



SEMESTER-3rd

Course No: UCATC-301

Course: Data Structures using C-Language

Total Marks: 100

Internal Assessment:20

Semester Exam:80

Duration of Examination: 1 Hr.

Credits:04(Theory)

Learning Outcomes(LO):

LO1.To be familiar with fundamental data structures and with the manner in which these data structures can best be implemented; become accustomed to the description of algorithms in both functional and procedural styles

LO2.To have a knowledge of complexity of basic operations like insert, delete, search on these data structures.

LO3.Ability to choose a data structure to suitably model any data used in computer applications.

LO4.Design programs using various data structures including hash tables, Binary and general search trees, heaps, graphs etc.

LO5.Ability to assess efficiency tradeoffs among different data structure implementations.

LO6.Implement and know the applications of algorithms for sorting, pattern matching etc.

UNIT-I

Introduction and Classifications of Data Structures. Data Structure operations. Time and space complexity of algorithms. Asymptotic Notations: Big, Omega, Theta Introduction to Arrays: array structure, Memory Representation, Operations, merging two arrays Searching Algorithms: Liner Search & Binary Search Sorting Algorithms: Bubble Sort, Insertion Sort, Selection Sort, Quick Sort, Time and space complexity of sorting & search algorithms

10 HRS

UNIT - II

Heap: Introduction, Types of Heap, Insertion, Deletion Linked list, Type of Lists: Single, Double, Circular, Operations on Lists: Traversal, Insertion, Deletion

10 HRS

UNIT - III

Stack: Introduction, Operations, Applications Queue: Introduction, Types, Operations, Applications

10 HRS

UNIT- IV

Trees: Binary Tree: Properties, Binary Tree Traversal, Binary Search Trees: Introduction, Insertion, Deletion, Complete Binary Trees Graph Basics, Terminologies, Memory Representation

10HRS



UNIT-V

File Structures: Concepts of fields, records and files. Files: File Organization, Sequential Files, Structure, Operations, Disadvantages, Areas of use, Direct File Organization, Indexed Sequential File Organization and text files, Hashing techniques for direct files.

10 HRS

References:

- 1) Data Structures - Seymour Lipschutz (Schaum's Outlines)
- 2) Data Structure and File Using C - Abhay Abhyankar.
- 3) Fundamental of Data Structure in C - Sahani.
- 4) Data Structure Using C - Radhakrishanan and Shrivastav.
- 5) Data Structure Using C- R.S.Salaria
- 6) Simplified Approach to Data Structures- Vishal Goyal, Lalit Goyal, et.al

B.Practicum(credits:02)

Students are required to write and practically execute programs to solve problem using various data structures. The teacher can suitably device problems which help students experiment using the suitable datastructures and operations. Some of the problems are indicated below.

1. Write program that uses functions to perform the following:
2. Creation of list of elements where the size of the list, elements to be inserted and deleted are dynamically given as input.
3. Implement the operations, insertion, deletion at a given position in the list and search for an element in the list
4. To display the elements in forward / reverse order
5. Write a program that demonstrates the application of stack operations (Eg: infix expression to postfix conversion)
6. Write a program to implement queue data structure and basic operations on it (Insertion, deletion, find length) and code at least one application using queues.
7. Write a program that uses well defined functions to Create a binary tree of elements and Traverse the a Binary tree in preorder, inorder and postorder,
8. Write program that implements linear and binary search methods of searching for an elements in a list.
9. Write and trace programs to understand the various phases of sorting elements using the methods
 - a. Insertion Sort
 - b. Quicksort
 - c. Bubble sort
10. Write and trace programs to Create a Binary search tree and insert and delete from the tree.
11. Represent suitably a graph data structure and demonstrate operations of travesrals on it.



SEMESTER-3rd

Course No: UCATS-301

Course: PC Assembly and Installation

Total Marks: 100 Theory (Int:10, semester Examination:40) Practical: 50(Int:25, Ext:25)

Duration of Examination: 1 Hr.

Credits:04 (Theory+ Practical)

Learning Outcomes:

1. To make students understand the basic structure, operation and characteristics of digital computer.
2. To familiarize the students with various unit inside a processor as well as the concept of the concept of pipelining.
3. To familiarize the students with hierarchical memory system including cache memories and virtual memory.
4. To make students know the different ways of communicating with I/O devices and standard I/O interfaces.

UNIT - I

Introduction to Computer System, Difference Between Hardware and Software, Different input and output devices, CPU (Central Processing Unit)- ALU and control unit, Memory & Its Types- Static RAM and Dynamic RAM, ROM, PROM, EPROM, EEPROM, Optical Storage: CD, DVD, BLUE RAY DISC. SMPS, UPS (Online/Offline), Computer ports. controller cards, AGP card, display cards: CGA VGA SVGA, sound Card, FAX/Modem Cards, TV Tuner Cards, LAN Cards, Ethernet cards.

15 HRS

UNIT - II

Study of different types of Motherboards, Motherboard Configuration, Types of Processors- Intel Pentium IV, Dual core, Core 2 Duo, Quad processor etc, Booting concept of computer in DOS and Windows environment, Different types of Application Software, Basic LAN concepts, Network Topology, Types of cable, Twisted cable, UTP, STP, Fibre optics, Coaxial cable, Connectors: RJ 45, BNC, T- Connector, Hub, Switch, Router, Bridges, Gateways, Repeater

15 HRS

Practical

1. Assembling and Disassembling of the system, Replacement of components etc
2. Formatting/Partitioning of Hard Disk
3. Installation of Operating System
4. Application Software Installation, (Antivirus Software Installation. Installation of Drivers for Printers, Scanners, Web Camera)
5. Troubleshooting with PC: POST (Power on Self Test)
6. BIOS Errors
7. Windows file repairing
8. Use of system tools like Disk defragmentation, Disk clean up, Scan disk etc.
9. Use of open source data recovery tools.
10. Use of CD ROM and DVD Drivers
11. Working with different control panel option of windows.
12. Network set up

P. Ganuwa



Suggested Readings:

1. P.K Sinha&PritiSinha, Computer Fundamentals, BPB Publications.
2. R.K. Taxali, PC Software for Windows
3. -Singh & Singh, Computer Hardware Course, Computech Publications Limited.
4. Wikibooks contributors, How to Assemble A Desktop PC, Platypus Global Media
5. Jacob Beckerman, How to build a computer, A step by step guide, JIBB Publishing.
6. Mark L. Chambers, Build your own PC Do-It-yourself for dummies.
7. N.S. Reddy, PC Hardware - Theory and Practical, In Depth step by step, Neo publishing house
8. Diagram Books of different types of Mother Boards.



SEMESTER-3rd

Course No: UCATS-302

Course: Free and Open System Software

Total Marks: 100

Internal Assessment:20

Semester Exam:80

Duration of Examination:1 Hr.

Credits: 04(Theory+Practical)

Learning outcomes:

- LO1: How to differentiate a licensed software from a free software
- LO2: Understanding the concept of FOSS
- LO3: Understanding the concept of data recovery software and antivirus software
- LO4: MOOCs content availability and their use

Unit – I

Introduction to FOSS, History, Need of Free and Open Sources, Advantages and Disadvantages of FOSS, Brief understanding of Software Development Life Cycle, Development and maintenance of Free and Open Source Software. 15 HRS

Unit – II

Open Source vs Proprietary Software, Benefits of Open/Community based Software, Requirements for being open, free software, open source, FOSS Licensing Models: GPL, AGPL, LGPL, FDL. 15HRS

Practical:

1. Salient features of some FOSS like (Libre Open Office, Android OS, Apache HTTP Server, MySQL) Applications of Open Source Operating System LINUX: - Introduction, General Overview
2. Kernel Mode and Usermode – Process and Scheduling, Development with Linux.
3. Open Source Software Organizations
4. Some Free and Open Data Recovery Softwares (e.g PhotoRec, TestDisk, FreeRecover etc)
5. Introduction to Open Learning Management System (LMS)/Content Management Systems(CMS) (e.g. Working on MOODLE
6. Working on WordPress

Suggested Reading:

1. Philosophy of GNU URL: <http://www.gnu.org/philosophy/>.
2. Linux Administration URL: <http://www.tldp.org/LDP/lame/LAME/linux-admin-made-easy/>.
3. The Python Tutorial available at <http://docs.python.org/2/tutorial/>.
4. Perl Programming book at <http://www.perl.org/books/beginning-perl/>.
5. Ruby programming book at <http://ruby-doc.com/docs/ProgrammingRuby/>.
6. Version control system URL: <http://git-scm.com/>.
7. Samba: URL : <http://www.samba.org/>.
8. Libre office: <http://www.libreoffice.org/>.
9. Ellen Siever, Stephen Figgins, Robert Love, Arnold Robbins, "Linux in a Nutshell", Sixth Edition, OReilly Media, 2009

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SEMESTER-4th

Course No: UCATC-401

Course: Database Management System

Total Marks: 100

Internal Assessment: 20

Semester Exam: 80

Duration of Examination: 1 Hr.

Credits: 04(Theory)

Learning Outcomes(LO):

LO1: Gain knowledge of database systems and database management systems software.

LO2: Ability to model data in applications using conceptual modelling tools such as ER Diagrams and design data base schemas based on the model.

LO3: Formulate, using SQL, solutions to a broad range of query and data update problems.

LO4: Demonstrate an understanding of normalization theory and apply such knowledge to the normalization of a database.

LO5: Be acquainted with the basics of transaction processing and concurrency control.

LO6: Familiarity with database storage structures and access techniques.

LO7: Compare, contrast and analyse the various emerging technologies for database systems such as SQL.

LO8: Analyse strengths and weaknesses of the applications of database technologies to various subject areas.

UNIT - I

Overview of DBMS: Data & information, Entity & attributes, Records, files & their types, Database, views, relationships among entities, DBMS: its evolution, components advantages and disadvantages. Architecture of DBMS.

10 HRS

UNIT - II

Relational DBMS: definition, concept of table, keys [primary, unique, candidate, foreign, conjugate] role of database administrator. Data models [traditional, semantic, hierarchical, network, relational] E-R diagram.

10 HRS

UNIT - III

Normalization: Anomalies and data redundancies in Database, Dependencies [functional, fully functional and minimal/irreducible set], Normal forms [1st, 2nd, 3rd, BCNF,]

10 HRS

UNIT - IV

Overview of SQL, Data types in SQL, Table creation, insertion, deletion, alteration and retrieval of data from table, Table deletion, simple & nested queries using DOL, DML and DCL commands, SQL queries using conditions like where, where-like, order by, greater than, less than, if-then, if- then-else, if-then else if, data integrity constraints, views, joins.

10 HRS



UNIT - V

Security issues: Data security issues, risks, data tampering, data theft, unauthorized access, password related threats, data security requirements [confidentiality, integrity, availability] granting and revoking of privileges and roles, definition of Encryption and Decryption.

10 HRS

Suggested Readings:

1. Bipin C.Desai: An Introduction to Database Systems, West-publishing company.
2. Elmasri, Navathe, Somayajulu, Gupta: Fundamentals of Database Systems, Pearson Education.
3. Date, C.J.: An Introduction to Database Systems Addison Wesley Pearson Education.
4. Narayan S Umanath, Richard W Scamell : Data Modelling and Database Design, Thomson Course Technology India Edition.
5. R.A. Parida, Vinod Sharma: The power of Oracle 9i, Firewall Media Publications.
6. Bayross Ivan: SQL, PLISQL the programming language of Oracle, PB publication

B:Practicum(credits:02)

Students are required to practice the concepts learnt in the theory by designing and querying a database for a chosen organization (Like Library, Transport etc). The teacher may devise appropriate weekly lab assignments to help students practice the designing , querying a database in the context of example database. Some indicative list of experiments is given below.

Experiment 1: E-R Model

Analyze the organization and identify the entities, attributes and relationships in it. .Identify the primary keys for all the entities. Identify the other keys like candidate keys, partial keys, if any.

Experiment 2: Concept design with E-R Model

Relate the entities appropriately. Apply cardinalities for each relationship. Identify strong entities and weak entities (if any).

Experiment 3: Relational Model

Represent all the entities (Strong, Weak) in tabular fashion. Represent relationships in a tabular fashion.

Experiment 4: Normalization

Apply the First, Second and Third Normalization levels on the database designed for the organization

Experiment 5: Installation of Mysql and practicing DDL commands

Installation of MySql. Creating databases, How to create tables, altering the database, dropping tables and databases if not required. Try truncate, rename commands etc.

Experiment 6: Practicing DML commands on the Database created for the example organization

DML commands are used to for managing data within schema objects. Some examples:

SELECT - retrieve data from the a database

INSERT - insert data into a table

UPDATE - updates existing data within a table

DELETE - deletes all records from a table, the space for the records remain

Experiment 7: Querying

practice queries (along with sub queries) involving ANY, ALL, IN, Exists, NOT EXISTS, UNION, INTERSECT, Constraints etc.

Experiment 8 and Experiment 9: Querying (continued...)

Practice queries using Aggregate functions (COUNT, SUM, AVG, and MAX and MIN),GROUP BY, HAVING and Creation and dropping of Views.



SEMESTER-4th

Course No: UCATS-401

Course: Information Security

Total Marks: 100

Internal Assessment: 20

Semester Exam:80

Duration of Examination:1 Hr.

Credits: 04(Theory+Practical)

Learning Outcomes:

1. Develop an understanding of information assurance as practiced in computer operating systems, distributed systems, networks and representative applications.
2. Gain familiarity with prevalent network and distributed system attacks, defenses against them, and forensics to investigate the aftermath.
3. Develop a basic understanding of cryptography, how it has evolved, and some key encryption techniques used today.
4. Develop an understanding of security policies (such as authentication, integrity and confidentiality), as well as protocols to implement such policies in the form of message exchanges.

UNIT I

Information Security Concepts, security, computer threats and computer vulnerabilities, Types of Attacks Overview of wired and Wireless Networks, internetworking, Internet, extranet, Malicious softwares- virus, Trojans, worms, Password Cracking, Threats using Programming Bugs, Introduction to Cybercrimes and Cyber terrorism.

10HRS

UNIT - 11

Cryptography: Introduction to Cryptography, Symmetric key Cryptography, Asymmetric key Cryptography, Message Authentication and Hash functions, Digital Signatures, Public Key infrastructure, Security management, Firewalls, Antivirus software, email security

10HRS

Practical:

1. General features of Linux operating system.
2. Open data recovery software
3. Antivirus software
4. Concepts of Free and Open source software

Suggested Readings:

1. Malcolm Harkins, Managing Risk and Information Security: Protect to Enable, Apress.
2. Michael E Whitman and Herbert J Mattord, "Principles of Information Security", Vikas Publishing House, New Delhi, 2003
3. Micki Krause, Harold F. Tipton, "Handbook of Information Security Management", Vol \-3 CRC Press LLC, 2004.
4. Matt Bishop, " Computer Security Art and Science", Pearson/PHI, 2002.
5. Bruce Schneier, Applied Cryptography Second Edition, John Wiley & Sons, Inc.
6. Sunit Belapure, Nina Godbole, Cyber Security, Wiley.



SEMESTER-4th

Course No: UCATS-402

Course: Web technology

Total Marks: 100

Internal Assessment:20

Semester Exam:80

Duration of Examination:1 Hr.

Credits: 04 (Theory+Practical)

Learning Outcomes:

1. To understand basics of the Internet and World Wide Web
2. To acquire knowledge and skills for creation of web site considering both client and server-side programming
3. To learn basic skill to develop responsive web applications
4. To understand different web extensions and web services standards
5. To understand basic concepts of Search Engine Basics.
6. To learn Web Service Essentials.
7. To learn Rich Internet Application Technologies.
8. To understand and get acquainted with Web Analytics 2.0

UNIT-I

Introduction to Internet: Introduction, Objectives, Evolution, Applications (Email, Social Networking, E-Commerce etc.), World Wide Web (WWW), Search Engine, ISP. Basic of Computer Networks: (LAN, MAN, WAN), Network Topologies, Intranet, Extranet.

15 Hrs

UNIT -II

Internet Terms: Web page, website, web portal, browsers, Web server, Proxy Server, URL, ISP, download and upload, online and offline, Hosting and Domain Name, Hypertext, TCP/IP, UDP, HTTP, HTTPS, FTP, IP Address and its classes.

15 Hrs

Practical:

1. Introduction to HTML,
2. Format of HTML Program,
3. Implementation of Formatting Tags
4. Use of Image Tags,
5. Linking of Documents, List Tag, Tables Tag, Frames, Forms.

Suggested Reading:

1. HTML 5 and CSS 3 Made Simple by Ivan Bayros.
2. Computer Networks- Andrew.S. Tannenbaum, Pearson.
3. CSS: The Definitive Guide, 3rd Edition by Eric Meyer, O'Reilly Media.
4. The Internet- Douglas E. Comer, Pearson.
5. Web Programming - Chris bates - Wiley Dreamtech India
6. Internet and Worldwide Web, H.M. Deitel, P.J. Dietel and AB. Goldberg, 3e, Pearson Education
7. Mastering Javascript and Jscript, James Jaworski, 2e, BPB
8. HTML, DHTML, JavaScript, Perl CGI by Ivan Bayross, BPB Publications

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