PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

MSc DEGREE EXAMINATION MAY 2022
(Second Semester)

Branch – **SOFTWARE SYSTEMS** (Five year integrated)

DATA STRUCTURES

Time: Three Hours Maximum: 75 Marks

SECTION-A (10 Marks)
Answer **ALL** questions
ALL questions carry **EQUAL** marks (10 x 1 = 10)

1. The matrix contains m rows and n columns. The matrix is called Sparse Matrix if _____
   (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. Representation of data structure in memory is known as:
   (i) Recursive (ii) Storage structure
   (ii) Abstract data type (iv) File structure

3. Merge sort uses which of the following technique to implement sorting?
   (i) Backtracking (ii) Divide and Conquer
   (iii) Greedy algorithm (iv) Dynamic Programming

4. If several elements are competing for the same bucket in the hash table, what is it called?
   (i) Diffusion (iii) Collision
   (iii) Replication (iv) Duplication

5. The type of linked list in which the node does not contain any pointer or reference to the previous node is _____
   (i) Circularly singly linked list (ii) Circular doubly linked list
   (iii) Singly linked list (iv) Doubly linked list

6. Which of the following information is stored in a doubly-linked list's nodes?
   (i) Value of node (ii) Address of the previous node
   (iii) Address of next node (iv) All of the above

7. Which of the following is not the application of stack?
   (i) A parentheses balancing program
   (ii) Tracking of local variables at run time
   (iii) Compiler Syntax Analyzer
   (iv) Data Transfer between two asynchronous process

8. A queue follows _____
   (i) FIFO principle (ii) Ordered array
   (iii) LIFO principle (iv) Linear tree

9. What is a full binary tree?
   (i) Each node has exactly zero or two children
   (ii) Each node has exactly two children
   (iii) All the leaves are at the same level
   (iv) Each node has exactly one or two children

Cont....

10. A person wants to visit some places. He starts from a vertex and then wants to visit every place connected to this vertex and so on. What algorithm he should use?
(i) Depth First Search (ii) Prim's algorithm
(iii) Breadth First Search (iv) Kruskal's algorithm

SECTION - B (25 Marks)

Answer **ALL** questions
ALL questions carry **EQUAL** Marks (5 x 5 = 25)

11 a Discuss the importance of analyzing Time and Space Complexities in Data Structures

OR

b What is meant by ADT? Give few examples of ADT.

12 a Sort the following numbers using Insertion Sort and Selection Sort
56, 58, 8, 4, 3, 1, 12, 26, 32 & 23.

OR

b Compare and Contrast Binary Search and Sequential Search.

13 a Enumerate the advantage of Dynamic Memory Allocation .

OR

b How to implement Polynomial Addition using Linked List.

14 a Convert ((a+b*c)/(d /e + f)) into postfix using stack.

OR

b List the applications of Queue.

15 a Discuss about Binary Tree Traversals with suitable example.

OR

b How Graphs are different from Trees.

SECTION -C (40 Marks)

Answer **ALL** questions
ALL questions carry **EQUAL** Marks (5 x 8 = 40)
Question no. 16 is compulsory

16 Discuss about the importance of analyzing Best, Worst and Average case analysis of algorithm.

17 a Discuss about Quick Sort. List the various steps involved in sorting using Quick sort. Sort the following numbers using Quick Sort. 78, 56, 12, 45, 36, 7, 2, 3, 10 & 4

OR

b Enumerate rehashing and Extendable Hashing technique with appropriate example.

18 a List the steps in deleting a node in Singly Linked List with example.

OR

b Compare Singly Linked List and Doubly Linked List. State the disadvantages of Doubly Linked List.

19 a How expressions are evaluated using stack. Demonstrate with an example.

OR

b What is Circular Queue? Mention the condition to check whether a Circular Queue is Full or not.

20 a List the Properties of B Trees and B+ Trees.

OR

b What is Minimum Spanning Tree. Discuss any method to generate a MST from Graph.

Z-Z-Z

END