Subject Code—6812

M.C.A. (Fourth Year) EXAMINATION

(5 Years Integrated Course)

MCA-403

ANALYSIS AND DESIGN OF COMPUTER ALGORITHM

Time : 3 Hours   Maximum Marks : 100

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

(a) Explain the role of trees for the design of algorithms.   10

(b) Solve the following recurrence relation using substitution on method :   10

$$T^1(n) = \begin{cases} 1, & n \le 4 \\ 2T\left(\dfrac{n}{2}\right) + \log n, & n > 4 \end{cases}$$

2. (a) Write the algorithm for binary search. 10

   (b) How are directed graphs represented in the memory ? Illustrate with example.

   10

3. (a) Write an algorithm for quicksort and determine its complexity. 10

   (b) Give an algorithm of merge sort and find its complexity. 10

4. Write the algorithm of Dijkastra for shortest path. Explain with the help of example. 20

5. Discuss the travelling salesperson problem. Also discuss its importance in the study of complex algorithm. 20

6. (a) What is the 8 queues problem ? 10

   (b) Consider $w = \{5,7,10,12,15,18,20\}$ and $m=35$. Find all possible subsets of w that sum to m using recursive backtracting algorithm for sum of subsets problem.

   10

7. Discuss the $n-p$ hard and $n-p$ complete problem with the help of example. Also state their importance. 20

8. Write short notes on the following :

   (a) Heap sort

   (b) Flow shop scheduling

   (c) Minimum cost spanning tree. 20