CBCS Scheme

USN ☐☐☐☐☐☐☐☐☐☐ **15CS43**

Fourth Semester B.E. Degree Examination, June/July 2017
Design and Analysis of Algorithms

Time: 3 hrs. Max. Marks: 80

Note: Answer FIVE full questions, choosing one full question from each module.

Module-1

1 a. Define algorithm. Explain asymptotic notations, Big O, big Omega, big theta notations.
   (08 Marks)
   b. Explain general plan of mathematical analysis of nonrecursive algorithms with example.
   (08 Marks)

OR

2 a. Define time and space complexity. Explain important problem types. **(08 Marks)**
   b. Illustrate mathematical analysis of recursive algorithm for towers of hanoii. **(08 Marks)**

Module-2

3 a. Explain concept of divide and conquer. Write merge sort algorithm. **(08 Marks)**
   b. Write a recursive algorithm for binary search and also bring out its efficiency. **(08 Marks)**

OR

4 a. Illustrate the tracing of quick sort algorithm for the following set of numbers:
      25, 10, 72, 18, 40, 11, 64, 58, 32, 9 **(08 Marks)**
   b. List out the advantages and disadvantages of divide and conquer method and illustrate the topological sorting for the following graph.
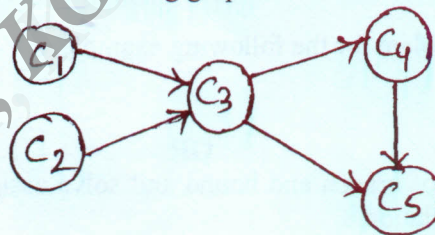

Fig.Q4(b) **(08 Marks)**

Module-3

5 a. Explain Greedy criterion. Write a Prim's algorithm to find minimum cost spanning tree.
   (08 Marks)
   b. Sort the given list of numbers using heap sort: 2, 9, 7, 6, 5, 8. **(08 Marks)**

OR

6 a. Write an algorithm to find single source shortest path. **(08 Marks)**
   b. Construct a Huffman tree and resulting code word for the following:

Character	A	B	C	D	-
Probability	0.35	0.1	0.2	0.2	0.15

Encode the words DAD and ADD. **(08 Marks)**

Module-4

7 a. Explain the concept of dynamic programming, with example. **(08 Marks)**
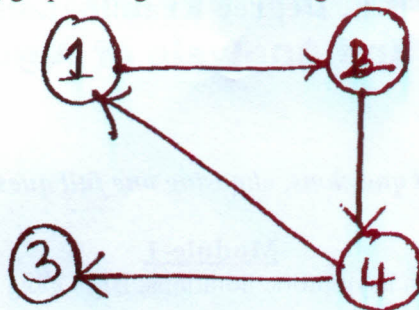
   b. Trace the following graph using Warshall's algorithm.

Fig.Q7(b) **(08 Marks)**

OR

8 a. Explain Multistage graphs with example. Write multistage graph algorithm to forward approach. **(08 Marks)**

   b. Solve the following instance of Knapsack problem using dynamic programming. Knapsack capacity is 5.

Item	Weight	Value
1	2	$12
2	1	$10
3	3	$20
4	2	$15

(08 Marks)

Module-5

9 a. Explain backtracking concept. Illustrate N queens problem using backtracking to solve 4-Queens problem. **(08 Marks)**

   b. Solve subset sum problem for the following example, s = {3, 5, 6, 7} and d = 15. Construct a state space tree. **(08 Marks)**

OR

10 a. Explain the concept of branch and bound and solve assignment problem for the following and obtain optimal solution.

$$
\text{Person} \begin{array}{c} a \\ b \\ c \\ d \end{array} \begin{bmatrix} 9 & 2 & 7 & 8 \\ 6 & 4 & 3 & 7 \\ 5 & 8 & 1 & 8 \\ 7 & 6 & 9 & 4 \end{bmatrix} \begin{array}{cccc} \text{Job1} & \text{Job2} & \text{Job3} & \text{Job4} \end{array}
$$

(08 Marks)

   b. Explain LC Branch and Bound and FIFO branch and bound. **(08 Marks)**

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