Exam Slot: A

College of Engineering Chengannur

(Managed by IHRD, A Govt of Kerala Undertaking)

Department of Computer Engineering

BTech Degree Sixth Semester Computer Science and Engineering **First Internal Examination – May 2021**	**Academic Year 2020-2021**
Course Code & Name: CS 302 Design and Analysis of Algorithms	**Faculty Name: Ah. Siraj**
Duration: 1½ Hrs	**Max. Marks: 50**

Course Outcomes: At the end of the course the student will be able to

CO1:	Analyze a given algorithm and express its time and space complexities in asymptotic notations.
CO2:	Solve recurrence equations using Iteration Method, Recurrence Tree Method and Master's Theorem to compute time complexity of algorithms.
CO3:	Design algorithms using Divide and Conquer Strategy, Greedy Strategy, Dynamic Programming, Back Tracking, and Branch and Bound Techniques.
CO4:	Apply various operations on Balanced Binary tree structures - AVL, RED-BLACK, B Trees and disjoint sets.
CO5:	Apply Graph Traversals, Spanning Tree and Shortest Path Algorithms..
CO6:	Classify computational problems into P, NP, NP-Hard and NP-Complete.

	PART-A **(Answer All Questions)**	**CO &CL**	**Marks**
1	Write the recurrence equation for computing average complexity of quick sort and explain the concept behind the equation.	CO1, L2	**5**
2	Write the insertion sort algorithm. Write the first 5 numbers in sorted order. Then demonstrate how this algorithm performs step by step for the next two numbers. Data is given in website. How many comparisons involving array elements are performed in these two steps?	CO1, L2	**5**
3	Apply Master theorem to solve $T(n) = 6T(n/3) + n$	CO2, L2	**5**

4	Using asymptotic notations, write all the relations between the functions f and g with proper justification. $f = 5n^2 + 3n$ $g = n^2$	CO1, L2	**5**
PART-B			
5	With the data given in the website i) Construct a maxheap using first 5 numbers. (No need to explain this). ii) Insert the next two numbers into this heap and illustrate the changes. iii) Apply heap sort algorithm on this heap until two numbers are sorted out and calculate the work done during the sorting phase.	CO1, L3	**2** **4** **4**
6	Write an algorithm to find the largest three numbers of an array without altering it. Determine the complexity of the algorithm.	CO1, L3	**10**
7	Insert the data given in the website one by one into an initially empty AVL tree. After each insertion compute the balance factor, and apply appropriate rotations.	CO4, L3	**10**