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INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

B.Tech III Semester End Examinations (Regular) - December, 2017

Regulation: IARE – R16

DESIGN AND ANALYSIS OF ALGORITHMS

(Common to CSE/IT)

Time: 3 Hours

Max Marks: 70

Answer ONE Question from each Unit

All Questions Carry Equal Marks

All parts of the question must be answered in one place only

UNIT – I

1. (a) Briefly explain the time complexity and space complexity estimation. [7M]
- (b) Sort the following elements using Merge Sort. 45,22,88,23,78,46,84,44,21,34. [7M]

2. (a) Write and trace the binary search algorithm for searching the element 70 from the list 3,14,27,31,39,42,55,70,74,81,85,93,98. Analyze its worst case time complexity. [7M]
- (b) ALGORITHM Sum(n) [7M]

```
// Input: A nonnegative integer n
S ← 0
For i ← 1 to n do
  S ← S + i
Return S
```

 1. What does this algorithm compute?
 2. What is basic operation?

How many times the basic operation is executed?

UNIT – II

3. (a) Define articulation points and construct a depth first spanning tree for the graph shown in Figure 1. [7M]



Figure 1

- (b) Write the algorithm to find the depth first search and breadth first search of a graph. [7M]

4. (a) Explain about Weighted Union and Collapsing Find using an example. [7M]
- (b) Write the algorithm for finding the bicomponents of a graph G. [7M]

UNIT – III

5. (a) Explain the Job sequencing with deadlines using following example. [7M]
 $N=5$,profits $(p_1,p_2,\dots,p_5)=(20,15,10,5,1)$,deadlines $(d_1,d_2,\dots,d_5) = (2, 2, 1, 3, 3)$.
- (b) Write an algorithm for optimal binary search tree. [7M]
6. (a) Explain Kruskal's Algorithm to find Minimum cost Spanning Tree using an example. [7M]
- (b) Write a pseudo code using bottom-up dynamic programming for the knapsack Problem. [7M]

UNIT – IV

7. (a) What is graph coloring problem? Discuss in detail the m-coloring graph problem. [7M]
- (b) Explain how backtracking can be used to solve n-queens problem and obtain one solution to 4-queens problem showing the state space tree. [7M]
8. (a) Apply backtracking to find Hamiltonian cycle in the following graph shown in Figure 2 and write the algorithm. [7M]

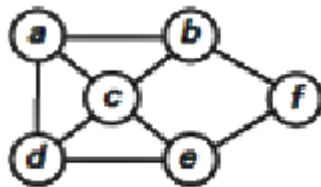


Figure 2

- (b) Find the optimal tour of travelling salesman problem for the graph shown in Figure 3 using branch and bound. [7M]

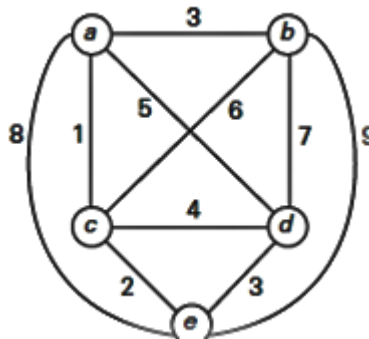


Figure 3

UNIT – V

9. (a) State Cook's theorem and explain. [7M]
(b) Describe about clique decision problem. [7M]
10. (a) Write a brief note on P, NP NP hard and NP complete [7M]
(b) Prove that the circuit Satisfactory problem is NP complete [7M]

