

## 4.1 DATA STRUCTURES USING C

L T P

Periods/week 5 - 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 (08 Periods)**  
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 (10 Periods)**  
Concept of Arrays, Single dimensional array, Two dimensional array storage strategy of multidimensional arrays, Index Formula for single and multidimensional Array, Operations on arrays with Algorithms (Insertion, deletion), Advantages and disadvantages.
- 3. Linked Lists (14 Periods)**  
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 (10 Periods)**  
Introduction to stacks, Representation of stacks, Implementation of stacks using Array & Link List, Uses of stacks, Introduction to queues, Implementation of queues (with algorithm), Circular Queues, De-queues, Recursion.
- 5. Trees, Graph and Table (24 Periods)**  
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, AVL Tree, B-Tree, Introduction to graphs, types of graphs, Breadth first search, Depth first search, Adjacent matrix, Searching Sequential table, Hash tables
- 6. Sorting and Searching (14 Periods)**  
Introduction, Search algorithm (Linear and Binary), Concept of sorting, Sorting algorithms (Bubble Sort, Insertion Sort, Quick Sort, Selection Sort, Merge Sort, Heap Sort, Radix Sort) and their comparisons, Complexity Analysis of Sorting Algorithms.

## LIST OF PRACTICALS

*Write programs 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 and algorithms in theory class and then write programs for the algorithms. Finally all the programs should be run on computers. This will help the students to have clear concepts of programming.

## RECOMMENDED BOOKS

1. Data structures – Schaum’s Outline Series by Lipschutz; McGraw Hill Education P Ltd , New Delhi
2. Data Structures using C and C++ by Rajesh K. Shukla; Wiley-India Pvt Ltd. Daryaganj, New Delhi
3. Data Structures and Algorithm Using C by RS Salaria; Khanna Book Pub. Co. (P) Ltd. New Delhi
4. Data Structure using C by Manoj Kumar Jambla; Eagle Publishing House, Jalandhar
5. Expert Data Structures with C by R.B. Patel; Khanna Publishers, New Delhi.
6. Data Structure through C by Yashwant Kanekar; BPB Publications
- 7.

## SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time allotted (Period)	Marks Allotted (%)
1	8	10
2	10	12
3	14	18
4	10	12
5	24	30
6	14	18
<b>Total</b>	<b>80</b>	<b>100</b>

## 4.2 WEB TECHNOLOGIES

L T P

Periods/week 6 - 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 (12 Period)**  
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, E-mail, Telnet, FTP, IRC, NNTP, Video conferencing, e-commerce, Internet connecting media
- 2. World Wide Web (WWW): (12 Period)**  
World Wide Web and its evolution, web page, web server, HTTP protocol. Examples of web servers. Navigation Tools: Mozilla Firefox, Google Chrome, Internet Explorer, Uniform Resource Locator (URL). Hypertext, hyperlinks and hypermedia, URL, its registration, browsers, search engines, proxy servers
- 3. Developing Portals Using HTML (25 Period)**  
Introduction to HTML-5 and CSS-3 Basic structure of HTML, designing a web page, inserting links images, horizontal rules, comments. Formatting text, title, headings, colours, fonts, sizes, simple tables and forms, div, li & ul. HTML tags, hyperlinks. Adding graphics and images, image maps, image files. Using tables, forms, style sheets and frames
- 4. Client-side Scripting: Using Java Script & JQuery (15 Period)**  
Operator and expression, control statements, loop, array, Java Script Event Modeling, Document Object Model (DOM), Validating Forms using Java script, data base connectivity using Java Script & JQuery, developing interactive website using Java script
- 5. Server-side Scripting: (10 Period)**  
PHP and ASP.NET : GET POST Method, Control Structures, Introduction to IIS and Tomcat Web server, Configuration and deployment of to IIS and Tomcat Web server with Windows Server.
- 6. Dream weaver: Basic features of Dreamweaver and Implementation of dream weaver functions / Utility (05 Period)**
- 7. Introduction to PHP, Mysql, developing dynamic website using PHP and ASP.NET, Mysql, Implementation of AJAX using PHP and ASP.NET (17 Period)**

## **LIST OF PRACTICALS**

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

## **INSTRUCTIONAL STRATEGY**

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

## **RECOMMENDED BOOKS**

1. Internet and Web Technologies by Rajkamal, Tata McGraw Hill Education Pvt Ltd , New Delhi
2. Internet 6-in-1 by Kraynak and Habraken, Prentice Hall of India Pvt. Ltd., New Delhi
3. Using the Internet IV edition by Kasser, Prentice Hall of India Pvt. Ltd., New Delhi
4. Using the World Wide Web, (IInd edition) by Wall, Prentice Hall of India Pvt. Ltd., New Delhi
5. A complete guide to Internet and Web Programming by Deven N. Shah, Wiley-India Pvt Ltd. Daryaganj, New Delhi
6. Internet for Everyone by Alexis Leon and Mathews Leon; Vikas Publishing House Pvt. Ltd., New Delhi
7. Principles of Web Designing Joel Sklar, Web Warrior Series Available with Vikas Publishing House Pvt. Ltd., New Delhi
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., New Delhi
10. Dynamic Web Publishing – Unleashed Tech Media
11. Using Active Server Pages by Johnson et.al. Prentice Hall of India, New Delhi
12. Web Development with Visual Basic with CD ROM by Chapman; Prentice Hall of India, New Delhi
13. Java Server Pages (JSP) by Pekowsky Addison Wesley (Singapore) Pvt. Ltd., New Delhi
14. Active Server Pages (ASP) by Keith Morneau Jill Batistick Web Warrior Series Available with Vikas Publishing House Pvt. Ltd., New Delhi

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
19. Web Technologies by Ivan Bayross.

**SUGGESTED DISTRIBUTION OF MARKS**

<b>Topic No.</b>	<b>Time allotted (Period)</b>	<b>Marks Allotted (%)</b>
1	12	12
2	12	12
3	25	28
4	15	15
5	10	10
6	5	5
7	17	18
<b>Total</b>	<b>96</b>	<b>100</b>

**RATIONALE**

The subject provides the students with the knowledge of architecture and organization of personal computers. Micro programmed control and hardwired control are explained with algorithms for different arithmetic operations

**DETAILED CONTENTS**

1. **Introduction** **(05 Period)**  
Computer system organization and architecture
2. **Register Transfer and Micro Operations** **(20 Period)**  
Register transfer language, bus and memory transfer, arithmetic logic micro operations. Basic computer organization and design, instructions and instructions codes, computer instruction. Timing and control, instruction cycles, memory reference instruction, input and output and interrupts, complete computer description
3. **Programming the basic Computer** **(15 Period)**  
Machine language, assembly language, assembler, program loops, programming arithmetic, and logic operations, sub routines, input- output programming
4. **Micro Programmed Control** **(12 Period)**  
Control memory, address sequencing, micro programs example
5. **Central Processing Unit** **(16 Period )**  
General register organization, instruction formats, stacks organizations, addressing modes, data transfer and manipulation, programmed control, reduced instructions set computers, pipeline and vector processing, parallel processing, pipelining, arithmetic pipelines, RISC pipelines, Vector processing, array processors.
6. **Computer Arithmetic Algorithm** **(16 Period)**  
Addition and Subtraction algorithm, multiplication algorithms, division algorithms, floating point arithmetic operations
7. **Input- Output Organization** **(12 Period )**  
Peripheral devices, Input Output interface, asynchronous data transfer, modes of transfer, priority interrupt, Direct Memory Access (DMA), Input Output processor

## LIST OF RECOMMENDED BOOKS

1. Computer Architecture by Rafiquzzaman, M; Prentice Hall of India, New Delhi
2. Fairhead- 80386/80486, BPB Publication, New Delhi
3. Hardware and Software of Personal Computers by Bose, SK; Willey Eastern Ltd., New Delhi
4. Structured Computer Organization by Tanenbaum, Andrew S; Prentice Hall of India, New Delhi
5. Upgrading and preparing PCs by Scott Muller, Techmedia Publications
6. Computer Organization and Architecture by Linda Labur, Narosa Publishing House Pvt, Ltd., Darya Ganj, New Delhi
7. Computer system architecture, Morris mano Prentice Hall of India, New Delhi
8. Digital Electronics by RP Jain, TMH
9. Digital Logic design by Morris, PHI

## SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time allotted (Period)	Marks Allotted (%)
1	5	6
2	20	22
3	15	16
4	12	12
5	16	16
6	16	16
7	12	12
<b>Total</b>	<b>96</b>	<b>100</b>

## 4.4 DATABASE MANAGEMENT SYSTEM

L T P

Periods/week 5 - -

### 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 (16 Period)**

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 (16 Period)**

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) (16 Period)**

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: (14 Period)**

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 (10 Period)**

Concept of Normalization, Need of Normalization, Non-loss decomposition and functional dependencies, First, Second and Third normal forms, Boyce/ Codd normal form

**6. Database Access and Security (08 Period)**

Database security, process controls, database protection, 2-phase command protocols, 2-phase working protocols, grant and revoke, Locking methods. Replication and Database Mirroring



## INSTRUCTIONAL STRATEGY

Explanation of concepts should be done 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 arun K Majumdar and P Bhattacharya, Tata McGraw Hill Education Pvt Ltd, New Delhi
- 3) Introduction to DBMS by by ISRD Group, Tata McGraw Hill Education Pvt Ltd, New Delhi
- 4) Database Management Systems by Alexis Leon and Mathews Leon; Vikas Publishing House Pvt. Ltd., New Delhi
- 5) An introduction to database systems by Date C.J. Adison Wesley
- 6) Fundamentals of Database Systems by Elmasri/Navathe/Adison Wesley
- 7) Database systems, Raghu Ramakrishnan
- 8) An Introduction to Database Systems by Bipin C. Desai, Galgotia Publications Pvt. Ltd., Daryaganj, New Delhi 110 002
- 9) SQL Unleashed by Hans Ladanyi Techmedia Publications, New Delhi
- 10) Relational Database Management

## SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time allotted (Period)	Marks Allotted (%)
1	16	20
2	16	22
3	16	20
4	14	16
5	10	12
6	8	10
<b>Total</b>	<b>80</b>	<b>100</b>

## 4.5 SYSTEM AND SOFTWARE ENGINEERING

L T P

Periods/week 5 - -

### 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. Study of System (06 Period)**  
The system concepts, characteristics of a system, organization, interaction, interdependence, integration, control objectives
- 2. Study of system analysis (14 Period)**  
Introduction system development life cycle (SLDC), Phases of SDLC, identification, Preliminary investigation/study, facts gathering and its techniques(Interviews, questionnaires, Background reading, onsite observation, record gathering etc), types of feasibility- operational, technical, economical, System analysis, System design (Data flow diagram, data dictionary) ,testing, implementation
- 3. Introduction to Software (S/W) Engineering (10 Period)**  
Introduction, size factors. Quality and productivity factors. Management issues, Models: waterfall, spiral, prototyping, fourth generation techniques, s/w process, Introduction to agile technologies
- 4. Software Metrics Engineering (10 Period)**  
Size, function and design oriented metrics, halstead software science, McCabe's complexity
- 5. Planning (10 Period)**  
The development process, an organizational structure, other planning activities
- 6. Software Cost Estimations (10 Period)**  
Cost factors, cost estimations techniques. Staffing level estimation, estimating software maintenance costs, COCOMO
- 7. Software Requirements Definition (10 Period)**  
Problem analysis, requirement engineering. The software requirements specifications (SRS), formal specifications techniques, characteristics of a good SRS
- 8. Software Design and Implementation Issue (10 Period)**  
Fundamental design, concept design notations, design techniques, structured coding techniques coding styles, documentation guidelines

### RECOMMENDED BOOKS

1. Software Engineering by Rajib Mall, PHI Publishers, New Delhi
2. An Integrated Approach to Software Engineering by Pankaj Jalote, Narosa Publishing House Pvt Ltd, Darya Ganj, New Delhi 110002
3. Software Engineering, Sangeeta Sabharwal, New Age International, Delhi

4. Software Engineering by KK Aggarwal and Yogesh Singh
5. Software Engineering – A Practitioner’s Approach by RS Pressman, Tata McGraw Hill Publishers, New Delhi

**SUGGESTED DISTRIBUTION OF MARKS**

<b>Topic No.</b>	<b>Time allotted (Period)</b>	<b>Marks Allotted (%)</b>
1	6	08
2	14	20
3	10	12
4	10	12
5	10	12
6	10	12
7	10	12
8	10	12
<b>Total</b>	<b>80</b>	<b>100</b>

## 4.6 COMPUTER NETWORKS

L T P  
Periods/week 4 - 5

### 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 ( 10 Period)  
Concept of network, Models of network computing, Networking models, Peer-to – peer Network, Server Client Network, LAN, MAN and WAN, Network Services, Topologies, Concept of switching, Switching Techniques
2. OSI Model (22 Period)  
Standards, OSI Reference Model, Physical layer concepts, Data-link layer concepts, Networks layer concepts, Transport layer concepts, Session layer concepts, presentation layer concepts, Application layer concepts, Introduction to TCP/IP, Concept of physical and logical addressing, Different classes of IP addressing, special IP address, Sub netting and super netting , Loop back concept, IPV4 and IPV6 packet Format, Configuring IPV4 and IPV6
3. Protocol Suites (08 Period)  
Models and Protocols, Network IPX/SPX ,Intranet Protocols
4. Network Architecture (8 Period)  
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, ISDN, PSTN, RF, DSL, VSAT, Optical and IPLC)
5. Network Connectivity (08 Period)  
Network connectivity Devices, NICs, Hubs, switch, Repeaters, Multiplexers, Modems, Routers and Routing Protocols ,Gateways, Amplifiers, Firewall, ATM,VOIP and Net-to-Phone Telephony, Laws and Protocols
- 6.. Wireless Networking (08 Period)  
Basics of Wireless: Types of Wireless Networks, Wireless MAN, Networking, Wireless LAN, Wi-Fi, WiMax (Broad-band Wireless) and Blue-Tooth technology, Mobile Adhoc Network (MANET)

### LIST OF PRACTICALS

1. Recognize the physical topology and cabling (coaxial, OFC, UTP, STP) of a network.
2. Recognition and use of various types of connectors RJ-45, RJ-11,BNC and SCST
3. Recognition of network devices (Switches, Hub, Routers of access points for Wifi

4. Making of cross cable and straight cable
5. Install and configure a network interface card in a workstation.
6. Identify the IP address of a workstation and the class of the address and configure the IP Address on a workstation
7. Managing user accounts in windows and LINUX
8. Study and Demonstration of sub netting of IP address
9. Use of Netstat and its options.
10. Connectivity troubleshooting using PING, IPCONFIG, IFCONFIG
11. Installation of Network Operating System(NOS)
12. Visit to nearby industry for latest networking techniques

### **INSTRUCTIONAL STRATEGY**

This subject deals with both theory and practicals. The students should be made to 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. Data Communications and Networking by Forouzan, (Edition 2<sup>nd</sup> and 4<sup>th</sup> ), Tata McGraw Hill Education Pvt Ltd , New Delhi
3. Data and Computer Communication by William Stallings, Pearson Education, New Delhi
4. Networking Essentials – BPB Publications New Delhi
5. Computer Network and Communications By V.K. Jain and Narija Bajaj, Cyber Tech Publications, New Delhi.

### **SUGGESTED DISTRIBUTION OF MARKS**

<b>Topic No.</b>	<b>Time allotted (Period)</b>	<b>Marks Allotted (%)</b>
1	10	16
2	22	36
3	8	12
4	8	12
5	8	12
6	8	12
<b>Total</b>	<b>64</b>	<b>100</b>

## 4.7 INDUSTRIAL TRAINING

Industrial training 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.

For this purpose, students at the end of fourth semester need to be sent for industrial training for a minimum of 4 weeks duration to be organised during the semester break starting 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 teacher may guide a group of 4-5 students. A minimum of one visit 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.

Internal assessment and external assessment 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, if any. The components of evaluation will include the following.

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