JYOTI NIVAS COLLEGE AUTONOMOUS
SYLLABUS FOR 2018 BATCH AND THEREAFTER

Programme: B.Sc. **Semester: II**

COMPUTER SCIENCE - II

COMPUTER FUNDAMENTALS AND PROGRAMMING IN C

Course Code: 18IICS2 **No. of Hours: 60**

COURSE OBJECTIVES:

- To impart the basic concepts of data structures and algorithms, searching and sorting techniques
- To understand basic concepts about stacks, queues, lists, trees and graphs
- To understand the fundamental concepts and techniques of Operating Systems.
- To study the concepts in process management, memory managements and deadlocks.

LEARNING OUTCOMES:

- An ability to write and analyze algorithms & summarize searching, sorting techniques
- An ability to describe stack, queue and linked list operation, knowledge of tree and graphs concepts
- An ability to understand basic concepts of operating system.
- An ability to describe process management, scheduling and concurrency control mechanisms, memory management and deadlocks

UNIT I **(10 HRS)**

Introduction: The need for data structure - Classification of data structure - Operations on data structure.
Algorithm: Specification - Complexity of algorithms - Simple examples.
Arrays: Definition - Operations - Memory representation.
Sorting: Insertion sort - Merge sort - Quick sort.
Searching: Linear search - Binary search analysis.

UNIT II **(16 HRS)**

Linked Lists: Introduction-Singly linked list – Doubly linked list – Operations – Application – Polynomial addition - Dynamic storage management – Garbage collection and compaction.
Stack: Definition – Operation - Memory representation - Application of stack – Recursion - Infix to postfix expression - Evaluation of expression.
Queue - Definition – Operation – Memory representation – Variation of queue – Circular queue – Deqeues - Priority queue.
Trees: Definition - Types and Terminology – Binary trees – Traversals – operations. **Graph**s: Definition – Types – Representation – Traversal – DFS- BFS.

UNIT III **(13 HRS)**

Introduction: Definition - System Components - Operating System Services - Types of System Calls -Operating System for different computing environments

Process Management: Process Concepts: Process definition - Process State - Process Control Block.

CPU Scheduling: Basic Concepts - Scheduling Criteria - Scheduling Algorithms (FCFS, SJF, Priority, Round-Robin)

Thread: Overview – Benefits - User & Kernel Threads - Multithreading Models.

Deadlocks: Characterization: Necessary Conditions - Resource Allocation graph - **Detection** (Single Instance and Multiple Instance) - **Recovery** (Process Termination and Resource Preemption).

UNIT IV **(13 HRS)**

Memory Management: Swapping - **Contiguous Memory Allocation**: Memory Protection - Memory Allocation – Fragmentation – **Paging:** Basic method - Hardware Support – Protection - Structure of the Page table - Hierarchical Paging - Hashed Page Tables - Inverted Page Table – **Segmentation**: Basic Method – Hardware - Protection and Sharing – Fragmentation **-** **Demand Paging:** Basic Concepts.

UNIT V **(08 HRS)**

File Management: File Concepts - Attributes – Operations – Types – Structure - Internal File Structure - **Access Methods**: Sequential, Direct - Indexed - **Directory Structures**: Single-level - Two-level - Tree Structured - **Allocation Methods**: Contiguous – Linked - Indexed - **Free Space Management:** Bit Vector - Linked List - Counting - Grouping.

REFERENCE BOOK:

1. Ellis Horowitz & Sartaj Sahni. Fundamentals of Data Structures. Galgotia BookSource.2008, 2nd edition.
2. Seymour Lipschutz. Data Structures with C. Tata McGraw - Hill Education. 2014.
3. J P Tremblay & P G Sorenson. An Introduction to Data Structures with Applications. Tata McGraw-Hill. Second Edition.
4. Abraham Silberschatz, Greg Gagne, Peter Galvin. Operating Systems Principles. John Wiley Publications. 2016. 9th Edition.
5. Andrew S Tanenbaum, Modern Operating Systems, Prentice Hall of India Learning. 2009. 3rd Edition.
6. Gary Nutt. Operating Systems. Pearson Education. 3rd edition.
7. D.M. Dhamdhere. Operating Systems: A Concept-based Approach, Tata McGraw-Hill Education-2012 ,3rd edition.

COMPUTER SCIENCE II

DATA STRUCTURES USING C – LAB

No. of Hours: 45

PART – A

1. Write a C program to print the Fibonacci series up to a given number using a recursive function.
2. Write a C program to perform linear search.
3. Write a C program to perform binary search.
4. Write a C program to arrange n numbers in ascending order using insertion sort
5. Write a C program to sort the numbers using merge sort.
6. Write a C program to sort the numbers using quick sort.
7. Write a C program to evaluate a postfix expression.
8. Write a C program to solve the Towers of Hanoi problem using recursion.

Part – B

1. Write a C program to implement the linked list operations using pointers:
   i. Insertion- At the beginning ,end, and the given position.
   ii. Display the contents

2. Write a C program to implement the linked list operations using pointers
   i. Deletion- At the beginning ,end, and the given position.
   ii. Display the contents

3. Write a C program to implement the stack operations of push & pop and display contents using arrays.

4 .Write a C program to implement the stack operations of push & pop and display contents using pointers.

5. Write a C program to convert the given infix expression to postfix expressing using stack.

6. Write a C program to implement the queue operations of insertion & deletion and display contents using pointers.

7. Write a C program to perform binary tree traversals:
   i. Inorder
   ii. Preorder
   iii. Postorder