M.E. First Semester (Computer Science & Information Technology) (New-CGS)

13184 : Elective-I : Algorithmics : 1 RNME 5

P. Pages : 2

Time : Three Hours

* 0 7 4 8 *

AW - 3604

Max. Marks : 80

Notes : 1. Assume suitable data wherever necessary.
2. Illustrate your answer necessary with the help of neat sketches.

SECTION – A

1. a) What is an elementary operation? Describe with the help of Fibonacci sequence. **8**

b) Explain. **6**
i) Maximum Rule.
ii) Duality Rule.
iii) Threshold Rule.

OR

2. a) What are the various mathematical notations? Explain each in detail. **7**

b) What are the points on which we have to concentrate at the time of selecting the best algorithm? **7**

3. a) Explain the concept of Tower of Hanoi in detail. **7**

b) Describe trees. Explain search tree algorithm in detail. **6**

OR

4. a) Solve the following inhomogeneous recurrence. **8**

$t_n - 3t_{n-1} = (n+5)3^n \quad n \geq 1$

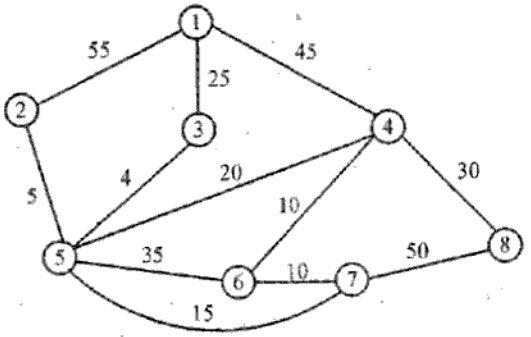
b) What is associative table? Explain hashing with example. **5**

5. a) Explain knapsack algorithm. Find the optimal solution for the instance **7**
$n = 5,\ m = 100,\ w = (11, 22, 33, 44, 55)$
and $v = (20, 33, 66, 44, 50)$

b) Explain exponentiation as an example of divide and conquer. **6**

OR

6. Explain Kruskal's and Prim's algorithm. Simulate them on the following graph. **13**



SECTION – B

7. a) Explain chain matrix multiplication algorithm for dynamic programming. 7

b) Explain Floyd's algorithm for computing all pairs shortest path. Find the matrix D where: 7

$$D_0 = L = \begin{bmatrix} 0 & 5 & \infty & \infty \\ 50 & 0 & 15 & 5 \\ 30 & \infty & 0 & 15 \\ 15 & \infty & 5 & 0 \end{bmatrix}$$

$L(i, j) = \infty$ if the edge (i, j) doesn't exist.

OR

8. a) Explain depth first search for undirected graph with suitable example. 7

b) Use branch and bound to solve the assignment problem with the following cost matrix. 7

Agent \ Task	1	2	3	4	5
a	11	17	8	16	20
b	9	7	12	6	15
c	13	16	15	12	16
d	21	24	17	28	26
e	14	10	12	11	15

9. a) Describe parallel algorithm to find the connected component of the graph with suitable example. 6

b) What is Monte Carlo algorithm? Explain the concept of amplification of stochastic advantage. 7

OR

10. a) Explain Probabilistic selection and sorting in detail. 6

b) Explain parallel evaluation of expression with example. 7

11. a) Give an efficient algorithm to determine whether a graph can be pointed with just two colors, and if so, how to do it? 7

b) Write short note on linear regression. 6

OR

12. a) Can we use information theoretic technique for testing graph connectivity? If yes then explain. If no, suggest another technique and explain. 6

b) Prove that $HAM \equiv T^P HAMD$. 7

****