Roll No. .....

Subject Code—2083

M.C.A. (Fourth Year) EXAMINATION

(5 Years Integrated Course)

MCA-403

ANALYSIS & DESIGN OF COMPUTER ALGORITHMS

Time : 3 *Hours* *Maximum Marks :* 100

Note : Attempt any *Five* questions out of eight. All questions carry equal marks.

1. (a) Defing Algorithm. Explain different types of algorithms.

   (b) What do you understand by analysis of algorithms ? Discuss various asymptotic notations. 8+12

2. (a) What is data structure ? Explain its various types with illustrations.

(b) Define Graph. How is it represented in memory ? **10+10**

3. (a) Describe the divide and conquer design technique.

(b) Write an algorithm for mergesort and determine its complexity. Give example. **6+14**

4. (a) Find an optimal solution to the Knaspsack instance.

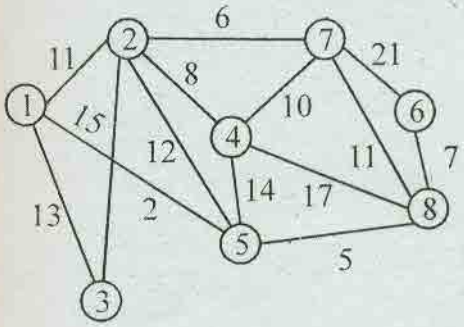
$n = 7$, M = 15, $(p_1, p_2, \ldots\ldots p_7) = (10,5,15,7,6,18,3)$ and $(w_1, w_2, \ldots\ldots w_7) = (2,3,5,7,1,4,1)$.

(b) Find an optimal placement for 13 programs on three tapes T_0, T_1 and T_2 where the programs are of lengths 12, 5, 8, 32, 7, 5, 18, 26, 4, 3, 11, 10 and 6. **8+12**

5. (a) Write an algorithm to construct the optimal binary search tree T given the roots $R(i, j)$, $0 \leq i < j \leq n$. Show that this can be done in time $O(n)$.

(b) Compare greedy method and dynamic programming along with proper illustrations. **12+8**

6. Write Prim's and Kruskal's algorithm for minimum cost spanning trees. Compute a minimum cost spanning tree for the graph given below : **20**



7. (a) Explain graph coloring problem with the help of an example. Discuss the significance of 4-color conjecture.

   (b) Write recursive backtracking algorithm for the sum of subsets problem. **10+10**

8. (a) Discuss branch and bound technique of problem solving.

   (b) Describe and give examples of NP-hard and NP-complete problems. **6+14**