BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(END SEMESTER EXAMINATION)

CLASS: IMSC **SEMESTER : IV**
BRANCH: MATHS & COMP. **SESSION : SP/19**

SUBJECT: CS6101 DESIGN AND ANALYSIS OF COMPUTER ALGORITHM
TIME: 3:00 HOURS **FULL MARKS: 60**

INSTRUCTIONS:
1. The question paper contains 7 questions each of 12 marks and total 84 marks.
2. Candidates may attempt any 5 questions maximum of 60 marks.
3. The missing data, if any, may be assumed suitably.
***4*. Before attempting the question paper, be sure that you have got the correct question paper.**
5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.

Q.1(a) Write a recursive function for calculating the sum of the elements in the array and find its time complexity. [2]

Q.1(b) Discuss the different asymptotic notation. [4]

Q.1(c) What is randomized algorithm? Derive an algorithm using random number approach to identify the repeated array elements & find its time complexity. [6]

Q.2(a) Solve the following recurrence equation using Master - Theorem: [2]
$T(n)= 9T(n/3) + 4n^6$, $n \geq 3$ and a is a power of 3. $T(1) = c$.

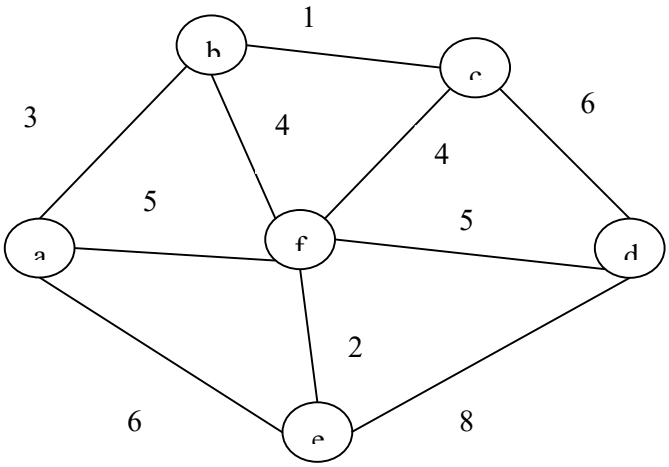
Q.2(b) Show how quick-sort works on the following sequence of keys: 5, 5,8,3,4,3,2. show the steps. [4]

Q.2(c) Write an algorithm for quick-sort and derive its complexity in best, average and worst cases. [6]

Q.3(a) Illustrate the difference between greedy and divide and conquer approach. [2]

Q.3(b) Solve the following using job-sequencing with deadline algorithm. [4]
N=5, (p1, p2,p3,p4,p5)=(20,15,10,5,1) and (d1, d2,d3,d4,d5)=(2,2,1,3,3). Find the optimal solution with a profit.

Q.3(c) Give the pseudo code for prim's algorithm and apply the same to find the MST of the graph shown below: [6]



Q.4(a) Illustrate the difference between dynamic programming and divide and conquer approach. [2]

Q.4(b) Write an algorithm for finding the all pair shortest path problem, discuss its complexity. [4]

Q.4(c) Find a minimum cost path from S to T in multistage graph using dynamic programming. [6]

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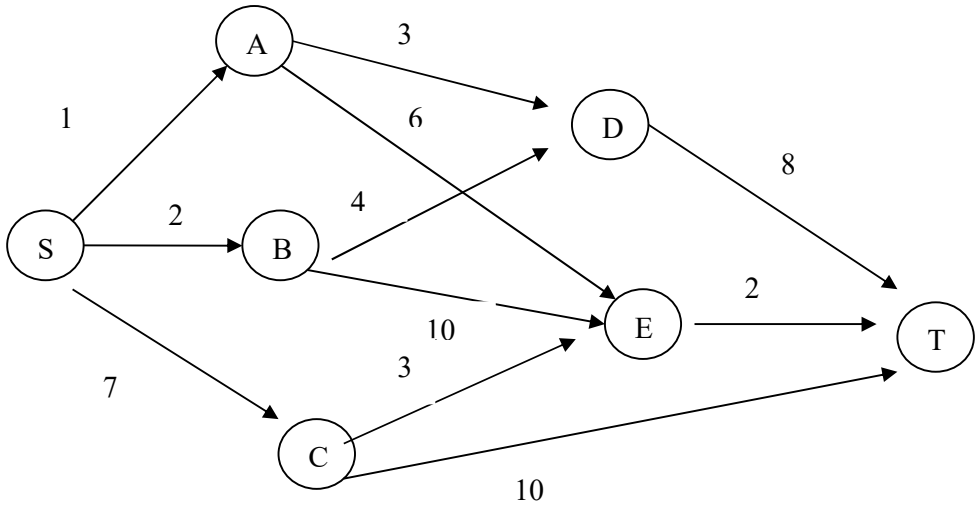

Q.5(a) What are the major advantages of backtracking? [2]
Q.5(b) Draw the state space tree for 4x4 queen problem. [4]
Q.5(c) Write an algorithm for NXN queen problem. [6]

Q.6(a) Define LIFO search and FIFO search in branch and bound. [2]
Q.6(b) Solve the following instantance of the knapsack problem using branch and bound [4]
Given the knapsack capacity W=10.

Item	Weight	Value/profit
1	4	40
2	7	42
3	5	25
4	3	12

[6]

Q.6(c) Solve the following problem for TSP using branch and bound, the cost matrix is given below

∞	7	3	12	8
3	∞	6	14	9
5	8	∞	6	18
9	3	5	∞	11
18	14	9	8	∞

Q.7(a) Differentiate between NP-Complete and NP-hard problem. [2]
Q.7(b) Design the relationship among P, NP, NP complete and NP-hard problems. [4]
Q.7(c) Discuss the non deterministic sorting algorithm. [6]

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