BCS 3602

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Following Paper ID and Roll No. to be filled in your Answer Book.

PAPER ID : 33226 Roll No.

B. Tech. Examination 2022-23

(Even Semester)

DESIGN AND ANALYSIS ALGORITHMS

Time : Three Hours] *[Maximum Marks : 60*

Note :– (i) Attempt all questions.

(ii) Assume suitable data wherever necessary.

SECTION–A

1. Attempt all parts of the following : $8\times1=8$

(a) Solve the following recurrence using master method :

$$T(n)=4T\left(n/3\right)+n^2$$

(b) What is the advantage of binary search over linear search?

(c) What are greedy algorithms? List their characteristics.

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(d) When and how dynamic programming is applicable?

(e) List the different types of representation of graphs.

(f) Define spanning tree.

(g) Differentiate between NP complete and NP-hard.

(h) What do you mean by P (n) approximation algorithms?

SECTION – B

2. Attempt any two parts of the following : $2 \times 6 = 12$

(a) Apply quick sort algorithm to sort the following data :

15, 22, 30, 10, 49, 64, 1, 3, 9, 2

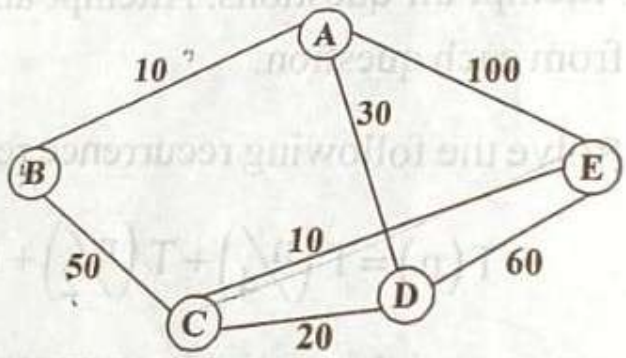
is it a stable sorting algorithm? Justify.

(b) What is Knapsack problem? Solve fractional knapsack problem using greedy programming for the given four items with their weights $w = \{3, 5, 9, 5\}$ and values $P = \{45, 30, 45, 10\}$ with knapsack capacity is 16.

(b) Discuss greedy approach to an activity selection problem of scheduling several competing services.

(c) What is an amortized analysis? Explain aggregate method of amortized analysis using suitable example.

5. (a) Discuss Dijkstra's algorithm for finding shortest path. Describe its working for the graph given below :



(b) Differentiate between depth first search and breadth first search.

(c) What is back tracking? Discuss sum of subset problem with the help of an example.

6. (a) What is Travelling Salesman Problem (TSP)? Find the solution of following TSP using dynamic programming :

0	1	15	6
2	0	7	3
9	6	0	12
10	4	8	0

(b) Discuss the problem classes P, NP and NP-complete with class relationship.

(c) Write short notes on the following :

(i) Randomized algorithm

(ii) Approximation algorithm

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