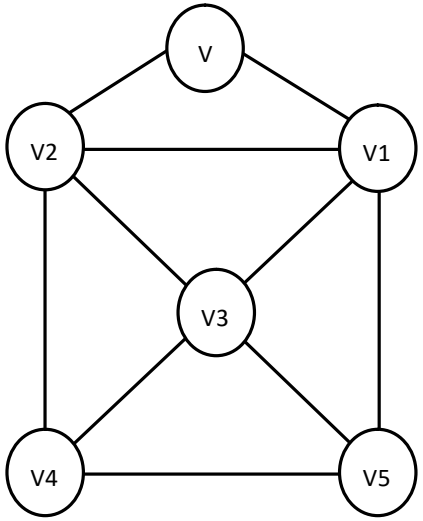
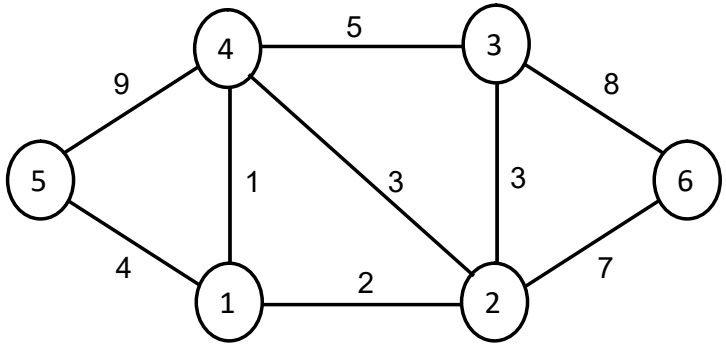
What is the weight of the minimum spanning tree using the Prim's algorithm starting from vertex a? Write down the steps and diagrams wherever necessary.

6. a) How does BFS algorithm work? Explain it using the diagram of a graph given below - 5



where root node is (V).

b) Consider the following graph and find the MST and weight using Kruskal's method. 5



UG/PG ODD SEMESTER (CBCS) EXAM., 2020
held in April – 2021

COMPUTER SCIENCE

7th / 1st Semester

COURSE NO. MCS - 704/MS - 104
(Design and Analysis of Computer Algorithm)

Full Marks : 70
Pass Marks : 28

Time : 3 hours

The figures in the margin indicate full marks for the questions

(Answer any five)

UNIT-I

1. a) What is an algorithm? Write the properties of algorithm. 3

b) Solve the recurrence relation 3
T (n) = T (n/2) + 1

c) What is stack overflow? Write the algorithm of stack overflow. 3

d) Make a heap with following numbers 5
27, 18, 15, 22, 33, 25, 16, 30, 5
Explain heap sort from the diagram of the heap tree.

2. a) How to prove that an algorithm is correct? 2

b) Analyse the algorithm of factorial of a number by solving the recurrence equations. 4

c) What are the queue operations? Write the algorithm of all the operations. 3

d) Explain substitution method by using an example. 3

e) Draw the functional growth diagram of big-oh function and explain. 2

UNIT - II

3. a) Write the algorithms - 2+3=5

i) MaxMin

ii) Binary Search

b) Sort the numbers using Merge sort technique- 3
15, 65, 75, 36 44, 88, 2, 3, 31

c) Multiply the matrices using Strassen's Matrix Multiplication if 6

$A = \begin{bmatrix} 1 & 2 \\ 2 & 1 \end{bmatrix}$ and $B = \begin{bmatrix} 3 & 2 \\ 2 & 3 \end{bmatrix}$

Also analyse the time complexity of the algorithm.

4. a) Compare linear search and binary search techniques. 3

b) Sort the following numbers using quick sort technique. 3

6, 5, 3, 1, 8, 7, 2, 4

c) Draw a BST with the following nodes 4, 7, 13, 1, 6, 14, 3, 10, 8 and show the delete operation of the node 14. Calculate number of comparisons for the delete operation and subsequent search operations. 4

d) Write the algorithm of finding the first two max values from an array of ten numbers. Analyse the algorithm. 4

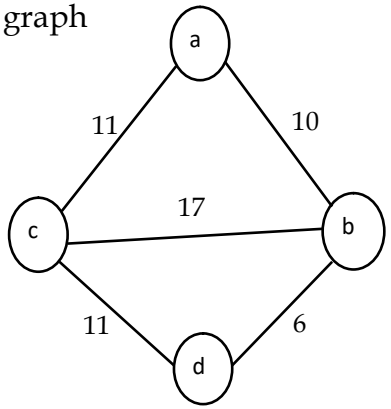
UNIT - III

5. a) Compare the Prims algorithm and Kruskal algorithm for MST 3

b) Write the DFS algorithm with example. 3

c) Explain KMP string matching algorithm with example. 3

d) Consider the given graph 5



c) Define bipartite graph. 2

d) Give an example of strongly connected graph. 2

UNIT - IV

7. a) What are the properties of dynamic programming? 2

b) Explain multi-stage graph with example. 4

c) What are the steps for building the Huffman Tree? 3

d) Explain Knapsack problem and give an example. 5

8. a) Draw the Huffman Tree for the data given below- 5

Letter :	z	k	m	c	u	d	*l*	e
Frequency:	2	7	24	32	37	42	42	120

b) Write short note on - 3+3=6

i) Floyd - Warshall Algorithm

ii) Optimal Binary Tree

c) Compare dynamic programming with greedy method. 3

UNIT - V

9. Write short notes on - 5+5+4=14

i) NP Hard and NP - Completeness

ii) Finding Convex Hull Algorithm

iii) Computational Geometry

10. a) Compare TSP and optimized TSP in the context of NP problems. 10

b) Write the application domains of computational geometry. 4