CBCS SCHEME

USN ☐☐☐☐☐☐☐☐☐☐ **15CS43**
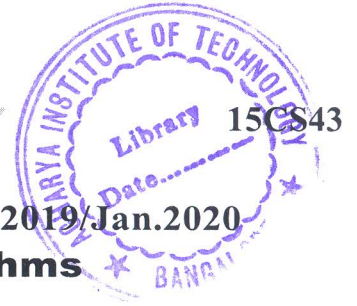
Fourth Semester B.E. Degree Examination, Dec.2019/Jan.2020
Design and Analysis of Algorithms

Time: 3 hrs.   Max. Marks: 80

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

Module-1

1 a. Define algorithm. What are the properties of an algorithm? Explain with an example.
    (08 Marks)
   b. Explain asymptotic notations, with examples.   **(08 Marks)**

OR

2 a. Explain general plan of mathematical analysis of nonrecursive algorithm with example.
    (08 Marks)
   b. Define time and space complexity. Explain important problem types.   **(08 Marks)**

Module-2

3 a. Explain divide and conquer technique. Write binary search algorithm.   **(08 Marks)**
   b. Apply quick sort to sort the list 'QUESTION' in alphabetical order. Draw the tree of recursive calls made.   **(08 Marks)**

OR

4 a. What is decrease and conquer approach? Explain the different major variations of decrease and conquer.   **(08 Marks)**
   b. Design merge sort algorithm and discuss its best-case, average-case and worst-case efficiency.   **(08 Marks)**

Module-3

5 a. Explain Geedy 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. 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)**
   b. Write an algorithm to find single source shortest path.   **(08 Marks)**

Module-4

7 a. Define transitive closure. Trace the following graph using Warshall's algorithm. **(08 Marks)**
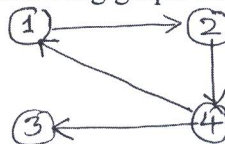

Fig.Q.7(a)

   b. What is Dynamic programming? Explain in detail with suitable examples.   **(08 Marks)**

OR

8 a. Solve the following instance of knapsack problem using dynamic programming. The capacity of knapsack is W = 5. **(08 Marks)**

Item	Weight	Value
1	2	3
2	3	4
3	4	5
4	5	6

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

Module-5

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

b. Explain back tracking concept and how back tracking is used for solving 4-Queen's problem. Show the state space table. **(08 Marks)**

OR

10 a. Explain LC branch and bound and FIFO branch and bound. **(08 Marks)**

b. Obtain the optimal solution for the given assignment problem as a matrix shown below using branch and bound method. **(08 Marks)**

$$
\begin{array}{c} \\ \text{Person} \end{array}
\begin{array}{c}
\quad\;\; \text{Job1} \quad \text{Job2} \quad \text{Job3} \quad \text{Job4} \\
\begin{array}{c} A \\ B \\ C \\ D \end{array}
\left(
\begin{array}{cccc}
10 & 2 & 7 & 8 \\
6 & 4 & 3 & 7 \\
5 & 8 & 1 & 8 \\
7 & 6 & 10 & 4
\end{array}
\right)
\end{array}
$$

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