

CMR Institute of Technology, Bangalore			
Department(s): Information Science & Engineering			
Semester: 4	Section(s): A/B/C	Lectures/week: 04	
Subject: Analysis & Design of Algorithm		Code: BCS401	
Course Instructor(s): Prof. Dinesh Kumaar/Prof. Kavitha			
Course duration: Feb 2026 – May 2026			
Google Classroom Link: https://classroom.google.com/c/ODQzNzM0ODg1MzA0?cjc=fmvezgz7			

IAT-2 QUESTION BANK

Module-3

1. Design Horspool's Algorithm for string Matching Apply Horspool algorithm too find pattern BARBER BI in the test JIM_SAW_ME IN_A_BARBERSHOP.

Marks: 10 | Bloom's Level: L3 | CO: CO3

2. Define Heap. Apply heap sort to sort the list of numbers: 2, 9, 7, 6, 5, 8 in ascending order using array representation.

Marks: 10 | Bloom's Level: L3 | CO: CO3

3. Define 2-3 Tree. Construct 2-3 tree for the list of keys: 9, 5, 8, 3, 2, 4, 7 by indicating each step of key insertion and node splits.

Marks: 10 | Bloom's Level: L3 | CO: CO3

4. Write the algorithm for comparison counting counting sort. Discuss its efficiency?

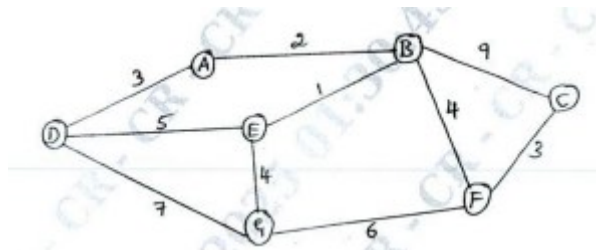
Marks: 10 | Bloom's Level: L3 | CO: CO3

Module – 4

1. Apply Floyd-s algorithm to find the all pair shortest path for the given 10 adjacency matrix. Fig.

Marks: 10 | Bloom's Level: L2 / L3 | CO: CO2

2. Apply Dijkstra's algorithm to fine single source shortest path for the given CO4 graph by considering A as the source vertex.



Marks: 10 | Bloom's Level: L3 | CO: CO4

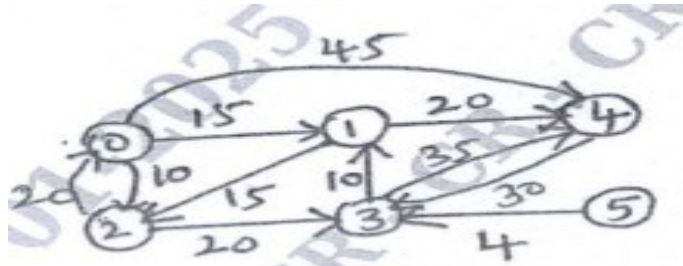
3. What are Huffman trees? Construct the Huffman tree for the following data

Character	A	B	C	D	-
Probability	0.4	0.1	0.2	0.15	0.15

i) Encode the text ABAC ABAD OR ii) Decode the code 100010111001010

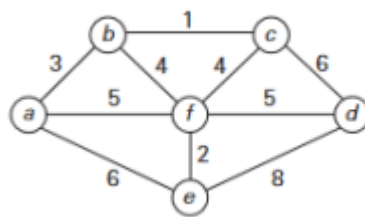
Marks: 10 | Bloom's Level: L3 | CO: CO4

4. Solve the following single source shortest path assuming vertex problem '5' as the source.



Marks: 10 | Bloom's Level: L3 | CO: CO4

5. Construct minimum cost spanning tree using Kruskals algorithm for the following graph.



Marks: 10 | Bloom's Level: L3 | CO: CO4

6. Define transitive closure of a graph. Apply Warshalls algorithm to compute transitive closure of a directed graph.

$$\begin{matrix}
 & \begin{matrix} a & b & c & d \end{matrix} \\
 \begin{matrix} a \\ b \\ c \\ d \end{matrix} & \begin{bmatrix} 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 \\ 1 & 0 & 1 & 0 \end{bmatrix}
 \end{matrix}$$

Marks: 6 | Bloom's Level: L3 | CO: CO4

Module – 5

1. Solve the following instance of the knapsack problem by using branch and bound method. Capacity $W = 10$

Item	1	2	3	4
Weight	4	7	5	3
Value	\$40	\$42	\$25	\$12

Marks: 10 | Bloom's Level: L3 | CO: CO5

2. Explain the following terms: (i) P- Problems (ii) NP - Problems CMRIT LIBRARY BANGALORE -560 037 (iii) NP- Complete Problems (iv) NP- Hard Problems..

Marks: 8 | Bloom's Level: L2 | CO: CO5

3. Construct a state space tree for subset sum problem using branch and bound for the set $S = \{3, 5, 6, 7\}$ and $d = 15$

Marks: 10 | Bloom's Level: L3 | CO: CO5

4. What is backtracking? Apply backtracking to solve the below instance of sum of subset problem $S = \{5, 10, 12, 13, 15, 18\}$ $d = 30$

Marks: 10 | Bloom's Level: L3 | CO: CO5

5. What is decision tree? Construct decision tree for the three element insertion sort.

Marks: 10 | Bloom's Level: L2 | CO: CO5

6. Explain the Greedy approximation algorithm to solve the discrete knapsack problem

Marks: 10 | Bloom's Level: L2 | CO: CO5