614151
S–261

B. Sc. (Fourth Semester)
EXAMINATION, 2022-23
COMPUTER SCIENCE
(Design and Analysis of Algorithms)
(SOS/CS/C–004)

Time : Two Hours] [*Maximum Marks : 70*

Note : (i) Attempt any *five* questions from Section A and any *three* questions from Section B.

(ii) Answer each question of Section A within 50 words.

(iii) Limit your answers within the given answer book. Additional answer book (B-Answer book) should not be provided or used.

Section—A

te : Attempt any *five* questions. Each question carries 5 marks.

Write about the constraints and criterion function used in backtracking.

Discuss D-search of branch and bound.

P. T.

3. Write algorithm to find longest common subsequence in two strings.

4. Outline the dynamic programming approach to solve the optimal binary search tree problem and analyse its time complexity.

5. Write down the algorithm and find the time complexity of selection sort with a suitable example.

6. Discuss various methods used for mathematical analysis of recursive algorithm.

7. Define the following terms :

   (i) best case

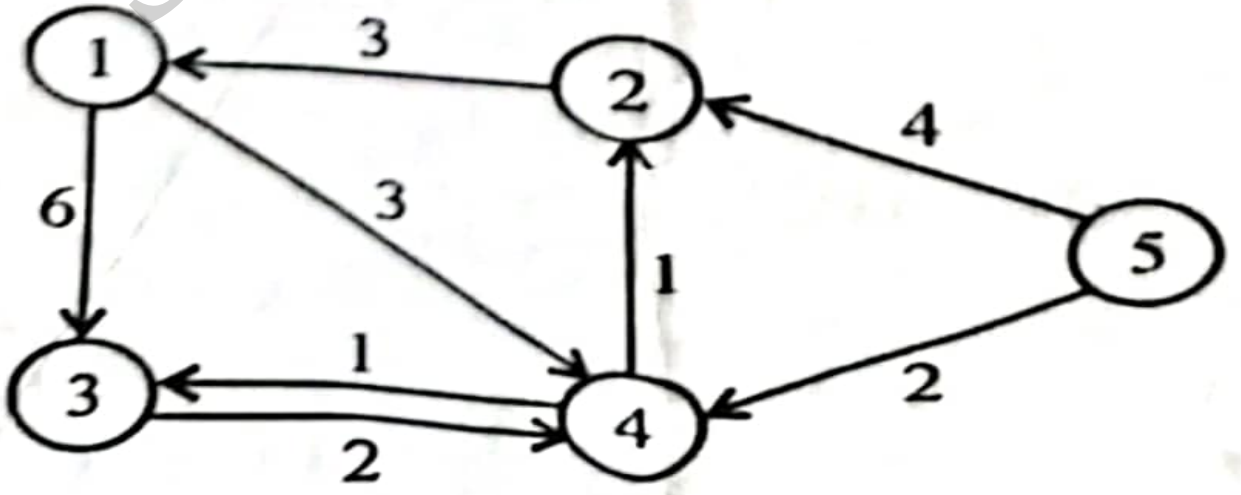
   (ii) average case

   (iii) worst case time complexity.

Section—B

Note : Attempt any *three* questions. Each question carries 15 marks.

(a) Explain Floyds-Warshall algorithm using dynamic programming. Trace the algorithm for the given example :



2. (a) Write the asympotic notation used for best case, average case and worst case analysis of algorithm. Write an algorithm for finding maximum element in an array.

(b) Solve the following recurrence relations :

(i) $x(n) = x(n-1) + 5$ for $n > 1 x(1) = 0$

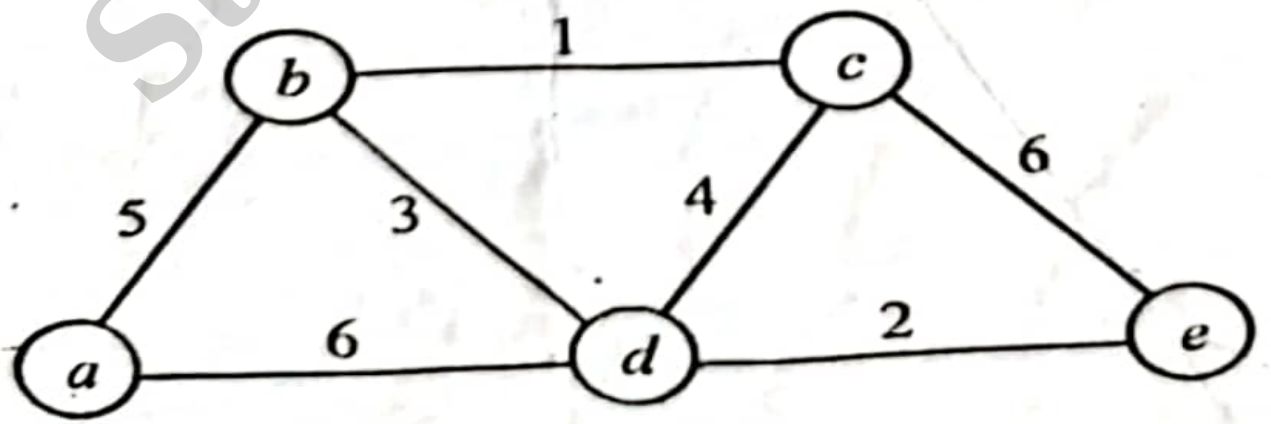
(ii) $x(n) = x(n/2) + n$ for $n > 1 x(1) = 1$

(solve for $n = 2^k$)

3. (a) Find the optimal solution to the fractional knapsack problem with given data :

Item	Weight	Benefit
A	2	60
B	3	75
C	4	90

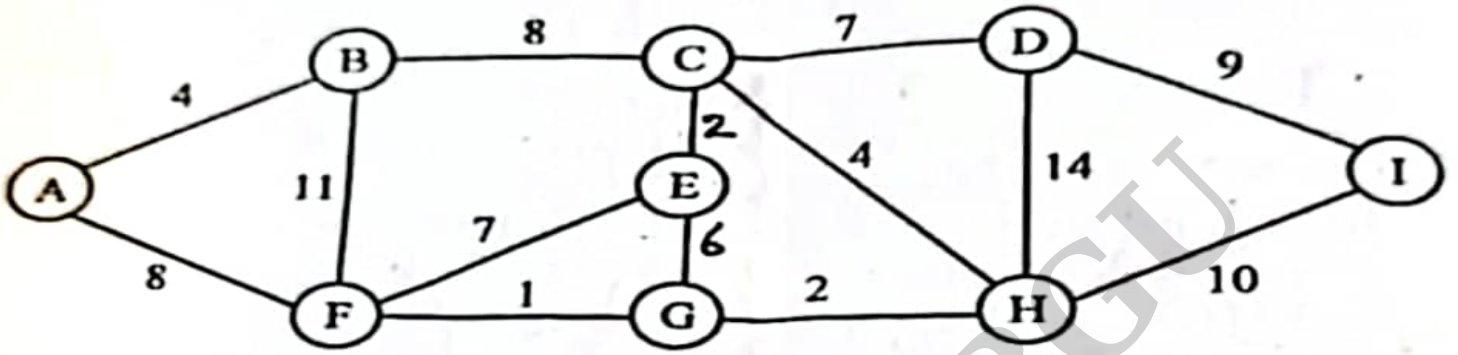
(b) Apply Kruskal's algorithm to find a minimum spanning tree of the following graph :



4. (a) State and prove Max-Flow Min-CUT theorem.

P. T. O.

(b) Explain how greedy approach is used in Dijkstra's algorithm for finding the single-source shortest paths for the given graphs :



5. (a) Give the algorithm for matrix multiplication and find the time complexity of the algorithm using step-count method.

(b) Prove that vertex cover problem is NP complete or not.

6. Write short notes on the following :

(a) Randomized Algorithm

(b) Red black tree

(c) Max-heapify