



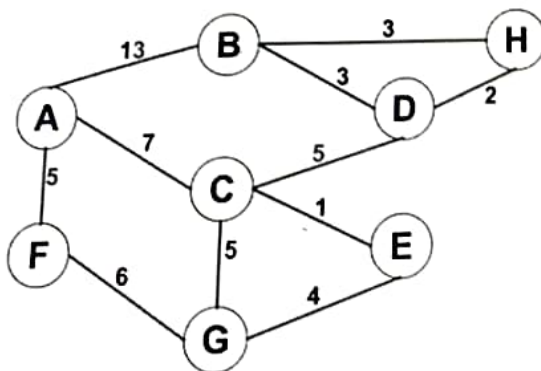
Final Assessment Test (FAT) - APRIL/MAY 2023

Programme	B.Tech	Semester	Winter Semester 2022-23
Course Title	ARTIFICIAL INTELLIGENCE	Course Code	BCSE306L
Faculty Name	Prof. Rajarajeswari S	Slot	C1+TC1
Time	3 Hours	Class Nbr	CH2022235001365
		Max. Marks	100

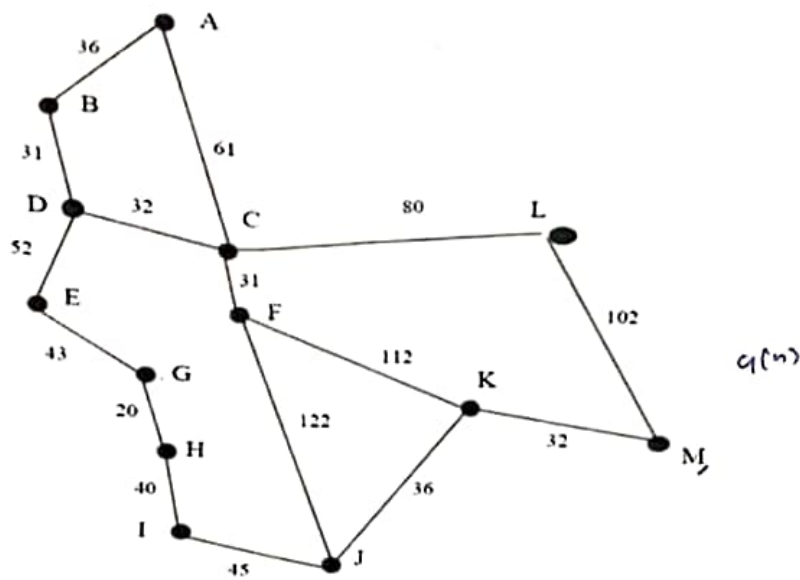
Section-1 (7 X 10 Marks)

Answer All questions

01. Social media becomes an essential element for the young generation. Social networking sites such as Facebook, Twitter, and LinkedIn hold voluminous profiles that need to be stored and managed in an efficient way. [10]
- What type of agent you will choose to identify the latest trends, hash tag, and requirement of different users. Justify. (3 Marks)
 - Explain the task environment and characteristics of AI system that are suitable to develop the above system. (7 Marks)
02. Consider a city with several locations connected by roads. The cost of traveling between each pair of locations is different, and there may be multiple paths to reach the same location. You are given a source location 'A' and a Target location 'H'. Suppose you wish to find the lowest-cost path to reach the target location using Uniform cost search, depth limited search and Iterative Deepening Search algorithms. Which among these algorithms return optimal solution? Justify your answer with search tree for each algorithm. [10]



03. Using the A* algorithm find a route for a bike traveller from town A to town M. Use the following cost functions. [10]
- $G(n)$ = The cost of each move as the distance between each town (shown on map).
- $H(n)$ = The Straight Line Distance between any town and town M. These distances are given in the table below.
- Draw the search tree for your solution and indicate the order in which you expanded the nodes.
- Finally, state the route you would take and the cost of that route.



Straight Line Distance to M

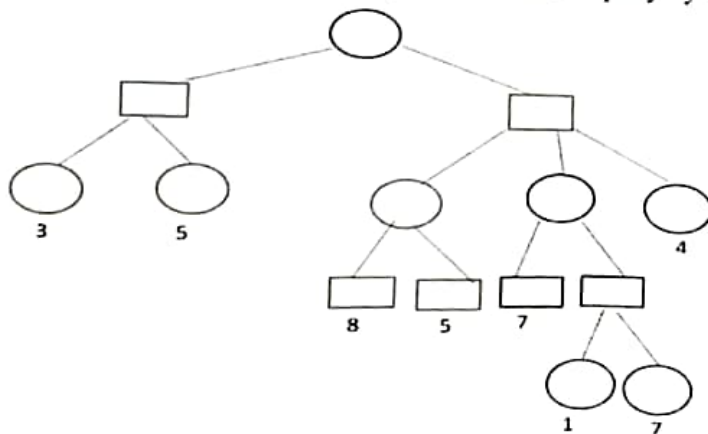
A	223
B	222
C	166
D	192

E	165
F	136
G	122
H	111

I	100
J	60
K	32
L	102

M	0
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04. Assume you are working in a trading company and you are asked to do an auction for used cars. Your aim is to sell the cars for the maximum possible price. But the bidders (represented by square) will try their best to get them for a least price. Given below is a graph representing various possible paths that you and a buyer will explore to achieve your goals. The leaf nodes represent the price of the cars (in 100K rupees). As an auctioneer (represented by circle), find an optimal path to bring profits to your trading company by avoiding unnecessary visits. [10]



Whether you achieve the same optimal path if you explore the possible paths from right to left? Justify your answer using the above graph.

05. An intelligent child wants to take a toy which is on the table. A small stool is available that will enable a child to reach table if she climbs on it. Initially, a child is at A, the toy at B and the stool at C. A child and stool have height Low, but if the child climbs onto the stool she will have height High, the same as the table. The actions available to the child include *Go* from one place to another, *Push* a stool from one place to another, *ClimbUp* or *ClimbDown* from a stool, and *Take* or *UnTake* a Toy. The result of a *Take* is that the child holds the toy if the child and toy are in the same place at the same height. [10]
- Write down the initial state description. (2 Marks)
 - Write the six action schemas. (3 Marks)

- iii. Construct a plan for a child to take the toy from the table with the help of a planning graph.
(5 Marks)

06. Suppose you wish to find economic reports regarding the impact of oil extraction in the west coasts of India. A commercial document retrieval service offers the following suggested matches: the table shows how often some key phrases appear in each report. [10]

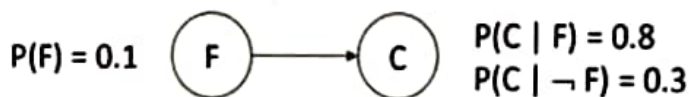
	West coast	Oil	India	Economy
Report A	12	0	3	24
Report B	10	5	20	10
Report C	0	12	9	8
Query	1	2	2	1

Actually obtaining the reports will cost real money, so you would like to select the one most likely to be relevant. Your task now is to assess this using the cosine similarity measure.

- i. One possible measure for determining which of the 3 documents is the cosine similarity measure, which measures the cosine of the angle between the query vector and that of each document. Compute this measure for each of the three documents. (7 Marks)

- ii. Based on your results of (a), which document is the best match for this query? Why? (3 Marks)

07. A. Consider the following Bayesian network, where F = having the flu and C =coughing: [10]



- i. Write down the joint probability table specified by the Bayesian network. (3 Marks)
ii. Determine the $P(F|C)$ for the following Bayesian network (3 Marks)



B. A person uses his car 30% of the time, walks 30% of the time and rides the bus 40% of the time as he goes to work. He is late 10% of the time when he walks; he is late 3% of the time when he drives; and he is late 7% of the time he takes the bus.

- i. What is the probability he took the bus if he was late? (2 Marks)
ii. What is the probability he walked if he is on time? (2 Marks)

Section-2 (2 X 15 Marks)

Answer All questions

08. Find the optimized solution in 8-Queens problem by considering the initial populations such as 47255282, 74321145, 51241442 and 13233254 using Genetic Algorithm. [15]

- Calculate the fitness values for all populations. (5 Marks)
- Find the fitness percentage. (2 Marks)
- Perform the selection operation based on 3 and 5 separation (2 Marks)
- Perform mutation operation. (2 Marks)
- Find an optimal solution by performing mutation operation by replacing the 3rd value of the population. (4 Marks)

09. (a). Express the below facts in predicate logic [5]

- Anything eaten by anyone and not killed is edible
- Ram eats mangoes and still alive
- Shankar eats everything that Ram eats
- Preethi like all kind of edibles

- Spinach and carrots are edible

(b). Convert the predicate sentences of (a) into CNF [Show the step-by-step conversion with applicable inference rules]. [5]

(c). Prove that, Ram likes mangoes, through proof by contradiction with the resolution graph. [5]

