

# CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY

Department of Computer Science & Engineering

C.T.I. Session- Jan - June, 2025 Month-February

Sem- B Tech(II) 4<sup>th</sup>(AI/DS) Subject- CN Code- B127471(022)

Time Allowed 2 hrs Max Marks 40

Min Marks 14

*Note - Q1 is compulsory, attempt any two questions from Q2, Q3, and Q4.*

CO1: The learner acquires basic concepts of network applications, network hardware, network software

CO2: The learner understands the protocols of the data link layer

Q.N.	Questions	Marks	Levels of Bloom's Taxonomy	COs
<b>Unit I</b>				
Q1	What is Internet?	[4]	L1	CO1
Q2	Explain components of a Frame Relay network.	[8]	L2	CO1
Q3	What is network applications give two examples? Explain Point-to-Point link.	[8]	L2	CO1
Q4	Explain functions of different layers in the OSI model. Write two devices of Physical layer?	[8]	L2	CO1
<b>Unit II</b>				
Q1	Find the CRC bits for the following. Data bits (Message) = 101100 Generator polynomial = $x^3+x+1$	[4]	L3	CO2
Q2	Explain frame format of HDLC Protocol. What are the various types of HDLC frame?	[8]	L2	CO2
Q3	What are the Static and Dynamic Channel Allocation? Calculate the maximum throughput of the Slotted ALOHA.	[8]	L3	CO2
Q4	What is the frame format of Ethernet (IEEE 802.3). Explain the components of a Wireless LAN.	[8]	L2	CO2



# CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY

## Department of Computer Science & Engineering

Class Test – I Session- January – June, 2025 Month- February

Sem- 4<sup>th</sup> (CSE) AI/DS

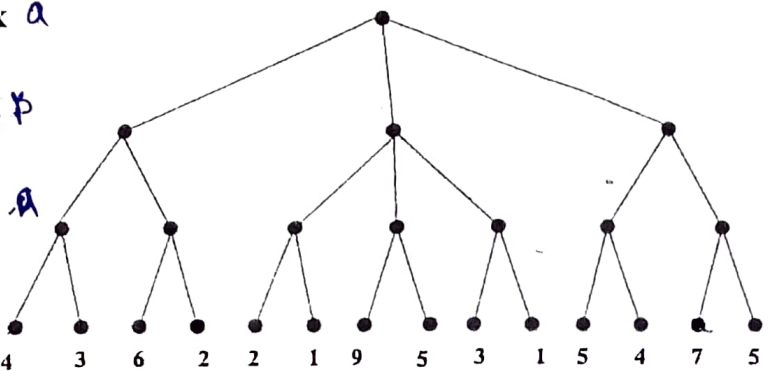
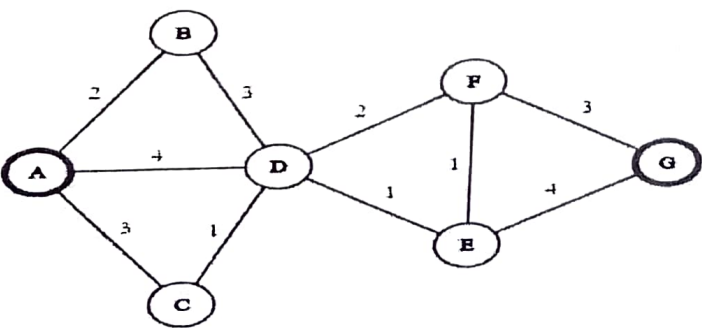
Subject- Artificial Intelligence: Principles and Applications

Code- B127472(022)

Time Allowed: 2 hrs Max Marks: 40

Note: - Note: All questions are compulsory, attempt all questions from part A and B.

Q.N.	Questions	Marks	Bloom's Level	COs
<b>Part A</b>				
Q1 (a)	Which of the following algorithm is/are guaranteed to give an optimal solution? a. Greedy Best First Search b. Depth First Search c. A* with Zero heuristic d. None of these	[2]	Understand	CO1
Q1 (b)	Traversal of a graph is different from tree because- a. There can be a loop in graph so we must maintain a visited flag for every vertex b. DFS of a graph uses stack, but inorder traversal of a tree is recursive c. BFS of a graph uses queue, but a time efficient BFS of a tree is recursive. d. All of the above	[2]	Understand	CO2
Q2	Define in your own words: (a) intelligence, (b) artificial intelligence, (c) agent, (d) rationality, (e) logical reasoning.	[5]	Understand	CO1
Q3	For each of the following activities, give a PEAS description of the task environment and characterize it in terms of the properties- a. Practicing tennis against a wall. b. Shopping for used AI books on the Internet. c. Performing a high jump. d. Knitting a sweater. e. Bidding on an item at an auction.	[5]	Apply	CO1
Q4	Prove that if a heuristic is consistent, it must be admissible. Construct an admissible heuristic that is not consistent.	[6]	Apply	CO2
<b>Part B</b>				
Q1(a)	Let $h_1$ and $h_2$ be two admissible heuristics used in A* search. Which ONE of the following expressions is always an admissible heuristic? a) $h_1 + h_2$ b) $h_1 \times h_2$ c) $h_1 / h_2$ ( $h_2 \neq 0$ )          d) $ h_1 - h_2 $	[2]	Understand	CO2

(b)	<p>What is the logical translation of the following statement?</p> <p>"None of my friends are perfect."</p> <p>a. <math>\exists x (F(x) \wedge \neg P(x))</math>  b. <math>\exists x (\neg F(x) \wedge P(x))</math>  c. <math>\exists x (\neg F(x) \wedge \neg P(x))</math>  d. <math>\neg \exists x (F(x) \wedge P(x))</math></p>	[2]	Apply	CO3
Q2	<p>Consider following graph and execute alpha beta pruning searching-</p> <p>MAX <math>\alpha</math></p> <p>MIN <math>\beta</math></p> <p>MAX <math>\alpha</math></p> 	[5]	Apply	CO2
Q3	<p>Consider the problem of maximizing the function-</p> $f(x) = -x^2/10 + 3x$ <p>where <math>x</math> is allowed to vary between 0 and 31. To solve this use a genetic algorithm.</p>	[5]	Apply	CO3
Q4	<p>Consider following undirected graph in which we are searching from start state A to goal state G. The heuristic function <math>h</math> are as follows- <math>h(A)=7</math>, <math>h(B)=5</math>, <math>h(C)=6</math>, <math>h(D)=4</math>, <math>h(E)=3</math>, <math>h(F)=3</math>, <math>h(G)=0</math>. Find the sequence of node explored by A* graph search algorithm. Assume that, in case of ties, the search procedure uses a lexicographical order for tie-breaking.</p>  <p>Explain the optimality of A* algorithm with suitable notation and description.</p>	[6]	Apply	CO2





# CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY

## Department of Computer Science & Engineering

Class Test – I Session- April-May , 2025 Month- Feb 2025

Sem-4<sup>th</sup> CSE (AI) Subject- Operating System Code-B127473(022)

Time Allowed: 2 hrs Max Marks: 40

**Note: -** 1) From Unit- I & II Question No. 1 is compulsory, attempt any two questions from Question No. 2, 3 and 4.

2) From Unit – III attempt any Two Questions.

CO1: Understand basics, services of Operating System and structures of Operating System.

CO2: Understand the basic processing unit, scheduling and synchronization of process & program.

CO3: Understand the characteristics of deadlock and its prevention.

Q. N.	Questions	Marks	Levels of Bloom's Taxonomy	COs										
Unit I														
Q1	What is Operating System?	[2]	Understand	CO1										
Q2	What are the functions of Operating System? -	[6]	Analyze	CO1										
Q3	What is batch processing and spooling?	[6]	Understand	CO1										
Q4	Explain layered architecture of operating system.	[6]	Understand	CO1										
Unit II														
Q1	Explain process state transition.	[2]	Understand	CO1, CO2										
Q2	Explain critical section and explain all the three algorithms proposed to solve the critical section problem.	[6]	Apply	CO2										
Q3	Explain any one classical problem of synchronization.	[6]	Apply	CO2, CO3										
Q4	For the given set of data calculate average waiting time and also draw Gantt chart using Following algorithms. All process arrived at time = 0 (i) FCFS (ii) SJFS (iii) Round Robin (Quantum = 4) <table><tr><th>Process</th><th>Burst time</th></tr><tr><td>P<sub>1</sub></td><td>12</td></tr><tr><td>P<sub>2</sub></td><td>4</td></tr><tr><td>P<sub>3</sub></td><td>3</td></tr><tr><td>P<sub>4</sub></td><td>8</td></tr></table>	Process	Burst time	P <sub>1</sub>	12	P <sub>2</sub>	4	P <sub>3</sub>	3	P <sub>4</sub>	8	[6]	Apply	CO2, CO3
Process	Burst time													
P <sub>1</sub>	12													
P <sub>2</sub>	4													
P <sub>3</sub>	3													
P <sub>4</sub>	8													
Unit III														
Q1	What are the Deadlock characteristics? How it can be handled through prevention.	[6]	Understand	CO3										
Q2	Explain resource allocation graph.	[6]	Understand	CO3										
Q3	Explain Deadlock avoidance giving example.	[6]	Apply	CO3										





**CHHATRAPATI SHIVAJI VASTU SANGRAHALAYA**  
**TECHNICAL UNIVERSITY**  
**Department of Computer Science & Engineering**  
**Class Test – I Session- JAN – JUN, Month-April**  
**Sem- BTech(Honors) CSE 4<sup>th</sup>(AI/DS)**  
**Subject Name – Theory of Computation**  
**Subject-Code- B127474(022)**

Max Marks: 40

Min Marks: 14

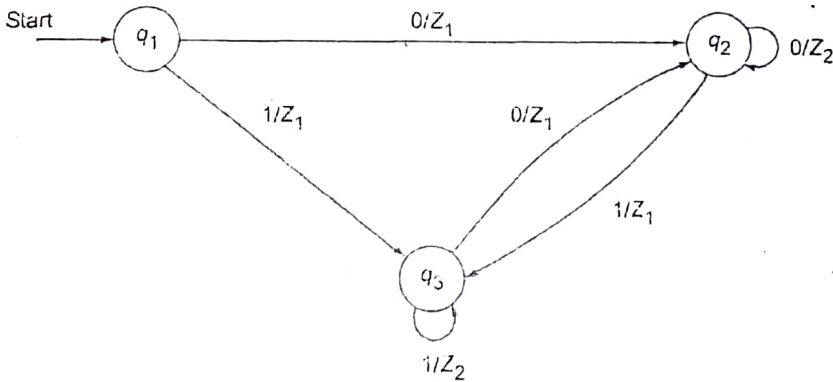
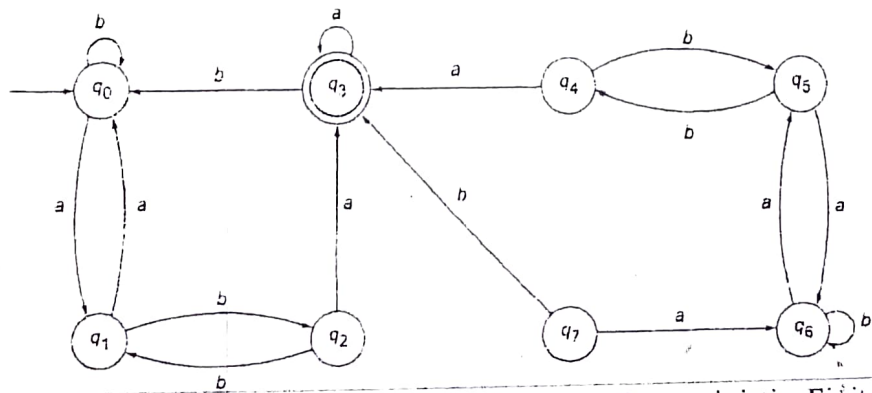
Time Allowed: 2 hrs

*Note: -Part A is compulsory, attempt any questions from B, C and D.*

*CO1: Students will demonstrate a comprehensive understanding of foundational concepts in artificial intelligence (AI) and its significance in modern computing.*

*CO2: Students will analyze and evaluate key concepts and methodologies in AI, including the Turing test, the Chinese Room Thought Experiment, and the distinctions between optimum reasoning/behavior and human-like behavior/reasoning.*

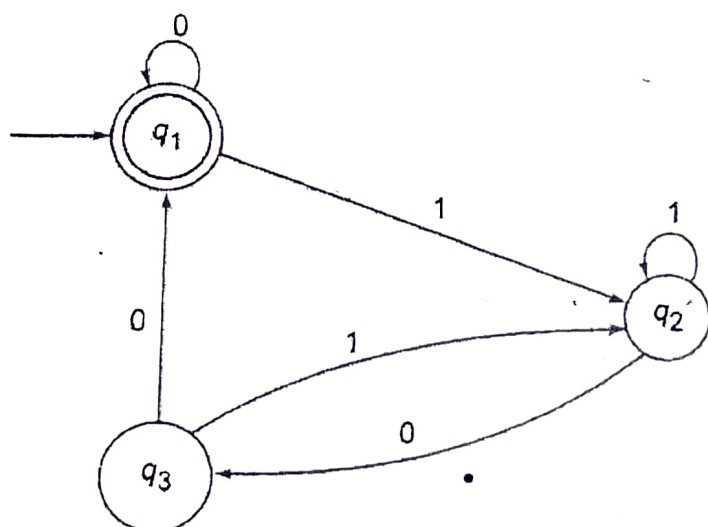
*CO3: Students will develop proficiency in search algorithms and optimization techniques used in AI.*

	Questions	Marks	Levels of Bloom's Taxonomy	COs
<b>Unit I</b>				
Q1	Briefly describe the differences between DFA, NFA, and NFA with epsilon-moves.	[4]	Understand	CO1
Q2	Briefly define Mealy and Moore Machine. Construct a Moore machine equivalent to the following Mealy machine. 	[8]	Applying	CO2
Q3	Construct the minimum state automaton equivalent to the following transition diagram. 	[8]	Applying	CO2
Q4	Explain the concept of equivalence between Deterministic Finite Automata (DFA) and Non-Deterministic Finite Automata (NFA). Construct a DFA equivalent to the following NFA.	[8]	Applying	CO2

State/ $\Sigma$	a	b
$\rightarrow q_0$	$q_0, q_1$	$q_0$
$q_1$	$q_2$	$q_1$
$q_2$	$q_3$	$q_3$
$(q_3)$		$q_2$

### Unit II

- |    |   |     |            |     |
|----|---|-----|------------|-----|
| Q1 | Explain the concept of Arden's Theorem.   | [4] | Understand | CO3 |
| Q2 | Construct a DFA with reduced states equivalent to the regular expression $10 + (0+11)0^*1$ .          | [8] | Applying   | CO3 |
| Q3 | Briefly explain the Pumping lemma. Show that language $L = \{ww \mid w \in (a+b)^*\}$ is not regular. | [8] | Applying   | CO3 |
| Q4 | Construct a regular expression corresponding to the following state diagram.                          | [8] | Applying   | CO3 |





**CHHATTISGARH SWAMI VIVEKANAND  
TECHNICAL UNIVERSITY**  
**Department of Computer Science & Engineering**  
Class Test – I Session- JAN – JUN, Month-February  
Sem- CSE 4<sup>th</sup> (AI/DS)

**Subject Name – R for Data Science**

**Subject- Code-B127475(022)**

Max Marks: 40

Min Marks:14

Time Allowed:2 hrs

*Note: -Part A is compulsory, attempt any questions from B,C and D.*

**CO1:** Explain critical R programming concept.

**CO2:** Apply various concepts of vectors to write programs in R.

**CO3:** Apply various concepts of matrices to write programs in R.

**CO4:** Apply various concepts of arrays to write programs in R.

Q.N.	Questions	Marks	Levels of Bloom's Taxonomy	COs
<b>Unit I</b>				
Q1	Describe various features of R.	[4]	Understand	CO1
Q2	Describe with example various methods of vector creation.	[8]	Understand	CO2
Q3	a. Create and store a sequence of values from 10 down to -6 that decreases by 0.5 at each step. b. Overwrite the object from (a) using the same sequence but with the order reversed. c. Repeat the vector c(3, -5, 7, -9) three times, with each element repeated 4 times (i.e. each element appears 4 consecutive times before the next), and store the result. Then, display the resulting vector sorted in ascending order. d. Create and store a vector that contains, in any arrangement, the following components: i. A sequence of integers from 5 to 12 (inclusive). ii. A fourfold repetition of the value 3.5. iii. The number -1. iv. A sequence of five values starting at 100 and ending at the total length of the vector created in (c). e. Confirm that the length of the vector created in (d) is 18.	[8]	Apply	CO3
Q4	a. Convert the vector c(3, 1, 0.8, 3, 1, 0.8, 3) to a vector of only 3s, using a vector of length 2. b. The conversion from a temperature measurement in degrees Celsius 'C' to Fahrenheit 'F' is performed using the following equation: $F = 9/5 * (C + 32)$ . Use vector-oriented behaviour in R to convert the temperatures 10, 30, 15, -5, 50, 60, and 100 in degrees Celsius to degrees Fahrenheit. c. Use the vector c(3, 6, 9) and the vector c(2, 3) in conjunction with rep and * to produce the vector c(3, 6, 9, 6, 12, 18).	[8]	Apply	CO3
<b>Unit II</b>				
Q1	Explain a three-dimensional array graphically with an example.	[4]	Understand	CO4



Q2	Describe with example various methods of 2D matrix creation.	[8]	Understand	CO3
Q3	<p>a. Construct and store a 4 x 3 matrix filled row-wise with the values 3.5, 9.2, 6.4, 8.1, 7.3, 4.5, 2.1, 3.2, 6.5, 1.8, 5.9, 7.4.</p> <p>b. Confirm the dimensions of the matrix from (a) are 3 x 3 if you remove any one row.</p> <p>c. Overwrite the second column of the matrix from (a) with the same column sorted in descending order.</p> <p>d. What does R return if you delete the fourth row and the first column from (c)? Make sure the result is a matrix, not a vector.</p> <p>e. Store the top four elements from the second column of (c) as a new 2 x 2 matrix.</p> <p>f. Modify the matrix from (c) by replacing the values at positions (3,2), (4,1), (1,2), and (2,1) with half the sum of the elements from the diagonal of the matrix created in (e).</p>	[8]	Apply	CO3
Q4	<p>a. Create and store a three-dimensional array with four layers of a 3 x 3 matrix, filled with an increasing sequence of values between 1.0 and 4.0 (inclusive) that's evenly distributed.</p> <p>b. Extract and store as a new object the second- and first-row elements, in that order, of the third column only of all layers of the array from (a).</p> <p>c. Use a twofold repetition of the first row of the matrix formed in (b) to fill a new array of dimensions 3 x 2 x 2 x 2.</p> <p>d. Create a new array consisting of the results of deleting the third layer of the array from (a).</p> <p>e. Overwrite the first and second row elements of the third column of layers 1, 3, and 4 of (d) with the value 99.</p>	[8]	Apply	CO4





Chhattisgarh Swami Vivekanand Technical University  
University Teaching Department  
**Class Test-1**  
**B. Tech(H)-4<sup>th</sup> Semester**  
**Branch: AI/DS**

**Subject Name:** Data Visualization

**Subject Code:** B127476(022)

**Max Marks:** 40

**Min Marks:** 14

**Times:** 2 hrs

**Note:** Part A is compulsory, attempt any two questions from B, C, and D.

Q. No.		Questions	Marks	BL	CO
PART 1					
1	a	What do you mean by Visualization.	4	L1	1
	b	Explain Coordinate System with Curved Axes.	8	L2	1
	c	Explain Various Directory of Visualization.	8	L2	1
	d	Explain various visualizing nested proportion	8	L2	1
PART 2					
2	a	Define Density plot with suitable Example.	4	L2	1
	b	Explain Empirical Cumulative Distribution functions.	8	L3	1
	c	Explain Q-Q plot with Suitable Example.	8	L3	1
	d	Write short notes on: a) Tree map b) Mosaic plot	8	L2	1