

# REVISED CURRICULUM

FOR

DIPLOMA PROGRAMME

IN

## Computer Engineering

2<sup>nd</sup> Year (i.e. 3<sup>rd</sup> & 4<sup>th</sup> Semester)

FOR THE STATE OF HIMACHAL PRADESH



(Implemented w.e.f. Session 2013-14)

Prepared by:-

**Composite Curriculum Development Centre**

Directorate of Technical Education,

Vocational & Industrial Training, Sundernagar(H.P.)

July, 2013

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### THIRD SEMESTER

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### FORTH SEMESTER

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## PREFACE

India, in last two decades, has made significant progress in all major spheres of activity. Since 1947, the Technical Education System has grown into fairly large sized system, offering opportunities for education and training in wide variety of trades / disciplines at different levels. Needless to say that well trained technical manpower is the backbone of any growing economy in the era of fast industrialization. It has been the endeavor of the Technical Education Department to take decisive steps to enhance the capacities of technical institutions with major emphasis on quality and excellence in technical education .Our country is the only country in the world which has 50% population below the age of 25 years whereas America has 30% and China 40%.Working Age Population (WAP) is increasing in India whereas it is decreasing in other parts in the world. Challenge before us is to train this WAP for the world of work .Updated curriculum is one of the most powerful tools to improve the quality of training.

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.

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

Major employment opportunities of the diploma holders.

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.

Vertical and horizontal mobility of diploma pass outs for their professional growth.

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 field organizations/ industry of different categories viz. small, medium and large scale which offer wage employment for the diploma pass outs. 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 and incorporated as per the requirement of curriculum . The document contains the study and evaluation scheme and detailed subject/course contents to enable the H.P. Polytechnics to implement revised curriculum and to achieve the desired objectives.

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.

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## 2<sup>nd</sup> YEAR OF THREE YEAR DIPLOMA PROGRAMME IN COMPUTER ENGG.

### 1. SALIENT FEATURES

- 1) Name of the Programme : Three year Diploma Programme  
Civil Engineering
- 2) Duration of the Programme : Three years (06 Semesters)
- 3) Entry Qualification : As prescribed by H.P. Takniki  
Shiksha Board
- 4) Intake : As approved by H.P. Takniki  
Shiksha Board
- 5) Pattern of the Programme : Semester Pattern
- 6) Curriculum for : 2<sup>nd</sup> year of Three year Diploma  
Programme(Technical Stream)

### 7) **Student Centred Activities:**

A provision of 2-4 hrs per week has been made for organizing Student Centred Activities for overall personality development of students. These activities will comprise of co-curricular & other activities such as expert lectures, games, seminars, declamation contests, educational field visits, NCC, NSS and cultural activities & hobby classes like photography, painting, singing etc.

### 8) **Industrial Training:-**

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. 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

**Note:** Head of Department shall ensure that these marks are conveyed to the H.P. Takniki Shiksha Board, Dharamsala at the end of semester along with sessional record.

### 2.2 GUIDELINES FOR SESSIONAL 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 tests. At least three tests shall be conducted during the semester out of which at least one should be house test. 30% weightage shall 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/External 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 practicals.
- The distribution of mark for internal assessment in drawing subjects shall be as per following guidelines:-
  - i. 60% marks for sheets
  - ii. 40% for test.

## STUDY AND EVALUATION SCHEME

### THIRD SEMESTER COMPUTER ENGINEERING

SR. NO	SUBJECTS	STUDY SCHEME <i>Hrs/Week</i>		MARKS IN EVALUATION SCHEME								Total Marks
				INTERNAL ASSESSMENT			EXTERNAL ASSESSMENT					
				Th	Pr	Tot	Th	Hrs	Pr	Hrs	Tot	
3.1	*Digital Electronics	4	2	30	20	50	100	3	50	3	150	200
3.2	Computer assembly and Maintenance	4	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	*Programming Through C Language	4	4	30	20	50	100	3	50	3	150	200
3.5	* Operating Systems	4	4	30	20	50	100	3	50	3	150	200
	# Student Centred Activities	-	3	-	25	25	-	-	-	-	-	25
	<i>Total</i>	19	21	150	125	275	500	-	250	-	750	1025

\* Common with 3<sup>rd</sup> sem. Electronics & Comm. Engg & Information Technology

**STUDY AND EVALUATION SCHEME**

**FOURTH SEMESTER COMPUTER ENGINEERING**

SR. NO	SUBJECTS	STUDY SCHEME <i>Hrs/Week</i>		MARKS IN EVALUATION SCHEME								Total Marks
				INTERNAL ASSESSMENT			EXTERNAL ASSESSMENT					
		Th	Pr	Th	Pr	Tot	Th	Hrs	Pr	Hrs	Tot	Tot
4.1	*Computer Networks	4	2	30	20	50	100	3	50	3	150	200
4.2	*Programming in VB.Net	4	4	30	20	50	100	3	50	3	150	200
4.3	*Relational Database Management system.	3	4	30	20	50	100	3	50	3	150	200
4.4	*Data Structure Using C	3	4	30	20	50	100	3	50	3	150	200
4.5	Software engineering	3		25	-	25	100	3			100	125
4.6	* Microprocessor and Programing.	4	2	30	20	50	100	3	50	3	150	200
# Student Centred Activities		-	2	-	25	25	-	-	-	-	-	25
<i>Total</i>		21	18	175	125	300	600	-	250	-	850	1150

\* Common with 4<sup>th</sup> sem. Electronics & Comm. Engg & Information Technology

## 3.1 Digital Electronics

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### Rationale:-

*To study different logic families. To introduce different logic gates, their Boolean algebra and combinational logic design using those gates. To learn how to design sequential logic using flip flop. After this course the student will be able to design simple logic circuits, assemble logic circuits, test the logic circuits, observe outputs of logic circuits and troubleshoot digital circuits*

### Pre-Requisite -

1. Basic Electronics Engineering

## DETAILED CONTENTS

### 1. Introduction To Digital Techniques

10 hrs

Digital circuit., Digital signal, Use of digital circuit and digital signal, Advantages and Disadvantages of Digital circuits, Number System - Introduction to Binary, Octal, Decimal, Hexadecimal number system. Conversion of number systems, 1's complement and 2's complement, Binary arithmetic (addition, subtraction). BCD code, BCD arithmetic (addition, subtraction).

Introduction to A/D and D/A Converters.

### 2. Logic Gates And Boolean Algebra

09 hrs

Logical symbol, logical expression and truth table of AND, OR, NOT, NAND, NOR, EX- OR and EX-NOR gates, Universal gates – NAND and NOR gate, Logical circuits of basic gates using universal gates, Basic laws of Boolean algebra, Duality theorem, De Morgan's theorems.

### 3. Combinational Logic Design / Circuits

16 hrs

Simplification of Boolean expression using Boolean algebra. Construction of logical circuits forms Boolean expressions. Boolean expressions using Sum of products and product of sums forms. K-map representation of logical functions. Minimization of logical expressions using K-map ( 2, 3, 4 variables). Standardization of SOP & POS equations. Concept of Adders / Subtractors. Truth table, K-map, Simplified logical expression and logical circuit using basic gates and universal gates of:

(a) Half adder and full adder.

(b) Half subtractor and full subtractor.

Block diagram, Truth table, Logical expression and logic diagram of Multiplexers (4:1 and 8:1), Multiplexer IC. Block diagram and Truth table of Demultiplexer (1:4; 1:8; 1:16), Demultiplexer IC..

Block diagram, Truth table, working principle of Encoders & Decoders



#### 4. Flip Flops And Sequential Logic Design

24 hrs

One-bit memory cell, clock signal, Symbol and Logic diagram using NAND gates, working and truth table of R S flip- flop. Symbol and Logic diagram using NAND gates, working, truth table and timing diagram of Clocked R S flip flop.

Triggering: edge triggering and level triggering, Symbol and Logic diagram using NAND gates, working, truth table and timing diagram of J-K flip flop. Block diagram and truth table of Master slave J-K flip flop. Symbol, working and truth table of D- flip flop and T-flip flop. Applications of flip flops, Concept, Modulus, Working, truth table, timing diagram of a counter. Asynchronous counter (3 bit, 4 bit); Design of mod N-counter: working, truth table and timing diagram, 3-bit Synchronous counter: working, truth table and timing diagram, Block diagram, Working, Truth Table and waveforms of Shift register: SISO, SIPO, PISO, PIPO (4-bit) and Universal Shift register (4-bit). Applications of Counters and Registers.

#### 5. Memories

05 hrs

Classification of memories RAM, ROM, PROM, EPROM, E2PROM. Circuit diagram and working of Static and dynamic RAM

#### Practical:

*Skills to be developed:*

*Intellectual Skills:*

1. Interpret the results
2. Verify the tables

#### List of Practical:

- 1) Study of Digital IC datasheets and noting down the characteristics for
- 2) TTL & CMOS logic families.
- 3) Verification of truth table of logic gates.
- 4) Verification of DeMorgan's theorem.
- 5) Construction of Half adder and Full adder.
- 6) Implementation of Combinational Circuit using Multiplexer.
- 7) Construction of 7-segment decoder driver.
- 8) Verification of truth table of Flip flops.
- 9) Universal Shift Register
- 10) Decade counter using IC 7490.
- 11) Design of 3-bit Synchronous counter.

#### Text Books:

Name of Authors	Titles of the Book Edition	Name of the Publisher
R.P. Jain	Modern Digital Electronics	Tata McGraw Hill
Malvino Leach	Digital Principles	Tata McGraw Hill
Tokheim	Digital Electronics	Tata McGraw Hill

#### Reference books :

Name of Authors	Titles of the Book Edition	Name of the Publisher
S.P. Bali	2000 solved problems in Electronics Sigma series	Tata McGraw Hill Digital

## SUGGESTED DISTRIBUTION OF MARKS

<b>Topic No</b>	<b>Time Alloted</b>	<b>Marks Alloted</b>
<b>1</b>	<b>10</b>	<b>15</b>
<b>2</b>	<b>9</b>	<b>15</b>
<b>3</b>	<b>16</b>	<b>25</b>
<b>4</b>	<b>24</b>	<b>35</b>
<b>5</b>	<b>5</b>	<b>10</b>

## 3.2 Computer Assembly and Maintenance

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*Rationale:-To provide the required background of computer installation, maintenance & testing of peripherals and also to develop knowledge regarding construction and interfacing aspects of peripherals attached to the computer system.*

### DETAILED CONTENTS

#### 1. PC Hardware Overview

Block diagram of digital computer. IBM PC family. IBM PC hardware components. Device controller. Hardware-Software Interaction in PC. Factors affecting the performance of computer. Importance of electrostatic discharging (ESD).

#### 2. Keyboard and Mouse

(8 hrs)

##### 2.1 Keyboard

Types/categories of keyboards. Keyboard working. Keyboard selection. Key switch debouncing. Keyboard troubleshooting. Keyboard care and Preventive Maintenance.

##### 2.2 Mouse

Types/categories of mouse. Mouse Working. Mouse Selection. Mouse Troubleshooting. Mouse care and Preventive Maintenance.

#### 3. Printers

(13 hrs)

##### Printers

Types/categories of printers.

##### DMP

Types of Dot Matrix Printer .Construction and Working of Dot Matrix Printer, Printer interfaces, DMP cartridges, Troubleshooting Dot Matrix Printer, Care and Preventive Maintenance of Dot Matrix Printer .

##### Inkjet Printer

Types of Inkjet printer, Construction and Working of Inkjet Printer, Inkjet cartridges, Troubleshooting Inkjet Printer, Care and Preventive Maintenance of Inkjet Printer, Construction and Working of Laser Printer.

##### Laser Printer

Types of Laser printer, Working of Laser Printer, Laser printer cartridges, Troubleshooting Laser Printer, Care and Preventive Maintenance of Laser Printer.

#### 4. Monitors

(5hrs)

Display Adapter, Features of CGA, EGA, VGA, SVGA, XGA, Construction and working of CRT based display devices, Random Scanning and Raster Scanning, Beam Penetration and shadow masking methods of producing colors, Introduction to current CRT and Flat Panel monitors. Introduction to Graphics Accelerators.

- 5. Other input/ Output Devices (Brief Introduction) (3hrs)**  
Scanner. Plotter. Speaker, Microphone, Web Camera, Joy Stuck, Light Pen, Bar code Reader, MODEM - Internal MODEM, External MODEM, Care and Preventive Maintenance of Input/Output Devices.
- 6. Memory Devices (8 hrs )**  
Definition and need of memory, Memory hierarchy diagram, Bits and Bytes, Secondary Memory Devices, Types of Hard Disk Drive (IDE/EIDE/ATA/PATA/SATA/SCSI/Solid State) PATA Vs SATA, Construction and working of HDD, Logical structure of hard disk and its organization, HDD interfaces, Introduction to Floppy Disk and Floppy Disk Drive, Introduction to various Optical Disks (CDROM and DVD ) and their drives.  
CD/DVD Writer , Introduction to pen drive.  
Primary Memory, RAM and ROM categories, Static and Dynamic R/W Memory, Physical Memory Organization ( RAM Packaging ), Difference between Single data rate SDRAM and Double data rate , SDRAM
- 7. Motherboard and Microprocessor ` (6 hrs)**  
Motherboard: History, IBM Approach, PC Motherboard Functions  
Motherboard Components ,Types of expansion slots and buses  
Microprocessor: History, Microprocessor as the brain of PC,  
Coprocessor/Math processor, Compatibility of microprocessor with motherboard.
- 8. Power Supply (4 hrs)**  
Need/Function of power supply in PC, Types of power supplies – Linear and SMPS, PC power supply (SMPS) – AT and ATX, Block diagram and working of SMPS , Output Connectors of SMPS, Upgrading/Replacing SMPS inside PC's system box, Troubleshooting SMPS, Care and Preventive Maintenance of SMPS.
- 9. Troubleshooting PC (7 hrs)**  
Preventive Maintenance, Troubleshooting and Repair, Preventive Maintenance Plan/Schedule, Nature of PC faults, Types of PC faults, Troubleshooting strategy, Basic diagnostic software and hardware tools, Different troubleshooting techniques (Functional Area Approach, Split Half Method, Divergent, convergent and feedback path Method).
- 10. Assembling the Computer System (2 hrs)**  
Study of latest configuration of computer system, Introduction and steps for assembling and disassembling of the Computer system .Precautions for assembling and disassembling the computer system.
- 11. Preparation of Computer Centre (2 hrs)**  
Prepare List of Hardware required for computer centre, Calculation of power supply requirement for the computer centre, Calculation of A.C. requirement

for the computer laboratory, Calculation of UPS requirement for the computer laboratory.

### List of Practicals

- 1 To recognize various parts of a typical computer system.
- 2 Assembly and disassembly of a system box and identifying various parts inside the system box.
- 3 Assembly and disassembly of keyboard and mouse and study of their interface cables,
- 4 connectors and ports and handling keyboard/mouse parameters in windows
- 5 Installing and using various wireless input devices(Keyboard/Mouse/Scanner etc.) under Windows/Linux.
- 6 Study of installing a scanner and using it.Using mic and speaker to input and output sound using Windows/Linux.
- 7 Assembly and disassembly of printer, installing a printer, taking test page, and using printer under Windows/Linux.
- 8 Study of various types of memory chips and using them.
- 9 Study of various types of hard disk drives and preparing them for use
- 10 Writing CD and DVD using Windows/Linux.
- 11 To install and remove microprocessor to and from the motherboard.
- 12 To install and remove SMPS and to troubleshoot it.
- 13 Troubleshooting PC (Here teacher will assign a faulty PC to students in groups for troubleshooting.

### RECOMMENDED BOOKS

- 1) IBM PC and Clones Hardware Trouble Shooting and Maintenance by B. Govindarajalu, Tata McGraw Hill 1991
- 2) PC upgrade and maintenance Guid by Mark Minasi bpb publication
- 3) A to Z of PC Hardware maintenance Dhanpat Rai publication
- 4) All About Keyboard and Mouse bpb publication
- 5) All About Hard Disk bpb publication
- 6) All About Printers bpb publication
- 7) All About Motherboard bpb publication

### SUGGESTED DISTRIBUTION OF MARKS

Topic No	Time Alloted	Marks Alloted
1	6	5
2	8	10
3	13	15
4	5	10
5	3	10
6	8	10
7	6	10
8	4	10
9	7	10
10	2	5
11	2	5

## 3.3 DATA COMMUNICATION AND NETWORKS

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3	-	2

### Rationale

*Effective communication is vital for healthy society. Information is of little use if it is not communicated to a right person at right time. Convergence of computing and communication technologies has changed the way we used to communicate. Internet is one of the testimonies of the success of this convergence. This course is designed to enable students to develop the basic understanding of data communication. The students will get conversant with the basic terminology, concepts, principles, protocols and practices related to data communication.*

### Detailed Contents

#### 1. Communication Basics (06 Hours)

Data Communication, Communication Model – Components, Data Representation, Data Flow – Simplex, Half-Duplex and Full-Duplex, Communication Modes – Serial and Parallel Transmission, Synchronous and Asynchronous Transmission, Network Topologies, Protocols and Standards, Introduction to ISO/OSI Model for Computer Networks

#### 2. Data Transmission (10 Hours)

Analog and Digital Data, Analog and Digital Signals, Periodic Analog Signals – Period, Frequency, Phase and Wavelength, Composite Signals, Digital Signals – Bit Rate, Bit Length, Digital Transmission – Baseband and Broadband, Transmission impairments, Data Rate Limits – Nyquist and Shannon Capacities, Performance Metrics – Bandwidth, Throughput, Latency and Jitter, Transmission Media (Principles, Characteristics, Performance and Applications) – Guided (Twisted Pair, Coaxial cable, Optical Fiber) and Unguided (Radio wave, Microwave, Infrared wave, Light wave)

#### 3. Communication Signaling (08 Hours)

Modulation, Need for modulation, Analog to Analog Modulation (AM, FM, PM), Digital to Analog (ASK, FSK, PSK), Analog to Digital (PCM), Digital to Digital (Line coding, Block coding)

#### 4. Error Detection and Correction Techniques (08 Hours)

Error, Types of Errors, Error Rate, Error Detection and Correction Techniques – Block Coding (Parity Check, Hamming Codes), Cyclic Codes (CRC), Checksum

#### 5. Data Link Control (08 Hours)

Framing, Flow Control, Stop and wait protocols, Sliding window protocol

#### 6. Bandwidth Management (08 Hours)

Multiplexing and Spreading, Type of Multiplexing (TDM, FDM, WDM), Spread Spectrum – FHSS, DSSS, Switching Techniques – Circuit Switching and Packet Switching

## Practical List

- 1) To study Amplitude/ Frequency modulation and demodulation (AM, FM)
- 2) To study Amplitude/ Frequency/ Phase Shift Keying (ASK, FSK, PSK)
- 3) To study Pulse Code Modulation (PCM)
- 4) To get familiar with different network cables (UTP, Thin Ethernet, Thick Ethernet, OFC)
- 5) To get familiar with different network connectors (RJ-45, RJ-11, BNC)
- 6) To prepare UTP patch cord (using standard 568A and 568B)
- 7) To study multiplexed signals

## Books/ References

1. "Data and Computer Communication," By William Stallings, PHI
2. "Computer Communication and Networking," By John Freer
3. "Data Communications and Networking," By B.A. Forouzan, Tata McGraw Hill

## SUGGESTED DISTRIBUTION OF MARKS

<b>Topic #</b>	<b>Time Allotted</b>	<b>Marks Allotted</b>
<b>1</b>	<b>06</b>	<b>14</b>
<b>2</b>	<b>10</b>	<b>22</b>
<b>3</b>	<b>08</b>	<b>16</b>
<b>4</b>	<b>08</b>	<b>16</b>
<b>5</b>	<b>08</b>	<b>16</b>
<b>6</b>	<b>08</b>	<b>16</b>

### 3.4 PROGRAMMING THROUGH 'C' LANGUAGE

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#### Rationale:

*The objectives of this course are to make the student understand programming language, programming, concepts of Loops, reading a set of Data, stepwise refinement, Functions, Control structure, Arrays. After completion of this course the student is expected to analyze the real life problem and write a program in 'C' language to solve the problem. The main emphasis of the course will be on problem solving aspect i.e. developing proper algorithms.*

#### DETAILED CONTENTS

- 1. Introduction to Programming** **6 hrs.**  
Algorithms, Flow-charts ,Evolution of Programming Languages, structured Programming techniques, Compilation, Linking and Loading, Testing and Debugging, Documentation
  
- 2 . Introductions to 'C' Language** **8 hrs.**  
Character set, Identifiers, keywords, Variables, Data Types, , Constants and Literals, Structure of c program, Basic input/output statement, Formatted statements ( Printf , Scanf) and unformatted statements(getchar, putchar, gets, puts).
  
- 3. Operators** **6 hrs.**  
Arithmetic operators, Relational Operators, Logical Operators, Bit wise operators, assignment operators, Conditional operators, Special operators.
  
- 4. Flow Control Statements** **8hrs.**  
Branching statements:, Conditional( If, If...else, nested If , if...else if ladder, Switch case) , Unconditional (Goto, break, continue and return), Loops: while loop, do while, for loop, Nested loops, Infinite loops.
  
- 5. Storage Classes** **6hrs.**  
Scope and lifetime: auto, extern and static, register, volatile.
  
- 6. Arrays** **8hrs.**  
One dimensional arrays: Array declaration and initialization; Two dimensional arrays: Array declaration and initialization, Character array, Strings, Standard library string functions (strlen, strlen, strchr, strcmp, strcpy,)



## **7. Functions**

**8 hrs.**

Definition, Prototype of a function: Formal parameter list, Return Type, Function call, Passing arguments to a Function: call by reference, call by value, Recursive Functions, arrays as function arguments.

## **8. Structures and Unions**

**6 hrs.**

Structure variables, initialization, structure assignment, arrays of structures, unions.

## **9. Pointers**

**8hrs.**

Address and dereferencing operators, pointer type declaration, pointer assignment, pointer initialization, pointer arithmetic, dynamic memory allocation( malloc , calloc , free).

### **Practical List**

Students must prepare a neat and clean practical copy covering at least the programming exercises mentioned below:

Writing, Compiling and Executing a Simple Program:

1. To print a message like "Hello World" on computer screen

**Using variables and arithmetic operators:**

2. To perform addition, subtraction, multiplication and division operations on two integers

**Using unformatted I/O**

3. To use unformatted character I/O functions (getchar() and putchar())
4. To use unformatted string I/O functions (gets() and puts())

**Using Formatted I/O**

5. To use scanf() function to read integers (%d, %i, %o, %u, %x), characters (%c), floating point numbers (%f, %g, %e), strings (%s, scanset)
6. To use printf() function to format and print output (%d, %i, %o, %u, %x, %e, %E, %f, %g, %c, %p, %C, %s, %n)
7. To change width, precision and alignment of the output of printf()

**Using Bit-wise operators**

8. To perform and, or, not, exor, left-shift and right-shift operations on integers

**Using Conditional Branching**

9. To compute the real roots of a quadratic equation (using if statement to check for the imaginary roots)
10. To check whether a given integer is even or odd (if ... else statement)
11. To write month name corresponding to a month number (switch ... case)

### **Using Iterative Statements**

12. To check whether a given integer is prime
13. To reverse the digits of a given positive integer
14. To generate the multiplication table of a given integer
15. To generate the first n terms of a given AP series
16. To generate first n terms of Fibonacci series
17. To compute factorial of a given integer

### **Using Arrays**

18. To compute sum of elements of a one dimensional integer array
19. To find the largest element in a one dimensional array
20. To search a given element in a one dimensional array
21. To perform matrix addition and matrix multiplication using 2-D arrays

### **Using Strings**

22. To convert the alphabetic characters of a string to uppercase
23. To find the length of a string
24. To use Standard Library String Functions (strcat(), strrev(), strcpy(), strcmp())

### **Using Structures and Unions**

25. To read and print multiple data items (roll\_no, name, branch, semester etc.) pertaining to an individual student
26. Demonstrating the use of union

### **Using Pointers**

27. Demonstrating the use of address and dereferencing operators
28. Performing pointer arithmetic to manipulate an array

### **Using Functions**

29. Writing a function to find sum of two integers
30. Writing a function to swap value of two integers (Call by reference)
31. Writing a function to compute factorial of a given integer (Recursion)

## Books/ References

1. *"The C Programming Language," B.W. Kernighan & D M Ritchie, Pearson Education*
2. *"Programming with C," Byron S Gottfried Second edition, Tata McGraw Hill*
3. *"Let us C," Yashwant Kanetkar, BPB Publications*
4. *"Programming with ANSI-C," E. Balagurusamy, Tata McGraw Hill*
5. *B.W. Kernighan & D M Ritchie, "The C Programming Language, Pearson Education*
6. *Byron S Gottfried "Programming with C" Second edition, Tata McGrawhill,*
7. *Kanetkar Y, "Let us C", BPB Publications, E. Balagurusamy, "Programming with ANSI-C", Tata McGraw Hill.*

### SUGGESTED DISTRIBUTION OF MARKS

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

## 3.5 Operating System

L	T	P
4	-	4

### Rationale

*An Operating System (OS) turns an otherwise a heap of computer hardware to a useful and usable unit. An OS manages all the hardware resources, provides a framework for user applications to run, and has a user interface that makes it convenient for users to interact with the computer system. Today there are a number of operating systems for different-different platforms and usages. Yet, there is a considerable commonality amongst all. This course focuses on these common aspects of various OS. This course will make the students familiar with the concepts, terminology, functions and internal working of an OS.*

### Detailed Contents

- 1. Introduction (4 Hours)**  
Operating System (OS): Objectives, Functions, Evolution, Classification, Booting (Cold and Warm)
- 2. Operating System Structures (6 Hours)**  
OS Services, User Interface (Command-Line Interface, Graphical User Interface), System Calls, Kernel, OS structure (monolithic, layered and microkernel)
- 3. Process Management (10 Hours)**  
Process, Process States, Process Control Block (PCB), Operations on Processes, Inter-process Communication, Process Synchronization – Critical Section Problem, Solutions to Critical Section Problem – Peterson’s Solution, Hardware Solution, Semaphores and Monitors, Deadlocks – Essential Conditions, Prevention and Avoidance – Bankers Algorithm, Threads – User-level and Kernel-level threads, Multithreading Models – Many to One, One to One, Many to Many
- 4. CPU Scheduling (10 Hours)**  
Scheduling – Objectives, performance criteria, CPU and I/O burst cycle, Preemptive Vs. Non preemptive scheduling, CPU Scheduler(Long-term, Short-term), Scheduling Algorithms: First-come-first-served (FCFS), Shortest job first (SJF), Shortest Remaining Time First (SRTF), Round Robin (RR), Priority Scheduling, Multilevel Queue Scheduling, Multilevel Feedback Queue
- 5. Memory Management (10 Hours)**  
Contiguous Memory Allocation – MFT, MVT, Buddy System, Fragmentation (Internal, External), Compaction, Memory Hole Allocation Strategies (First-fit, Best-fit, Worst-fit), Non-contiguous Memory Allocation – Paging – Logical and Physical Address Spaces, Page, Frame, Shared Pages, Page Table Structure – Hierarchical, Hashed and Inverted, Segmentation – User View of main memory, Segments

## 6. Virtual Memory

(4 Hours)

Swapping, Demand Paging, Page Replacement Policies – FIFO, Optimal, LRU, LFU and MFU, Thrashing

## 7. Storage Management

(8 Hours)

File – Concept, Attributes, Operations, Types, Structure, Access Methods – Sequential and Direct, Allocation Methods – Contiguous, Linked, Indexed, Directory Structure – Single level, Two level and Tree Structure, Free Space management techniques –Bitmap and Linked List, Disk Scheduling

## 8. I/O Subsystem

(6 Hours)

I/O instructions based and Memory-mapped I/O systems, Polling, Interrupts, DMA, Buffering, Caching, Spooling

## 9. Case Studies

(6 Hours)

Features comparison of Windows Family, UNIX, Linux and Android Operating Systems

### Practical List

- 1) Installation and configuration of Windows 7/ Windows 8
- 2) Installation and configuration of Linux (Ubuntu/ Redhat)
- 3) Getting familiar with various components of Windows Desktop
- 4) Using general Windows commands – CLS, DIR, MD, CD, RD, DEL, MOVE, COPY, REN, ATTRIB, ECHO, EXIT, TYPE
- 5) Using general Linux commands – man, apropos, clear, ls, mkdir, cd, rmdir, pwd, rm, touch, mv, tr, wc, sort, grep, wall, write, who, chmod, useradd, usermod, userdel, groupadd, groupmod, groupdel, chown, chgrp, kill, ssh, ftp, telnet
- 6) Using Android and IOS devices (preferably on Tablets)

### Books/ References

1. *Operating Systems: Design and Implementation*, Andrew S. Tanenbaum, PHI
2. *Operating System Concepts* Abraham Silberschaz, Peter Galvin, Addison Wesley
3. *Operating System*, William Stallings, PHI

### SUGGESTED DISTRIBUTION OF MARKS

Topic #	Time Allotted	Marks Allotted
1	04	10
2	06	10
3	10	15
4	10	15
5	10	15

Topic #	Time Allotted	Marks Allotted
6	04	05
7	08	10
8	06	10
9	06	10

## 4.1 Computer Networks

L T P  
4 - 4

### RATIONALE

*The Course provides the student with the basic of Computer Network. Awareness of various protocols and routing algorithms. Knowledge of various devices used in networking. Network Security & Its issues.*

### DETAILED CONTENTS

- 1. Networks Basics (12 Hrs)**  
What is Network, Uses of Computer Networks, Networking Models (Client Server, peer to peer, Distributed processing), Network Topologies, Types of network (PAN, LAN, MAN, WAN), Network Terminologies (Broadcast, Multicast, Unicast, Layer, Protocols, Interface), Design issues for Layer, Network Services, Services primitives, Wireless Networks – WiFi, WiMax, Features of Wireless Networks.
- 2. Reference Models (08Hrs)**  
OSI Reference Model, Functions of layers in OSI Reference Model, TCP/IP reference Model, TCP/IP Network Model.
- 3. Internetworking Basics (10 Hrs)**  
Internet, Intranet, Communication over internet, IP Addressing, Classes of IP Addressing, sub-netting, super-netting, IPv4 header format, CDIR, NAT, Mobile IP, IPv6, Need for IPv6, IPv6 header format.
- 4. Network Channel Allocation (10 Hrs)**  
Static Channel allocation in LANs and MANs, Dynamic Channel allocation in LANs and MANs, Multiple Access protocols (ALOHA - Pure ALOHA & Slotted ALOHA, CSMA, CSMA/CD, Collision Free protocols), Ethernet Cabling, Fast Ethernet, Gigabit Ethernet.
- 5. Routing. (08 Hrs)**  
Adaptive & Non adaptive routing, Optimality principle, shortest path routing, flooding,
- 6. Network Connectivity (08 Hrs)**  
Network Connectivity Devices, NIC, Repeater, Hub, Switch, Router, Bridge, Gateway, VOIP, Wireless NIC, Access Point, Modem, Print Server, Bluetooth.

## 7. Network Security

(08 Hrs)

Security Issues, Cryptography, Encryption Model, Encryption Methods, IPSec, Firewall, VPN, WEP.

### Practical Work

1. Practicing of UTP cable for networking.
2. Preparing straight and cross over cable and their testing.
3. Recognizing the physical topology of a network.
4. Identify the IP address of a workstation and the class of the address and configure the IP address on a workstation.
5. Establishing a LAN and its testing.
6. Installation and configuring wireless NIC and access point.
7. Establishing and testing of WiFi and Adhoc Network.
8. Setting up security component for wire and wireless networks.

### RECOMMENDED BOOKS

1. *Computer Network by Andrew S. Tanenbaum (PHI)*
2. *Computer Communication and Networking by John Freer*
3. *Data Communications and Networking by Foronzan, Tata McGraw Hill, NewDelhi.*

### SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted	Marks Allotted (%age)
1	12	20
2	08	12
3	10	16
4	10	16
5	08	12
6	08	12
7	08	12
<b>Total</b>	<b>64</b>	<b>100</b>

## 4.2 Programming in VB.Net

L P  
4 4

### Rationale:

*To cover Visual Basic.NET tips, examples, and how-tos on everything from programming to managing the development of Visual Basic applications, and provides in-depth material on the new object-oriented features of Visual Basic .NET.*

### DETAILED CONTENTS

- 1 **Introduction to VB.NET** (04 hrs)  
The .NET Framework and Common Language Runtime.
- 2 **VB.NET Development Environment** (04 hrs)  
The Visual Basic .NET IDE: The Menu, The Toolbars, Toolbox, Code Editors, Forms. Windows in Visual Studio IDE: Properties Window, Solution Explorer, Class View, Server Explorer, Code Window, Dynamic Help Window, Component Trays, Command Windows.
- 3 **Language Features of VB.NET** (08 hrs)  
Object Oriented Concepts, Classes & Objects, Creating Methods, Overloading Methods, Overriding Methods, Namespace, Collections, Multithreading, Constructors, Inheritance
- 4 **Writing Software** (05 hrs)  
Variables, Comments, Data Types, Strings, Handling Time & Dates, Boolean, Arrays
- 5 **Controlling The Flow** (07 hrs)  
The If, Else, If – Else Statement, Comparison Operators, AND/OR Operators, String Comparison, Select CASE, Loops: For---Next Loop, For each---Next Loop, Do Loop, Do---Until Loop, Do ---While Loop, Nested Loop, While Loop
- 6 **Windows Forms** (12 hrs)  
All about Windows MDI Forms, Text Boxes, Rich Text Boxes, Buttons, Check Boxes, Radio Buttons, List Boxes, Combo Boxes, Picture Boxes, Check List Boxes, Timers, Scroll Bars, Menus.
- 7 **Data Access With ADO.NET** (12 hrs)  
What are data bases, Accessing Data with Server Explorer, Data adapters & Data Sets, Creating New Data Connection, Selecting a Data Provider Using SQL Server, Adding Multiple Table to Dataset



- 8      **Binding Controls to Data Bases**      **(12 hrs)**  
 Binding Text Boxes, Buttons, Check Boxes, Radio Buttons, Combo Boxes,  
 List Boxes, Checked List Boxes, Data Grids .

**Practicals**

1. Introduction & Installation of VB.NET
2. VB.NET IDE Environment
3. Building Windows Application
4. Displaying Dialog Boxes & Message Boxes
5. Creating Menus
6. Creating Your own Custom Controls
7. Accessing Data Bases Using Microsoft Access
8. Data Accessing Using ADO & OLEDB
9. Data Binding
10. Creating Windows Application Using Date , Timer, Text Boxes, Buttons, Check Boxes, Radio Buttons ,List Boxes, Combo Boxes, Picture Boxes, Check List Boxes, Scrollbars

**Suggested Text Books and References**

1. *Visual Basic .NET Black Book*, Steven Holzner, Dreamtech Press
2. *Visual Basic .NET The Complete Reference* Jeffrey R. Shapiro, TM
3. *Beginning VB.NET*, Richard Blair, Jonathan Crossland, Mathew Reynolds, Thearon Willis

**Digital References**

- 1 <http://www.w3school.com>
- 2 <http://www.microsoft.com>
- 3 <http://www.technologia.com>
- 4 <http://www.makesofteducation.com>
- 5 [www.iranicdl.ir/files/Vb.NET-Syllabus.pdf](http://www.iranicdl.ir/files/Vb.NET-Syllabus.pdf)
- 6 [http://home.pec.edu/pg\\_syllabus/mca.pdf](http://home.pec.edu/pg_syllabus/mca.pdf)

**SUGGESTED DISTRIBUTION OF MARKS**

Topic No.	Time Allotted	Marks Allotted (%age)
1	4	6
2	4	8
3	8	12
4	5	10
5	7	10
6	12	18
7	12	18
8	12	18

## 4.5 Relational Database Management System

<b>L</b>	<b>P</b>
3	4

### **RATIONALE:**

*Database and database systems have become an essential component of everyday life in modern society. This course will acquaint the students with the knowledge of fundamental concepts of DBMS and its application in different areas, storage, manipulation and retrieval of data using query languages.*

### **DETAILED CONTENTS**

#### **THEORY**

- 1. Introduction (03 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, System Analysts.
- 2. Database System Concepts and Architecture (05 hrs)**  
Schemes and Subschemes, Instances, keys, Redundancy, 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.
- 3. Data Modelling using E.R. Model (Entity Relationship Model) (04 hrs)**  
Data Models Classification : Object and Record based model, semantic data models. Entities and Attributes. Entity types and Entity sets. Key attribute and domain of attributes. Association and 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. Dependencies and Normalization (08 hrs)**  
Functional Dependencies, Trivial and Non-trivial dependencies Closure of a set of dependencies and attributes  
Normalization  
Non-loss decomposition, First, Second and Third normal forms, Boyce/Codd normal form.
- 6. Structure Query Language (SQL) and PL/SQL (12 hrs)**  
Data Definition Language (DDL), Data Manipulation Language (DML), Create, Drop, Alter, Insertion commands, Select command with WHERE clause using conditional and Boolean operator, group by Clause Like

operator, Grouping Data joins, sub queries union, Intersect, Minus Clause. Sorting and updating the Data. PL/SQL Introduction, PL/SQL block structure variables, SQL statements in PL/SQL, PL/SQL Control Structures.

**7. Query Processing and Transaction Processing (10 hrs.)**

General strategies for query processing, Equivalence expressions, Selection & join operation. Concept of transaction, States of transactions, Concurrent Executions, Serializability Recoverability, Transaction Definition in SQL. Lock based protocols : share & exclusive models, Protocols. Deadlock handling, Deadlock prevention, detection & recovery.

**Practicals**

- 1) Creating & Executing DDL in SQL.
- 2) Creating & Executing Integrity constraints in SQL.
- 3) Creating & Executing DML in SQL.
- 4) Executing relational, logical and mathematical set operators using SQL.
- 5) Executing group functions
- 6) Executing string operators & string functions.
- 7) Executing Date & Time functions.
- 8) Executing Data Conversion functions.
- 9) Executing DCL in SQL.
- 10) Executing Sequences and synonyms in SQL.
- 11) Execute 50 SQL queries (operators, functions, clauses, join concepts)
- 12) Program for declaring and using variables and constant using PL/SQL.
- 13) Program using if then else in PL/SQL
- 14) Program using for loop & while loop in PL/SQL.
- 15) Program using nested loop in PL/SQL.

**INSTRUCTIONAL STRATEGIES**

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

**RECOMMENDED BOOKS**

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

## Digital References

- 1 [http://www.niit.edu.pk/~kamran/lectures/rdbms\\_oracle/SQL/lecture\\_1.pdf](http://www.niit.edu.pk/~kamran/lectures/rdbms_oracle/SQL/lecture_1.pdf)
- 2 [http://en.wikipedia.org/wiki/Relational\\_database\\_management\\_system](http://en.wikipedia.org/wiki/Relational_database_management_system)

### SUGGESTED DISTRIBUTION OF MARKS

Sr No	Topic	Time Allotted (Hrs)	Marks Allotted (%)
1	Introduction	03	05
2	Database System Concepts and Architecture	05	10
3	Data Modeling using E.R. Model (Entity Relationship Model)	04	10
4	Relational Model:	06	15
5	Dependencies and Normalisation	08	20
6	Structure Query Language(SQL) and PL/SQL	12	20
7	Query Processing and Transaction Processing	10	20
<b>Total</b>		<b>48</b>	<b>100</b>

## 4.4 DATA STRUCTURES USING 'C'

L T P

4 - 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. Introduction

(08 hrs)

Algorithms, Flowcharts, Data Types, Data Structures – Linear and Non-Linear Data Structures, Pointers, Dynamic Memory Allocation (malloc(), calloc() and free())

#### 2. Arrays

(10 hrs)

Representation in Memory, Operations on Arrays – Searching, Insertion, Deletion and Sorting, Two-Dimensional Arrays – Representation in Memory (Row-Major and Column-Major Order)

#### 3. Linked Lists

(12 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

(12 hrs)

Introduction to stacks, Representation of stacks, Implementation of stacks (using arrays, using linklist), different operations on stacks, Introduction to queues, different operations on queues, circular queue, , 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

(14 hrs)

Introduction, Search algorithm (Linear and Binary), Concept of sorting, Sorting algorithms (Bubble Sort, Quick Sort, Selection Sort) and their comparisons.

## Practical List

Students must prepare a neat and clean practical copy covering at least the practical work with algorithms, flowcharts, C implementation and output for exercises mentioned below:

- 1) Inserting and deleting elements in an array
- 2) To implement a linked list and demonstrate insertion, deletion and traversing operations on it
- 3) To implement a doubly linked list and demonstrate insertion, deletion and traversing operations on it
- 4) To implement a stack and demonstrate push, pop and peek operations on it
- 5) To display the reverse of a string using a stack (push all characters until '\0', pop and display elements until stack is empty)
- 6) To implement a queue and demonstrate various operations on it
- 7) To implement a circular-queue and demonstrate various operations on it
- 8) To implement a dequeue and demonstrate various operations on it
- 9) To implement a tree and perform In-order, Pre-Order and Post-order traversals
- 10) To implement a binary search tree and perform insertion, deletion and search operations on it
- 11) To search an element in an array using linear search
- 12) To search an element in a sorted array using binary search
- 13) To sort elements of a given array in ascending order using selection sort technique
- 14) To sort elements of a given array in ascending order using bubble sort technique
- 15) To sort elements of a given array in ascending order using quick sort technique
- 16) To sort elements of a given array in ascending order using merge sort technique

### 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*

## SUGGESTED DISTRIBUTION OF MARKS

Topic #	Time Allotted	Marks Allotted
1	08	8
2	10	12
3	12	20
4	12	20
5	10	15
6	12	25
Total	64	100

## 4.5 SOFTWARE ENGINEERING

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4 -

### RATIONALE

*Objective of this course is to provide student with understanding of software development process, various techniques used in development of a software, lifecycle of a software, quality assurance.*

### DETAILED CONTENTS

#### Unit I

(6 hrs.)

Introduction to software engineering, Importance of software, The evolving role of software, Software Characteristics, Software Components, Software Applications, Software Crisis, Software engineering problems, Software Development Life Cycle, Software Process.

#### Unit II

(10 hrs.)

Analysis Principles, Water Fall Model, The Incremental Model, Prototyping, Spiral Model, role of management in software development. Design principles, problem partitioning, abstraction, and top down and bottom up-design, structured approach, functional versus object oriented approach, Cohesion, Coupling, Fourth generation techniques.

#### Unit III

(10 hrs.)

Top-Down and Bottom –Up programming, structured programming, information hiding, programming style and internal documentation. Testing principles, Levels of testing, Testing Life cycle, functional testing, structural testing, test plane, test case specification, Verification & validation, Unit testing, Integration Testing, Alpha & Beta testing, system testing and debugging.

#### Unit IV

(10 hrs.)

The Management spectrum- (The people, the product, the process, the project), cost estimation, project scheduling, staffing, software configuration management, Structured Vs Unstructured maintenance, quality assurance, project monitoring, risk management.

#### Unit V

(12 hrs.)

Reliability issues, Reliability metrics, Reliability growth modeling, Software quality, ISO 9000 certification for software industry, SEI capability maturity model, comparison between ISO & SEI CMM. CASE and its Scope, CASE support in software life cycle, documentation, project management, Reverse Software Engineering, Architecture of CASE environment.

### Text Books:

1. Pressman, Roger S., “Software Engineering: A Practitioner’s Approach”, McGraw Hill
2. Jalote, Pankaj, “Software Engineering”, Narosa
3. Schaum’s Series, “Software Engineering”, TMH



### SUGGESTED DISTRIBUTION OF MARKS

<b>Topic No.</b>	<b>Time Allotted</b>	<b>Marks Allotted (%age)</b>
1	6	16
2	10	18
3	10	18
4	10	24
5	12	24

## 4.6 MICROPROCESSOR AND PROGRAMMING

L P  
4 4

### RATIONALE

*The course provides the student with the opportunity to study Architecture and memory management of 8 bit & 16 bit microprocessor (i.e 8085 & 8086), to study assembly language programming and to implement different system interfacing.*

### 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 microprocessor) (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 (06 hrs)**  
Instruction cycle, machine cycle and T-states, Fetch and execute cycle.
- 6. Interrupts (06 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. 16-bit Microprocessor 8086****(06 hrs)**

Silent features of 8086 Microprocessor, architecture of 8086 (Block diagram, signal description), register organization, concepts of pipelining, memory segmentation and memory address generation.

**List of Practical.**

- 1) Addition of Two 8 bit numbers.
- 2) Subtraction of Two 8 bit numbers
- 3) Multiplication of Two 8 bit numbers
- 4) Division of Two 8 bit numbers
- 5) Largest number in an array.
- 6) Smallest number in an Array.
- 7) Arrange data of an array in ascending order.
- 8) Arrange data of an array in ascending order.
- 9) BCD Up counter
- 10) BCD Down Counter

**Text Books:**

1. *An introduction to the Intel family of Microprocessors* James L. Antonakos  
Pearson Education Asia
2. *Microprocessor Architecture programming & application with the 8085* Ramesh A. Gaonkar, Penfam International
3. *Digital Electronics and Applications* by Malvino Leach; Publishers McGraw Hills, New Delhi
4. *Microprocessor Architecture, Programming and Applications with 8080/8085* by Ramesh S Gaonker, Willey Eastern Ltd. New Delhi. *Microprocessor and Applications* by B Ram

**SUGGESTED DISTRIBUTION OF MARKS**

Topic No.	Time Allotted	Marks Allotted (%age)
1	4	5
2	12	20
3	10	15
4	16	20
5	06	10
6	06	12
7	04	08
8	06	10