Computer Engineering

4.2   DATA STRUCTURES USING 'C'
(Common in Computer Engineering and Information Technology)

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RATIONALE

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

DETAILED CONTENTS

1.   Fundamental Notations   (04 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   (04 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   (08 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 fibonacii 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 them 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 Structure using C by Manoj Kumar Jambla, Eagle Publishing House, Jalandhar
2. Data Structures and Algorithm Using C by RS Salaria, Khanna Book Publishing Co. (P) Ltd. New Delhi
3. Data Structure using C by ISRD Group, Tata McGraw Hills Education Pvt Ltd , New Delhi
4. Data Structures by Sanjiv Sofat, Khanna Publishers, New Delhi
5. Expert Data Structures with C by R.B. Patel – Khanna Publishers, New Delhi.
6. Data structures – Schaum's Outline Series – by Lipschutz, McGraw Hill Education Pvt Ltd , New Delhi
7. Data structures – O.G. Kakde and U.A. Deshpande
8. Data Structures by Kruse
9. Data Structure using Pascal by Tenenbaum, Prentice Hall of India
10. Data Structure using C by Robert Kruse, Prentice Hall of India
11. Data Structure through C by Yashwant Kanekar, BPB Publications

12. Data Structure through C in depth by SK Srivastava, Deepali Srivastava, BPB Publications
13. Introduction to Data Structure and Algorithm with C++ by Glenn W. Rowe, Prentice Hall of India
14. Data Structure through "C" Language by Sameeran Chattopadhyay, Matangini Chottopadhyay, BPB Publications
15. Data Structure through "C" Language by DOEACC, , BPB Publications
16. Data Structure using "C" Lab Workbook by Shukla, , BPB Publications

SUGGESTED DISTRIBUTION OF MARKS FOR FACILITATING THE PAPER SETTER

Sr No	Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1	Fundamental Notations	4	10
2	Arrays	4	10
3	Linked Lists	14	25
4	Stacks, Queues and Recursion	8	20
5	Trees	8	15
6	Sorting and Searching	10	20
	Total	**48**	**100**

4.3 OBJECT ORIENTED PROGRAMMING USING C++
(Common in Computer Engineering and Information Technology)

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RATIONALE

Object orientation is a new approach to understand the complexities of the real world. In contrast to the earlier approaches like procedural etc, object orientation helps to formulate the problems in a better way giving high reliability, adaptability and extensibility to the applications. The students are already familiar with this concept of programming in C which is the basic for 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   (04 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   (10 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, 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   (08 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

7.   Polymorphism and Virtual Functions   (06 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   (06 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 Standard Template Library(STL)   (02 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 life operations
8   Implementation of a mini project in C++
9   Introduction to latest ANSI C++ Compiler and elaboration of short comings of Turbo C++
      Compiler

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
      Education Pvt Ltd , New Delhi
2.   Object Oriented Programming in C++ by E. Balaguruswamy, Tata McGraw Hill Education
      Pvt Ltd , New Delhi
3.   C++ by Robert Lafore, Galgotia Publications Pvt. Ltd., Daryaganj, New Delhi
4.   Object Oriented Programming and C++ by R Rajaram; New Age International (P) Ltd.,
      Publishers, New Delhi

5.   Schaum's Outline of Programming with C++ by John R. Hubbard

SUGGESTED DISTRIBUTION OF MARKS FOR FACILITATING THE PAPER SETTER

Sr No	Topic	Time Allotted (hrs)	Marks Allotted (%)
1.	Introduction and Features	4	10
2.	Language Constructs	10	15
3.	Classes and Objects	4	10
4.	Member Functions	4	10
5.	Overloading Member Functions	4	10
6.	Inheritance	8	20
7.	Polymorphism and Virtual Functions	6	10
8.	File and Streams	6	10
9	Standard Template Library(STL)	2	5
Total		**48**	**100**

4.4   COMPUTER ARCHITECTURE
(Common in Computer Engineering and Information Technology)

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RATIONALE

The subject provides the students with the knowledge of detailed organization of currently available personal computers in order to understand their functioning and maintenance. The students will also get familiar with different types of mother boards, architecture and bus standards.

DETAILED CONTENTS

1. Data Representation   (10 hrs)
    Data Types-Number System, 1's Complement, 2's Complement, BCD Code, Gray Code
2. Central Processing Unit   (10 hrs)
    Introduction, General Register Organization, Stack Organization, Instruction Formats, Addressing Modes, Introduction to RISC, CISC architecture, Pipeline processing
3. Arithmetic Operations   (12 hrs)
    Introduction, Addition, Subtraction, Multiplication and Division algorithm
4. Input-Output Organisation   (16 hrs)
    Input-output interface, I/O bus and interface for module, I/ O vs memory bus. Isolated Vs memory mapped, IP modes of data transfer, first in first out buffer, priority interrupt, daisy chaining priority, parallel priority interrupt priority encoder, interrupt cycle, direct memory access DMA controller, DMA transfer
5. Memory Organisation   (16 hrs)
    Memory hierarchy; main memory, memory address, map, RAM and ROM chips, memory connection to CPU, auxiliary memory, associative memory, read and write operation, cache memory, associative maping, virtual memory, memory management hardware, memory segmentation.

INSTRUCTIONAL STRATEGY

As this paper is fully theoretical so it should be taught in a way to make it interesting by showing charts to the students to enable them to understand the subject theoretically. Block diagram of computer, algorithms to various arithmetic operations, CDs for demonstration should be used to make the students understand the subject. After completing the subject, students must know how the computer works, about various types of controllers and memory organization.

RECOMMENDED BOOKS

1. Computer Architecture by Rafiquzzaman, M; Prentice Hall of India, New Delhi.
2. Computer Architecture by Carter, SOS: Tata McGraw Hill Education Pvt Ltd , New Delhi
3. Fairhead – 80386/80486 BPB Publication, New Delhi

4.   Hardware and Software of Personal Computers by Bose, SK; Willey Eastern Ltd., New Delhi

5.   Structured Computer Organisation by Tanenbaum, Andrew S.; Prentice Hall of India, New Delhi.

6.   Upgrading and Preparing PCs by Scott Muller, Techmedia Publications

7.   Computer Organization and Architecture by Linda Labur, Narosa Publishing House Pvt. Ltd., Darya Ganj, New Delhi.

8.   Computer system Architecture by Morris Mano

SUGGESTED DISTRIBUTION OF MARKS FOR FACILITATING THE PAPER SETTER

Sr No	Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1	Data Representation	10	15
2	Central Processing Unit	10	15
3	Arithmetic Operations	12	20
4	Input-Output Organisation	16	25
5	Memory Organisation	16	25
	Total	**64**	**100**

4.6   INTERNET AND WEB TECHNOLOGIES

(Common in Computer Engineering and Information Technology)

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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   (08 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, E-mail, Telnet, FTP, IRC, NNTP, Video conferencing, e-commerce

2.   Internet Connectivity   (04 hrs)

Telephone line, cable, leased line, ISDN, VSAT, RF link

3.   World Wide Web (WWW):   (08 hrs)

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

4.   Internet Security   (04 hrs)

Basics of authentication and authorization. Introduction to firewall, various techniques of encryption and decryption, SSL (Secure Socket Loyer)

5.   Developing Portals Using HTML   (16 hrs)

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. HTML tags, hyperlinks. Adding graphics and images, image maps, image files. Using tables, forms, style sheets and frames

6.   Client-side Scripting: Using Java Script,   (08 hrs)
      Java Script Event Modeling, Document Object Model (DOM), Validating Forms using Java
      script
7.   Server-side Scripting: `   (08 hrs)
      PHP: GET POST Method, Control Structures
8.   Dream weaver: Basic features of Dreamweaver   (08 hrs)

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.   Internet for Everyone by Alexis Leon and Mathews Leon; Vikas Publishing House Pvt.
      Ltd., New Delhi

6. Practical Guide and Internet by AB Tiwana; Galgotia Publications Pvt. Ltd., New Delhi
7. HTML – 4 for World Wide Web by Castro Addison Wesley (Singapore) Pvt. Ltd., New Delhi
8. Principles of Web Designing Joel Sklar, Web Warrior Series Available with Vikas Publishing House Pvt. Ltd., New Delhi
9. HTML 4.0 Unleashed by Rick Dranell; Tech Media Publications
10. Teach Yourself HTML 4.0 with XML, DHTML and Java Script by Stephanie, Cottrell, Bryant; IDG Books India Pvt. Ltd., New Delhi
11. Dynamic Web Publishing – Unleashed Tech Media
12. Using Active Server Pages by Johnson et.al. Prentice Hall of India, New Delhi
13. Web Development with Visual Basic with CD ROM by Chapman; Prentice Hall of India, New Delhi
14. Java Server Pages (JSP) by Pekowsky Addison Wesley (Singapore) Pvt. Ltd., New Delhi
15. Active Server Pages (ASP) by Keith Morneau Jill Batistick Web Warrier Series Available with Vikas Publishing House Pvt. Ltd., New Delhi
16. ASP Unleashed Tech Media Publication
17. JSP O'Reilly SPD Publishers Hans Bergsten
18. Java Script in 24 hrs Tech Media Publications
19. Java Servlets by O'Reilly SPB Publishers

SUGGESTED DISTRIBUTION OF MARKS FOR FACILITATING THE PAPER SETTER

Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1-4	24	40
5-6	24	40
7-8	16	20
Total	**64**	**100**