CSE/IT 225 (R-15)

Total No. of Questions :09] [Total No. of Pages : 02

II/IV B.Tech. DEGREE EXAMINATIONS, NOV/DEC- 2019

Second Semester

CSE/IT

INTRODUCTION TO ALGORITHMS

Time: Three Hours **Maximum marks:60**

Answer Question No.1 Compulsory **6X2=12 M**

Answer ONE Question from each Unit **4X12=48 M**

1. a) What are the criteria an algorithm should satisfy?
   b) Give a brief on Job sequencing with deadlines
   c) What are bi-connected components
   d) Give time complexity of Binary search algorithm
   e) Principle of LC Branch and Bound
   f) Define Cook's Theorem.

UNIT-I

2. a) Why do we use asymptotic notations in the study of algorithms? Briefly describe the commonly used asymptotic notations.
   b) Give the worst case time and the best case time for the following algorithm:

```
Compute (n)
{ for (i=2 to n/2)
  { if (n% i ==0)
    break;
  }
}
```

(OR)

3. a) For what kind of problems, the approach divide and conquer is applied? Explain with example.
   b) Write and explain starassen's Matrix Multiplication algorithm.

P.T.O

UNIT-II

4. a) Write a greedy algorithm for the optimal solution of the knapsack problem.

   b) Solve the single source shortest path problem using greedy method.

(OR)

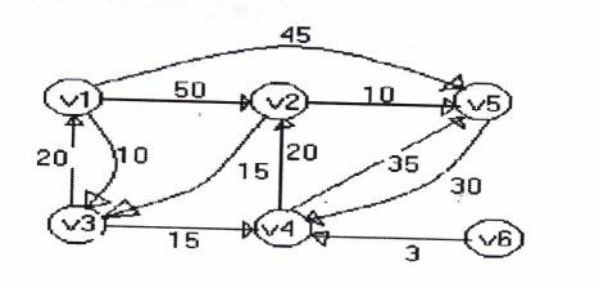
5. a) Design a dynamic programming algorithm and explain for finding an optimal order of multiplying n matrices.

   b) Solve the following job sequencing problem:
   n=5, (p1, ...,p5)=(30, 45, 20, 15, 10) and (d1, ..., d5)=(2,2,1,3,3).

UNIT-III

6. a) Explain the algorithm based on DFS for finding strongly connected components of a directed graph G.

   b) Apply single source shortest paths algorithm to the following graph (assume-source vertex is VI):



(OR)

7. Explain backtracking algorithm. Describe the backtracking solution to solve 8-Queen's problem.

UNIT-IV

8. a) Compare the brute force method with the backtracking method.

   b) Use the Least Cost Branch and Bound approach to solve the knapsack problem with n=3, m=20 (p1=25, p2=24, p3=15) and (w1, w2, w3)=(18,15,10)

(OR)

9. a) Compare and contrast the P and NP problems.

   b) What is meant by a non-deterministic algorithm? Explain its significance.

CSE/IT 225 (R-15)

Total No. of Questions :09] [Total No. of Pages : 02

II/IV B.Tech. DEGREE EXAMINATIONS, APRIL/MAY- 2019

Second Semester

CSE/IT

INTRODUCTION TO ALGORITHMS

Time: Three Hours **Maximum marks:60**

Answer Question No.1 Compulsory **6X2=12 M**

Answer ONE Question from each Unit **4X12=48 M**

1. a) Time and space complexities
   b) Define Omega notation
   c) Mention properties of strongly connected components.
   d) Mention general characteristics of Greedy method.
   e) Give Inorder traversal of a tree
   f) Mention different computational complexity measures

UNIT-I

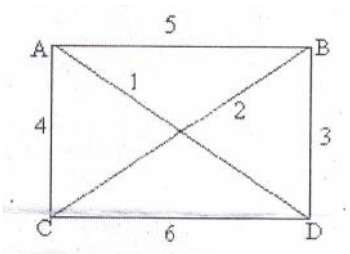
2. a) Write and explain the control abstraction for Divide and conquer.
   b) Differentiate between priori analysis and posteriori analysis.

(OR)

3. a) List the relative advantages and disadvantages of the partition algorithm with suitable explanation and example.
   b) Write the Quicksort algorithm? Analyze the time complexity in worst case.

UNIT-II

4. a) Find the shortest path between all pairs of nodes in the following graph.



P.T.O

b) Prove that the edge with the smallest weight will be part of every minimum spanning tree.

(OR)

5. a) What is spanning tree? Explain the prim's algorithm with an example.

b) Explain the terms feasible solution, optimal solution and objective function.

UNIT-III

6. a) Prove or disprove an undirected graph G=(V,E) is Biconnected if and only if for each pair of distinct vertices u and v there are two distinct paths from u to v that have no vertex in common except u and v.

b) Write an algorithm of Biconnected components.

(OR)

7. Explain the applications of Backtracking. Draw and explain the portion of the tree for 4-queens problem that is generated during backtracking.

UNIT-IV

8. a) Explain the satisfiability problem and write the algorithm for the same.

b) Write a brief on polynomial Vs non-polynomial time complexity and give suitable example for each with suitable explanation.

(OR)

9. a) Differentiate between Dynamic Knapsack and Branch and Bound Knapsack problem.

b) Describe problem state, solution state and answer state with an example.