the practical exercises.

DETAILED CONTENTS

- (1) Information Technology – its concept and scope
- (2) Computers for information storage, information seeking, information processing and information transmission
- (3) Elements of computer system, computer hardware and software; data – numeric data, alpha numeric data; contents of a program, processing
- (4) Computer organization, block diagram of a computer, CPU, memory
- (5) Input devices; keyboard, Scanner, mouse etc; output devices; VDU and Printer, Plotter
- (6) Electrical requirements, inter-connections between units, connectors and cables
- (7) Secondary storage; magnetic disks – tracks and sectors, optical disk (CD, CD-RW and DVD Memory), primary and secondary memory: RAM, ROM, PROM etc., Capacity; device controllers, serial port, parallel port, system bus
- (8) Installation concept and precautions to be observed while installing the system and software
- (9) Introduction about Operating Systems such as Windows, Windows NT etc.
- (10) About the internet – server types, connectivity (TCP/IP, shell); applications of internet like: e-mail and browsing
- (11) Various Browsers like WWW (World wide web); hyperlinks; HTTP (Hyper Text Transfer Protocol); FTP (File Transfer Protocol)
- (12) Basics of Networking – LAN,WAN, Topologies

LIST OF PRACTICALS

1. Given a PC, name its various components and list their functions
2. Identification of various parts of a computer and peripherals
3. Practice in installing a computer system by giving connection and loading the system software and application software
4. Installation of DOS and simple exercises on TYPE, REN, DEL, CD, MD, COPY, TREE, BACKUP commands
5. Exercises on entering text and data (Typing Practice)
6. Installation of Windows 98 or 2000 or NT or XP.
 - (1) Features of Windows as an operating system
 - Start
 - Shutdown and restore
 - Creating and operating on the icons
 - Opening closing and sizing the windows
 - Using elementary job commands like – creating, saving, modifying, renaming, finding and deleting a file
 - Creating and operating on a folder
 - Changing setting like, date, time color (back ground and fore ground)
 - Using short cuts
 - Using on line help
7. MS-Word
 - File Management:
Opening, creating and saving a document, locating files, copying contents in some different file(s), protecting files, Giving password protection for a file
 - Page Set up:
Setting margins, tab setting, ruler, indenting
 - Editing a document:
Entering text, Cut, copy, paste using tool- bars
 - Formatting a document:
Using different fonts, changing font size and colour, changing the appearance through bold/ italic/ underlined, highlighting a text, changing case, using subscript and superscript, using different underline methods
 - Aligning of text in a document, justification of document ,Inserting bullets and numbering
 - Formatting paragraph, inserting page breaks and column breaks, line spacing
 - Use of headers, footers: Inserting footnote, end note, use of comments
 - Inserting date, time, special symbols, importing graphic images, drawing tools
 - Tables and Borders:
Creating a table, formatting cells, use of different border styles, shading in tables, merging of cells, partition of cells, inserting and deleting a row in a table
 - Print preview, zoom, page set up, printing options

- Using Find, Replace options
- Using Tools like:
Spell checker, help, use of macros, mail merge, thesaurus word content and statistics, printing envelopes and labels
- Using shapes and drawing toolbar,
- Working with more than one window in MS Word,
- How to change the version of the document from one window OS to another
- Conversion between different text editors, software and MS word

8. MS-Excel

- Starting excel, open worksheet, enter, edit, data, formulae to calculate values, format data, create chart, printing chart, save worksheet, switching between different spread sheets
- Menu commands:
Create, format charts, organise, manage data, solving problem by analyzing data, exchange with other applications. Programming with MS-Excel, getting information while working
- Work books:
Managing workbooks (create, open, close, save), working in work books, selecting the cells, choosing commands, data entry techniques, formula creation and links, controlling calculations, working with arrays
- Editing a worksheet, copying, moving cells, pasting, inserting, deletion cells, rows, columns, find and replace text, numbers of cells, formatting worksheet
- Creating a chart:
Working with chart types, changing data in chart, formatting a chart, use chart to analyze data
- Using a list to organize data, sorting and filtering data in list
- Retrieve data with MS – query: Create a pivot table, customising a pivot table. Statistical analysis of data
- Exchange data with other application: embedding objects, linking to other applications, import, export document.

9. MS PowerPoint

- a) Introduction to Powerpoint
 - How to start Powerpoint
 - Working environment: concept of toolbars, slide layout, templates etc.
 - Opening a new/existing presentation
 - Different views for viewing slides in a presentation: normal, slide sorter etc.
- b) Addition, deletion and saving of slides
- c) Insertion of multimedia elements
 - Adding text boxes
 - Adding/importing pictures
 - Adding movies and sound
 - Adding tables and charts etc.
 - Adding organisational chart

- d) Formatting slides
 - Using slide master
 - Text formatting
 - Changing slide layout
 - Changing slide colour scheme
 - Changing background
 - Applying design template
 - e) How to view the slide show?
 - Viewing the presentation using slide navigator
 - Slide transition
 - Animation effects etc.
10. Internet and its Applications
- a) Log-in to internet
 - b) Navigation for information seeking on internet
 - c) Browsing and down loading of information from internet
 - d) Sending and receiving e-mail
 - Creating a message
 - Creating an address book
 - Attaching a file with e-mail message
 - Receiving a message
 - Deleting a message

RECOMMENDED BOOKS

1. *Fundamentals of Computer* by V Rajaraman; Prentice Hall of India Pvt. Ltd., New Delhi
2. *Computers Today* by SK Basandara, Galgotia publication Pvt ltd. Daryaganj, New Delhi.
3. *MS-Office 2000 for Everyone* by Sanjay Saxena; Vikas Publishing House Pvt. Ltd., New Delhi
4. *Internet for Every One* by Alexis Leon and Mathews Leon; Vikas Publishing House Pvt. Ltd., Jungpura, New Delhi
5. *A First Course in Computer* by Sanjay Saxena; Vikas Publishing House Pvt. Ltd., Jungpura, New Delhi
6. *Mastering Windows 95*, BPB Publication, New Delhi
7. *Computer Fundamentals* by PK Sinha; BPB Publication, New Delhi
8. *Fundamentals of Information Technology* by Leon and Leon; Vikas Publishing House Pvt. Ltd., Jungpura, New Delhi
9. *On Your Marks - Net...Set...Go... Surviving in an e-world* by Anushka Wirasinha, Prentice Hall of India Pvt. Ltd., New Delhi
10. *Learning MS Office XP* by Ramesh Bangia, Khanna Book Publishing Co. (P) Ltd., New Delhi.
11. *Fundamentals of Information Technology* by Vipin Arora, Eagle Parkashan, Jalandhar

2.7 WORKSHOP PRACTICE - II

L T P

- - 6

RATIONALE

In order to have a balanced overall development of diploma engineers, it is necessary to integrate theory with practice. workshop practices are included in the curriculum in order to provide hand on experience about use of different tools and basic manufacturing practices.

This course aims at developing general manual and machining skills in the students. Besides above, the development of dignity of labour, precision, safety at work place, team working and development of right attitude are the other objectives.

DETAILED CONTENTS (PRACTICALS)

The following shops are included in the syllabus:

1. Machine Shop
2. Electronic Shop
3. Sheet Metal Shop

Note:

The contents of shops prescribed under Workshop Practice-II are same as that of General Workshop Practice-I which is common for most of engineering diploma courses except Computer Engineering.

1. Machine Shop

1. Demonstration of functioning of lathe machine with the help of dis-assembled lathe, the names of different parts of machine. Lathe operations and safety measures and practice in the starting and stopping of the machine.
2. Practical demonstration by instructor : Holding the round bar, facing at one end, centring and rough turning.
3. Simple exercise on plain and step turning.
4. Demonstration of simple exercise on shaping machine
5. Demonstration of simple exercise on Milling machine
6. Drilling: simple exercise on drilling machine

2. Electronic Shop

- 2.1 Identification and familiarization with the following electronic instruments:
 - a) Multimeter digital (Three and half digit)
 - b) Single beam simple CRO, function of every knob on the front panel
 - c) Audio-oscillator sine and square wave output
 - d) Power supply fixed voltage and variable voltage, single output as well as dual output.Job I - Practice in the use of above mentioned equipment through a small experiment
- 2.2 Identification and familiarization with commonly used tools: statement of their uses. Identification and familiarisation with active

and passive components; colour code and types of resistor and potentiometers (including VDR, LDR, and thermistor). Identification of components including LED, LCD, UJT, FET, Coils, relays, switches (SPDT, DPDT, etc.) connectors, micro switches, reed relays, transformers (mains, audio and RF, etc) Linear and Digital ICs, Thyristors, etc.

NOTE: *Demonstration Boards for the above components should be made.*

Job II Cut, strip, join and insulate two length of wires/ cables (repeat with different types of cables/wires)

Job III Cut, strip, connect/solder/crimp different kinds of wires/ cables (including shielded cable) to different types of power/general purpose/Audio Video/Telephone plugs, sockets, jacks, terminals, binding posts, terminal strips, connectors. The tasks should include making complete recording/ playback/ antenna/ speaker leads for common electronic products such as Radio, TV, VCR, Cassette Recorder, Hi-Fi equipment, Head set, microphone

Job IV Cut, bend, tin component, Leads, inserts and solder components (resistor, capacitor, diodes, transistors, IFT type coils, DIL, ICs etc) on a PCB

Job V Wiring of a small circuit on a PCB/tag strip involving latching, sleeving and use of identifier tags

3. Sheet Metal Shop

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

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

3.2 Introduction and demonstration of various machines and equipment used in sheet metal shop e.g. Shearing Machine, Bar Folder, Burring Machine, Turning Machine, Wiring Machine, Setting Down Machine, Forming Machine, Brake etc.

3.3 Introduction to various raw materials used in sheet metal shop e.g. black-plain sheet, galvanized-iron plain sheet, galvanized corrugated sheet, aluminium sheets etc.

3.4 Study of various types of Nuts, Bolts, Rivets, Steel Screws etc.

Job I Shearing practice on a sheet using hand shears.

a) Single rivetted lap joint/Double rivetted lap joint

b) Single cover plate chain type/zig-zag type single rivetted Butt Joint

RECOMMENDED BOOKS

- 1) *Workshop Technology I,II,III, by S K Hajra, Choudhary and A K Chaoudhary. Media Promoters and Publishers Pvt. Ltd., Bombay*
- 2) *Workshop Technology by Manchanda Vol. I,II,III India Publishing House, Jalandhar.*
- 3) *Manual on Workshop Practice by K Venkata Reddy, KL Narayana et al; MacMillan India Ltd. New Delhi*
- 4) *Basic Workshop Practice Manual by T Jeyapoovan; Vikas Publishing House (P) Ltd., New Delhi*

3.1 DIGITAL ELECTRONICS

L T P

5 - 2

RATIONALE

This syllabus 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.

DETAILED CONTENTS

- 1. Introduction** (05 hrs)
Distinction between analog and digital signal. Applications and advantages of digital signals. General principles of A/D and D/A conversion, brief idea of their application
- 2. Number System** (06 hrs)
Binary and hexadecimal number system: conversion from decimal and hexadecimal to binary and vice-versa. Binary addition, subtraction, multiplication and division including binary points. 1's and 2's complement method of addition/subtraction, sign magnitude method of representation, floating point representation
- 3. Codes and Parity** (06 hrs)
Concept of code, weighted and non-weighted codes, examples of 8421, BCD, excess-3 and Gray code. Concept of parity, single and double parity and error detection and correction using Hamming code, Alpha numeric codes: ASCII and EBCDIC.
- 4. Logic Gates and Families** (12 hrs)
Concept of negative and positive logic. Definition, symbols and truth tables of NOT, AND, OR, NAND, NOR, EXOR Gates, EXNOR gate, NAND and NOR as universal gates. Logic family classification: Definition of SSI, MSI, LSI, VLSI, TTL and C MOS families and their sub classification, Characteristics of TTL and C MOS digital gates. Delay, speed, noise margin, logic levels, power dissipation, fan-in, power supply requirement and comparison between TTL and C MOS families
- 5. Logic Simplification** (08 hrs)
Postulates of Boolean algebra, DE Morgan's Theorems. Various identities. Formulation of truth table and Boolean equation for simple problem. Implementation of Boolean (logic) equation with gates. Karnaugh map (upto 4 variables) and simple application in developing combinational logic circuits
- 6. Arithmetic circuits** (08 hrs)
Half adder and Full adder circuit, design and implementation. Half and Full subtractor circuit, design and implementation. 4 bit adder/subtractor. Adder and Subtractor IC (7484)

7. **Decoders, Multiplexeres and De Multiplexeres** (08 hrs)
Four bit decoder circuits for 7 segment display and decoder/driver ICs. Multiplexers and De-Multiplexers. Basic functions and block diagram of MUX and DEMUX. Different types and ICs
8. **Latches and flip flops** (07 hrs)
Concept and types of latch with their working and applications. Operation using waveforms and truth tables of RS, T, D, Master/Slave JK flip flops. Difference between a latch and a flip flop. Flip flop ICs
9. **Counters** (11 hrs)
Binary counters, Divide by N ripple counters, Decade counter, Pre settable and programmable counters, Up/down counters, Introduction to Asynchronous and Synchronous counters, Ring counter with timing diagram, Counter ICs
10. **Shift Register** (09 hrs)
Introduction and basic concepts including shift left and shift right. Serial in parallel out, serial in serial out, parallel in serial out, parallel in parallel out. Universal shift register. Buffer register, Tristate Buffer register. IC 7495

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. - Construction of 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. 4 bit adder, 2's complement subtractor circuit using an 4 bit adder IC and an XOR IC and verify the operation of the circuit.
5. - Construction of NOR Gate Latch and verification of its operation
- Construction of NAND Gate Latch and verification of its operation
6. Verification of truth table for positive edge triggered, negative edge triggered, level triggered IC flip-flops (At least one IC each of D latch , D flip-flop, JK flip-flops).
7. Verification of truth table for encoder and decoder ICs, Mux and DeMux
8. Construction of a 4 bit SISO, SIPO, PISO, PIPO shift registers using JK/D flip flops and verification of their operation.
9. Construction and testing of a 4 bit ring counter
10. Asynchronous Counter ICs
Verification of truth table for any one universal shift register IC

Use of IC 7490 or equivalent TTL (a) divide by 2 (b) divide by 10 Counter

OR

Use of IC 7493 or equivalent TTL (a) divide by 2 (b) divide by 8 (c) divide by 16 counter

11. To construct and test 4/8 bit D/A Converter using IC
12. To construct and test 4/8 bit A/D Converter using IC

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 may be given to the students.

RECOMMENDED BOOKS

1. *Digital Electronics and Applications by Malvino Leach, Tata McGraw Hill, New Delhi*
2. *Digital Logic Designs by Morris Mano, Prentice Hall of India, New Delhi*
3. *Digital Fundamentals by Thomas Floyds, Universal Book Stall*
4. *Digital Electronics by RP Jain, Tata McGraw Hill, New Delhi*
5. *Digital Electronics by KS Jamwal, Dhanpat Rai and Co., New Delhi*
6. *Digital Electronics by Rajiv Sapra, Ishan Publication, Ambala*
7. *Digital Electronics by BR Gupta, Dhanpat Rai & Co., New Delhi*
8. *Digital Systems: Principles and Applications by RJ Tocci, Prentice Hall of India, New Delhi*
9. *Digital Electronics by Rajaraman V., Prentice Hall of India, New Delhi*
10. *Fundamentals of Digital Electronics by Naresh Gupta, Jain Brothers, New Delhi*

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (hrs)	Marks Allotted (%)
1.	05	05
2.	06	05
3.	06	05
4.	12	15
5.	08	10
6.	08	10
7.	08	10
8.	07	10
9.	11	15
10.	09	15
Total	80	100

3.2 COMPUTER PROGRAMMING USING 'C'

L T P
3 - 4

RATIONALE

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

DETAILED CONTENTS

1. **Algorithm and Programming Development** (04 Hrs)
Steps in development of a program, Flow charts, Algorithm development, Program Debugging
2. **Program Structure** (04 Hrs)
I/o statements, assign statements, Constants, variables and data types, Operators and Expressions, Standards and Formatted, Use of Header & Library files
3. **Control Structures** (08 Hrs)
Introduction, Decision making with IF – statement, IF – Else and Nested IF, While and do-while, for loop, Break and switch statements
4. **Functions** (06 Hrs)
Introduction to functions, Global and Local Variables, Function Declaration, Standard functions, Parameters and Parameter Passing, Call – by value/reference, Recursion
5. **Arrays** (04 Hrs)
Introduction to Arrays, Array Declaration and Initialization, Single and Multidimensional Array, Arrays of characters
6. **Pointers** (08 Hrs)
Introduction to Pointers, Address operator and pointers, Declaring and Initializing pointers, Assignment through pointers, Pointers and Arrays
7. **Structures and Unions** (06 Hrs)
Declaration of structures, Accessing structure members, Structure Initialization, Arrays of structures, Unions
8. **Strings** (04 Hrs)
Introduction, Declaring and Initializing string variables, Reading and writing strings, String handling functions, Array of strings
9. **Files** (04 Hrs)
Introduction, File reading/writing in different modes, File manipulation using standard function types

LIST OF PRACTICALS

1. Programming exercises on executing and editing a C program.
2. Programming exercises on defining variables and assigning values to variables.
3. Programming exercises on arithmetic and relational operators.
4. Programming exercises on arithmetic expressions and their evaluation
5. Programming exercises on formatting input/output using printf and scanf
6. Programming exercises using if statement.
7. Programming exercises using if – Else.
8. Programming exercises on switch statement.
9. Programming exercises on do – while statements.
10. Programming exercises on for – statement.
11. Programs on one-dimensional array.
12. Programs on two-dimensional array.
13. (i) Programs for putting two strings together.
(ii) Programs for comparing two strings.
14. Simple programs using structures.
15. Simple programs using pointers.
16. Simple programs for reading from a file and writing into a file.

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

RECOMMENDED BOOKS

1. *Application Programming in C* by RS Salaria, Khanna Book Publishing Co(P) Ltd. New Delhi
2. *Programming in C* by Schaum Series, McGraw Hills Publishers, New York
3. *Exploring C* by Yashwant Kanetkar – BPB Publications, New Delhi
4. *Programming in C* by Stefin G. Coachin
5. *Programming in C* by R Subburaj, Vikas Publishing House Pvt. Ltd., Jangpura, New Delhi
6. *Programming with C Language* by C Balaguruswami, Tata McGraw Hill, New Delhi
7. *Elements of C* by M.H. Lewin, Khanna Publishers, New Delhi
8. *Programming in C* by Stephen G Kochan
9. *Programming in C* by BP Mahapatra, Khanna Publishers, New Delhi

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1	4	10
2	4	10
3	8	15
4	6	10
5	4	10
6	8	15
7	6	10
8	4	10
9	4	10
Total	48	100

3.3 DATA COMMUNICATION & NETWORKING

L T P
3 - 2

RATIONALE

The Course provides the student with:

1. *Basic of Communication and Networking*
2. *Principles of digital data transmission.*
3. *Communication methods and equipments used in data transmission.*
4. *Errors in data communication and how to deal with them.*

DETAILED CONTENTS

1. Communication Basics

Need for modulation in communication systems. Concept of AM, FM, PM, PAM, FSK, PSK and PCM , Communication model, Data communication networking.

2. Networking Basics-

What is network, Models of networking computing, Networking models, Peer-to-peer Network, Server Client Network, LAN, MAN, and WAN, Network Services, Topologies, Switching Techniques.

3. Data Transmission

Analog and digital transmission, Transmission impairments (delay distortion, Noise, Bandwidth, channel capacity), Transmission medias: Wired (Twisted Pair, Coaxial cable, Optical fiber) and wireless (Radio wave, Microwave, Infrared, Light wave) and their characteristics.

4. Data Communication Principles

- Transmission of binary data, concept of simplex, half duplex and full duplex modes, two and four line systems.
- Byte level data communication, Synchronous communication, data transfer efficiency.
- Asynchronous communication, start-stop bits, data transfer efficiency, relative advantage and disadvantage with synchronous communication.
- Frame level communication, data packets, addresses encoding and decoding of data packets, data encryption and decryption.
- Serial and parallel data communication, comparison in terms of speed of data transfers.

5. Error Detection Techniques.

Source of errors in data communications, effects of errors, data error rate and its dependency on data transfer rates. Error detecting through parity bit, block parity to detect double errors and correct single error, CRC.

6. Communicating Methods and Standards

Multiplexed lines, Multiplexing and Demultiplexing, Frequency division multiplexing, Time division multiplexing, Direct mode of communication, Handshake Mode, Need of hand shake mode of communication, Physical, electrical, and hand shake aspect of standards RS 232C, IEEE 488. Types of modems and their working principle.

RECOMMENDED BOOKS

1. *Data and Computer Communication by William Stalling (PHI)*
2. *Computer Communication and Networking by John Freer*
3. *Computer Network by Tennan Baum (PHI)*

Practical Work

- Study of AM and FM modulated signals
- Study of PCM and pulse modulated signals
- Study of different network cables & their testing
- Study of different network connectors
- Study of RS232C ports and observe the signals
- Study of modem and its working
- Study the use of multiplexers and demultiplexers

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1	6	10
2	6	15
3	10	20
4	10	20
5	6	15
6	10	20
Total	48	100

3.4 COMPUTER PERIPHERALS AND INTERFACING

L T P

3 - 4

RATIONALE

A computer engineer should be able to interface and maintain key-board, printer, mouse monitor etc along with the computer system. The course provides the necessary knowledge and skills regarding working construction and interfacing aspects of peripherals. The students will get to know how various peripherals communicate with central processing unit of the computer system and pattern their respective operations. The student will be able to maintain keyboard, printer, monitors and Power Supplies (CVTs and UPSs) along with computer system. This subject provides the required background of computer installation, maintenance and testing of peripheral with micro computers So a course on Computer Peripherals and Interfacing Devices is required to develop such skills.

DETAILED CONETENTS

- 1. Video Display** (06 hrs)
The basic principle of working of video monitors, video display adapters, video modes, Video display EGA/VGA/SVGA/PCI adapters and their architecture, Overview of raster scan, vector graphic, their main difference and relative advantages, Concept of reduction and bandwidth of monitors refreshing of screen
- 2. Hardware Organization of PCs** (06 hrs)
Types of motherboard and their details, types of microprocessors and their compatibility with motherboards, serial and parallel ports, PS/2, USB Ports, Electrical requirements, Interconnection between units, connectors and cables.
- 3. Storage Devices** (05 hrs)
Types of Hard Disk Drives- IDE, SCSI, SATA, External Hard Disk. Constructional features and working of hard disk drive, floppy disk drive, optical and DVD disk drive. Logical structure of disk and its organization, boot record, and CD writer.
- 4. Input Devices** (08 hrs)
Detailed working principle of various input devices such as keyboard, mouse, scanner. Basic principle of touch screen, light pen, digitizers and joystick, flash drive. Drivers for various input devices and their role.
- 5. Output Devices** (07 hrs)
Overview of printer and its classification (impact and Non-impact printer, serial and parallel printers), principle and working of desk Jet, dot matrix and laser printers, principles of working and features of plotter, and modems. Software drivers for various output devices and their role.
- 6. Power Supplies** (05 Hrs)
Explain the working of SMPS used in computers and constant voltage transformers. On Line/Off Line uninterrupted power supplies (UPS), basic principle of working their importance and maintenance

7. **The BIOS and DOS Services** (05 Hrs)
 The basic idea of BIOS and DOS services for diskette, serial port, keyboard and printers.

LIST OF PRACTICALS

- 1) To study the construction and working of CRT, coloured and black and white monitor and troubleshooting it.
- 2) Exercise on assembling a PC with peripherals and testing the same.
- 3) To Study the components and internal parts, working of hard disk, floppy disk drive and CDROM, flash drives
- 4) To study the operations, components and internal parts of keyboard, mouse and their troubleshooting
- 5) Study of components, internal parts and working of DMP, Inkjet printer and Laser printer and various installation of printers
- 6) To study the SMPS circuit and measure its various voltages. Connecting SMPS to mother- board and other devices.
- 7) To study the operation and maintenance of UPS.

INSTRUCTIONAL STRATEGY

While teaching the subject the teacher may take the interfacing devices like disk drives, printers, key-boards, scanners, plotters etc. physically and explain its working. Additional practical exercise on maintenance and repair on peripheral devices will help the students to develop adequate skills.

RECOMMENDED BOOKS

1. *Hardware Trouble Shooting and Maintenance by B. Govinda Rajalu, IBM PC and Clones, Tata McGraw Hill 1991*
2. *The waite group writing MS DOS Device, Drives by Robert, S Lai: Addison, Wesley Publishing Co. 2nd Ed. 1992.*
3. *Hardware and Software of Personal Computers by SK Bose; Wiley Eastern Limited, New Delhi.*
4. *Microprocessors and Interfacing by Hall, Douglas: McGraw Hill*
5. *Microprocessors and Interfacing by Uffenbeck.*
6. *Fundamentals of Computers by Sukhvir Singh; Khanna Publishers, New Delhi*
7. *Computer Peripherals for Micro Computers, Microprocessor and PC by Levis Hahenstau*
8. *Inside the PC (Eight Edition) by Peter Norton; Tech Media Publication, New Delhi*
9. *Upgrading and Praparing PC*

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time (Hrs)	Allotted	Marks Allotted (%)
1	6		15
2	6		15
3	3		15
4	8		15
5	7		10
6	3		15
7	5		15
Total	48		100

3.5 OPERATING SYSTEMS (OS)

L T P

3 - 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.

DETAILED CONTENTS

- 1. Overview of Operating Systems** (04 hrs)
Definition of Operating Systems, Types of Operating Systems, Importance of Operating Systems, Memory organization, Linking, loading and executing control program
- 2. Functions of Operating System** (22 hrs)
Process Management Functions (Principles and Brief Concept); Job Scheduler, Process Scheduler, Process synchronization.

Memory Management Function (Principles and Brief Concept); Introduction, Single Process System, Fixed Partition Memory, System Loading, Segmentation, Swapping, Simple Paging System, Virtual Memory.

I/O Management Functions (Principles and Brief Concept); Dedicated Devices, Shared Devices, I/o Devices, Storage Devices, Buffering, Spooling.

File Management; Principles and Brief Concept, Types of File System; Simple file system, Basic file system, Logical file system, Physical file system.

Dead Lock; Condition for Dead lock, Dead Lock Preventions, Dead Lock Avoidance
- 3. Linux Operating System** (22 hrs)
Introduction, history of Linux and Unix, Linux Overview, Structure of Linux, Linux releases, open linux, system requirements, file structures, process scheduling and memory management in Unix.

Linux Commands and Filters: Shells, concepts of command options, input, output redirecting and network file, process and communication commands like mkdir, cd, ls, who, whoami, cat, more, tail, head, mv, chmod, grep, wc, sort, kill, write, wall, mail, news

LIST OF PRACTICALS

1. Directory commands
2. File commands
3. Process management
4. Using file permission commands
5. Mail commands

INSTRUCTIONAL STRATEGY

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

RECOMMENDED BOOKS

1. *Operating Systems by John J Donovan, Tata McGraw Hill, New Delhi*
2. *Linux – The Complete Reference by Ruichard Peterson, Tata McGraw Hill, New Delhi*
3. *Operating Systems by Stallings Tata McGraw Hill.*
4. *System Programming by Dharam Dhare, Tata McGraw Hill, New Delhi*
5. *Operating System Concepts by Ekta Walia, Khanna Publishers, New Delhi.*
6. *Unleashed Linux by Tech Media Publishers, New Delhi*
7. *Linux – Install and Configuration Black Book by Die Annlebalnc and Issac Yates, IDG Books India Private Ltd., New Delhi.*

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1	4	20
2	22	50
3	22	30
Total	48	100

3.6 COMPUTER WORKSHOP

L T P

- - 4

RATIONALE

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

DETAILED CONTENTS

1. Familiarization with various components and parts of personal computers, mother board details, hard disk and hard disk drive, floppy disk drive. CD Rom drive, DVD, keyboard, display devices, various chips (memory chips and CPU); serial and parallel ports, inkjet, Dot matrix and Laser printers, Modems, connectors and cables
2. Assembly and Disassembling of PCs : Power supply, linear power supply and switch mode power supply, trouble shooting of SMPS.
3. Installation and booting of various operating system, LINUX, windows XP server, Latest Version of Windows. Familiarization of their features with practical demonstrations. Changing settings on Windows XP, VISTA, creating boot sector, Structure of floppy disk and hard disk, writing to boot sector and reading from it.
4. Installation of latest version of other software like MS-Office, Visual Basic, Adobe Photoshop, Corel Draw, Macromedia Flash etc.
5. Installation of latest version of database software like Oracle, My SQL, SQL Server etc.
6. Virus detection, prevention and cure. Use of PC tools. Learning various types of virus such as polymorph virus, stealth viruses; boot sector virus, file virus, partition table viruses.
7. Installation, uninstallation and use of Antivirus software.

INSTRUCTIONAL STRATEGY

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

RECOMMENDED BOOKS

- 1) *PC Upgrade and Maintenance Guide 8th Edition by Mark Minasi, BPB Publication*
- 2) *Hardware Bible by Winn Rosch, Techmedia Publications*
- 3) *IBM PC and Clones by Govinda Rajalu. Tata McGraw Hill, Publishers, New Delhi*
- 4) *Electronic Instrumentation and Measurement Techniques by WD Cooper and Adhelfrics. Prentice Hall of India, New Delhi*

- 5) *Common Computer Circuits and Faults Vol. 1* by M. Lotia, BPB Publications, New Delhi
- 6) *Monitor and Fault Diagnosis Vol. 1 and II.* M. Lotia, BPB Publications, New Delhi
- 7) *Unix System Administration by Unleashed.* Tech. Media Publications, New Delhi
- 8) *Understanding Unix* Tech Media Publications, New Delhi
- 9) *Linux Unleashed* Tech Media Publications, New Delhi
- 10) *Unix Configuration and Installation* DPB Publications, New Delhi
- 11) *Novel Network Novel's Guide to Network 4.01 Networks*
- 12) *Teach Yourself Unix* BPB Publications, New Delhi
- 13) *Study Guide Windows NT Server and Workstation 4* Tech Media Publications, New Delhi
- 14) *Complete Guide to Window NT and Workstation* by Peter Norton. Tech Media Publications, New Delhi
- 15) *Complete Guide to Windows 98* by Peter Norton. Tech. Media Publications, New Delhi
- 16) *Training Guide for Windows 98* by MCSE, Tech Media Publications, New Delhi

ECOLOGY AND ENVIRONMENTAL AWARENESS CAMP

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 eco system and controlling pollution by pollution control measures. He should also be aware of environmental laws related to the control of pollution.

This is to be organized at a stretch for 3 to 4 days. Lectures will be delivered on following broad topics. There will be no examination for this subject.

1. Basics of ecology, eco system and sustainable development
2. Conservation of land reforms, preservation of species, prevention of advancement of deserts and lowering of water table
3. Sources of pollution - natural and man made, their effects on living and non-living organisms
4. Pollution of water - causes, effects of domestic wastes and industrial effluent on living and non-living organisms
5. Pollution of air-causes and effects of man, animal, vegetation and non-living organisms
6. Sources of noise pollution and its effects
7. Solid waste management; classification of refuse material, types, sources and properties of solid wastes, abatement methods
8. Mining, blasting, deforestation and their effects
9. Legislation to control environment
10. Environmental Impact Assessment (EIA), Elements for preparing EIA statements
11. Current issues in environmental pollution and its control
12. Role of non-conventional sources of energy in environmental protection

4.1 GENERIC SKILLS AND ENTREPRENEURSHIP DEVELOPMENT

L T P
3 - -

RATIONALE

Generic Skills and Entrepreneurship Development is one of the courses from “Human Science” subject area. Generic skills have emerged as an important component of employability skills, which enable an individual to become and remain employable over lifetime and to lead happy and prosperous life. Entrepreneurship development aim at developing conceptual understanding for setting-up one’s own business venture/enterprise. This aspect of Human Resource Development has become equally important in the era, when wage employment prospects have become meager.

Both the areas are supplementary to each other and soft skills are required to be developed in diploma passouts for enhancing their employability for self confidence as well as self employment

DETAILED CONTENTS

- 1. Introduction to Generic Skills** (04 hrs)
Importance of Generic Skill Development (GSD), Global and Local Scenario of GSD, Life Long Learning (LLL) and importance of GSD in it.
- 2. Managing Self** (08 hrs)
Knowing Self for Self Development - Self-concept, personality etc. Managing Self - Physical, Personal grooming, Health, Hygiene. Managing Self –Learning (Assignment, tutorial and seminar) - Collection of Information: Sources of information (primary and secondary) - concepts, examples and comparison, library as a source, Dewey’s Decimal System. Reading Skills: Purpose of reading, composition of sentences, paragraph etc, definition and different styles of reading, techniques of systematic reading and note taking. Writing Skills: Organising thinking, writing a rough draft, review and preparation of final draft. Managing Self – Psychological Stress, Emotions, Anxiety-concepts and significance - Techniques to manage the above
- 3. Managing in Team** (06 hrs)
Team - definition, hierarchy, team dynamics, Team related skills-sympathy, empathy, co-operation, concern, lead and negotiate, work well with people from culturally diverse background, Communication in group - conversation and listening skills
- 4 Task Management** (03 hrs)
Task Initiation, Task Planning, Task execution, Task close out, Exercises/case studies on task planning towards development of skills for task management

5. **Problem Solving** (05 hrs)
Prerequisites of problem solving- meaningful learning, ability to apply knowledge in problem solving, Different approaches for problem solving, Steps followed in problem solving, Exercises/case studies on problem solving.
6. **Entrepreneurship** (08 hrs)
Concept/Meaning and its need, Competencies/qualities of an entrepreneur, Entrepreneurial Support System e.g., District Industry Centres (DICs), Commercial Banks, State Financial Corporations, Small Industries Service Institute (SISIs), Small Industries Development Bank of India (SIDBI), National Bank of Agriculture and Rural Development (NABARD), National Small Industries Corporation (NSIC) and other relevant institutions/organizations at State/National level.
7. **Market Survey and Opportunity Identification (Business Planning)**
How to start a small scale industry, Procedures for registration of small-scale industry, List of items reserved for exclusive manufacture in small-scale industry, Assessment of demand and supply in potential areas of growth, Understanding business opportunity, Considerations in product selection, Data collection for setting up small ventures. (08)
8. **Project Report Preparation** (06 hrs)
Preliminary Project Report, Techno-Economic Feasibility Report, Exercises regarding "Project Report Writing" for small projects

INSTRUCTIONAL STRATEGY

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

RECOMMENDED BOOKS

1. *Generic skill Development Manual, MSBTE, Mumbai.*
2. *Lifelong learning, Policy Brief (www.oecd.org)*
3. *Lifelong learning in Global Knowledge Economy, Challenge for Developing Countries – World Bank Publication*
4. *Towards Knowledge Society, UNESCO Paris Publication*
5. *Your Personal Pinnacle of Success by DD Sharma, Sultan Chand and Sons, New Delhi*
6. *Human Learning, Ormrod*
7. *A Handbook of Entrepreneurship, Edited by BS Rathore and Dr JS Saini; Aapga Publications, Panchkula (Haryana)*

8. *Entrepreneurship Development by CB Gupta and P Srinivasan, Sultan Chand and Sons, New Delhi*
9. *Environmental Engineering and Management by Suresh K Dhamija, SK Kataria and Sons, New Delhi*
10. *Environmental and Pollution Awareness by Sharma BR, Satya Prakashan , New Delhi*
11. *Essentials of Environmental Studies by Joseph, Pearson Education (Singapore) Pte, Ltd. 482,FIE Patparganj, Delhi 110092*
12. *Thakur Kailash, Environmental Protection Law and policy in India: Deep and Deep Publications, New Delhi*
13. *Handbook of Small Scale Industry by PM Bhandari*

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (hrs)	Marks Allotted (%)
1.	4	5
2.	8	15
3.	6	10
4.	3	10
5.	5	10
6.	8	15
7.	8	15
8.	6	20
Total	48	100

4.2 DATA STRUCTURES USING 'C'

L T P
3 - 4

RATIONALE

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

DETAILED CONTENTS

1. **Fundamental Notations** (4 hrs)
Problem solving concept, top down and bottom up design, structured programming, Concept of data types, variables and constants, Concept of pointer variables and constants
2. **Arrays** (4 hrs)
Concept of arrays, single dimensional array, two dimensional array storage strategy of multidimensional arrays, operations on arrays with algorithms (searching, traversing, inserting, deleting)
3. **Linked Lists** (14 hrs)
Introduction to linked list and double linked list, Representation of linked lists in Memory, Traversing a linked list, Searching linked list, Insertion and deletion into linked list, Application of linked lists, Doubly linked lists, Traversing a doubly linked lists, Insertion and deletion into doubly linked lists
4. **Stacks, Queues and Recursion** (8 hrs)
Introduction to stacks, Representation of stacks, Implementation of stacks, Uses of stacks, Introduction to queues, Implementation of queues (with algorithm), Circular Queues, De-queues, Recursion
5. **Trees** (08 hrs)
Concept of Trees, Concept of representation of Binary Tree, Binary Search Trees, Traversing Binary Trees (Pre order, Post order and In order), Searching, inserting and deleting binary search trees
6. **Sorting and Searching** (10 hrs)
Introduction, Search algorithm (Linear and Binary), Concept of sorting, Sorting algorithms (Bubble Sort, Insertion Sort, Quick Sort, Selection Sort, Merge Sort, Heap Sort) and their comparisons.

LIST OF PRACTICALS

Write programmes in C to implement

1. Inserting and deleting elements in an array
2. Insertion and deletion of elements in linked list
3. Insertion and deletion of elements in double linked list
4. Stack implementation using arrays
5. Stack implementation using pointers
6. Queue implementation using arrays
7. Queue implementation using pointers
8. Linear search in a given list
9. Binary search in a given list
10. Implementation of binary search tree
11. Implementation of bubble sort algorithm
12. Implementation of insertion sort algorithm
13. Implementation of quick sort algorithm
14. Implementation of selection sort algorithm
15. Conversion from infix and post-fix notation
16. Implementation of factorial of a number using recursion
17. Implementation of fibonacci series using recursions

INSTRUCTIONAL STRATEGY

This subject clears all fundamentals of programming techniques. Teachers should stress on explaining all the techniques and algorithm in detail in theory sessions. The students should be asked to convert their ideas about a problem into algorithms in theory class and then write programs for the algorithms. Finally all the programmes should be run on computers. This will help the students to have clear concepts of programming.

RECOMMENDED BOOKS

- 1) *Data Structures and Algorithm Using C by RS Salaria, Khanna Book Publishing Co. (P) Ltd. New Delhi*
- 2) *Expert data structures with C by R.B. Patel – Khanna Publishers, New Delhi.*
- 3) *Data structures – Schaum’s Outline Series – McGraw Hill*
- 4) *Data structures – O.G. Kakde and U.A. Deshpande*
- 5) *Data Structures by Kruse*
- 6) *Data Structures by Sanjiv Sofat, Khanna Publishers, New Delhi*
- 7) *Data Structures by Horwitz and Sartaj Sahni*
- 8) *Data Structures by Tanenbaum, Prentice Hall of India, New Delhi*
- 9) *Pascal and Data Structure by Dale and Lily*
- 10) *Data Structure by Schaum’s Series, McGraw Hills Publications*
- 11) *Data Structure using Pascal by Tenenbaum, Prentice Hall of India*
- 12) *Data Structure using C by Robert Kruse, Prentice Hall of India*
- 13) *Data Structure through C by Yashwant Kanekar, BPB Publications*
- 14) *Data Structure through C in depth by SK Srivastava, Deepali Srivastava, BPB Publications*
- 15) *Introduction to Data Structure and Algorithm with C++ by Glenn W. Rowe, Prentice Hall of India*
- 16) *Data Structure through “C” Language by Sameeran Chattopadhyay, Matangini Chottopadhyay, BPB Publications*

- 17) *Data Structure through “C” Language by DOEACC, , BPB Publications*
18) *Data Structure using “C” Lab Workbook by Shukla, , BPB Publications*

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1	4	10
2	4	10
3	14	25
4	8	20
5	8	15
6	10	20
Total	48	100

4.3 RELATIONAL DATABASE MANAGEMENT SYSTEM (RDBMS)

L T P

4 - 3

RATIONALE

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

DETAILED CONTENTS

- 1. Introduction** (06 hrs)
Database Systems; Database and its purpose, Characteristics of the database approach, Advantages and disadvantages of database systems. Classification of DBMS Users; Actors on the scene, Database Administrators, Database Designers, End Users, System Analysts and Application Programmers, Workers behind the scene (DBMS system designers and implementers, tool developers, operator and maintenance personnel)
- 2. Database System Concepts and Architecture** (06 hrs)
Data models, schemas, instances, data base state.
DBMS Architecture; The External level, The conceptual level, The internal level, Mappings.
Data Independence; Logical data Independence, Physical data Independence.
Database Languages and Interfaces; DBMS Language, DBMS Interfaces. Classification of Database Management Systems
- 3. Data Modeling using E.R. Model (Entity Relationship Model)** (10 hrs)
Data Models Classification; File based or primitive models, traditional data models, semantic data models, Entities and Attributes, Entity types and Entity sets, Key attribute and domain of attributes, Relationship among entities
- 4. Relational Model** (06 hrs)
Relational Model Concepts: Domain, Attributes, Tuples and Relations.
Relational constraints and relational database schemes; Domain constraints, Key constraints and constraints on Null, Relational databases and relational database schemes, Entity integrity, referential integrity and foreign key
- 5. Normalization** (06 hrs)
Non-loss decomposition and functional dependencies, First, Second and Third normal forms, Boyce/Codd normal form
- 6. Database Access and Security** (06 hrs)
Database integrity, access controls, database protection, 2-phase commit protocols, 2-phase locking protocols, grant and revoke

7. **SQL using Oracle** (24 hrs)
 SQL * Plus, DDL (Data Definition Languages): Creating Tables, Creating a table with data from another table, Inserting values into a table, updating columns of a Table, Deleting Rows, Dropping a Table.
- DML (Data Manipulation Language): Database Security and Privileges, Grant and Revoke Command, Maintaining Database Objects, Commit and Rollback, various types of select commands, various types of join.
- PL/SQL: Introduction to PL/SQL, Advantage of PL/SQL, PL/SQL Block Structure, PL/SQL Architecture, Fundamentals of PL/SQL, PL/SQL Data types, Variables and constants, scope of variables, Assignment & expression, operators, operator precedence.

LIST OF PRACTICALS FOR RDBMS USING ORACLE:-

1. Exercises on creation and modification of structure of tables.
2. Exercises on inserting and deleting values from tables.
3. Exercises on querying the table (using select command).
4. Exercises on using various types of joins.
5. Exercises on using functions provided by database package.
6. Exercises on commands like Grant, Revoke, Commit and Rollback etc.
7. Introductory exercises on PL/SQL.
8. Design of database for any application using oracle.

INSTRUCTIONAL STRATEGIES

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

RECOMMENDED BOOKS

- 1) *Fundamentals of Database Management Systems by Dr Renu Vig and Ekta Walia, - an ISTE, Publication, New Delhi*
- 2) *Database Management Systems by Alexis Leon and Mathews Leon; Vikas Publishing House Pvt. Ltd., New Delhi*
- 3) *An introduction to database systems by Date C.J. Adison Wesley*
- 4) *Fundamentals of Database Systems by Elmasri/Navathe/Adison Wesley*
- 5) *An Introduction to database systems by Bipin C. Desai, Galgotia Publications Pvt. Ltd., Daryaganj, New Delhi 110 002*
- 6) *SQL Unleashed by Hans Ladanyi Techmedia Publications, New Delhi*
- 7) *Oracle 8, The complete reference by Koch and Loney, Tata McGraw Hill Publications New Delhi*

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1	06	08
2	06	12
3	10	14
4	06	12
5	06	12
6	06	12
7	24	30
Total	64	100

4.4 COMPUTER NETWORKS

L T P
4 - 2

RATIONALE

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

DETAILED CONTENTS

- 1. Networks Basics** (06 hrs)
What is network, Models of network computing, Networking models, Peer-to-peer Network, Server Client Network, LAN, MAN and WAN, Network Services, Topologies, Switching Techniques
- 2. OSI Model** (09 hrs)
Standards, OSI Reference Model, OSI Physical layer concepts, OSI Data-link layer concepts, OSI Networks layer concepts, OSI Transport layer concepts, OSI Session layer concepts, OSI presentation layer concepts, OSI Application layer concepts
- 3. Introduction to TCP/IP** (07 hrs)
Concept of physical and logical addressing, Different classes of IP addressing special IP address, Sub netting and super netting, Loop back concept, IPV4 packet Format, Need of IPV6
- 4. Protocol Suites** (03 hrs)
Models and Protocols, Network IPX/SPX, Internet Protocols
- 5. Network Architecture** (06 hrs)
ARC net specifications, Ethernet Specification and Standardization: 10 mbps (Traditional Ethernet), 10 mbps (Fast Ethernet) and 1000 mbps (Gigabit Ethernet), Introduction to Media Connectivity (Leased lines, ICDN, PSTN, RF, VSAT, Optical and IPLC)
- 6. Network Connectivity** (07 hrs)
Network connectivity Devices, NICs, Hubs, Repeaters, Multiplexers, Modems, Routers and Protocols, Firewall, ATM, VOIP and Net-to-Phone Telephony, Laws and Protocols.
- 7. Network Printing** (03 hrs)
Print Services
- 8. Network Administration / Security** (09 hrs)
Client Server Technology, Server Management, Raid management and mirroring, Hauffman codes, Cryptography
- 9. Network Trouble Shooting Techniques** (06 hrs)
Trouble Shooting process, Trouble Shooting Tools

10. **Error Detection** (05 hrs)
 Source of errors in data communication. Effect of errors, data error rate and its dependency on data transfer rates. Error detection through parity bit, block parity to detect double errors and correct single errors. General principles of error detection and correction using cyclic redundancy checks. Encoding redundant and recovery of data.
11. **Wireless Networking** (03 hrs)
 Basics of Wireless: Wireless MAN, Networking, Wireless LAN, Wi Fi, Wi Max (Broad Band Wireless) and Blue Tooth technology

LIST OF PRACTICALS

1. Recognize the physical topology of a network.
2. Identify the IP address of a workstation and the class of the address and configure the IP address on a workstation
3. Subnet a Class C IP address.
4. Use User Manager for Domains to create, delete and rename a user in Windows NT.
5. Create, Edit and Delete a Linux user account.
6. Use of Netstat and its switches.
7. Install and configure a network interface card in a workstation.
8. Edit a windows login script in a windows NT workstation.
9. Add and change security rights in a Windows NT network.
10. Implement a full backup with the Sbackup utility.
11. Troubleshooting connectivity issues on a Multiplatform network.
12. Editing file system rights in a Linux environment.
 - a) Interfacing with the network (Ethernet)
 - b) Preparing of network cables including hubs, connectors etc.
 - c) Establishment of LAN network for homogeneous systems
 - d) Establishment of LAN network for heterogeneous systems
 - e) Use of protocols and gateways in establishing LAN
 - f) Writing small programs such as file security, file transfer, remote testing
 - g) Trouble shooting of networks
 - h) Writing login scripts

Support Equipment PC Workstation

- Serial Mouse
- 2.3" Floppy drive
- CD drive
- A network Interface card
- Network connection with Internet connectivity
- A tape backup device attached to and configured on the NetWare5 server
- Access to a DNS server
- An external modem with cables
- Hub/switch

Required Software

- Windows XP/2000

- Windows NT server
- NetWare5 server
- Linux OS
- S/W drivers for NIC and modem.

Required Tools and Supplies

- Anti-static wrist wrap
- Anti-static mat
- Crimping tool for RJ 45 connector
- UTP Cable (category 5), RJ 45 connector
- Screwdriver kit

INSTRUCTIONAL STRATEGY

This subject deals with both theory and practicals. The students should practically establish LAN with various hardware and software and their integration.

RECOMMENDED BOOKS

1. *Computer Networks by Tanenbaum, Prentice Hall of India, New Delhi*
2. *Local Area Networks by Peter Hudson*
3. *Understanding Local Area Network by Neil Jenkins*
4. *Area Networks by Stan Schatt, Prentice Hall of India, New Delhi*
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. *Data Communications and Networking by Foronzan, Tata McGraw Hill, New Delhi.*
9. *Linux – The complete Reference by Richard Peterson, Tata McGraw Hill, New Delhi.*
10. *Linux – Install and Configuration Black Book by Dee Annleblanc and Issac Yates, IDG Books India Private Limited, Delhi.*
11. *Unleashed Linux by TechMedia Publishers, New Delhi*

SUGGESTED DISTRIBUTION OF MARKS FOR FACILITATING THE PAPER SETTER

Topic No.	Topic	Time Allotted (Hrs)	Marks Allotted (%)
1	Networks Basics	6	10
2	OSI Model	9	15
3	Introduction to TCP/IP	7	10
4	Protocol Suites	3	05
5	Protocol Suites	6	10
6	Network Architecture	7	10
7	Network Connectivity	3	05
8	Network Printing	9	15
9	Network Administration / Security	6	05
10	Error Detection	5	10
11	Wireless Networking	3	05
Total		64	100

4.5 MICROPROCESSORS & INTERFACING DEVICES

L T P
4 - 2

RATIONALE

The study of microprocessors in terms of architecture, software and interfacing techniques leads to the understanding of working of CPU in a microcomputer. The development in microprocessors of 32 bit architecture brings them face-to-face with mainframe systems. Thus the study of microprocessors is relevant in finding employment in R&D, assembly, repair and maintenance of hardware of microprocessors and computers.

Microprocessors find application in process control industry. They also form a part of the electronic switching system between source and destination in long distance telecommunications. Thus the microprocessor is an area of specialization. Students of electronics and related engineering branches often use microprocessors to introduce programmable control in their projects, in industrial training.

DETAILED CONTENTS

- 1. Evolution of Microprocessor** (04 hrs)
Typical organization of a microcomputer system and functions of its various blocks. Microprocessor, its evolution, function and impact on modern society
- 2. Architecture of a Microprocessor (With reference to 8085 micro processor)** (12 hrs)
Concept of Bus, bus organization of 8085, Functional block diagram of 8085 and function of each block, Pin details of 8085 and related signals, Demultiplexing of address/data bus generation of read/write control signals, Steps to execute a stored programme
- 3. Memories and I/O interfacing** (10 hrs)
Memory organization, Concept of memory mapping, partitioning of total memory space. Address decoding, concept of I/O mapped I/O and memory mapped I/O. Interfacing of memory mapped I/O devices. Concept of stack and its function. Basic RAM Cell, N X M bit RAM, Expansion of word length and capacity, static and dynamic RAM, basic idea of ROM, PROM, EPROM and EEPROM.
- 4. Programming (with respect to 8085 microprocessor)** (16 hrs)
Brief idea of machine and assembly languages, Machines and Mnemonic codes. Instruction format and Addressing mode. Identification of instructions as to which addressing mode they belong. Concept of Instruction set. Explanation of the instructions of the following groups of instruction set. Data transfer group, Arithmetic Group, Logic Group, Stack, I/O and Machine Control Group. Programming exercises in assembly language. (Examples can be taken from the list of experiments).

5. **Instruction Timing and Cycles** (08 hrs)
Instruction cycle, machine cycle and T-states, Fetch and execute cycle.
6. **Interrupts** (04 hrs)
Concept of interrupt, Maskable and non-maskable, Edge triggered and level triggered interrupts, Software interrupt, Restart interrupts and its use, Various hardware interrupts of 8085, Servicing interrupts, extending interrupt system
7. **Data transfer techniques** (04 hrs)
Concept of programmed I/O operations, sync data transfer, async data transfer (hand shaking), Interrupt driven data transfer, DMA, Serial output data, Serial input data
8. **Peripheral devices** (06 hrs)
8255 PPI and 8253 PIT, 8257 DMA controller, 8279 Programmable KB/Display Interface, 8251 Communication Interface Adapter, 8155/8156

LIST OF PRACTICALS

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

INSTRUCTIONAL STRATEGY

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

RECOMMENDED BOOKS

1. *Digital Electronics and Applications by Malvino Leach; Publishers McGraw Hills, New Delhi*
2. *Digital Logic and Computer Design by Mano, M Morris; Prentice Hall of India, New Delhi*

3. *Digital Integrated Electronics by Herbert Taub and Donalds Sachilling; Prentice Hall of India Ltd., New Delhi*
4. *Digital Electronics by Rajaraman; Prentice Hall of India Ltd., New Delhi*
5. *Microprocessor Architecture, Programming and Applications with 8080/8085 by Ramesh S Gaonker, Willey Eastern Ltd. New Delhi*
6. *Microprocessor and Applications by B Ram*
7. *Microprocessor and Microcontrollers by Dr BP Singh, Galgotia Publications, New Delhi*
8. *Introduction to Microprocessors by Mathur, Tata McGraw Hill, New Delhi*
9. *Microprocessor and Microcomputers by Refiquzzaman, Prentice Hall of India Ltd., New Delhi.*

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1.	04	05
2.	12	20
3.	10	15
4.	16	25
5.	08	10
6.	04	05
7.	04	05
8.	06	15
Total	64	100

4.6 VISUAL PROGRAMMING (USING VISUAL BASIC)

L T P
2 - 4

RATIONALE

Visual programming is the programming technique to make the task easy. This type of programming has become very helpful for designing window based applications. This subject will give the students an in depth understanding of the functions used in Visual Basic. The practical exercises of Visual Basic during the course of the study will reinforce the understanding of the subject.

DETAILED CONTENTS

1. Overview of visual programming, advantages of visual programming(02 hrs)
2. **Introduction to Visual Basic** (08 hrs)
Features and applications of VB, concept of integrated development environment (IDE), project application like standard Exe, Active X EXE, Data reports
3. **VB Structure** (04 hrs)
Variable declaration types, user defined data types, scope and life of a variable, arrays, constructors, control flow statements, procedures and functions.
4. **Designing the User Interface** (04hrs)
Design aspects of VB forms, Elements of user Interface, properties of controls, textbox, label, command button, check box and list box, designing forms and displaying messages using above controls, control arrays.
5. **Menus and Common Dialogue Control** (04 hrs)
Creating menus at design time using menu design window, control menus and runtime, create shortest keys for pull down menus, common dialogue control.
6. **Display date, time, string type conversion and printing Information**(04 hrs)
Data reports and environments, display tabular data in report form, date and time, fundamentals of printing, printing with print form method.
7. **Data Base Programming** (04 hrs)
Connecting with database, using DAO, and ADO, Displaying Data in grids, generating Data reports using SQL.
8. Working with inbuilt Active X, Windows common control, creating own Active X through Active X Control, Active X EXE, difference between EXE and DLL (02 hrs)

LIST OF PRACTICALS

- 1) Exercise on opening projects like standard Exe, Active-X EXE and Active-X control
- 2) Exercise on all the menus of opening window of VB
- 3) Exercise on all basic controls
- 4) Exercise on design form
- 5) Exercise on small application using appropriate command
- 6) Exercise on menus
- 7) Writing programs using arrays
- 8) Exercise on Data base connectivity
- 9) Exercise on creating reports

INSTRUCTIONAL STRATEGY

This subject deals with the programming concept of VB and the subject is having both theory and practical. While imparting instructions to the students, the teacher should stress on the usage of various built in Active-X Controls, DLL files so that with the help of which the students can develop application packages of their own

RECOMMENDED BOOKS

1. Mastering VB, by Evangelous Petroustos BPB Publications, New Delhi
2. Teach Yourself VB by Techmedia Publications, New Delhi
3. Microsoft VB Manual by MS Press
4. Visual Basic & .Net by Null Dale, Michael Mc Millan, Chip Weems, Mark Headigton, Narosa Publishing House pvt Ltd, Darya Ganj, New Delhi 110 002

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1	2	5
2	8	10
3	4	15
4	4	20
5	4	10
6	4	10
7	4	20
8	2	10
Total	32	100

ENTREPRENEURIAL AWARENESS CAMP

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

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

5.1 COMPUTER ARCHITECTURE

L T P
3 - -

RATIONALE

The subject provides the students with the knowledge of detailed organization of commonly available computers in order to understand their functionality. The objective of the course is to familiarize the students with hardware design of computer at register and chip level and to introduce advances in computer architecture.

DETAILED CONTENTS

- 1. Basic Concepts** (06 hrs)
Functional blocks; data types; complements; fixed and floating point representation; memory addresses; main memory operations; assembly language; stacks; subroutines
- 2. Micro-Operations and Instructions** (08 hrs)
Registers transfer; bus and memory transfer; arithmetic, logic and shift micro-operations; computer registers; computer instructions and their timing signals; memory and register reference instructions; input-output and interrupt; addressing modes
- 3. CPU and ALU** (11 hrs)
Micro-programmed control; general register organization; instruction formats; data transfer and manipulation; addition and subtraction; multiplication algorithms; division algorithms
- 4. Memory Organization** (07 hrs)
Organization inside a chip; main memory; auxiliary memory; associative memory; cache memory; virtual memory
- 5. Input-Output Organization** (08 hrs)
Peripheral devices; input-output interface; modes of transfer; priority interrupt; DMA; input-output processor
- 6. Advanced Topics** (08 hrs)
Parallel processing; pipelining: arithmetic pipelining, instruction pipelining, RISC pipelining; vector processing; array processors

INSTRUCTIONAL STRATEGY

As the subject is theoretical, instructor should make it interesting by giving examples.

RECOMMENDED BOOKS

1. *Computer System Architecture* by M. Morris Mano (PHI)
2. *Computer Organization* by V. Carl Hamacher, Zvonko G. Vranesic, Safwat G. Zaky (McGraw Hill)
3. *Computer Architecture and Organization* by John P. Hayes (McGraw Hill)
4. *Computer Architecture: A Quantitative Approach* by D.A. Patterson, J.L. Hennessy (Harcourt)
5. *Computer Organization and Design* by P. Pal Choudhuri (PHI)

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1	06	14
2.	08	16
3.	11	22
4.	07	16
5.	08	16
6.	08	16
Total	48	100

5.2 INTERNET AND WEB TECHNOLOGIES

L T P
3 - 4

RATIONALE

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

DETAILED CONTENTS

1. **Internet Basics** (04 hrs)
Specification and technical details for establishing Internet. Types and functions of modems, IP addressing, internet domains, domain name server, TCP/IP protocols, Internet service providers, Intranets
2. **Internet Connectivity** (03 hrs)
Telephone line, cable, leased line, ISDN, VSAT, RF link
3. **World Wide Web (WWW)** (05 hrs)
World Wide Web and its evolution, web page, web server, HTTP protocol. Examples of web servers. Navigation Tools: Netscape and Internet Explorer to surf Internet, Uniform Resource Locator (URL). Hypertext, hyperlinks and hypermedia, URL, its registration, browsers, search engines, proxy servers
4. **Internet Security** (04 hrs)
Basics of authentication and authorization, Introduction to firewall, various techniques of encryption and decryption, SSL (Secure Socket Loyer)
5. **Internet Applications:** (04 hrs)
E-mail, Telnet, FTP, IRC, NNTP, Video conferencing, e-commerce
6. **Developing Portals Using HTML** (06 hrs)
Basic structure of HTML, designing a web page, inserting links images, horizontal rules, comments. Formatting text, title, headings, colours, fonts, sizes, simple tables and forms. HTML tags, hyperlinks. Adding graphics and images, image maps, image files. Using tables, forms, style sheets and frames
7. **Using Front Page** (04 hrs)
Front page editor, Front page explorer
8. Client-side Scripting: Using Java Script, Introduction to VB Script (06 hrs)

9. **Server-side Scripting** (12 hrs)
Java Server Pages (JSP), Web Page designing using database as a Back and JSP as front end, Introduction to other scripting languages like ASP/CGI.

LIST OF PRACTICALS

1. Configuring computer system to access internet
2. Using e-mail
3. Using WWW for accessing relevant information
4. Using Telnet
5. Using FTP
6. Using IRC
7. Creating Web pages using HTML
8. Creating web pages using front page
9. Demonstration of audio-video conferencing
10. Demonstration of e-commerce transaction
11. Design of Forms using Java Script or Visual Basic Script
12. Validation of user queries and responses in the Forms using Java Script or VB script
13. Create a Homepage with frames, animation, background sound and hyperlinks
14. Design Shopping Cart for e-commerce applications
15. Develop hitometer for each client i.e. number of visitors. Visit to a site.
16. Designing simple server side program which accept some request from the client and respond
17. Establishing sessions between servers and clients
18. Design fill-out form with text, check box, radio buttons etc and embed Java script or VB script to validate users input.
19. Develop simple server side program in Server Script which accept some request from the client and respond.
20. Develop interface with database (MS-Access etc) for online retrieval and storage of data through HTML form.

INSTRUCTIONAL STRATEGY

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

RECOMMENDED BOOKS

1. *Internet 6-in-1 by Kraynak and Habraken, Prentice Hall of India Pvt. Ltd.*
2. *Using the Internet IV edition by Kasser, Prentice Hall of India Pvt. Ltd.*
3. *Using the World Wide Web, (IInd edition) by Wall, Prentice Hall of India Pvt. Ltd.*
4. *Internet for Everyone by Alexis Leon and Mathews Leon; Vikas Publishing House Pvt. Ltd.*
5. *Practical Guide and Internet by AB Tiwana; Galgotia Publications Pvt. Ltd.*
6. *HTML – 4 for World Wide Web by Castro Addison Wesley (Singapore) Pvt. Ltd.*
7. *Principles of Web Designing Joel Sklar, Web Warrior Series Available with Vikas Publishing House Pvt. Ltd.*
8. *HTML 4.0 Unleashed by Rick Dranell; Tech Media Publications*

9. *Teach Yourself HTML 4.0 with XML, DHTML and Java Script by Stephanie, Cottrell, Bryant; IDG Books India Pvt. Ltd.*
10. *Dynamic Web Publishing – Unleashed Tech Media*
11. *Using Active Server Pages by Johnson et.al. Prentice Hall of India*
12. *Web Development with Visual Basic with CD ROM by Chapman; Prentice Hall of India*
13. *Java Server Pages (JSP) by Pekowsky Addison Wesley (Singapore) Pvt. Ltd.*
14. *Active Server Pages (ASP) by Keith Morneau Jill Batistick Web Warriier Series Available with Vikas Publishing House Pvt. Ltd.*
15. *ASP Unleashed Tech Media Publication*
16. *JSP O’Reilly SPD Publishers Hans Bergsten*
17. *Java Script in 24 hrs Tech Media Publications*
18. *Java Servlets by O’Reilly SPB Publishers*

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1-3	12	45
4-5	08	15
6-8	16	25
9	12	15
Total	48	100

5.3 OBJECT ORIENTED PROGRAMMING USING C++

L T P
3 - 4

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 C++. This course offers the modern programming language C++ that shall help the students to implement the various concept of object orientation practically. The students will be able to programme in the object oriented technology with the usage of C++.

DETAILED CONTENTS

- 1. Introduction and Features** (06 hrs)
Fundamentals of object oriented programming – procedure oriented programming Vs. object oriented programming (OOP), Object oriented programming concepts – Classes, reusability, encapsulation, inheritance, polymorphism, dynamic binding, message passing, data hiding
- 2. Language Constructs** (06 hrs)
Review of constructs of C used in C++ : variables, types and type declarations, user defined data types; increment and decrement operators, relational and logical operators; if then else clause; conditional expressions, input and output statement, loops, switch case, arrays, structure, unions, functions, pointers; preprocessor directives
- 3. Classes and Objects** (04 hrs)
Creation, accessing class members, 2 Private Vs Public, Constructor and Destructor, Objects
- 4. Member Functions** (04 hrs)
Method definition, Inline functions implementation, Constant member functions, Friend Functions and Friend Classes, Static functions
- 5. Overloading Member Functions** (04 hrs)
Need of operator overloading, operator overloading, instream/outstream operator overloading, function overloading, constructor overloading
- 6. Inheritance** (12 hrs)
Definition of inheritance, protected data, private data, public data, inheriting constructors and destructors, constructor for virtual base classes, constructors and destructors of derived classes, and virtual functions, size of a derived class, order of invocation, types of inheritance, single inheritance, hierarchical inheritance, multiple inheritance, hybrid inheritance, multilevel inheritance, concept of overriding
- 7. Polymorphism and Virtual Functions** (04 hrs)
Importance of virtual function, function call binding, virtual functions, implementing late binding, need for virtual functions, abstract base classes and pure virtual functions, virtual destructors

8. **File and Streams** (4 hrs)
 Components of a file, different operation of the file, communication in files, creation of file streams, stream classes, header files, updating of file, opening and closing a file, file pointers and their manipulations, functions manipulation of file pointers, detecting end-of-file.
9. Introduction to Templates, STL and Namespaces (04 hrs)

LIST OF PRACTICALS

- 1 Programming exercises on control flow statements in C++
- 2 Programming exercises on arrays, strings, function and pointers in C++
- 3 Writing programs to construct classes and deriving objects
- 4 Writing programs for constructors, destructors, using public and private access specifies
- 5 Programming exercises on operator overloading, type conversions and inheritance
- 6 Programming exercises on functional overloading
- 7 Writing programs on steam computation and file operations
- 8 Implementation of a mini project in C++

INSTRUCTIONAL STRATEGY

Since the entire course is totally practical oriented, it is strongly intended that after discussing the individual concepts in class, the students shall be asked to write the programmes for the same in the practical class. The theory and practical shall go hand in hand. It is required that the students make a file of practical exercises which may include the problem definition, algorithms flow charts (wherever required) and the print outs for each listed practical

RECOMMENDED BOOKS

1. *Mastering C++ by KR Venugopal and Rajkumar, T Ravishankar; Tata McGraw hill Publishing Co. Ltd.*
2. *Object Oriented Programming in C++ by E. Balaguruswamy, TMH Publishing Co. Ltd.*
3. *C++ by Robert Lafore, Galgotia Publications Pvt. Ltd., Daryaganj*
4. *Object Oriented Programming and C++ by R Rajaram; New Age International (P) Ltd., Publishers*
5. *Schaum's Outline of Programming with C++ by John R. Hubbard*

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time (Hrs)	Allotted	Marks Allotted (%)
1	6		08
2	6		08
3	4		10
4	4		15
5	4		15
6	12		18
7	4		10
8	4		10
9	4		06
Total	48		100

5.4 INSTALLATION, MAINTENANCE AND TROUBLESHOOTING OF COMPUTER & NETWORKS

L T P
2 - 4

RATIONALE

This subject gives the knowledge and competency to diagnose the faults for trouble shooting for systematic repair and maintenance of computers and computer peripherals.

DETAILED CONTENTS

1. **Repair, Servicing and Maintenance Concepts** (4 hrs)
Introduction to servicing and maintenance concepts. Meantime between failure (MTBF) meantime the repair maintenance policy, factors affecting the performance of computer, potential problems preventive maintenance and corrective maintenance. Preventive maintenance schedule. Circuit tracing techniques. Concept of shielding grounding and power supply requirements and considerations of computers and its peripherals.
1. **Fundamental Trouble Shooting Procedures** (4 hrs)
Fault location, Fault finding aids, Service Manuals, Test and measuring instruments, Special tools
2. **Hardware and Software Faults** (6 hrs)
Trouble shooting techniques, Different trouble shooting techniques and methods, Functional area approach, Split half method, Divergent, convergent and feedback path circuits, analysis measured techniques, Cartridge tape drive, CD drive, Ethernet card failure, modern, serial and parallel port errors. Display card errors, input/output board error, key board error, mouse error, memory related errors. Operating system related errors of Unix, DOS, Windows, Virus errors
4. **Networking** (6 hrs)
LAN failure, cabling connectivity, hub, bridge, switches, Managing network services TCP/IP, Address management, DNS, Domain, Work Group
5. **Trouble shooting of computers, component and peripherals** (4 hrs)
Managing Network Services, TCP/IP, address Management, DNS, DOMAIN, Workgroup (Create workgroup), Network addresses Management of Gateway, Map Network drive, client-server technology, Network Neighborhood.

Installation and troubleshooting of Bridges, Routers, Access Point, LAN Cards Input/output channels, Hub, Switches,
6. **Sharing of devices on Networks, Installation and management of network sharing tools i.e winproxy, managing IP addresses, 2-Tier, 3-Tier Network Architecture** (2 hrs)

7. Different types of cables used in Networking, their coding, connecting style, wi-fi system, V-Sat, ISDN, PSTN, Leased line, study of peer to peer networking (2 hrs)
8. **Installation:** (4 hrs)
Environmental requirements of computer system and peripherals. Sighting preparation and design of computer rooms. Testing specifications and installation of computer systems and peripherals.

LIST OF PRACTICALS

1. Installation of modems and startup a new internet connection in a standalone machine.
2. Sharing of Internet by VPN (Virtual Private Network)
3. Study of troubleshooting and maintenance of computer systems
4. Installation and study of ISDN, PSTN lines, V-sat, RF-link
5. Study of BNC, RJ-45 connectors
6. Study of cables and their connecting structure (i.e simple or cross cable (color coding of cables)
7. Study and management of Network resources,
8. Study and Installation of Firewall in your system
9. Sharing of resources on LAN

INSTRUCTIONAL STRATEGY

While taking the theory classes, the teachers should lay emphasis on the practical aspects of trouble shooting and maintenance. As the given subject is based on hardware aspects of computer system, it needs lot of technical skills to study it thoroughly, field visit to maintenance repair and assembly centres will be beneficial to the students.

RECOMMENDED BOOKS

1. *PC Upgrading , Maintenance and Troubleshooting Guide by SK Chauhan, SK Kataria and Sons, New Delhi*
2. *Troubleshooting and Maintenance of electronic Equipment by K. Sudeep Singh: SK Kataria and Sons, New Delhi*
3. *Troubleshooting Computer System by Robert C Benner*
4. *IBM PC and Clones Govinda Rajalu*
5. *Computer Maintenance and Repair – Scholi Muller*
6. *Upgrading your PC by Mark Minersi*

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1-2	8	25
3	6	10
4-6	12	45
7-8	6	20
Total	32	100

ELECTIVE-I

5.5.1 .NET TECHNOLOGIES

L T P
3 - 4

RATIONALE

This is an upcoming technology, so the teacher should take pain in making the students conversant with this. The demonstration should be given using .NET software for describing the various features of .NET technology

DETAILED CONTENTS

1. **.NET in Context** (4 hrs)
Vision and Goal of .Net, Building Blocks of .Net, Overview of .Net applications, XML and .Net, Interoperability between .Net and COM+
2. **Overview of the .Net Framework** (4 hrs)
.Net Evolution, .Net Framework Architecture, Common Type System, Meta Data, Common Language Runtime, .Net Class Framework, Garbage Collection
3. **Execution under .Net** (2 hrs)
What is MSIL?, Intermediate Language (IL), JIT Compilation
4. **Engineering Applications** (14 hrs)
Window forms and the .Net framework and Controls, Web forms, ASP .Net, and the .Net framework
5. **Working with Data in .Net** (14 hrs)
System Data, System .Xml
6. **Engineering Web Services** (10 hrs)
What are Web Services?, Building Block of Web Service, Creating a Web Services, Consuming a Web Services

LIST OF PRACTICALS

1. Installation of .net
2. Exploring the various features of .net
3. Ability to work and start various tasks and features of .net framework
4. Able to work and develop program in Visual Basic.net
5. To explore in detail Visual Studio.net

INSTRUCTIONAL STRATEGY

.NET being a new technology subject, the teacher should lay considerable emphasis on giving various examples while imparting instructions to the students. Practice exercises will reinforce understanding of various features of this language and will develop requisite abilities to develop programs.

RECOMMENDED BOOKS

1. *Introducing .NET* by James Conard, Patrick Rengler, Birn Eranics, Jay Elynn Wron Publications
2. *Microsoft Visual C# .Net Step- by-Step*, by sharp and Jagger, PHI
3. *Introducing Microsoft .Net*, 3rd Edition by Platt, PHI
4. *Visual Basic .Net* by Tony gaddis, Scott Jones Publishers
5. *ODP with Microsoft Visual Basic .Net and Microsoft Visual C# .Net Step- by- Step*, by Reynolds- Haertle, PHI
6. *Professional .Net framework* by Kevin Hoffman, Jeff Gabrial, SHROFF Publishers and Distributors Pvt. Ltd.

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1.	04	10
2.	04	10
3.	02	05
4.	14	30
5.	14	30
6.	10	15
Total	48	100

5.5.2 NETWORK OPERATING SYSTEM (NOS)

L T P
3 - 4

RATIONALE

This course enable the students to install and manage Linux Server, use of Vi Editor for writing shell scripts for various computational and system administration tasks.

DETAILED CONTENTS

1. **Introduction** (6 hrs)
Definition, features and examples of Network Operating System
2. **Linux Operating System** (12 hrs)
Installation: Linux Loader (LILO) and Grand Unified Boot loader (GRUB), installing Linux. Linux Editors: Text editor, Vi editor, starting and quitting Vi editor, Vi-modes, inserting, deleting, copying, moving, searching and replacing text, setting preferences. X-Windows System: Introduction, configuring X-Windows, Window manager, GNOME and KDE
3. **Shell Programming** (8 hrs)
Creating and running shell programmes, using variables, assigning value to a variable, positional parameters and built-in-shell variables, conditional and iteration statements, writing shell scripts using input, output and other control statements for simple programmes like sorting, searching, finding maximum and minimum and other system programmes like finding the disk space available, to display currently logged-on users and managing files and disk space
4. **System Administration** (8 hrs)
System administration basics, booting and shutdown, mounting and unmounting files, compressing files with gzip and compress, taking back-ups, using maintenance disk, managing users, installing and managing devices for sound, video, installing pictures and sharing printers
5. **Network and Network Services** (8 hrs)
Hardware requirements, configuring Linux files, setting up proxy server, web server, domain name server and other services like Telnet, FTD, Network File System (NFS)
6. **Connecting to Internet** (6 hrs)
Configuring a dial-up connection, web browsing, e-mail, downloading files, updating Linux

LIST OF PRACTICALS

1. Installing Linux using LILO and GRUB (Dual Booting)
2. Creating and managing user accounts
3. Using vi editor to create files and shell programmes
4. Write shell programmes for the following:
 - Factorial of number computation
 - Prime number finding

- Reversing digits of a number
 - Lower case to upper case conversion
 - Sorting and searching numbers
 - Creating a list of files that have not been accessed for a long time
 - Create a back-up copy of all recently accessed files
 - Delete files in the /temp directory that have not been used recently
5. Using Internet: Visit various Linux sites, downloading files and using e-mail
 6. Configuring Servers: Mail server, DNS server, Web server, DHCP server, Samba server

INSTRUCTIONAL STRATEGY

As this is a completely practical oriented subject, the concepts should be made clear with examples and demonstrations.

RECOMMENDED BOOKS

1. *Time Parker, Linux Unleashed, Third Edition, Techmedia 1999*
2. *Norton P, Complete Guide to Linux, Techmedia*
3. *Paul G. Sery, Linux, Network Toolkit, Comdex Computer Publishing*
4. *Nicholas Wells, Guide to Linux Installing and Administration, Vikas Publishing House*

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1.	06	10
2.	12	25
3.	08	25
4.	08	15
5.	08	15
6.	06	10
Total	48	100

5.5.3 COMPUTER BASED INSTRUMENTATION AND CONTROL

L T P
3 - 4

RATIONALE

The course provides the students an understanding of basic concepts and principles of control system, signal conditioning and real time system. Understanding working of various sensors and control elements. Provides knowledge of computer based process control system.

DETAILED CONTENTS

1. **Introduction to Control System** (06 hrs)
Basic concepts of control system. Types of control systems, analog & digital control systems, application based control systems such as process control, sequential control, numerical control, servo mechanism. Important parameters of a control systems such as stability sensitivity, accuracy & speed of response. Control systems block diagram and signals flow graphs
2. **Sensors** (08 hrs)
Temperature sensors such as thermistor, resistor, thermocouple, IC temperature sensors. Strain gauge sensors, types, mounting methods and specification. Photo device like (Photo diode, Photo Transistor, Photo conductive cell, LDRS. Hall affect device. Potentiometers. LVDT, magnetic proximatry, switches & shaft position encodes.
3. **Signal Conditioning** (10 hrs)
Review of potentiometers, AC & DC bridges, Reviews of amplifiers, including high input impedance circuits/devices. Opt couplers and optointerrupters. Process of digitization, AID & D/A conversion, standard AID D/A conversion cards & their specification. Multiplexed AID converter & specification.
4. **Control Elements** (08 hrs)
Solenoids, fears, relays, DIP switches, solid state switches. DC motors, speed torque characteristics speed control techniques stepper motor principles, permanent magnet stepper motor, single stach and multistack variable reluctance stepper motors hybrid stepper motor, static dynamic torque characteristics, motion control of stepper motors.
5. **Control Systems** (12 hrs)
Block diagram, classification, transfer function. Feedback in Control Systems: Proportional control, integration control, proportional plus integration, derivative control, proportional plus derivative control, phase leg and lead control, gardratic and combination blocks. Simplification methods, cascaded or series scanning junction cascade blocks. Simplification methods, cascades or series scanning junction cascade blocks, case off points and its movements; moving summary junction, signal flow graphs constration transfer function determination.
 - a) An overview of analog control systems
 - b) Digital control systems

6. **Real Time Systems and Distributed Control** (04 hrs)
Real Time control, considerations in terms of software. Hardware systems and reliability, concepts of distributed control.

LIST OF PRACTICALS

The laboratory work involve open ended experimentation & following are just the guidelines & by no means are exhaustive.

1. Familiarization with different transducers & their characteristics.
2. Familiarization with interface standard such as RS 232, centronics parallel.
3. Familiarization with AID cards & their specification.
4. Interfacing & programming the AID card of measurement of parameters like pressure, temperature distance etc. using appropriate transducers & signal conditioning circuits.
5. DC motor control using computers.
6. Stepper motor control using computer.
7. Case study of computer based process control system.

INSTRUCTIONAL STRATEGY

The computer based control systems have significant importance in industry. Adequate knowledge about various sensors, control elements and control system should be given to students. The students should be given clear idea about the basic concepts of control systems.

RECOMMENDED BOOKS

1. Digital Control System by Gopal. M
2. Digital Control System by Orgata

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1	06	15
2	08	15
3	10	20
4	08	20
5	12	25
6	04	05
Total	48	100

5.6 MINOR PROJECT WORK

L T P
- - 4

Minor project work aims at exposing the students to the various industries dealing with computers. It is expected that students will get acquainted with computer environment possess desired attitudes. For this purpose student during middle of the semester may be sent for a period of two to four weeks at a stretch in different establishments. During exposure, the students may try to observe the following:

- 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 of computers
- 5) Variety of computers and peripherals in assembly organizations
- 6) Working of a software package development organizations
- 7) Maintenance of database

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

As a minor project activity each student is supposed to study the operations at site and prepare a detail project report of the observations/processes/activities observed 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:

Sr.	Criteria	Weightage
(a)	Attendance and Punctuality	15%
(b)	Initiative in performing tasks/ creating new things	30%
(c)	Relation with people	15%
(d)	Report Writing	40%

6.1 BASICS OF MANAGEMENT

L T P
3 - -

RATIONALE

Since the diploma holders are expected to take up middle level managerial positions, their exposure to basic management principles is very essential. Some topics like Structure of Organization, Leadership, Motivation, Customer Relationship Management (CRM), Legal Aspects of Business, Environmental Considerations, Accident and Safety: Total Quality Management (TQM), Intellectual Property Rights (IPR) etc. have been included in the subject.

DETAILED CONTENTS

1. **Introduction:** (8 Hrs)
Definition and concept of Management, functions of management viz. planning, organizing, staffing, coordinating, controlling; Various areas of management - Human Resource Management (HRM), Financial Management, Marketing Management, Material Management etc.
2. **Structure of Industrial Organization** (4 Hrs)
Concept and structure of an organization, hierarchical management structure (top, middle and lower level management) and functional management structure.
3. **Leadership** (4 Hrs)
Concept, importance, types and qualities of a good leader
4. **Motivation** (4 Hrs)
Concept and importance of motivation - drives and incentives, intrinsic and extrinsic motivation, brief about theories of motivation.
5. **Customer Relationship Management (CRM)** (6 Hrs)
Need, various types of customers, customer satisfaction, life- long customer, Customer Satisfaction Index (CSI) and its significance in playing effective role of engineers in changing scenario.
6. **Legal Aspects of Business** (12 Hrs)
 - a) Elementary knowledge of Income Tax, Sales Tax, Excise Rules, Provident Fund
 - b) Elementary knowledge of Factory Act, 1948 and Payment of Wages Act 1936, Workmen Compensation Act, Industrial Dispute act 1947, Employees State Insurance Act 1978.
 - c) Labour Welfare schemes including wage payment-types, system of wage payment and incentives.
 - d) Intellectual Property Rights (IPR): Concepts, definition, infringements and remedies related to patents, copyrights, trademarks, and designs. Introduction to registering procedure, patent rules.
 - e) Accident and Safety: Classification, precaution and treatment after accident, safety practices promotion, personal protection equipment (PPEs) for safety at work places.

7. Introduction to Total Quality Management (TQM) and steps to achieve this. (2 hrs)
8. Environmental Considerations (8 Hrs)
 - a) Concept of ecology and environment
 - b) Factors contributing to Air, Water, Noise Pollution
 - c) Pollution Control Board
 - d) Disaster Management-basic idea

INSTRUCTIONAL STRATEGY

It is observed that the diploma holders generally take up middle level managerial positions, therefore, their exposure to basic management principles is very essential. Accordingly students may be given conceptual understanding of different topics related to management. Some of the topics may be taught using question answer, assignment or seminar. The teacher will discuss success stories and case studies with students, which in turn, will develop appropriate managerial qualities in the students. In addition, expert lectures may also be arranged from within the institutions or from management organisations. Appropriate extracted reading material and handouts may be provided.

RECOMMENDED BOOKS

1. *Principles of Management by Philip Kotler TEE Publication*
2. *Principles and Practice of Management by Shyamal Bannerjee: Oxford and IBM Publishing Co, New Delhi.*
3. *Financial Management by MY Khan and PK Jain, Tata McGraw Hill Publishing Co.: 7, West Patel Nagar , New Delhi.*
4. *Modern Management Techniques by SL Goel: Deep and Deep Publications Pvt Limited , Rajouri Garden, New Delhi.*
5. *Management by James AF Stoner, R Edward Freeman and Daniel R Gilbert Jr. : Prentice Hall of India Pvt Ltd, New Delhi.*
6. *Essentials of Management by H Koontz, C O' Daniel , Mc Graw Hill Book Company, New Delhi.*
7. *Marketing Management by Philip Kotler, Prentice Hall of India, New Delhi*
8. *Total Quality Management by Dr DD Sharma, Sultan Chand and Sons, New Delhi.*
9. *Intellectual Property Rights and the Law by Dr. GB Reddy.*
10. *Service Quality Standards, Sales & Marketing Department, Maruti Udyog Ltd.*
11. *Customer Relationship Management: A step-by-step approach, Mohamed & Sagadevan Oscar Publication, Delhi*
12. *Customer Relation Management, Sugandhi RK, Oscar Publication, Delhi*
13. *Environment Engineering by GN Pandey & GC Pandey, Tata McGraw Hill Publication.*

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (hrs)	Marks Allotted (%)
1.	8	15
2.	4	10
3.	4	10
4.	4	12
5.	6	10
6.	12	15
7.	2	08
8.	8	20
Total	48	100

6.2 COMPUTER GRAPHICS

L T P
3 - 4

RATIONALE

This subject will enable the students to have awareness about fundamental graphics which can be generated through computers using programming language C. Students will be able to make picture and introduce motion in them using basic transformation.

DETAILED CONTENTS

1. **Graphic Systems** (6 hrs)
Display devices, display processors graphics software coordinate representation, graphics functions and standards.
2. **Scan conversion and Output Primitives** (12 hrs)
 - Scan converting the point
 - Scan converting the straight line - Bresenham's line algorithm.
 - Scan converting a circle - Defining a circle
 - Bresenham's circle algorithm.
 - Region filling - introduction, flood filling, boundary filling
 - Side effects of scan conversion.Graphic primitives in C, Point plotting, line drawing algorithms – DDA algorithms, Bresenham's line algorithms, circle-generating algorithms, ellipses
3. **Two-Dimensional Transformations** (8 hrs)
Basic transformations-translation, scaling, rotation, matrix representations and homogeneous coordinates, composite transformations – scaling relative to a fixed pivot, rotation about a fixed pivot point, general transformation equations, other transformation – reflection and shearing.
4. **Windowing and Clipping Techniques** (8 hrs)
Windowing concepts, clipping algorithms, area clipping, line clipping, polygon clippings, text clipping, blanking, window to-viewpoint transformation, Cohen Sutherland clipping algorithm.
5. **Three Dimensional Graphics** (8 hrs)
Three dimensional transformation, wire frame model, hidden line and hidden surface elimination (z-buffer algorithm), curve fitting and tracing
6. **Perspective and Transformations** (6 hrs)
Perspective and Parallel transformations, vanishing points, perspective anomalies

LIST OF PRACTICALS

Write programs for following:

1. To draw a line
2. To move a character about a line
3. To move two characters in. opposite direction.

4. To draw a circle
5. To move a character along circumference
6. To move along radius.
7. To use 2-d translation technique,
8. To use 2-d scaling technique
9. To use 2-d rotation technique.
10. To use 2-d reflection technique

INSTRUCTIONAL STRATEGY

As the subject deals with Core Graphics Packages and techniques with vast applications in Medical Science, Animation Software, Image Processing, Compression techniques. Teacher is required to expose basic idea of graphics and implementation of various algorithms in C Programming language. The teacher should make the students to write the algorithm first and then based on those algorithms make them implement.

RECOMMENDED BOOKS

1. Theory and problems of Computer Graphics by Roy A Plastock and Gordon Kalley. McGraw Hill Publishers, Schaum's Outline series.
2. Computer Graphics by Donald Hearn and M Pauline Baker
3. Principles of Interactive Computer Graphics by WM Newman and RF Spraul
4. Interactive Computer Graphics by Harengton
5. Computer Graphics Programming Approach by Steven Harrington
6. Computer Graphics for Engineers by A Rajaraman, Narosa Publishing House Pvt Ltd Daryaganj, New Delhi 110002

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1	6	10
2	12	25
3	8	20
4	8	20
5	8	15
6	6	10
Total	48	100

6.3 JAVA PROGRAMMING

L T P
4 - 4

RATIONALE

Today, the most likely place you will find Java is on World Wide Web. The web acts as convenient transport mechanism for Java programs and the web's ubiquity has popularized Java as an Internet development tool. Java has shifted the programming paradigm of single machine to distributed network of machines. Any application on World Wide Web can be easily implemented. Internet can have numerous applications and various protocols. This course will enable the students to learn in detail network programming language Java.

DETAILED CONTENTS

1. **Introduction to Java** (06 hrs)
A brief history, How Java Works. Java Virtual Machine (JVM), Java in time compiler (JIT), Java features using Java with other Tools, Native code, Java Application types, comparison with C and C++
2. Working with Data types, Control flow statements, Arrays, command line arguments (05 hrs)
3. **Java Classes and Memory Management** (09 hrs)
Introduction to Classes, inheritance, encapsulation and Polymorphism, constructors and Finalizers, Garbage collection, Access specifier
4. **Interfaces and Packages** (04 hrs)
Using Java interface, using Java Packages
5. **Exception Handling and Stream Files** (06 hrs)
Over view of exception handling, Method to use exception handling, Method available to exceptions (The throw statement, The Throws class, Final class), Creating your own exception classes
6. **Threads and Multi-threading** (04 hrs)
Overview, Thread Basics - Creating and running a thread, thread control methods, threads life cycle and synchronization
7. **Introduction to Applet, Application and JDK** (08 hrs)
Java Applets Vs Java Applications, Building Application with JDK, Building Applets with JDK, HTML for Java Applets, Managing input-output stream
8. Java Data Base Connectivity (JDBC) (06 hrs)

LIST OF PRACTICALS

1. Programming exercise on control flow statements in Java
2. Programming exercise on Arrays and String
3. Programming exercise on inheritance
4. Write Program for exception handling

5. Write programs for Multithreading
6. Programming exercise on Java applets
7. Write program for Java Data base connectivity
8. Mini project on Java

INSTRUCTIONAL STRATEGY

The subject deals with object oriented concept. As the subject has both theory and practical's, more stress should be given to practical work.

RECOMMENDED BOOKS

- 1) *Java Programming by Balagurusamy*
- 2) *Set of Books on Java by Sun Microsystems*
- 3) *Java Programming- "How to Program Java" by Dietel and Dietel*
- 4) *The Complete Reference Java by Herbel Schildt; McGraw Hill,*

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1.	06	10
2.	05	10
3.	09	15
4.	04	8
5.	06	15
6.	04	10
7.	08	24
8.	06	8
Total	48	100

6.4 MULTIMEDIA AND APPLICATIONS

L T P
3 - 4

RATIONALE

Multimedia is being widely used in web pages, motion pictures and interactive presentations, animation etc. Multimedia has made a significant impact in training/education, business presentations, public information access etc. This course intends to introduce and expose multimedia technology and various factors and features of authoring software. It will also help in making the internet application richer in content and presentation.

DETAILED CONTENTS

- 1. Introduction** (05 hrs)
Introduction to multimedia, hypertext, hypergraphics, animation, application in education and training, science and technology, kiosks, business and games
- 2. Multimedia Hardware** (08 hrs)
Multimedia PC configuration, features and specifications of sound and video interfaces, OCR, touch-screen, scanners, digital cameras, speakers, printers, plotters, optical disks and drives as CDROM and DVD. multimedia networks
- 3. Multimedia Software** (12 hrs)
Image and sound file formats, multimedia file formats, compression, standards and techniques, features of software to read and write such files, video file formats and compression standards. Multimedia operating systems
- 4. Image Processing Tools** (10 hrs)
Using Photo-shop workshop, image editing tools, specifying and adjusting colors, using gradient tools, selection and move tools, transforming path drawing and editing tools, using channels, layers, filters and actions
- 5. Multimedia Authoring Tools** (13 hrs)
Types of Authoring Programmes – Icon based, time based, storyboarding/ scripting and object oriented. Working in Macromedia Flash, Exploring interface, using selection and PEN tools, working with drawing and painting tools, applying colour, viewing and manipulating time line, animating, tweening guiding layers, importing and editing sound and video clips in flash.

LIST OF PRACTICALS

Configuring multimedia devices to PC (Personal computer)

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
- Reading and writing of different format on a frame CD
- Transporting audio and video files
- Using various features of Flash
- Using various features of Photo-shop
- Making multimedia presentations combining, Flash, Photo-shop, such as department profile, lesson presentation, games and project presentations

INSTRUCTIONAL STRATEGY

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

RECOMMENDED BOOKS

1. *Multimedia An Introduction by Villam Casanova and Molina; Prentice Hall of India*
2. *Multimedia Bible by Win Rosch*
3. *Multimedia Making it work by Vaughan, Tay*
4. *Photo-shop for Windows Bible by Deke Maclelland IDG Books India Pvt. Ltd.*
5. *Multimedia Technology and Application by Hillman, Galgotia Publications,*
6. *Flash 5 Bible by Rein Hardit, IDG Books India Pvt. Ltd.*
7. *Flash 5 in easy steps by Vandome IDG Books India Pvt. Ltd.*
8. *Fundamentals of Multimedia by Li and Drew, Pearson Publications*

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1	5	15
2	8	15
3	12	20
4	10	20
5	13	30
Total	48	100

ELECTIVE-II

6.5.1 DATA WAREHOUSING AND DATA MINING

L T P
4 - -

RATIONALE

Since, now-a-days, the industries are concerned with large amount of data, so more computing power is required to process these data.

With this new focus on the information delivery, government and industry are looking to Data Mining and Data Warehousing as valuable construct to convert data to information. Data mining and data warehousing offer the ability to deliver information in an integrated manner which can be used in an easy way. Data Mining can be applied anywhere in business or organization where we have to identify and exploit predictable outcomes.

In this subject, teacher proposes to explain the technology of data warehousing and data mining to collect and analyze educational data. The subject aims to build the concepts of developing a model for application of data mining and data warehousing for education and other areas.

DETAILED CONTENTS

1. **Introduction to Data mining** (06 hrs)
What is data mining? Data mining background, Inductive learning, Statistics, Machine Learning, Differences between Data Mining and Machine Learning, Data Mining Models, Verification Model, Discovery Model, Data mining problems/issues.
2. **Data Mining Functions** (12 hrs)
Classification, Associations, Sequential/Temporal patterns, Clustering/Segmentation
3. **Data Mining Techniques** (15 hrs)
Cluster Analysis, Induction, decision trees, Rule induction, Neural networks, On-line Analytical processing (OLAP), OLAP Example, Comparison of OLAP and OLTP, Data Visualization
3. **Introduction to Data Warehousing** (06 hrs)
Concept and benefits of Data Warehousing, Types of data, Characteristics of a data warehouse, Processes in data warehousing. Data warehousing and (On Line Transaction Processing)OLTP Systems. The Data Warehouse model, Problems with data warehousing, Criteria for a data warehouse
5. **Architecture of Data Warehousing** (10 hrs)
Overall architecture, Metadata, Access Tools, Data Marts

6. **Building a Data Warehouse** (10 hrs)
Design considerations, Technical considerations, Implementation considerations
7. Case Studies on Data Mining Applications and recent trends in data mining (05 hrs)

INSTRUCTIONAL STRATEGY

Teacher should take the students to various organizations to show how the large data is stored and retrieved. Case studies should be taken for deeper understanding

RECOMMENDED BOOKS:

1. J. Han, M Kamber, *Data Mining Concepts and Techniques*, Morgan Kaufmann, 2001, ISBN 1-55860-489-8.
2. *Data Warehousing, Data Mining and OLAP* by Alex Berson and Stephen J Smith, Tata McGraw Hill.
3. *Introduction to Data Mining, Hand, Mannila, and Smyth*, MIT Press, Cambridge, MA, 2000.
4. *OLAP Solutions: Building Multidimensional Information Systems*, Erik Thomsen, John Wiley & Sons, Inc., 1997. (ISBN 0-471-14931-4).
5. *Data Mining: Technologies, Techniques, Tools, and Trends* by Bhavani Thuraisingham, CRC Press, ISBN: 0849318157, 1998
6. *Decision Support and Data Warehouse systems-* Efren G. Mallach (Tata McGraw Hill).
7. *Building the Data Warehouse – W.H. Inmon* (Wiley Pub.)
8. *Data Warehousing, Concepts, Technoques, Products and Applications-* CSR. Prabhu (PHI).
9. *Data Mining Concepts and Techniques – Jiawei Han and Micheline Kamber.*
10. *Data Warehousing in the Real World-* Sam Anahory and Denmis Murray (Pearson Ed.).

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1	6	10
2	12	20
3	15	25
4	6	10
5	10	12
6	10	13
7	5	10
Total	64	100

6.5.2 SOFTWARE ENGINEERING

L T P
4 - -

RATIONALE

This subject will enable the diploma students to have awareness about software engineering, various metrics, planning about software, cost estimation, software design etc.

DETAILED CONTENTS

1. **Introduction to Software (S/W) Engineering** (14 hrs)
Introduction, size factors, Quality and productivity factors. Management issues, models (waterfall, spiral, prototyping), fourth generation techniques, S/W process
2. **Planning** (8 hrs)
The development process, an organizational structure, other planning activities
3. **Software Cost Estimations** (10 hrs)
Cost factors, cost estimations techniques. Staffing level estimation, estimating software maintenance costs, COCOMO
4. **Software Requirements Definition** (8 hrs)
Problem analysis, Requirement engineering. software requirements specifications (SRS), Formal specifications techniques, Characteristics of a good SRS
5. **Software Design and Implementation Issue** (10 hrs)
Fundamental design, concept design notations, design techniques, structured coding techniques, coding styles, documentation guidelines
6. **Verification and Validation Techniques** (8 hrs)
Quality assurance-work-through and inspections, static analysis, symbolic execution, formal verification. Testing Techniques- Unit Testing, Alpha testing, Beta testing, Black Box and White Box Testing
7. **Maintenance Overview** (6 hrs)

INSTRUCTIONAL STRATEGY

This subject should be taught with reference to the software being developed by various software development companies. This would enable the student to correlate the software engineering concepts to realistic situations

RECOMMENDED BOOKS

1. *Software Engineering Concept* by Richard Fairley, Tata McGraw Hill Publishers.
2. *An Integrated Approach to Software Engineering* by Pankaj Jalote, Narosa Publishing House Pvt Ltd,
3. *S/ W Engineering* by Rajib Mall, PHI Publishers
4. *Software Engineering – A Practitioner’s Approach* by RS Pressman, Tata McGraw Hill Publishers.
5. *Software Testing Techniques* by B Beizer
6. *Software Engineering* by KK Aggarwal and Yogesh Singh
7. *A Software Engineering Approach* by Peter A Darnell, Phillips E, Moglis, Narosa Publishing House Pvt Ltd.

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1.	14	25
2.	8	10
3.	10	15
4.	8	15
5.	10	15
6.	8	12
7.	6	8
Total	64	100

6.5.3 WIRELESS COMMUNICATIONS

L T P
4 - -

RATIONALE

Wireless communication course is intended to provide exposure and awareness of latest wireless communication technologies such as GSM, CDMA, WLANs and Bluetooth. This course is designed in conjunction with course on Computer Networks, which provides preliminaries required for this course.

DETAILED CONTENTS

- 1. Introduction** (12 hrs)
Evolution of Mobile Communication Systems, Paging systems, cordless telephone system, cellular telephone system, comparison of common wireless communication systems, 2G cellular networks, 2.5G wireless networks, HSCSD, GPRS, EDGE, UMTS, CDMA2000, Wireless Local Loop, Blue Tooth and Personal Area Networks.
- 2. System Design Fundamentals** (12 hrs)
Frequency reuse, channel alignment strategies, handoff strategies, interference and system capacity, improving coverage and capacity in cellular systems
- 3. Mobile Radio Propagation** (10 hrs)
Free space propagation model, ground reflection (two-ray) model, small-scale multipath propagation, parameters of mobile multipath channels, types of small-scale fading.
- 4. Modulation Techniques** (12 hrs)
Overview of amplitude modulation, angle modulation, digital modulation, linear modulation techniques, constant envelope modulation, spread spectrum modulation techniques, fundamentals of equalization, diversity techniques, RAKE receiver, fundamentals of channel coding.
- 5. Multiple Access Techniques** (5 hrs)
Introduction to FDMA. TDMA, CDMA, SDMA
- 6. Wireless Systems and Standards** (13 hrs)
GSM, CDMA digital cellular standard (IS-95), Features of IEEE 802.11a/b/g/n, Bluetooth

INSTRUCTIONAL STRATEGY

Explanation of concepts using realtime examples/case studies.

RECOMMENDED BOOKS

1. *Wireless Communications Principles and Practice* by Theodore S. Rappaport, Pearson Education Asia, 2nd Edition.
2. *Modern Wireless Communications* by Simon Haykin, Michael Moher, Prentice Hall of India, . 1st Edition.
3. *Wireless Communications and Networking* by Jon W Mark, Prentice Hall of India, 1st Edition
4. *Wireless Communication* by BS Manoj and C Shiva Murthy

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1.	12	20
2.	12	20
3.	10	15
4.	12	20
5.	5	05
6.	13	20
Total	64	100

6.5.4 DISTRIBUTED SYSTEMS

L T P
4 - -

RATIONALE

This course covers abstractions and implementation techniques for the design of distributed systems. At the end of this course students will be familiar with the design and implementation issues of distributed systems.

DETAILED CONTENTS

1. **Introduction to Distributed Systems** (09 hrs)
Definition of distributed systems, their objectives, types, hardware and software concepts, architecture.
2. **Communication** (08 hrs)
Interprocess communication, Remote Procedure Call (RPC), Remote Method Invocation (RMI), Remote Object Invocation.
3. **Processes** (08 hrs)
Introduction to threads, threads in distributed and non distributed systems, client side software, design issues for servers.
4. **Naming** (08 hrs)
General issues with respect to naming, name resolution, implementation of a name space, domain name system.
5. **Security** (12 hrs)
Introduction to security in distributed systems, general issues in authentication and access control, security management.
6. **Distributed Object-based Systems** (09 hrs)
Introduction to distributed object based systems, overview of CORBA and DC OM and their comparison.
7. **Distributed File Systems and Document-based Systems** (10 hrs)
Introduction to distributed file system, distributed document-based systems, their examples, World Wide Web (WWW).

INSTRUCTIONAL STRATEGY

As the subject is new and fully theoretical, instructor should make it interesting by giving examples.

RECOMMENDED BOOKS

1. *Distributed Systems, Principles and Paradigms*, by Andrew S Tanenbaum and Maarten van Steen, Pearson Education
2. *Distributed Systems, Concepts and Design*, by George Coulouris, Jean Dollimore, Tim Kindberg, Addison Wesley.

SUGGESTED DISTRIBUTION OF MARKS

<i>Topic No.</i>	<i>Time Allotted (Hrs)</i>	<i>Marks Allotted (%)</i>
<i>1</i>	<i>09</i>	14
<i>2</i>	<i>08</i>	13
<i>3</i>	<i>08</i>	13
<i>4</i>	<i>08</i>	13
<i>5</i>	<i>12</i>	17
<i>6</i>	<i>09</i>	14
<i>7</i>	<i>10</i>	16
<i>Total</i>	<i>64</i>	<i>100</i>

6.5.5 MOBILE COMPUTING

L T P
4 - -

RATIONALE

The ubiquity of wireless communication technologies and the proliferation of portable computing devices have made possible a mobile computing era in which users, on the move, can seamlessly access network services and resources, from anywhere and at anytime. This course provides an introduction to the fundamentals of mobile computing. A background in computer networks and wireless communication is required.

DETAILED CONTENTS

1. Evolution of wireless networks, wireless data networks, WLANs, WPANs; mobile computing, its functions and devices, introduction to wireline, wireless and ad-hoc networks, middleware and gateways, application and services, developing mobile computing applications, security (10 hrs)
2. **Mobile Computing Architecture** (12 hrs)
3-tier architecture, design considerations for mobile computing, mobile computing through internet
3. **Mobile Computing through Telephony** (08 hrs)
Evolution, multiple access procedures, mobile computing through telephone, developing an IVR applications, Voice XML, telephony application programming interface (TAPI)
4. **Wireless Systems and Standards** (12 hrs)
Bluetooth, RFID, WIMAX, Wi-Fi, Mobile IP, IPV6, JAVA Card, Features of IEEE 802.11 a/b/g/n
5. **Wireless Application Protocol (WAP)** (10 hrs)
WAP, MMS, GPRS Applications
6. **Operating Systems for Mobile Devices** (12 hrs)
Design constraints in applications for handheld devices, palm and symbian OS features and architecture, introduction to J2ME technology, features and architecture of Windows CE.

INSTRUCTIONAL STRATEGIES

Explanation of concepts using real-time examples/case studies.

RECOMMENDED BOOKS

1. *Mobile Computing : Technology, Applications and Service Creation* by Asoke K. Talukdar and Roopa R. Yavagal, TMA, First Reprint – 2006.
2. *Wireless Communication: Principles and Practice* by Theodor S. Rappaport, Pearson Education Asia, 2nd Edition.
3. *Principles of Mobile Computing* by Owe Hansman, Lothar Merk, Martin S Nicklous and Thomas Stober, Springer-Verlag, 2nd Edition, 2003, New Delhi.

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1	10	15
2	12	20
3	08	10
4	12	20
5	10	15
6	12	20
Total	64	100

6.6 MAJOR PROJECT WORK

L T P
- - 8

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:

- Installation of computer systems, peripherals and software
- Programming customer based applications
- Web page designing including database connectivity
- Database applications
- Networking
- Software Development
- Fabrication of components/equipment (computer related components)
- Fault-diagnosis and rectification of computer systems and peripherals
- Bringing improvements in the existing systems/equipment
- Projects related to Multimedia
- Projects related to Computer Graphics

A suggestive criteria 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. This 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 criteria 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.

6.7 PRACTICE IN COMMUNICATION SKILLS

L T P
- - 2

RATIONALE

For successful completion of diploma programme, a student should possess adequate command on language and communication skills so that he/she is able to express himself/herself with ease and felicity. The language used by the student should be appropriate to objectives and occasion. The contents of this subject shall provide practical training to the students through language laboratory.

LIST OF PRACTICAL EXERCISES

1. Exercises on phonetics
2. Interactive session (case studies)
3. Presentation of periodic progress reports (written/oral) and maintaining daily diary
4. Exercises on self assessment using tools like SWOT analysis.
5. Communication empowerment through breaking language Barriers.
6. Internet communication
7. Correspondence
 - 7.1 Resume writing
 - 7.2 Covering letter
 - 7.3 Follow-up correspondence
 - 7.4 Internal and External business Correspondence
8. Practice on public relation skills with live examples.
9. Practice on listening skills.
10. Speaking exercises with emphasis on voice modulation (reading and extempore)
11. Demonstration and practice on Body language and Dress sense.
12. Exercises on etiquettes and mannerism in difficult situations like business meetings, table manners, telephone etiquettes and manners related to opposite gender.
13. Exercises on with and humour in conversations and creating lively environment.
14. Role play for effective Communication.
15. Cross-cultural Communication
16. Group Discussion
17. Mock interviews (telephonic/personal)