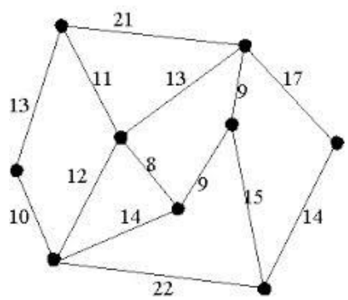
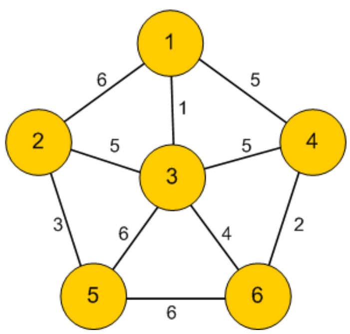
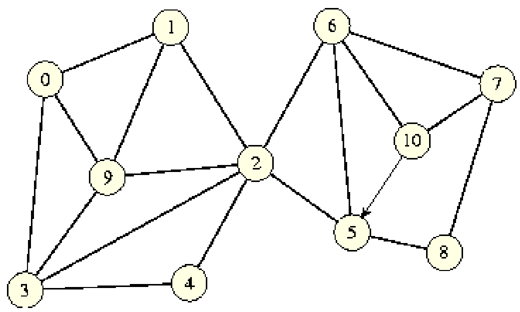
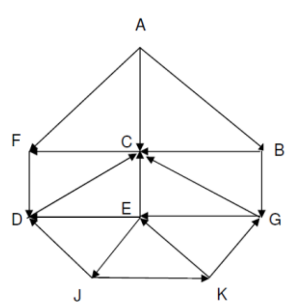
BE Semester-__VIII__ (Computer Engineering) Question Bank

(Design and analysis of algorithm)

All questions carry equal marks(10 marks)

1.	Explain quick sort algorithm and simulate it for following data sequence: 3 5 9 7 1 4 6 8 2
2.	Define the term minimum spanning tree. Apply Krushkal's algorithm to find MST for following graph 
3.	Find minimum spanning tree using prim's algorithm for below graph: 
4.	Solve following recurrence: $T(n) = 4T(n/4) + n$ $T(n) = T(n-1) + 1$
5.	What is an algorithm? Define computational problem. Define sorting problem.
6.	Solve the activity selection problem using greedy approach for followings set of activities: Set of activities, A = <A1, A2, A3, A4, A5, A6, A7, A8> Start time S = <1, 2, 3, 4, 5, 6, 7, 8> Finish time F = <4, 2, 6, 8, 5, 1, 9, 10>
7.	Differentiate: • Depth first serach v/s Breadth first search

	• Prim's algorithm v/s Krushkal's Algorithm
8.	Illustrate the operation of merge sort on the array A={3,56,34,26,49,9,18}
9.	Find Longest common sub sequence for given strings and trace back the solution: A = M N O N O P M N B = O P M N O
10.	Find the DFS and BFS traversal sequence for given graph. 
11.	Explain merge sort with suitable data. Derive and solve recurrence for the same.
12.	Define the terms: • Time complexity • Space complexity • Recurrence equation • Amortized analysis
13.	Create min and max heap for following data: 56 23 18 89 46 77 88 36 74 63 14
14.	What do you mean by complexity? Explain various types of complexity classes. What is worst case, best case and average case time complexity
15.	Find topological sorting for given graph. 
16.	Differentiate (i) surjective and bijective function (ii) P and NP problem
17.	Write traveling salesman problem.

18.	Write a short note on: • Adjacency matrix representation of graph • Adjacency list representation of graph
19.	Write the application of following: • Depth first traversal • Breadth first traversal • Merge sort • insertion sort
20.	Derive the best case and worst case time complexity of Insertion sort.
21.	Write Dijkstra’s algorithm.
22.	Explain with example greedy procedure and dynamic programming.
23.	Explain Rabin Karp algorithm with example.
24.	Define and Give an example of relation that is reflexive, transitive and symmetric.
25.	Write a procedure to insert and delete an element in binary search tree.
26.	Write master theorem and give example.
27.	Write Bellman-Ford algorithm.
28.	How can you solve recurrence equation? Explain with suitable example substitution method.
29.	Explain naïve string matching for string (1,1,1,1,0) and pattern (1,1,0).
30.	Write algorithm for MATRIX-CHAIN multiplication.
31.	Explain (i) Valid and invalid shift in pattern matching (ii) Prefix and suffix of string (iii) Abstract problem and decision problem (iv) Domain and codomain of function.
32.	Define big-Oh and Ω notation (i) 2^{300} show big – Oh notation. (ii) 3logn+loglogn show Ω notation.
33.	Use master theorem to give tight asymptotic bounds for the following recurrences. (i) $T(n)=4T(n/2)+n$ (ii) $T(n)=4T(n/2)+n^2$
34.	Explain the String matching with finite automata.
35.	Show the construction of recursion tree for the recurrence $T(n)=2T(n/2)+cn$.
36.	Explain the term equivalence relation and equivalence class. Explain the term cardinality and singleton.
37.	Give examples of relations that are a. Reflexive and symmetric but not transitive. b. Reflexive and transitive but not symmetric.

38.	Define directed graph, undirected graph, out-degree, in-degree of graph.
39.	What is a binary search tree? Explain preorder tree walk and postorder tree walk.
40.	Write an algorithm to add 2 numbers and find worst case analysis.