

CBCS SCHEME

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18MCA33

Third Semester MCA Degree Examination, Jan./Feb. 2021

Design & Analysis of Algorithms

Time: 3 hrs.

Max. Marks: 100

*Note: Answer any FIVE full questions, choosing ONE full question from each module.*Module-1

- 1 a. Explain the various stages of algorithm design and analysis process with the help of flow chart. (10 Marks)
- b. Define algorithm. Explain different asymptotic notations. (10 Marks)

OR

- 2 a. Write the general plan of analyzing the efficiency of non-recursive algorithm. Write an algorithm for element uniqueness problem and analyze. (10 Marks)
- b. Show that if $t_1(n) \in O(g_1(n))$ and $t_2(n) \in O(g_2(n))$ then $t_1(n) + t_2(n) \in O(\max(g_1(n), g_2(n)))$ (10 Marks)

Module-2

- 3 a. Write Brute force pattern matching algorithm and analyze. (10 Marks)
- b. Design the recursive merge sort algorithm and analyze. (10 Marks)

OR

- 4 a. Write algorithm for selection sort and analyze. (10 Marks)
- b. Explain multiplication of two large integers. (10 Marks)

Module-3

- 5 a. Write DFS Graph traversal algorithm and write a trace for the following graph: (10 Marks)

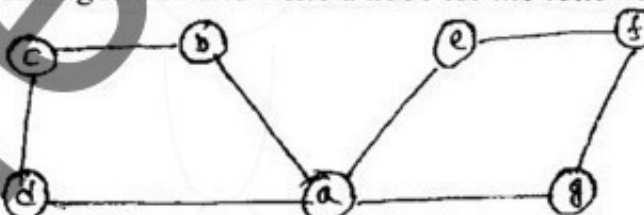


Fig. Q5 (a)

- b. Construct Huffman code for the character.

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

Encode Text DAD and decode 1001101101110111.

(10 Marks)

OR

- 6 a. Explain Johnson Trotter Algorithm for generating permutations and solve $\{1, 2, 3\}$. (10 Marks)
- b. Illustrate the pseudo code of Prim's algorithm. Apply the algorithm for the following graph:

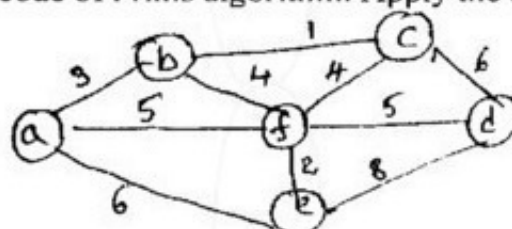


Fig. Q6 (b)

(10 Marks)

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Module-4

- 7 a. Illustrate Warshall's algorithm. Apply the algorithm to find transitive closure of the graph shown below. (10 Marks)

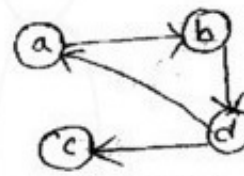


Fig. Q7 (a)

- b. Illustrate the algorithm for computing binomial coefficient. Apply the algorithm to compute 6C_3 . (10 Marks)

OR

- 8 a. Write Horspools string matching algorithm. Apply this to find the pattern "BARBER" in the text "JIM_SAW_ME_IN_A_BARBERSHOP" (10 Marks)
 b. Evaluate the input 30,20,56,75,35,19 for the hash function $h(K) = R \bmod 11$ and construct the open and close hash table. (10 Marks)

Module-5

- 9 a. Explain sum of subset problem with example. (10 Marks)
 b. Explain P, NP, NP complete problems. (10 Marks)

OR

- 10 a. Solve the following assignment problem using Branch and Bound method. (10 Marks)

9	2	7	8
6	4	3	7
5	8	1	8
7	6	9	4

- b. Solve the following Knapsack problem using Branch-and-Bound method.

Item	Weight	Value
1	4	\$ 40
2	7	\$ 42
3	5	\$ 25
4	3	\$ 12

W = 10

(10 Marks)
