CHRIST (DEEMED TO BE UNIVERSITY),BENGALURU - 560029

End Semester Examination March - 2018

Master of Computer Applications II SEMESTER

Code: MCA232 **Max.Marks: 100**

Subject: DATA STRUCTURES AND ALGORITHMS **Duration: 3Hrs**

SECTION A

Answer all the questions **5X20=100**

1 **a)** Construct a postfix expression from an infix expression ((A + B) * (C - E)) / (F + G)). **(4)**

[OR]

2 **b)** Explain the linked list implementation of a queue. Write an algorithm to insert an item into the queue. **(6)**

3 **c)** Write a recursive algorithm for Towers of Hanoi and explain with an example assuming 4 disks. **(10)**

[OR]

4 **a)** Compare linear and non-linear data structure with example. **(4)**

5 **b)** List out the areas in which data structures are applied extensively. **(6)**

[OR]

6 **c)** Write an algorithm to implement stack operations using arrays (include: push(), pop(), isempty() and top()). **(10)**

7 **a)** Analyze linear search for the following unsorted numbers: 11,2,9,13,57,25,17,1,90,3. **(10)**

[OR]

8 **b)** Sort the following numbers using merge sort (trace the sorting): 80, 30, 60, 50, 40, 20, 70, 10. **(10)**

9 **a)** Analyze the time complexity of selection sort for the following unsorted list of elements. **(10)**

15	20	10	30	50	18	5	45

[OR]

10 **b)** What is heap? Explain how heaps works to sort a set of elements. **(10)**

11 **a)** Explain the following with examples. **(10)**

i. Strongly connected graph and weakly connected graph.

ii. Weighted directed graph and Undirected graph.

iii. Cyclic and acyclic graphs.

iv. Trees and Minimum Spanning trees.

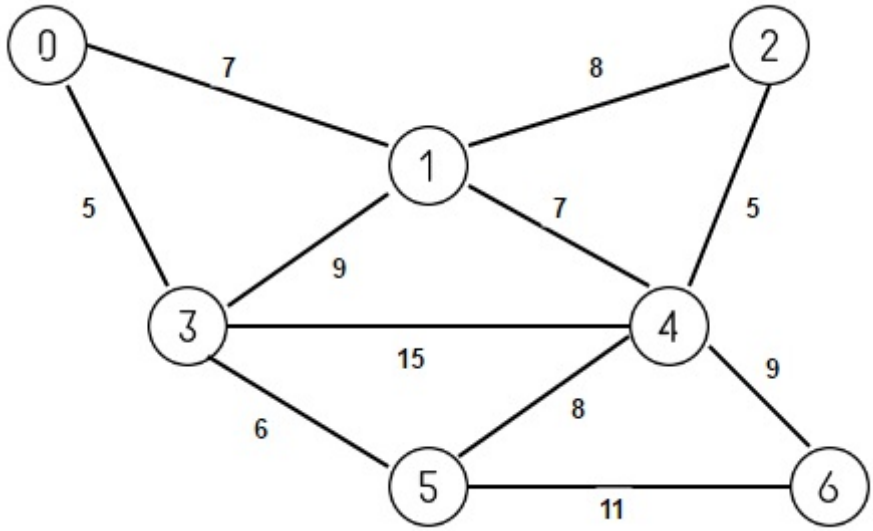
v. Binary Search Tree and Binary Tree traversal.

[OR]

12 **b)** Trace the Depth First Search algorithm with suitable graph **(10)**

13 **a)** Find the minimum spanning tree for the following graph using Prim's algorithm. **(10)**

END SEMESTER QUESTION PAPER



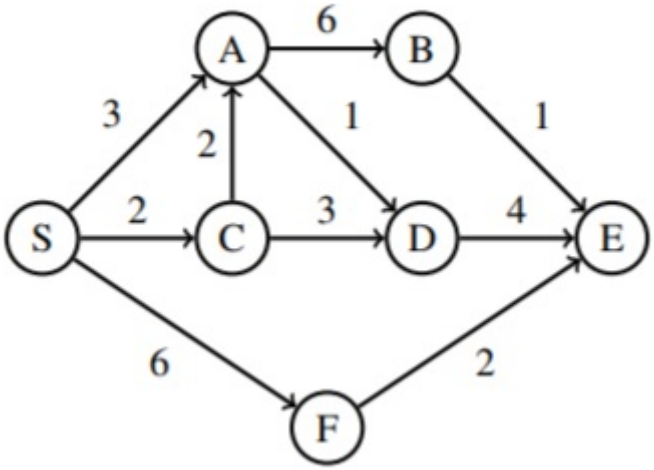
[OR]

14 b) Show the result of inserting 2,1,4,5,9,3,6,7 into an empty AVL tree. **(10)**

15 a) Discuss 8 Queen's problem by backtracking. **(10)**

[OR]

16 b) Find the shortest path from S to all other vertices for the following graph using Dijkstra's algorithm and display the shortest path. **(10)**



17 a) Analyse Floyd–Warshall algorithm for finding shortest paths in a weighted graph. **(10)**

[OR]

18 b) Write an algorithm to find the sum of subsets and analyze its time complexity. **(10)**

19 a) List out the difference between NP-Hard and NP-Complete problems with example. **(10)**

[OR]

20 b) Explain any two hard code generation problem with example. **(10)**

21 a) Examine the following statements and justify with example **(10)**

i. If a problem in NP can be solved in polynomial time then all problems in NP-Complete can also be solved in polynomial time.

ii. If a problem in NP-complete can be solved in polynomial time then all problems in NP can also be solved in polynomial time.

[OR]

22 b) Discuss any one NP Hard Scheduling problem in detail. **(10)**