

**Fourth Semester B.E. Degree Examination, June/July 2013**  
**Design and Analysis of Algorithms**

free for the

ne: 3 hrs.

Max. Marks: 100

**Note: Answer FIVE full questions, selecting  
at least TWO questions from each part.**

**PART - A**

- What is an algorithm? What are the properties of an algorithm? Explain with an example. (08 Marks)
- Explain brute force method for algorithm design and analysis. Explain the brute force string matching algorithm with its efficiency. (08 Marks)
- Express using asymptotic notation i)  $n!$  ii)  $6 * 2^n + n^2$ . (04 Marks)
- Explain divide and conquer technique. Write the algorithm for binary search and find average case efficiency. (10 Marks)
- What is stable algorithm? Is quick sort stable? Explain with example. (06 Marks)
- Give an algorithm for merge sort. (04 Marks)
- Explain the concept of greedy technique for Prim's algorithm. Obtain minimum cost spanning tree for the graph below Prim's algorithm. (09 Marks)

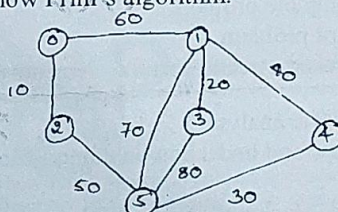


Fig.Q.3(a)

- Solve the following single source shortest path problem assuming vertex 5 as the source. (09 Marks)

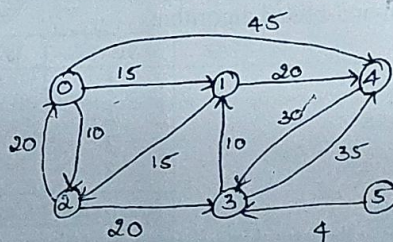


Fig.Q.3(b)

- Define the following: i) Optimal solution; ii) Feasible solution. (02 Marks)
- Using Floyd's algorithm solve the all pair shortest problem for the graph whose weight matrix is given below: (07 Marks)

$$\begin{bmatrix}
 0 & \infty & 3 & \infty \\
 2 & 0 & \infty & \infty \\
 \infty & 7 & 0 & 1 \\
 6 & \infty & \infty & 0
 \end{bmatrix}$$



- b. Using dynamic programming, solve the following knapsack instance.  
 $N = 4$     $M = 5$   
 $(W_1, W_2, W_3, W_4) = (2, 1, 3, 2)$   
 $(P_1, P_2, P_3, P_4) = (12, 10, 20, 15)$ .
- c. Outline an exhaustive search algorithm to solve traveling salesman problem.

### PART - B

- 5 a. Write and explain DFS and BFS algorithm with example.
- b. Obtain topologies sorting for the given diagram using source removal method.

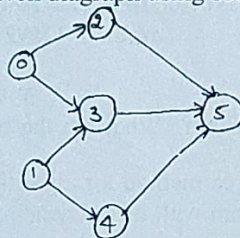


Fig.Q.5(b)

- c. Explain Horspool's string matching algorithm for a text that comprises letter (denoted by hyphen) i.e "JIM-SAW-ME-IN-BARBER-SHOP" with pattern "ME-IN". Explain its working along with a neat table and algorithm to find shift table.
- 6 a. Define the following:
    - i) Class P
    - ii) Class NP
    - iii) NP complete problem
    - iv) NP hard problem.
  - b. Write the decision tree to sort the elements using selection sort and find the lower bound.
  - c. What is numeric analysis?
  - d. Brief overflow and underflow in numeric analysis algorithms.
- 7 a. What is back tracking? Apply back tracking problem to solve the instance of subset problem:  $S = \{3, 5, 6, 7\}$  and  $d = 15$ .
  - b. With the help of a state space tree, solve the following instance of the knapsack problem using the branch-and-bound algorithm.

Item	Weight	Value
1	4	40
2	7	42
3	5	25
4	3	12
Knapsack	Capacity	$W = 10$

- c. Explain how backtracking is used for solving 4-queen's problem. Show the state space tree.
- 8 a. What is prefix computation problem? Give the algorithms for prefix computation: i)  $n$  processors; ii)  $n/\log n$  processors. Obtain the time complexities of these algorithms.
  - b. What is super linear speed up? Obtain the maximum speed up when  $P = 10$  values of  $f = 0.5, 0.1, 0.01$ .
  - c. What are the different ways of resolving read and write conflicts?

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