

## School of Computing Science and Engineering

**Master of Computer Applications  
Semester End Examination - Jun 2024**

**Duration : 180 Minutes  
Max Marks : 100**

### Sem II - E1PY203B - MCAN1260 Data Structures

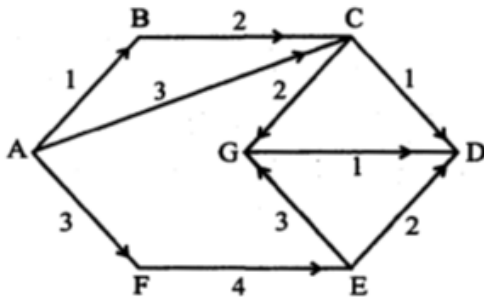
General Instructions

*Answer to the specific question asked*

*Draw neat, labelled diagrams wherever necessary*

*Approved data hand books are allowed subject to verification by the Invigilator*

- 1) Taking a suitable example, show the Adjacency list representation of a directed graph. K1(2)
- 2) What is sparse matrix ? Taking a suitable example show how a Sparse matrix can be represented to save the memory K2(4)
- 3) Show all the steps to traverse the following graph using Breadth First Search. Start from node A K2(6)



- 4) Given a 2 D array A[-100: 100, -5:50]. Find the address of element A[99,49] considering the base address as 10 and each element requires 4 bytes for storage. Follow both row major and column major order. K3(9)
- 5) Construct the Binary Tree whose Preorder and Inorder traversal sequences are given as below K3(9)  
 Preorder: G,B,Q,A,C,K,F,P,D,E,R,H  
 Inorder: Q,B,K,C,F,A,G,P,E,D,H,R
- 6) What is recursion in C? Solve the Towers of Hanoi problem using recursion. With a neat diagram show how Towers of Hanoi problem with 3 disks can be solved. K5(10)
- 7) Demonstrate the result of inserting the keys 16, 9, 17, 11, 3, 12, 8, 20, 22, 23, 13, 18, 14, 10, 1, 2, 24, 25, 26, 5 in to an empty Binary Search Tree. Delete the nodes 11, 20 and 24 and show the resultant Binary Search Tree. K4(12)
- 8) Explain Heap Sort. Build a Max Heap and a Min Heap using the following list of numbers: K5(15)  
 44, 30, 50, 22, 60, 55, 77, 55.

Show how the root nodes of these heaps can be deleted. Draw diagrams.

- 9) Write down the algorithm / program for Quick Sort. Execute your algorithm on the following set of values till the first 3 values are placed in their proper positions. K5(15)

38, 81, 22, 48, 13, 69, 93, 14, 45, 58, 79, 72

- 10) What are height balanced / AVL trees? Create an AVL tree for the following set of elements: K6(18)

a, z, b, y, c, x, d, w, e, v, f.