MCA/M-24   **24525**

DESIGN AND ANALYSIS OF ALGORITHMS
MCA-20-25(ii)

Time : Three Hours]   [Maximum Marks : 75

Note :   Attempt *Five* questions in all. Q. No. **1** is compulsory. Attempt *four* more questions, selecting *one* question from each Unit. All questions carry equal marks.

(Compulsory Question)

1.   (a)   What is divide and conquer problem ?

   (b)   What are various elements of dynamic programming ?

   (c)   What is meant by strongly connected components ?

   (d)   What is meant by flow network ?

   (e)   What are the line segment properties ?

   (f)   What is meant by independent sets ?   **6×2.5=15**

Unit I

2.   (a)   What are the various asymptotic notations ? Explain each in detail using suitable examples.   **7.5**

   (b)   Solve the following recurrence relation :

   $T(n) = T(n - 1) + 1$ and $T(1) = \theta(1)$.   **7.5**

3. (a) What is meant by probabilistic analysis ? Explain using suitable examples. **7.5**

   (b) Explain the use and limitations of Master's theorem using suitable examples. **7.5**

Unit II

4. (a) How can you solve longest common subsequence problem using dynamic programming ? **7.5**

   (b) Write an algorithm to insert an element in a Red-Black tree. **7.5**

5. What is Greedy programming ? Explain the general procedure to solve problem using greedy programming. Use example by solving activity selection problem. **15**

Unit III

6. (a) Write and explain the Bellman-Ford algorithm for finding the shortest path. **7.5**

   (b) Write and explain the Ford-Fulkerson algorithm for finding the maximum flow. **7.5**

7. How can you store string in computer memory ? Explain the Rabin-Karp algorithm to perform string matching and analyze the algorithm. **15**

Unit IV

8. What is meant by polynomial time verifications and reducibility ? Explain using appropriate examples. **15**

9. How can you solve travelling salesman problem and clique problem ? **15**