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TEST -1 EXAMINATION - February, 2022

B.Tech-IV Semester (CS/IT/ECE/Civil/BT)

COURSE CODE: 18B11CI412 MAX. MARKS: 15

COURSE NAME: Design & Analysis of Algorithms

COURSE CREDITS: MAX. TIME: 1 Hour

Note: *All questions are compulsory. Carrying of mobile phone during examinations will be treated as case of unfair means. Marks are indicated against each question in square brackets.*

Q1. Fix the following functions within correct asymptotic classes with proof: [2x1]

i. F(n) = 8 n^2 + n log n

ii. $F(n) = \sum_{i=0}^{k} a_i \times n^i$

Q2. Solve the following recurrences and find their complexity: [3x2]

i. $T(n) = T(\sqrt{n}) + n$ using substitution method

ii. T(n) = n T (n-1) using substitution method

iii. $T(n) = 3T(n/4) + cn^2$ using recursive tree method

Q3. Compare the order of growth of the following functions and indicate their order of growth: [2x1]

i. $\log_2 n$ and $\sqrt{n}$

ii. $(\log_2 n)^2$ and $\log_2 n^2$.

Q4. i. Suppose that you want to sort 'n' numbers with the help of Merge Sort but later you realized that you are not allowed to use any auxiliary space during sorting. Then write a merge procedure that can merge two sorted sub-lists into one sub-list without any auxiliary space. [2]

ii. In this continuation, reveal the facts whether the new code complexity is the same/increased/decreased as O(n log n). [2]

Q5. Draw a table of worst and best case complexity for at least five well-known sorting algorithms. And also show the best algorithm out of them with its limitation. [1]