Fourth Semester Syllabus

DATA STRUCTURES USING C (DCS-401)

Discipline core (DC) : Credit 4(3-0-2)

Objective: 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.

COURSE OUTLINE:

1. Fundamental Notations

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

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

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

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

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

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

RECOMMENDED BOOKS

1. Data structures – Schaum's Outline Series by Lipschutz; McGraw Hill Education P Ltd , New Delhi

Distributed System (DCS-402)

Discipline core (DC) : Credit 3(3-0-0)

DETAILED CONTENTS

Unit–I

Introduction to distributed Systems: Definition and goals, Hardware and Software concepts, Design issues

Unit-II

Communication in Distributed System: Computer Network and Layered protocols, Message passing and related issues, synchronization, Client Server model & its implementation, remote procedure call and implementation issues, Case Studies: SUN RPC, DEC RPC

Unit–III

Synchronization in distributed systems: Clock synchronization and related algorithms, mutual exclusion, Deadlock in distributed systems

Unit–IV

Processes and processors in distributed systems: Threads, system model, processor allocation, scheduling in distributed systems: Load balancing and sharing approach, fault tolerance, Real time distributed systems, Process migration and related issues

Unit –V

Distributed File Systems: Introduction, features & goal of distributed file system, file models, file accessing models, file sharing semantics, file caching scheme, file replication, fault tolerance, trends in distributed file system, case study.

Unit-VI

Distributed Shared Memory: Introduction, general architecture of DSM systems, design and implementation issues of DSM, granularity, structure of shared memory space, consistency models, replacement strategy, thrashing

UNIT-VII

Naming

Overview, Features, Basic concepts, System oriented names, Object locating mechanisms, Issues in designing human oriented names, Name caches, Naming and security, DNS

UNIT-VIII

Distributed Web-based Systems Architecture, Processes, Communication, Naming, Synchronization, Consistency and Replication: Web Proxy Caching, Replication for Web Hosting Systems, Replication of Web Applications

UNIT-IX

Security

Introduction of Security in Distributed OS, Overview of security techniques, features, Need, Access Control, Security Management

UNIT-X

Case Study Java RMI, Sun Network File System, Google case study

Text Books:

1. Singhal & Shivaratri, "Advanced Concept in Operating Systems", McGraw Hill
2. Ramakrishna, Gehrke," Database Management Systems", McGraw Hill
3. Vijay K.Garg Elements of Distributed Compuitng , Wiley
4. Coulouris, Dollimore, Kindberg, "Distributed System: Concepts and Design", Pearson Education
5. Tenanuanbaum, Steen," Distributed Systems", PHI
6. Gerald Tel, "Distributed Algorithms", Cambridge University Press

Computer Network (DCS-403)

Discipline core (DC): Credit 3(3-0-0)

Objective: 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.

COURSE OUTLINE:

1. Networks Basics

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

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

Models and Protocols, Network IPX/SPX ,Intranet Protocols

4. Network Architecture

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

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

Basics of Wireless: Types of Wireless Networks, Wireless MAN, Networking, Wireless LAN, Wi-Fi, Wi-Max (Broad-band Wireless) and Blue-Tooth technology, Mobile Adhoc Network (MANET)

RECOMMENDED BOOKS

1. Computer Networks by Tanenbaum, Prentice Hall of India, New Delhi

2. Data Communications and Networking by Forouzan, (Edition 2nd and 4th), Tata McGraw Hill Education Pvt Ltd , New Delhi

DATABASE MANAGEMENT SYSTEM (DCS-404)
Discipline core (DC): Credit 4(3-0-2)

Objective: 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.

COURSE OUTLINE:

1. Introduction

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

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)

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:

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

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

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

LIST OF PRACTICALS

1. Overview, Features and functionality, Application development in MS-Access
2. Exercises on different forms of select statement, altering and droping of tables
3. Exercises on creation of tables
4. Exercises on insertion of data into tables
5. Exercises on deletion of data using different conditions
6. Exercises on UPDATE statement

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

System and software Engineering (DCS-405)

Discipline core (DC): Credit 3(3-0-0)

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

COURSE OUTLINE:

1. Study of System

The system concepts, characteristics of a system, organization, interaction, inter dependence, integration, control objectives

2. Study of system analysis

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

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

Size, function and design oriented metrics, halstead software science, McCabe's complexity

5. Planning

The development process, an organizational structure, other planning activities

6. Software Cost Estimations

Cost factors, cost estimations techniques. Staffing level estimation, estimating software maintenance costs, COCOMO

7. Software Requirements Definition

Problem analysis, requirement engineering. The software requirements specifications (SRS), formal specifications techniques, characteristics of a good SRS

8. Software Design and Implementation Issue

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

Microprocessor (DCS-406)

Discipline core (DC): Credit 4(3-0-2)

Objective: The study of microprocessors in terms of architecture, software and interfacing techniques leads to the understanding of working of CPU in a microcomputer. The development in microprocessors of 32 bit architecture brings them face-to-face with mainframe finding employment in R&D, assembly, repair and maintenance of hardware of microprocessors and computers. Microprocessors find application in process control industry. They also form a part of the electronic switching system between source and destination in long distance telecommunications.

COURSE OUTLINE:

UNIT 1:-

ARCHITECTURE AND PROGRAMMING MODEL:-Architecture block diagram, register and flags, Interrupts, Main future of 8085.address space portioning, address decoding concept timing diagram for fetch, read write operation.

UNIT 2:-

INSTRUCTION SET:-Instruction classification of 8085: Concept of instruction. opcode and operand, single, two and three byte instruction according to operation .data transfer group ,arithmetic and logical group , stacks control, transfer group .assembly language and machine language formats. Assembly language programming concepts, programming exercises.

UNIT 3:-

INTERRUPTS & I /O:-Synchronous and Asynchronous data transfer DMA data transfer Mask able and non-mask able interrupts, vectored interrupt scheme of 8085.RIM & SIM instructions concept of interfacing, interfacing slow peripherals, I/O ports

UNIT 4:-

MICROCONTROLLER & PERIPHERAL INTERFACE CHIPS:-Features, block diagram, operating modes, microcontroller 8085, interfacing chip PPI8255.DMA controlled 8257.programmable interrupt controllers 8259, keyboard and display interface chip 8279 & programmable interval timer 8253.

UNIT 5:-

INTERFACING REAL-WORLD SIGNALS :-ADC& DAC concepts, interfacing 8- bit ADC, interfacing 8 bit DAC development tools .MDS & its role in system development. Logic analysers & its uses.

LIST OF PRACTICALS

1. Familiarization of different keys of 8085 microprocessor kit and its memory map
2. Steps to enter, modify data/program and to execute a programme on 8085 kit
3. Writing and execution of ALP for addition and sub station of two 8 bit numbers
4. Writing and execution of ALP for multiplication and division of two 8 bit numbers
5. Writing and execution of ALP for arranging 10 numbers in ascending/descending order
6. Writing and execution of ALP for 0 to 9 BCD counters (up/down counter according to choice stored in memory)
7. Interfacing exercise on 8255 like LED display control
8. Interfacing exercise on 8253 programmable interval timer
9. Interfacing exercise on 8279 programmable KB/display interface like to display the hex code of key pressed on display
10. Use of 8085 emulator for hardware testing