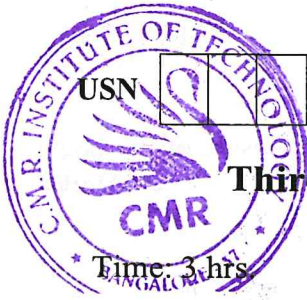18MCA33

USN

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

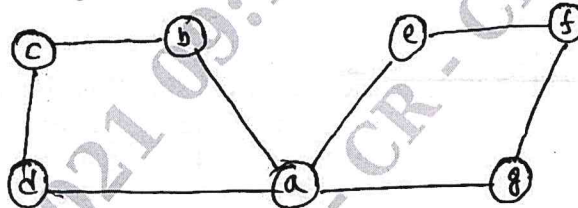5   a.   Write DFS Graph traversal algorithm and write a trace for the following graph: **(10 Marks)**

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)**
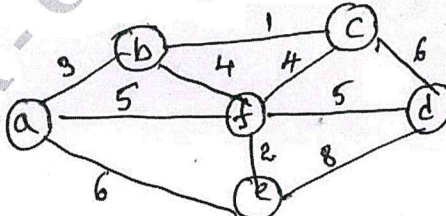   b.   Illustrate the pseudo code of Prims algorithm. Apply the algorithm for the following graph:

Fig. Q6 (b) **(10 Marks)**

Module-4

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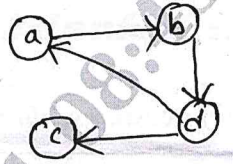

Fig. Q7 (a)

b. Illustrate the algorithm for computing binomial coefficient. Apply the algorithm to compute 6C3. **(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)**

$$\begin{bmatrix} 9 & 2 & 7 & 8 \\ 6 & 4 & 3 & 7 \\ 5 & 8 & 1 & 8 \\ 7 & 6 & 9 & 4 \end{bmatrix}$$

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)

* * * * *