PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

MSc(SS) DEGREE EXAMINATION DECEMBER 2025
(Second Semester)

Branch – **SOFTWARE SYSTEMS(five years Integrated)**

DATA STRUCTURES AND ALGORITHMS

Time: Three Hours | Maximum: 50 Marks

SECTION-A (5 Marks)
Answer **ALL** questions
ALL questions carry **EQUAL** marks (5 x 1 = 5)

1 What is the condition for a sparse matrix which contains m rows and n columns?
(i) Total number of Zero elements > (m*n)/2
(ii) Total number of Zero elements = m + n
(iii) Total number of Zero elements = m/n
(iv) Total number of Zero elements = m - n

2 Which data structures is used for implementing recursion?
(i) Stack (ii) List
(iii) Queue (iv) Array

3 Which type of linked list stores the address of the head node in the next pointer of the last node?
(i) Singly Linked List (ii) Doubly Linked List
(iii) Circularly Linked List (iv) Hashed list

4 What is the data structure required for Breadth First Traversal on a graph ?
(i) Stack (ii) Tree
(iii) Queue (iv) Array

5 What will happen if several elements are competing for the same bucket in the hash table?
(i) Diffusion (ii) Duplication
(iii) Replication (iv) Collision

SECTION - B (15 Marks)
Answer **ALL** Questions
ALL Questions Carry **EQUAL** Marks (5 x 3 = 15)

6 a Explain how sparse matrix is represented with example program.

OR

b Discuss how to implement two-dimensional array using C?

7 a Explain various operations of the stack? Write the routine to push & pop a element into a stack.

OR

b Illustrate the concept of Priority queue in detail. Implement the concept & write program.

Cont...

8 a Write about singly linked list in Data Structure & write its operations.

OR

b Evaluate the implementation of stack using linked list with Push & Pop.

9 a Illustrate different types of graph traversal & implement Breadth first traversal with program.

OR

b State an algorithm to insert nodes into binary search tree.

10 a Discuss the Radix sort algorithm for the following example
170, 45, 75, 90, 802, 24, 2, 66

OR

b Describe bubble sort algorithm with example.

SECTION -C (30 Marks)

Answer **ALL** questions
ALL questions carry **EQUAL** Marks (5 x 6 = 30)

11 a Elucidate a program to implement 3 dimensional arrays & calculate time complexities.

OR

b Elucidate the concept of asymptotic notation in detail with example program.

12 a Analyze how to implement parentheses matching using stack?

OR

b Determine the data structure which implements FIFO principle & where it is used? Write a program implementation for that data structure.

13 a Classify the application of linked list & explain any one in detail with program.

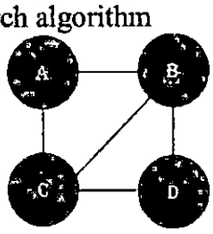
OR

b Assess the concept of doubly linked list with example program.

14 a Enumerate Binary search tree using the following elements 40,25,30,35,45,50,60 & write a routine to search an element in binary search tree.

OR

b Develop the adjacency matrix representation of following graph & implement Depth First Search algorithm



15 a Analyze linear probing collision resolution techniques with example program.

OR

b Develop a Max heap using the elements 4, 10, 3, 5, 1. Write routine for heap sort.

Z-Z-Z END