Department of Computer Science, GCW Parade Ground, Jammu

Courses offered by Department of Computer Science in the Semester 3rd and 4th as per NEP-2020

Semester	Stream	Subject	Course Code	Credit	No. of units
SEM-3RD	Major	Data structures	UCSMJT301	4+2	5
	Major	Digital Electronics	UCSMJT302	4	5
	Minor	Digital Electronics	UCSMNT301	4	5
	Multidisciplinary	Fundamentals of computers	UCSMDT301	3	4
	Multidisciplinary	Fundamentals of Datascience	UCSMDT301	3	4
	Skill Enhancement	Web Designing and Mobile Application	UCSSET301	3	4
	Skill Enhancement	Tally	UCSSET302	3	4
SEM-4TH	Major	Object Oriented Programming Structure	UCSMJT401	4+2	5
	Major	Database Management System	UCSMJT402	4	5
	Major	Operating System	UCSMJT403	4	5
	Major	Structured query Language	UCSMJT404	2	3

Course No:UCSMJT301 **Course: Data Structure using C-Language**
Total Marks: 100 **Internal Assessment: 20** **Semester Exam: 80**
Duration of Examination: 3 Hrs. **Credits: 04(Theory) 02(Practical)**

Learning Outcomes(LO):

LO1. To be familiar with fundamental data structures and with the manner in which these data structures can be 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.

UNIT-1

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 10 HRS

UNIT-II

Sorting Algorithms: Bubble Sort, Insertion Sort, Selection Sort, Quick Sort, Linked Lists: Type of Lists: Single, Double, Circular, Operations on Lists: Transversal, Insertion, Deletion 10HRS

UNIT-III

Stack: Introduction, Operations, Applications Queue: Introduction, Types, Operations, Application 10 HRS

UNIT-IV

Trees: Binary Tree: Properties, Binary tree traversal, Binary Search Trees: Introduction , Insertion, Deletion, Complete Binary Trees . Heap: Introduction, Types of Heaps, Graph Basics, Terminologies, Memory Representation 10 HRS

UNIT-V

File Structures: Concepts of fields, record and files. Files: File Organization, Sequential Files, Structure, Operations, Disadvantages, Area 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. Simplified Approach to Data Structures – Vishal Goyal,Lalit Goyal, et.al

Course No: UCSMJP350 **Course :Data Structures**

Total Marks:50 **Internal Assessment : 25** **External Exam:25**

Duration of Examination: 3 Hrs. **Credits: 02(Practical)**

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 data structures and operations. Some of the problems are indicated below:

1. Write program to execute the following operations on an array:
   - i) Insertion of an element from beginning, end and from nth location
   - ii) Deletion of an element from beginning, end and from nth location
   - iii) Merged un sorted lists
   - iv) Bubble Sort
   - v) Insertion Sort
   - vi) Selection Sort
   - vii) Quick Sort
2. Write program to execute the following operations on a linked list
   - i) Insertion from beginning and end of a singly linked list
   - ii) Deletion from beginning and end of a singly linked list
   - iii) Insertion from beginning and end of a doubly linked list
   - iv) Deletion from beginning and end of a doubly linked list
   - v) Insertion of an element in a circular linked list
   - vi) Deletion of an element in a circular linked list
3. Write program to execute the following operations on Stack and Queue
   - i) Push
   - ii) Pop
   - iii) Enqueue
   - iv) Dequeue
4. Write program to execute the following operations on Binary Tree
   - i) Traverse a Binary tree in preorder, inorder and postorder.
   - ii) Insertion, Deletion and Serach in a Binary Search Tree
5. Write program to execute the following operations on Graph
   - i) Represent suitably a graph data structure and demonstrate operations of traversals on it.

Course No: UCSMJT302 **Course : Fundamental of Digital Electronics**

Total Marks:100 **Internal Assessment : 20** **Semester Exam:80**

Duration of Examination: 3 Hrs. **Credits:04(Theory)**

Learning Outcomes(LO):

LO1. To make students understand the basic structure, operation and characteristics of digital computer.
LO2. To familiarize the students with arithmetic and logic unit as well as the concept of the concept of pipelining.
LO3. To familiarize the students with hierarchical memory system including cache memories and virtual memory.
LO4. To make students know the different ways of communicating with I/O devices and standard I/O interfaces.

UNIT-I

Overview of computers, Integer & floating point representation, Error detection and correction methods using Hamming technique, ASCII code representation, Number systems, & their inter- conversion rules, Rules of addition/subtraction for r's, (r-1)'s complements. 10HRS

UNIT-II

Logic gates, And, OR, NOT, NAND, XOR, NOR, XNOR Gates & their design.Boolean Algebra: Binary arithmetic , Boolean Expressions, laws of Boolean Algebra, De-Morgan laws, K-map, simplification of Boolean Expressions using SOP, POS, K-map techniques. 10HRS

UNIT-III

Combinational circuits : Half & Full adders & **subtractors** , parallel adders and subtractors. Encoder, decoder, Multiplexer, De-Multiplexer, code converters. Sequential circuits: Flip-flop and its types, registers and their types, &bi-directional register. **10HRS**

UNIT-IV

Memory organization: Memory Hierarchy, Memory, its types (RAM/ROM), Characteristics of memory, memory address map to CPU, cache memory **10HRS**

UNIT-V

I/O Devices, Modes of I/O transfer like DMA, program control, Interupt and its Types, Instruction Life Cycle 10HRS

References

1. Mano Morris M.M., Computer System Architecture, Prentice Hall of India, 1983
2. Floyd Digital Fundamentals, Universal Bookstall Pvt Ltd.
3. Digital electronics, R.K.Gaur
4. Tanenbaum,A.S, Structured Computer organization, Prentice Hall of India

Course No: UCSSET301 **Course: Web Designing and Mobile Application**
Total Marks:75 **(Internal Assessment Theory: 10** **Practical:60** **Attendence:5)**
Duration of Examination: 3 Hrs. **Credits:04(Theory)**

Learning Outcomes (LO):
LO1. To introduce the fundamentals of Internet, the principles of web design, and developing basic websites using HTML and Cascading Style Sheets.
LO2. To utilize JavaScript for the creation of dynamic web pages.
LO3. To explain the basics of mobile application development.
LO4. To apply development tools and technologies for application development across different platforms.

UNIT-I **10HRS**
Introduction to internet: Concept of WWW, Internet, URL, HTTP Protocol: Request and Response, Web browser and Web servers, how a browser communicates with a Web Server, Website, Webpage, Web Design: Basic principles involved in developing a web site, Planning process in website development, Design Concept, Website Navigation, Types of websites (Static and Dynamic Websites).
HTML: Elements of HTML & Syntax, Comments, Headings, Paragraph, Span, Pre-Tags, Backgrounds, Formatting tags, Images, Hyperlinks, div tag, List Type and its Tags, Table Layout, div, Use of Forms in Web Pages.

UNIT-II **10HRS**
Cascading Style Sheet (CSS): Introduction, Styling (Background, Text Format, Controlling Fonts) using inline and external CSS, CSS Styling (Background, Text Format, Controlling Fonts), Working with Lists and tables, CSS Id and Class, Box Model (Introduction, Border properties, Padding Properties, Margin properties)
JavaScript: Introduction, Syntax of JavaScript, data types, Operators, Variable declaration, Control Statements, Arrays, Functions, Pop up boxes, Working with Objects, Events, Forms and Validations

UNIT-III **10HRS**
Event Driven Programming: UI event loop, Threading for background tasks, Outlets / actions, delegation, notification, Model View Controller (MVC) design pattern. Mobile Application Development Life Cycle, Mobile application issues: limited resources (memory, display, network, file system), input / output (multi-touch and gestures)

UNIT-IV **10HRS**
Cross-Platform Development Frameworks: Introduction to cross-platform development tools and frameworks such as React Native and PhoneGap, Integrated Development Environments (IDEs): Visual Studio Code, Adobe PhoneGap, Creating and using databases, Introducing SQLite.

References

1. Ralph Moseley and M. T. Savaliya, Developing Web Applications, Wiley-India Private Limited, 2011.

2. Joel Sklar, Principles of Web Design, Cengage Learning, 6th Edition, 2015.
3. John Duckett, Beginning HTML, XHTML, CSS, and JavaScript, wiley India
4. Ian Pouncey, Richard York, Beginning CSS: Cascading Style Sheets for Web Design Wiley India
5. HTML and CSS, Jon Duckett, John Wiely, 2012
6. Laura Lemay, Rafe Colburn, Jennifer Kyrnin, "Mastering HTML, CSS & Javascript Web Publishing", 2016.
7. Pankaj Sharma, "Web Technology", Sk Kataria & Sons Bangalore
8. Mike Mcgrath, "Java Script", Dream Tech Press 2006, 1st Edition
9. Kogent Learning Solutions Inc., Web Technologies Black Book, Dreamtech Press, 2009.
10. Valentino Lee, Heather Schneider, and Robbie Schell, Mobile Applications: Architecture, Design, and Development, Prentice Hall, 2004.
11. Brian Fling, Mobile Design and Development, O'Reilly Media, 2009. Maximiliano
12. Firtman, Programming the Mobile Web, O'Reilly Media, 2010.

Evaluation Pattern of theory Component:

10 Marks will be evaluated through internal assessment only.

Evaluation Pattern of practical Component:60 Marks will be evaluated as

a)Internal Assessment:20 marks(12-Written Test+8-Viva Voce)

b)External Assessment:40 marks(20-Written Test+10-Practical File+10-Viva Voce)

Course No: UCSSET302 **Course: Tally**

Total Marks:75 (Internal Assessment Theory: 10 Practical:60 Attendence:5)

Duration of Examination: 3 Hrs. **Credits: 03(Theory)**

Learning Outcomes(LO):

This course is designed to impart knowledge regarding concepts of Financial Accounting Tally is an accounting package which is used for learning to maintain accounts. This course is useful for Students to get placements in different offices as well as companies in Accounts departments.
LO1. Understanding the power and potential of Tally Accounting Software from the business perspective
LO2. Company Setup & Configurations
LO3. Recording Financial Transactions
LO4. Financial Reports Analysis

UNIT-I **10HRS**

Accounts, Accounting, Terminology of Accounting, Golden Rules of Accounting, Introduction to Tally Prime, Download and Install Tally Prime. Purchase Order, Sales Order, Accounting Feature, Inventory Feature, Configuration, Security.

UNIT-II **10HRS**

Tally Vault, Backup company Data, Restore company Data, Split Company, Import and Export Configuration, Printing Configuration, Display All Report Configuration ,Short-cut of Tally Prime
Types of Business Organization, Create Master, Ledger,

UNIT-III **10HRS**

Pre Define Tally Group, Types of Voucher; Create Company, Voucher Transaction of Entry, View Reports, Provision Entries, Adjustment Entries, Closing Entries, Day Book, Trial Balance, Profit & Loss Accounting, Balance Sheet.

UNIT-IV ***10HRS***

Taxation System CGST, SGST, IGST, Stock Item, Stock Group, Transaction Entry 12 Months, Purchase, Sales, Invoice, Credit Note, Debit Note-Voucher, Inventory Reports, Tax Reports, Closing and Opening Balance. Interest calculation, GST Report, GSTR-1, GSTR-2, GSTR-3B, Pay GST.

References

1. Implementing Tally 9-A.K Nadhani,K.K Nadhani
2. Tally.ERP 9 Dr.k.Kiran Kumar
3. "Tally.ERP 9: The Complete Reference" by V. Rajaraman
4. "Tally 9: A Practical Guide" by R.K. Jain
5. "Learning Tally.ERP 9 with GST" by A.J. Arora
6. "Tally.ERP 9: A Beginner's Guide" by B. S. Raghu

Evaluation Pattern of theory Component:

10 Marks will be evaluated through internal assessment only.

Evaluation Pattern of practical Component:60 Marks will be evaluated as

a)Internal Assessment:20 marks(12-Written Test+8-Viva Voce)

b)External Assessment:40 marks(20-Written Test+10-Practical File+10-Viva Voce)

Semester:4 Course No: UCSMJT401 Course :Object Oriented Programming Structures
Total Marks:100 Internal Assessment : 20 Semester Exam:80
Duration of Examination: 3 Hrs. Credits:04(Theory) 02(Practical)

Learning Outcomes(LO):

LO1:Understanding about object oriented programming.
LO2:Gain knowledge about the capability to store information together in an object.
LO3:Understand the capability of a class to rely upon another class.
LO4:Learn how to store one object inside another object
LO5:Learn use of one method can be used in variety of different ways
LO6:Understanding the process of exposing the essential data to the outside of the world and hiding the low level data
LO7:Create and process data in files using file I/O functions
LO8:Understand about constructors which are special type of functions
LO9:Learn how to write code in a way that it is independent of any particular type

UNIT I: 10 Hrs

Introduction to Object Oriented Programming Basic concept of OOP, Comparison of Procedural Programming and OOP, Benefits of OOP, C++ compilation, Abstraction, Encapsulation, Inheritance, Polymorphism,Tokens and identifiers: Character set and symbols, Keywords, C++ identifiers; Variables and Constants, Operators, Types of operators in C++, Precedence and associativity of operators, Manipulators.

UNIT II: 10 Hrs

Decision and Control Structures if statement, if-else statement, switch statement, Loop: while, do-while, for; Jump statements: break, continue, go to.
Array, Pointer and Structure Arrays, pointers, structures, unions

UNIT III: 10 Hrs

Functions: main() function, components of function: prototype, function call, definition, parameter; passing arguments; types of function, inline function, function overloading.
Introduction to classes & objects , Creation & destruction of objects Data Members, Member Function

UNIT IV: 10 Hrs

Constructors, Instantiation of objects, Default constructor, Parameterized constructor, Copy constructor and its use, Destructors, Polymorphism, Operator Overloading.
Exception handling: Implementing try and catch block, Use of throw keyword.

UNIT V: 10 Hrs

Inheritance Derived class and base class: Defining a derived class, Accessing the base class member, Inheritance: multilevel, multiple, hierarchical, hybrid, File classes, Opening and Closing a file, File modes, Manipulation of file, Functions for I/O operations.

TEXT BOOKS:

1. Object Oriented Programming with C++ by E. Balagurusamy, McGraw-Hill Education (India)
2. ANSI and Turbo C++ by Ashoke N. Kamthane, Pearson Education
3. Big C++ - Wiley India
4. C++: The Complete Reference- Schildt, McGraw-Hill Education (India)
5. C++ and Object Oriented Programming – Jana, PHI Learning.
6. Object Oriented Programming with C++ - Rajiv Sahay, Oxford
7. Mastering C++ - Venugopal, McGraw-Hill Education (India).

Course No: UCSMJP450 **Course :Object Oriented Programming Structures**

Total Marks:50 **Internal Assessment : 25** **External Exam:25**

Duration of Examination: 3 Hrs. **Credits: 02(Practical)**

In this course the students shall be exposed to various practical problems based on topics mentioned above. The Teacher-in-Charge shall design 30-40 problems based on these courses. The students shall be required to systematically work out the solution of those problems and implement using relevant tool in the computer laboratory. The 50% of the total marks in this paper shall be reserved for internal assessment. The students shall also be required to maintain proper record of each practical in a Practical File which shall be regularly checked by the concerned teacher-in-charge. The internal assessment shall be based on regular tests, practical file and attendance in the laboratory. For the rest of 50% of the total marks there shall be an external examination which shall be conducted jointly by an internal examiner and an external examiner to be appointed by the University. The distribution of marks to various components is given below as:-

Breakup for Internal Assessment:

Regular Tests = 20 marks

Viva-voce Examination = 10 marks

Practical File = 10 marks

Attendance = 10 marks

Semester:4 Course No: UCSMJT402 Course: Database Management System
Total Marks:100 Internal Assessment : 20 Semester Exam: 80
Duration of Examination: 3 Hrs. Credits:04(Theory)

Learning Outcomes(LO):
LO1:To Understand the basic concepts and the applications of database systems
LO2:To understand the relational database design principles
LO3:To become familiar with the basic issues of transaction processing and concurrency control
LO4:To become familiar with database storage structures and access techniques

UNIT I:

Data base System Applications, Purpose of Database Systems, View of Data – Data Abstraction – Instances and Schemas – data Models – the ER Model – Relational Model – Other Models – Database Languages – DDL – DML – database Access for applications Programs – data base Users and Administrator – Transaction Management – data base Architecture – Storage Manager – the Query Processor 10 Hrs

UNIT II:

Data base design and ER diagrams – ER Model - Entities, Attributes and Entity sets – Relationships and Relationship sets – ER Design Issues – Concept Design – Conceptual Design for University Enterprise. 10 Hrs

UNIT III:

Introduction to the Relational Model – Structure – Database Schema, Keys – Schema Diagrams
Relational algebra: introduction, Selection and projection, set operations, renaming, Joins, Division, syntax, semantics. Operators, grouping and ungrouping, relational comparison.
Overview of the SQL Query Language – Basic Structure of SQL Queries, Set Operations, Aggregate Functions – GROUPBY – HAVING, Nested Sub queries, Views, Triggers.
10 Hrs

UNIT IV:

Normalization – Introduction, Non loss decomposition and functional dependencies, First, Second, and third normal forms – dependency preservation, Boyee/Codd normal form.
Higher Normal Forms - Introduction, Multi-valued dependencies and Fourth normal form, Join dependencies and Fifth normal form 10 Hrs

UNIT V:

Transaction management: ACID properties, serializability and concurrency control, Lock based concurrency control (2PL, Deadlocks),Time stamping methods, optimistic methods, database recovery management 10 Hrs

References

1.Data base System Concepts, Silberschatz, Korth, McGraw hill, Sixth Edition.(All UNITS except III th)
2.Data base Management Systems, Raghurama Krishnan, Johannes Gehrke, TATAMcGrawHill 3rd Edition.
3.Fundamentals of Database Systems, Elmasri Navathe Pearson Education.
4.An Introduction to Database systems, C.J. Date, A.Kannan, S.Swami Nadhan, Pearson, Eight Edition for UNIT III.
5.Rob, Coronel, "Database Systems", Seventh Edition, Cengage Learning.

Semester:4 **Course No: UCSMJT403** **Course: Operating System**
Total Marks:100 **Internal Assessment : 20** **Semester Exam: 80**
Duration of Examination: 3 Hrs. **Credits:04(Theory)**

Learning Outcomes:
LO1:Describe the important computer system resources and the role of operating system in their management policies and algorithms.
LO2:To understand various functions, structures and history of operating systems and should be able to specify objectives of modern operating systems and describe how operating systems have evolved over time.
LO3:Understanding of design issues associated with operating systems.
LO4:Understand various process management concepts including scheduling, synchronization, and deadlocks.
LO5:To have a basic knowledge about multithreading.
LO6:To understand concepts of memory management including virtual memory.
LO7:To understand issues related to file system interface and implementation, disk management.
LO8:To understand and identify potential threats to operating systems and the security features design to guard against them.
LO9:To have sound knowledge of various types of operating systems including Unix and Android.
LO10:Describe the functions of a contemporary operating system with respect to convenience, efficiency, and the ability to evolve.

UNIT-I
Introduction: Definition, Functions, Types of operating system, Computer System Structure- operation, I/O structure, storage structure, hardware protection, Operating System Services.
Process Management: Process Concept, Process Scheduling, Operation On Processes, Cooperating Processes, Threads, Inter-Process Communication.
Process Synchronization: The Critical Section Problem, Synchronization Hardware, Semaphores Classical Problems of Synchronization, Critical Regions.

10 Hours

UNIT-II
CPU Scheduling: scheduling criteria, scheduling algorithms: FCFS, SJF, priority scheduling, round robin scheduling, multilevel queue scheduling, multilevel feedback queue scheduling, multiple processor scheduling, real time scheduling.
Memory Management: Logical & Physical Address Space, Swapping, Continuous Allocation (single partition, multiple partitions), Internal, External fragmentation, Paging, Segmentation, Segmentation with Paging.

10 Hours

UNIT-III
Virtual Memory, Demand Paging, Performance of Demand Paging, Page Replacement. Page Replacement Algorithms- FIFO, optimal, LRU, LRU approximation algorithms, counting algorithms Trashing, Demand Segmentation.
Deadlocks: Characterization, Methods For Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, Recovery From Deadlock. 10 Hours

UNIT-IV
I/O Management: I/O system, I/O strategies, buffering.

File System Interface: File Concept, Access Methods-sequential, direct, index, Directory Structure single-level, two-level, tree-structured, acyclic-graph, general graph.
File System Implementation: File System Structure, allocation, Methods-contiguous allocation, linked allocation, indexed allocation, Free Space management, Directory Management, Directory Implementation, Efficiency and Performance.

10 Hours

UNIT-V

Secondary Storage Structure: Disk Structure, Disk Scheduling, FCFS, SSTF, SCAN, C-SCAN, Look Scheduling, Selection of A Scheduling Algorithm, Disk Management-disk formatting, boot block, bad blocks.
LINUX/UNIX: Features of LINUX operating system, Components of LINUX, Scheduling, Process and memory management, Basic Linux commands, Overview of Shell script programming.

10 Hours

Suggested Readings

1. Silberschatz, Galvin, "Operating System Concepts", Addison Wesley Publishing company, 1989
2. William Stallings, "Operating System", Macmillan Publishing Company.
3. Deitel H.M., "An Introduction To Operating Syste", Addision Wesley Publishing Company, 1984.
4. Tanenbaum, A.S., "Modern Operating System", Prentice Hall of India.
5. Milenkovic M, "Operating system-concepts and design", McGraw Hill, International edition.

Semester:4 Course No:UCSMJT404 Course : Structured Query Language
Total Marks:50 Internal Assessment : 10 Semester Exam:40
Duration of Examination: 2 Hrs. Credits:02(Theory)

Learning Outcomes(LO):

LO1:To Understand the basic concepts and the applications of database systems

LO2:To Master the basics of SQL and construct queries using SQL

LO3:To understand the relational database design principles

LO4:To become familiar with the basic issues of transaction processing and concurrency control

LO5:To become familiar with database storage structures and access techniques

UNIT I:

Introduction to SQL: Purpose of SQL,SQL Data types: Numeric data types, Date and Time data types, Character and String data types, Unicode character string data types, Binary data types, and Miscellaneous data types
Data Definition Language, Data Manipulation Language, Data Control Language
SQL Data Definition Language Commands, Create, Alter, Drop, Truncate, and Rename.
Data Manipulation Language Commands, SELECT, INSERT, UPDATE, and DELETE
DCL includes commands such as GRANT and REVOKE which mainly deal with the rights, permissions, and other controls of the database system

UNIT II:

SQL has many built-in functions for performing calculations on data. SQL Aggregate Functions, SQL String Functions, SQL Date Functions, and SQL Scalar functions.
SQL Expressions: SQL Boolean Expression, SQL Numeric Expression, and SQL Date Expression

UNIT III:

Introduction to the Relational Model – Structure – Database Schema, Keys , SQL queries and Sub queries, SQL Joins, SQL clause, GROUPBY – HAVING, Nested Sub queries, Views, Triggers.

References

1.Data base System Concepts, Silberschatz, Korth, McGraw hill, Sixth Edition.(All UNITS except III th)
2.Data base Management Systems, Raghurama Krishnan, Johannes Gehrke, TATAMcGrawHill 3rd Edition.
3.Fundamentals of Database Systems, Elmasri Navathe Pearson Education.
4.An Introduction to Database systems, C.J. Date, A.Kannan, S.Swami Nadhan, Pearson, Eight Edition for UNIT III.
5.Rob, Coronel, “Database Systems”, Seventh Edition, Cengage Learning.


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