School of Computing Science and Engineering
Master of Computer Applications
Semester End Examination - Nov 2023

Duration : 180 Minutes
Max Marks : 100

### Sem III - MCAN2330 - Design and Analysis of Algorithm

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) What is an algorithm? What are the five important features of an algorithm? K1 (2)

2) Describe Kruskal's algorithm for finding the Minimum Spanning Tree of a graph (MST). K2 (4)

3) Write down Dijkstra's algorithm for solving the single source shortest path on a weighted, directed graph. Execute your algorithm on the following graph with vertex A as the source vertex. K2 (6)
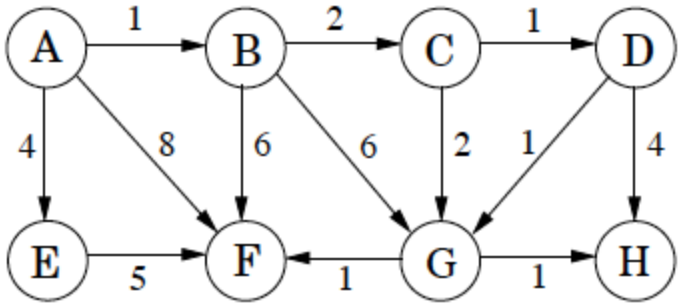
4) What is Backtracking? Solve 4 queens problem using backtracking. K3 (9)

5) Apply Greedy algorithm to find an optimal Huffman Code for the following set of frequencies? What is the percentage of data saving when compared with fixed length representation? K3 (9)
A:35K   B:20K   C:30K   D:25K   E:15K   F:40K

6) Explain NP, NP Hard and NP Complete problems, taking suitable examples. When do we go for approximation algorithms? K5 (10)

7) Write an algorithm for uniting two Binomial Heaps of the same degree. K4 (12)

8) Choose an appropriate sorting algorithm to sort the following set of data in linear time. What is the complexity of your algorithm?
1276, 5432, 8791 ,4562, 7834, 4356, 9001, 3782, 2671, 3421, 6927

K5 (15)

9) Create a Binomial Heap with the following set of data.
12. 4, 5, 9, 33, 22, 56, 43, 9, 11, 24, 58, 76, 87, 19, 13, 21, 48, 92, 55, 28
What will happen if the node containing value 21 is deleted from the heap?

K5 (15)

10) Derive a recursive procedure for finding solution to the matrix chain multiplication problem. Find an optimal parenthesization of a matrix-chain product whose sequence of dimensions is <3x8, 8x5, 5x12, 12x7, 7x50, 50x6>.

K6 (18)