DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE – RAIGAD -402 103

Winter Semester Examination – Nov - 2019 SY

Branch: Computer Science & Engineering **Sem.:- IV**

Subject:- Design and Analysis of Algorithms (BTCOC401) **Marks: 60**

Date:- 26/11/2019 **Time:- 3 Hrs.**

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Instructions to the Students

1. Each Question carries 12 marks.
2. Attempt **any Five** Questions of the following.
3. Illustrate your answers with neat sketches, diagram etc., wherever necessary.
4. If some part or parameter is noticed to be missing, you may appropriately assume it and should mention it clearly

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Q.1)a)Solve the following recurrence relation using master method.

(i) $T(n) = 4T(n/2) + n$

(ii) $T(n) = 4T(n/2) + n^2$

(iii)$T(n) = 4T(n/2) + n^3$

Q.1)b) Explain different asymptotic notations.

Q.2)a)Write Strassen's algorithm to multiply two 2X2 matrices. Apply Strassen's algorithm to multiply following matrices.

$$A = \begin{Bmatrix} 1 & 1 \\ 1 & 1 \end{Bmatrix} \qquad B = \begin{Bmatrix} 2 & 2 \\ 2 & 2 \end{Bmatrix}$$

Q.2) b) Write an algorithm for merge sort . Apply merge sort on following array

A= 5 1 2 6 3 7 9 4

Q.3) a) Write Huffman Coding algorithm . Obtain Huffman tree for following data.

Characters	"a"	"b"	"c"	"d"	"e"
Frequency	6	11	19	35	50

Q.3) b) What are the different elements of greedy strategy ? Explain the steps to solve the problem by greedy strategy.

Q.4) a) Compute Longest Common Subsequence using Dynamic Programming approach for sequences X and Y if X =A, B, C, B, D, A, B and Y =, B, D, C, A, B, A . What is the

length of LCS .

b) Compare Greedy Strategy , Dynamic Programming and Divide and Conquer approach.

Q.5)a) What is state space tree ?Using state space tree show that there exist an solution to 4-Queens problem .

b) Given n=6 weights, w={5,10,12,13,15,18} and M=30 .Find all possible subsets for which sum=M using sum of subsets algorithm.

Q.6) a) What is P class and NP class? Show relationship between them.

b) State the properties of Red- Black tree. Suppose that a node x is inserted into a red-black tree with RB-INSERT and then immediately deleted with RB-D ELETE . Is the resulting red-black tree the same as the initial red-black tree? Justify your answer.

**********Paper End**********