

4112/18

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BCAT 231

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Following Paper ID and Roll No. to be filled in your Answer Book.

PAPER ID : 1111

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No.

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## BCA Examination 2018-19

(Third Semester)

### DESIGN AND ANALYSIS OF ALGORITHM

*Time : Three Hours]*

*[Maximum Marks : 100*

**Note :-** Attempt all questions.

#### SECTION - A

1. Attempt any four questions of the following :  $4 \times 5 = 20$

- What is a lower bound on a function and also discuss the tight bound? Distinguish between big on,  $\Omega$  and  $\theta$ , and relate to algorithm analysis.
- What are Recurrence Equations? List the various methods to solve them.

*[P. T. O.*

- (c) Solve the following numbers using quick sort method :

6 1 9 3 4 8 2 7

Also give the complexity of quick sort method.

- (d) Solve the recurrence relation

$$T(n) = 2T\left(\frac{n}{3}\right) + n$$

by interaction method.

- (e) State the master theorem and its use. Using the master method. Solve the following recurrences :

(i)  $T(n) = 4T\left(\frac{n}{2}\right) + n^3$

(ii)  $T(n) = 2T\left(\frac{n}{2}\right) + n$

- (f) What is an Algorithms? What is the need to study algorithms? Also define :

(i) Time complexity

(ii) Space complexity

2. Attempt any two questions :  $2 \times 10 = 20$

- (a) Discuss the complexity of insertion sort.

- (b) Define heap. Explain the method of heap sort with example.
- (c) Given a set  $S = \{1, 3, 5, 4\}$  and  $x = 8$ , find the subset sum using backtracking approach.
3. Attempt any two questions :  $2 \times 10 = 20$
- (a) Solve the following 0/1 Knapsack problem using Greedy method :
- $P = (11, 21, 31, 33)$
- $W = (2, 11, 22, 15)$
- $C = 40$
- $n = 4$
- (b) Consider the scheduling problem where the 6 jobs have a profit of (10, 34, 67, 45, 23, 99) corresponding deadlines are (2, 3, 1, 4, 5, 3). Obtain the optimum schedule.
- (c) Create a Huffman tree for the following :

<b>Characters</b>	a	b	c	d	e	f
<b>Probability</b>	48	11	9	14	7	3

*[ P. T. O. ]*

4. Attempt any two questions :  $2 \times 10 = 20$

- (a) Design and analyse a dynamic programming algorithm for the problem of finding a longest common subsequence of a given sequence of  $n$  integers.
- (b) Explain the general method of branch and bound. Find the solution of the assignment problem using branch and bound method of the following problem :

	1	2	3
A	4	7	3
B	2	6	1
C	6	9	4

$c_{ij}$  is the cost for the  $i^{\text{th}}$  job assigned to  $j^{\text{th}}$  agent.

- (c) In how many ways, the following chain of matrices may be multiplied?

$A \times B \times C \times D$  where dimensions are  $[2 \times 5]$ ,  $[5 \times 3]$ ,  $[3 \times 6]$  and  $[6 \times 4]$  respectively. Find the number of multiplications required in each case.

5. Attempt any four questions :  $4 \times 5 = 20$
- (a) How will you find the shortest path between two given vertices using Dijkstra's algorithm?
  - (b) Define the terms :
    - (i) Cyclic graph
    - (ii) Forest
    - (iii) Path
    - (iv) Directed graph
    - (v) Weighted graph
  - (c) Discuss Prim's and Kruskal's algorithm for finding the minimum spanning tree.
  - (d) What are Spanning Tree? Explain with an example.
  - (e) What is a Flow Network? Explain min-max cut theorem.
  - (f) Which of more efficient of BFS and DFS? Explain giving reasons.

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