

S.No. : 182

BCA 2301

No. of Printed Pages : 06

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

PAPER ID : 21111

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BCA Examination 2018-19

(Third Semester)

DESIGN AND ANALYSIS OF ALGORITHM

Time : Three Hours]

[Maximum Marks : 60

- Note :- (i) Attempt all questions.
(ii) Be precise in your answer.
(iii) Assume any missing data.

SECTION-A

1. Attempt all parts of the following : $8 \times 1 = 8$
- Justify why quick sort is better than merge sort?
 - What do you mean by Stable Sort? Name two stable sort algorithms.
 - What are the steps to design an algorithm?

[P. T. O.

- (d) Difference between complete binary tree and binary tree.
- (e) Explain single source shortest path.
- (f) Name some terminologies, which are used in graphs.
- (g) Explain divide and conquer approach.
- (h) Define Back tracking.

SECTION – B

2. Attempt any two parts of the following : $2 \times 6 = 12$

- (a) Describe any one of the following sorting technique and write respective algorithms, using examples :
 - (i) Selection sort
 - (ii) Insertion sort
- (b) What are the different Greedy Criterion? Explain. Consider the five items with their weight and volumes :

$$I = \{I_1, I_2, I_3, I_4, I_5\}$$

$$W = \{5, 10, 20, 30, 40\}$$

$$V = \{30, 20, 100, 90, 160\}$$

The Knapsack has capacity $W = 60$; find the solution of the problem using the concept of fractional Knapsack.

- (c) Explain binary search tree and its operations. Make a binary search tree for the following sequence of numbers show all steps :

42, 32, 90, 34, 68, 72, 15, 24, 30, 66, 11, 50, 10

- (d) Brief the complexity classes of N, NP and NP complete, using example.

SECTION - C

Note :- Attempt all questions

3. Attempt any two parts of the following : $5 \times 2 = 10$

- (a) Show all steps of Strassen's matrix multiplication algorithm to multiply the following matrices :

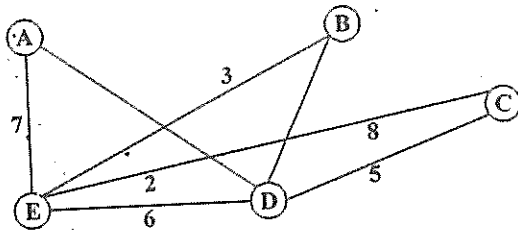
$$x = \begin{bmatrix} 3 & 2 \\ 4 & 8 \end{bmatrix} \text{ and } y = \begin{bmatrix} 1 & 5 \\ 9 & 9 \end{bmatrix}$$

- (b) Discuss asymptotic notations in brief.
- (c) Write short note on the following :
- n-Queen problem
 - Graph coloring

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4. Attempt any two parts of the following : $5 \times 2 = 10$

- (a) Define TSP problem in details. Find the solution for the following instance of TSP problem using branch and bound



- (b) Sort the following array using heap sort technique :

{25, 57, 48, 37, 12, 92, 86, 33}

- (c) Write BFS algorithm and perform it using an example.

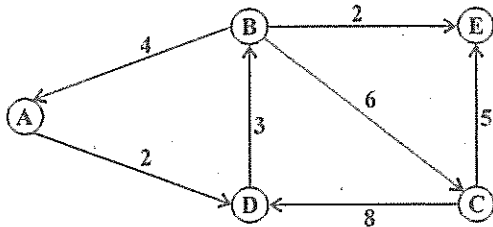
5. Attempt any two parts of the following : $5 \times 2 = 10$

- (a) Draw a Huffman tree for the following symbols whose frequency of occurrence in a message is stated along with the symbol below :

A : 15, B : 6, C : 7, D : 12, E : 25, F : 4, G : 6,
H : 1, I : 15

Decode the message 1110100010111011.

- (b) Find the all pair shortest paths for the given graph :

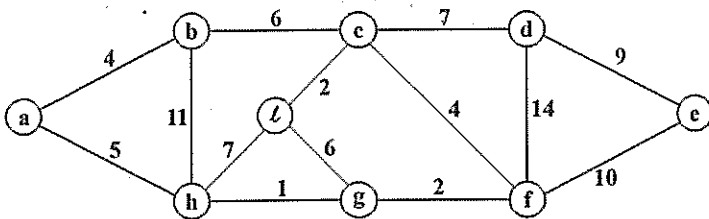


- (c) Write short notes on the following :

- (i) Multistage graph
- (ii) Hamilton cycle
- (iii) Time complexity and space complexity
- (iv) Growth function
- (v) Adjacency matrix

6. Attempt any two parts of the following : $5 \times 2 = 10$

- (a) What is Spanning Tree? Explain Prime's algorithm and find MST of graph :



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- (b) Explain and write algorithm for Greedy method of algorithm design. Given 10 activities along with their state and finish time as :

$$S = \{A_1, A_2, A_3, A_4, A_5, A_6, A_7, A_8, A_9, A_{10}\}$$

$$S_i = \{1, 2, 3, 4, 7, 8, 9, 9, 11, 12\}$$

$$F_i = \{3, 5, 4, 7, 10, 9, 11, 13, 12, 14\}$$

Compute a schedule where the largest number of activities take place.

- (c) Write Dijkstra's algorithm.

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