JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST-2 EXAMINATIONS-2022

B.Tech-VII Semester -Minor MSCE, 4th Year

COURSE CODE (CREDITS): 18B1WCI743 (2)   MAX. MARKS: 25

COURSE NAME: Advanced Algorithms

COURSE INSTRUCTORS: Diksha Hooda   MAX. TIME: 1 Hour and 30 Minutes

Note: All questions are compulsory. Marks are indicated against each question in square brackets.

Q1. Devise an algorithm that takes an array as an input and gives a sorted array as output. However, as against quick sort, it has two pivot elements. The intermediate output should be as follows. The left side of the first pivot should contain elements less than the first pivot, the elements between the two pivots should have elements between the two pivots and the elements to the right of the second pivot should be greater than the second pivot.   **[Marks: 2, CO-3]**

Q2. Explain Quick Sort and Randomized QuickSort. Write algorithm for Quick Sort. Derive its complexity in best, average and worst case.   **[Marks: 5, CO-3]**

Q3. Write the algorithm to find out the minimum from a given array using divide and conquer technique.   **[Marks: 2, CO-3]**

Q4. State all the cases of Master's Theorem. Solve the following recurrence relations using the same, if possible: **[Marks: 1*4, CO-1]**

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

b) $T(n)= 4T(n/2) + n \log n$

c) $T(n) = 36T(n/36) + \log n$

Q4. Solve the following job sequencing problem using greedy approach. What is the final job sequence and the total profit obtained, assuming it is maximization problem. Show all the intermediate steps.   **[Marks: 4, CO-2]**

Job	1	2	3	4	5
Profit	300	250	130	212	424
Deadline	2	1	2	1	3

Q5. What is a Randomized Algorithm and what are its types? Explain them and give example of each and discuss in detail. What are advantages of randomized algorithms in real world scenario?
[Marks: 3, CO-6]

Q6. What is a spanning tree? Find the minimum cost spanning tree using prim's algorithm for the following graph and show all the intermediate steps:
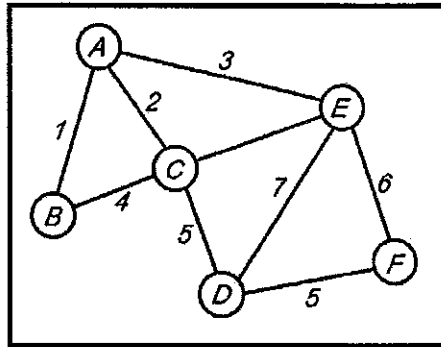
How is Prim's Algorithm different from Kruskal's algorithm?   [Marks: 3, CO-2]

Q7. What is Strassen's Multiplication? What was achieved with this algorithm? What was its complexity?
[Marks: 2, CO-3]

*****************************All the Best***