

CBCS Scheme

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16MCA33

Third Semester MCA Degree Examination, June/July 2018 Analysis and Design of Algorithms

Time: 3 hrs.

Max. Marks: 80

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

Module-1

- a. Explain various steps in fundamentals of algorithmic problem solving. (10 Marks)
b. List out important problem types in the study of algorithms. Explain any two of them. (06 Marks)

OR

- a. Discuss various asymptotic notations. (06 Marks)
b. Write an algorithm for solving tower of Hanoi problem. Find its time complexity. (10 Marks)

Module-2

- a. Write an algorithm to sort given set of numbers using selection sort. Analyze this algorithm. (08 Marks)
b. Discuss brute force string matching algorithm. Compute best and worst case time complexities. (08 Marks)

OR

- a. Briefly explain divide-and-conquer strategy. (02 Marks)
b. Apply merge sort on the array: P, r, o, G, R, a, M, m, i, N, g. (04 Marks)
c. Discuss the concept of multiplication of large integers. Apply this algorithm to multiply 25 and 64. Find the time complexity. (10 Marks)

Module-3

- a. Write an algorithm to traverse the graph using DFS method. Traverse the graph given in Fig.Q5(a) starting from the node D. Construct appropriate DFS tree.

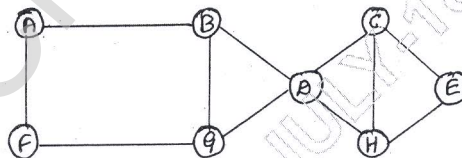


Fig.Q5(a)

(10 Marks)

- b. Briefly discuss the Johnson-Trotter algorithm to find permutations. Apply this algorithm for $n = 3$. (06 Marks)

OR

- a. Write Prim's algorithm for finding minimum spanning tree of a graph. Find the minimum spanning tree for the Fig.Q6(a) using Prim's algorithm.

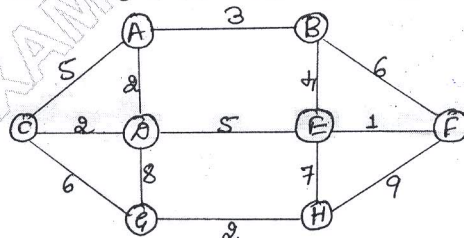


Fig.Q6(a)

(08 Marks)

1 of 2

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Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and/or equations written eg. 42+8 = 50, will be treated as malpractice.

- b. Discuss Huffman's algorithm for encoding and decoding. Following is the list of characters and their probability of occurrences. Construct a Huffman tree. Encode the text ABACABAD. Decode the code 100010111001010. (08 Marks)

Character	A	B	C	D	-
Probability	0.4	0.1	0.2	0.15	0.15

Module-4

- 7 a. Explain sorting by counting with suitable algorithm. Trace the algorithm to sort the numbers given here: 25, 42, -4, 56, 0, 10, 31. (08 Marks)
b. Discuss the concept of hashing. With suitable examples, explain the methods for resolving hash collisions. (08 Marks)

OR

- 8 a. Give Floyd's algorithm for solving all-pair-shortest-path problem. Apply the same on a graph given below:

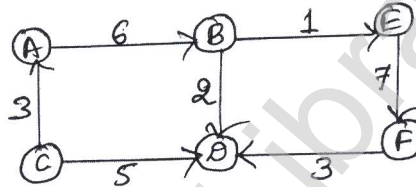


Fig.Q8(a)

- b. Explain 0/1 knapsack problem. Solve the following knapsack to find maximum profit. Using dynamic programming technique. (08 Marks)

Item	Weight	Value
1	3	25
2	1	20
3	2	40

Capacity of knapsack, $W = 4$.

(08 Marks)

Module-5

- 9 a. Write a note on decision trees. (04 Marks)
b. Draw a decision tree for finding minimum of three numbers. (04 Marks)
c. Discuss P, NP and NP – complete problems. (08 Marks)

OR

- 10 a. Discuss n-Queen's problem. Draw a state-space tree to solve n-Queen's problem for $n = 4$. (08 Marks)
b. Solve the following assignment problem using branch-and-bound technique, with suitable state-space tree.

	J_1	J_2	J_3	J_4
a	9	2	7	8
b	6	4	3	7
c	5	8	1	8
d	7	6	9	4

(08 Marks)