(i) Printed Pages: 4   Roll No. ....

(ii) Questions   : 9   Sub. Code : $\boxed{3}\ \boxed{6}\ \boxed{0}\ \boxed{8}$

Exam. Code : $\boxed{0}\ \boxed{4}\ \boxed{5}\ \boxed{9}$

M.Sc. Information Technology 1ˢᵗ Semester
(2122)
COMPUTER ALGORITHMS
Paper : MS-62

Time Allowed : Three Hours]   **[Maximum Marks : 80**

Note :—Question No. 1 (Section A) is compulsory. From all other Sections B-E select one question (full) each.

SECTION—A
(Compulsory)

1. Answer all of the following questions. Each question is for 2 marks :

   (a) Given the complexity of an algorithm is 2^n and size of data is n. If we increase the size of data to 4n, what is the change in exact complexity ?

   (b) What is space complexity ?

   (c) State Cooks theorem.

   (d) State the principle of optimality.

   (e) What are extrinsic controls ?

   (f) What is spanning tree ?

   (g) What is a recurrence relation ?   16

SECTION—B

2. (a) Differentiate between tree and graph. Discuss the applications of trees and graphs. **6**

   (b) Explain the algorithm for Tower of hanoi. Solve its complexity using recurrence relations :

   $T(n) = 2T(n - 1) + 1$ for $n > 1$, $T(1) = 1$. **10**

3. (a) Explain the asymptotic notations with the help of diagram. **8**

   (b) Differentiate between circular and linear queue. Write the algorithm for enqueue and dequeue for circular queue. **8**

SECTION—C

4. (a) Solve the complexity of binary research using recurrence relations. **8**

   (b) Calculate the minimum spanning tree using kruskal algorithm for following graph :

   8
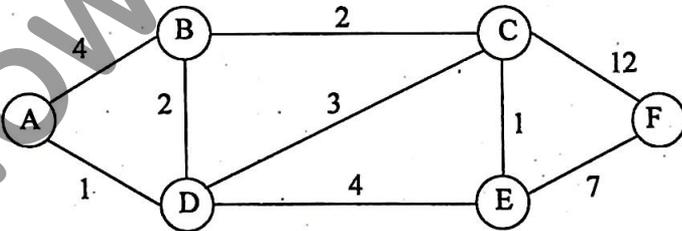
5. (a) State the Strassen's matrix multiplication algorithm. Discuss why it is better than original matrix multiplication method that has a complexity of n^3. **8**
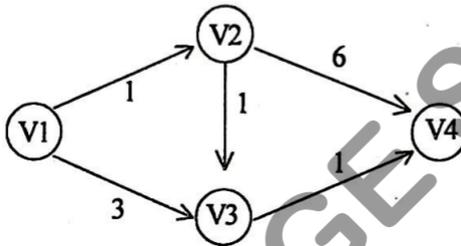
(b) Solve the following using greedy method :

Job_i = 1, 2, 3, 4, 5 ; $Deadline_i$ = 2, 1, 3, 1, 2

$Profit_i$ = 60, 30, 40, 80, 90   8
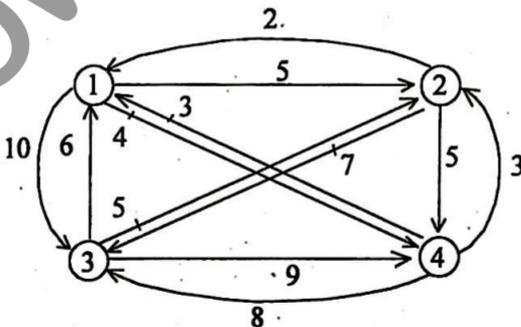
SECTION—D

6. (a) Solve the following using Bellman Ford algorithm where V1 is starting vertex :

8

(b) Discuss the algorithm for Hamiltonian cycles and state its complexity.   8

7. Explain the Travelling salesperson algorithm using Dynamic Programming Method. Solve the following :

16

SECTION—E

8. (a) Solve the following 0/1 knapsack problem using branch and bound method :

   $(m = 12)$, $(I = 1, 2, 3, 4)$ $(w_i = 2, 3, 4, 5)$ $(p_i = 10, 12, 20, 25)$ 8

   (b) Discuss the concepts of P, NP, NP-hard and NP-complete.

   8

9. (a) Discuss any 2 NP-hard graph problems. 8

   (b) Discuss the algorithm for Travelling Salesperson using branch and bound. 8