M.E. First Semester (Computer Science & Infor. Tech.) (New-CGS)

13184 : Elective - I : Algorithmics : 1 RNME 5

P. Pages : 2 | **AW - 3875**

Time : Three Hours | Max. Marks : 80

* 0 4 0 8 *

Notes : 1. All question carry marks as indicated.
2. Assume suitable data wherever necessary.
3. Use of pen Blue/Black ink/refill only for writing the answer book.

1. a) Explain : **8**

i) Propositional Calculus

ii) Set theory

iii) Quantifiers

b) What is Asymptotic notation? Explain big 0, theta notations in detail. **6**

OR

2. a) Explain efficiency of algorithm and why do look for efficiency. **7**

b) Explain : **7**

i) Maximum Rule.

ii) Duality Rule.

iii) Threshold Rule.

3. a) Explain : **6**

i) Queue

ii) Records and pointers

b) Prove that heap sort algorithm takes a time in 0 (n log n) to sort 'n' elements. **7**

OR

4. a) Explain the analysis of algorithm using the barometer instruction. **7**

b) Solve the following recurrence by Intelligent Guesswork : **6**

$$T(n) = \begin{cases} 0 & \text{if } n = 0 \\ 3T(n \div 2) + n & \text{otherwise} \end{cases}$$

5. a) What is divide and conquer? Explain with example. **7**

b) Explain Knapsack algorithm with example? 6

$N = 3,\ m = 20$

$(V_1, V_2, V_3) = (25, 24, 15)$

$(W_1, W_2, W_3) = (18, 15, 10)$

OR

6. a) Explain Exponentiation as an example of divide and conquer. 7

b) Prove that quick sort takes a time 0 (n log n) to sort n elements on the average. 6

7. a) Explain Recursion with suitable example. 7

b) Explain the chain matrix multiplication algorithm for dynamic progamming. 7

OR

8. Use Branch and Bound technique to solve the assignment problem with the following cost matrix 14

Agent \ task	1	2	3	4
a	11	12	18	40
b	14	15	13	22
c	11	17	19	23
d	17	14	20	28

9. a) Explain parallel merging networks in brief. 6

b) Prove that "A Sorting Network with 'n' inputs correctly sort any set of valves on its inputs if and only if it correctly sort all the 2n inputs vector consisting only zero and one". 7

OR

10. a) Explain Monte Carlo algorithm in detail. 7

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

11. a) What is Heuristic algorithm. Explain with example. 7

b) Prove that $MQ \leq IT$, assuming IT is smooth. 6

OR

12. a) Prove that any binary tree with K leaves has an average height of at least Lg K. 7

b) Explain in brief NP – hard problems. 6

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