USN	**1**	**S**	**J**							

SJC INSTITUTE OF TECHNOLOGY

(An Autonomous Institute under VTU, Belagavi)

1st SEMESTER M.Tech DEGREE SEMESTER END EXAMINATIONS APRIL 2025

Course:	**ADVANCED ARTIFICIAL INTELLIGENCE**		
Course Code:	**MCS101**	**Program:**	**M.Tech in Computer Science & Engineering**
Max Marks:	**100**	**Duration:**	**03 Hours**

Note:

1. Answer ONE question from each MODULE and Question 1 & 2 is compulsory.

2. Any missing Data can be suitably assumed.

		Module - 1	Marks	CO	RBTL
Q1	**a**	Explain the role of intelligent agents in AI system	4	1	L2
	b	Construct a function for the following: i) Table Driven Agent ii) Model Based Reflex Agent	8	1	L3
	c	Find the solution to sliding puzzle problem using A* search algorithm. Initial State: Final State: 2 8 3 / 1 6 4 / 7 _ 5 1 2 3 / 8 _ 4 / 7 6 5	8	1	L3
		Module – 2			
Q2	**a**	Describe the different approaches of knowledge representation.	6	3	L1
	b	Define constraint satisfaction problems and demonstrate with an example.	8	2	L2
	c	Distinguish the different types of local consistency.	6	2	L3
		Module – 3			
Q3	**a**	Compare regression and progression in classical planning.	4	4	L2
	b	Write the algorithm for conversion to clause form.	8	3	L2
	c	Consider the following set of statements i. Ram likes all kinds of food. ii. Apples and Chicken are food. iii. Anything anyone eats and is not killed is food. iv. Riya eats Melon and is still alive. v. Rita eats everything that Riya eats. Prove that likes (Ram, Melon) by Resolution.	8	3	L4
		OR			
Q4	**a**	Illustrate the concept of problem solving and planning.	4	4	L2
	b	Discuss unification algorithm.	8	3	L2

	c	Consider the following sets of facts involved in Marcus. i. Marcus was a man ii. Marcus was a pompiean iii. All Pompeians were Romans. iv. Ceasar was a ruler v. All Romans were either loyal to ceaser or hated him vi. Everybody is loyal to someone vii. People only try to assassinate rulers they are not loyal to. viii. Marcus tried to assassinate ceasar. Convert the above facts into clause form and also show a resolution proof of the statement: hate(Marcus, Ceasar).	8	3	L4
Module – 4
Q5	a	Provide few examples of use of N-gram models.	4	4	L1
	b	Write a note on Dempster-Shafer theory and Bayes theorem.	6	4	L2
	c	Describe the risk of a word appearing out of vocabulary in n-gram models.	10	5	L3
OR
Q6	a	Explain that MYCIN's combining rules satisfy the three properties.	4	5	L1
	b	Briefly explain the main tasks issues in NLP.	6	5	L2
	c	Consider the following toy grammar: S-> NP VP NP-> Noun NP-> NP and NP NP-> NP PP VP-> Verb VP-> VP and VP VP-> VP PP PP-> Prep NP Noun-> Sally |pools | streams | swims Prep-> in Verb -> pools | streams |swims i. Show all the parse trees in this grammar for the sentence "Sally swims in streams and pools." ii. Show all the table entries that would be made by a (non-probabilistic) CYK parser on this sentence.	10	5	L4
Module – 5
Q7	a	Write a short note on Robot Hardware.	4	5	L1
	b	Illustrate how "a machine can think" is determined using Turing Test.	8	5	L2
	c	Identify the different applications of Robotic technology and properties of good internal representation of robots.	8	5	L3
OR
Q8	a	What kind of a problem is robotics solving?	4	5	L1
	b	Write a Monte Carlo localization algorithm using a range-scan sensor model with independent noise.	8	5	L2
	c	How AI can be Incorporated in Ethics of AI.	8	5	L3

USN	1	S	J						

SJC INSTITUTE OF TECHNOLOGY

(An Autonomous Institute under VTU, Belagavi)

1st SEMESTER M.Tech DEGREE SEMESTER END EXAMINATIONS APRIL 2025

Course:	ADVANCED INTERNET OF THINGS		
Course Code:	MCS102	Program:	M.Tech in Computer Science & Engineering
Max Marks:	100	Duration:	03 Hours

Note:

1. Answer ONE question from each MODULE and Question 1 & 2 is compulsory.

2. Any missing Data can be suitably assumed.

Q. No.		Module - 1	Marks	CO	RBTL
Q1	a	Describe about Home Area Network (HAN).	6	1	L2
	b	Identify the characteristics of objects and also show the classification of object.	6	1	L2
	c	Illustrate the Communication support in MIPv6 through the Home Agent.	8	1	L3
		Module – 2			
Q2	a	Describe the key structural Aspects of IoT?	6	2	L2
	b	Infer the key supportive technologies that are needed for wide-scale deployment of IoT applications.	6	2	L2
	c	List the features of Constrained Application Protocol (CoAP) to support IoT and Inspect on Request/Response and Message models.	8	2	L3
		Module – 3			
Q3	a	Describe the concepts supported by any 2 wireless PAN technologies to IoT/M2M.	6	3	L1
	b	Construct the model for IPv6 tunneling concept.	6	3	L2
	c	Interpret migration strategies to IPv6 from IPv4. (Any one approach). Also identify the Advantages and Disadvantages of migration strategies to IPv6.	8	3	L3
		OR			
Q4	a	What are the features of Bluetooth technology connectivity used in IoT.	6	3	L1
	b	With a neat diagram outline the different fields of IPv6 packet.	7	3	L2
	c	Choose the need for header compression in IPv6. Identify the functionality of various schemes of header compression (HC).	7	3	L3

		Module – 4			
Q5	**a**	Describe an IoT system for Smart Lighting.	**4**	**4**	**L1**
	b	Illustrate the controller services for implementing Forest Fire Detection with python program.	**8**	**4**	**L2**
	c	Explain and show for smart Parking examine model and services for Raspberry Pi device using an ultrasonic sensor.	**8**	**4**	**L3**
		OR			
Q6	**a**	Define various flavours of Linux supported by Raspberry Pi.	**4**	**4**	**L1**
	b	Outline the steps used in python program for Raspberry Pi device to control an LED on/off based on the light-level sensed using LDR sensor.	**8**	**4**	**L2**
	c	Utilize DHT sensor and write steps for programming Raspberry Pi device to retrieve humidity and temperature data.	**8**	**4**	**L3**
		Module – 5			
Q7	**a**	What is Hadoop MapReduce programming model and MapReduce job execution work flow ?	**4**	**5**	**L1**
	b	With diagram identify the interaction in YARN between: i) Client and Resource Manager. ii) Resource Manager and Application Master.	**8**	**5**	**L3**
	c	Examine the steps for Batch Data Analysis with Hadoop MapReduce method.	**8**	**5**	**L4**
		OR			
Q8	**a**	List and define the key components of Hadoop YARN.	**4**	**5**	**L1**
	b	With block diagram identify the role of each components used in Hadoop cluster.	**8**	**5**	**L3**
	c	Analyse the key aspects of Spark Tools and Spark Cluster.	**8**	**5**	**L4**

USN	1	S	J						

SJC INSTITUTE OF TECHNOLOGY

(An Autonomous Institute under VTU, Belagavi)

1st SEMESTER M.Tech DEGREE SEMESTER END EXAMINATIONS APRIL 2025

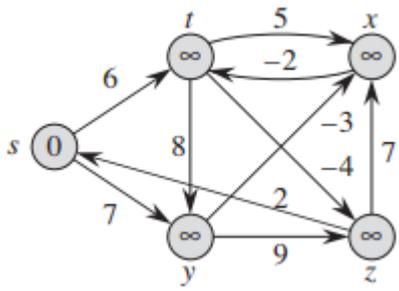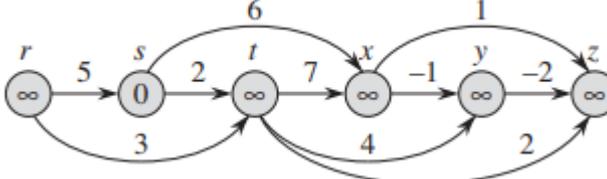| Course:		ADVANCED DATA STRUCTURE & ALGORITHMS		
Course Code:	MCS103	Program:	M.Tech in Computer Science & Engineering	
Max Marks:	100	Duration:	03 Hours	

Note:

    1. Answer ONE question from each MODULE and Question 1 & 2 is compulsory.
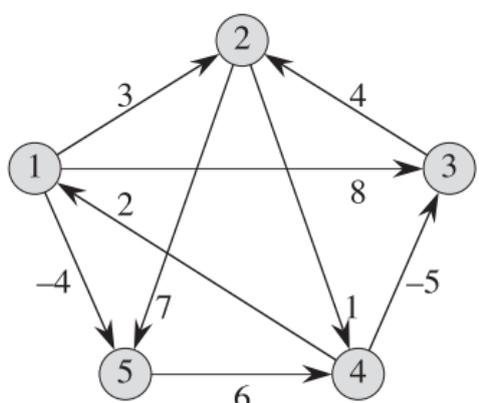
    2. Any missing Data can be suitably assumed.

Q.No.		Module - 1	Marks	CO	RBTL
Q1	a	Explain two models of search trees	5	1	L1
	b	Prove that A search tree for n objects has average depth at least log at most n/2	5	1	L3
	c	List the properties of the Red – Black Tree. Construct Red – Black Tree by inserting following sequence of numbers 8, 18, 5, 15, 17, 25, 40, 80	10	2	L3
		Module – 2			
Q2	a	Illustrate the following with suitable example a. Interval Trees b. Segment Trees	10	1	L2
	b	Given A = [63,60,110,23,81,38,50,10,5,71,30,100,90,20], construct and draw the kd-tree for A. What is the time complexity of kd-tree construction for a one-dimensional array A of size n?	10	2	L3
		Module – 3			
Q3	a	Define what a heap is and its purpose. Identify the two main conditions that must be satisfied for a heap to be correct.	4	3	L1
	b	Describe the Fibonacci Heap data structure, its key properties, and provide a simple example to illustrate its operations.	8	3	L2
	c	Discuss the balanced search tree and its properties. Develop a step-by-step algorithm to transform the balanced search tree into a heap.	8	3	L3
		OR			
Q4	a	Explain Binomial Heaps with suitable example.	6	3	L1
	b	Illustrate skew heap data structure.	6	3	L2

	c	Describe the common operations performed on a Leftist heap. Illustrate insert operation on leftist heap with a suitable example.	8	3	L3

<div align="center">Module – 4</div>

|					
Q5	a	Apply the Bellman-Ford algorithm to find the shortest path from the source vertex 'S' to all other vertices in the given graph.	10	4	L3
	b	Develop and apply an algorithm to compute the single-source shortest path in a Directed Acyclic Graph (DAG). Use the following example DAG to illustrate the algorithm's step-by-step execution:	10	4	L3

<div align="center">OR</div>

Q6	a	Describe the concept of Maximum Bipartite Matching and provide a step-by-step example to illustrate its application.	8	4	L3
	b	Write and explain Johnson algorithm for sparse graph. Use the same to find shortest paths between all pairs of vertices in the graph given below:	12	4	L3

<div align="center">Module – 5</div>

Q7	a	Describe the Naïve String Matching algorithm and apply it to the following example: Text: "ababababacaba" Pattern: "abaca"	10	5	L3

		Show the step-by-step process of the algorithm, including any shifts or comparisons made. Highlight the matches or mismatches between the pattern and the text.			
	b	Explain the Knuth-Morris-Pratt (KMP) algorithm for string matching, highlighting its key components and advantages. Additionally, compute and interpret the prefix function for the pattern "ababaca", illustrating its role in facilitating efficient string matching.	10	5	L4
OR					
Q8	a	Write Rabin – Karp matcher algorithm. Working modulo q = 11, how many spurious hits does the Rabin – Karp matcher encounter in the text, T = 2359023141526739921 when looking for the pattern P = 31415?	10	5	L3
	b	Design and analyze a finite automaton-based string matching algorithm that recognizes all strings ending with the pattern "ababaca". Construct a state transition diagram for the corresponding string matching automaton and demonstrate its operation on the input text T = "abababacaba".	10	5	L4
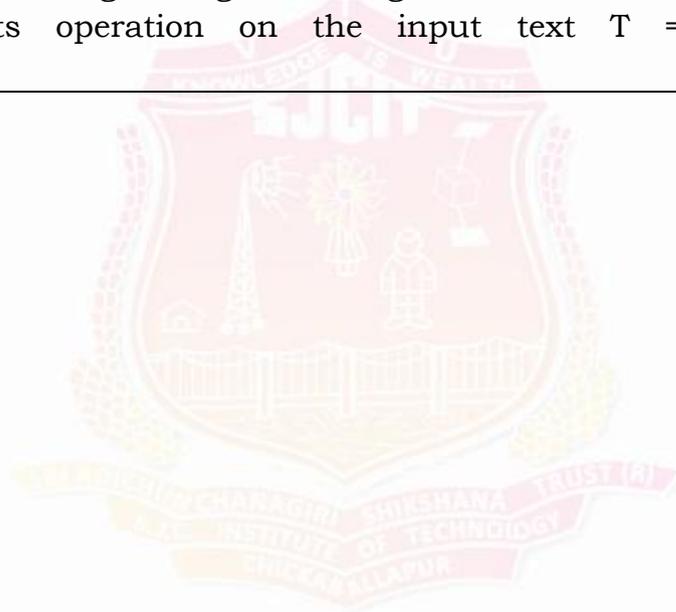
USN	1	S	J						

SJC INSTITUTE OF TECHNOLOGY

(An Autonomous Institute under VTU, Belagavi)

1st SEMESTER M.Tech DEGREE SEMESTER END EXAMINATIONS APRIL 2025

Course:		CYBER SECURITY AND CYBER LAW		
Course Code:	MCS104D	Program:		M.Tech in Computer Science & Engineering
Max Marks:	100		Duration:	03 Hours

Note:

1. Answer ONE question from each MODULE and Question 1 & 2 is compulsory.

2. Any missing Data can be suitably assumed.

Q. No.		Module - 1	Marks	CO	RBTL
Q1	a	Who are cyber criminals? Give the classifications of cyber-crimes.	6	1	L1
	b	Describe the measures to be taken for protection of laptops through physical and logical access with respect to cybercrimes.	7	1	L2
	c	Imagine an organization that specializes in securely storing sensitive data for multiple clients across various industries. Given the evolving nature of cyber threats, that can the organization implement to ensure both data protection and client trust? Explain with an example.	7	1	L3
		Module – 2			
Q2	a	List and explain the various phases involved in planning a cyber crime.	6	2	L2
	b	Illustrate the IT Act of 2000 address the issue of cybercrimes in India and prioritize its significance in tackling these crimes?	7	2	L2
		In the evolving landscape of digital threats, how effectively does the Information Technology Act, 2000, serve as a legal shield against cybercrimes in India, and what specific provisions make it a cornerstone in prioritizing cybersecurity over traditional forms of crime deterrence?	7	2	L3
		Module – 3			
Q3	a	Differentiate between virus and worms, Trojan horse and backdoor in cyber security.	6	3	L2
	b	Justify the role of proxy servers and anonymizers in the reduction of cyber-attacks. Explain with an example.	7	3	L2
	c	As cybercriminals increasingly use social engineering to orchestrate phishing attacks and identity theft. What role should public awareness play in complementing technological defenses?	7	3	L3
		OR			
Q4	a	Briefly discuss the phishing attack and identify theft attack with an example.	6	3	L2
	b	Compare the DOS and DDOS attacks with a suitable example.	7	3	L2

	c	With identity theft increasingly exploiting data from everyday digital footprints, can blockchain-based digital identities become the next frontier in preventing such crimes, and what challenges could arise in implementing such a solution at scale?	7	3	L3

Module – 4

Q5	a	Discuss about the relevance of OSI 7 layer model to computer forensics.	6	4	L1
	b	Write a note on computer forensics, cyber forensics and Digital Evidence Act. Justify.	7	4	L2
	c	As cybercriminals adopt advanced obfuscation techniques in email-based attacks, how can AI-powered forensic tools redefine the process of email investigation?	7	4	L3

OR

Q6	a	List and explain the various activities involved in the life cycle of a forensics investigation process.	6	4	L1
	b	Explain various key steps involved in tracing of email for forensics purpose.	7	4	L2
	c	In the age of intelligent malware and anti-forensic tactics designed to erase digital footprints, how can forensic auditors evolve their methods to detect manipulation while maintaining the integrity and admissibility of digital evidence in court?	7	4	L3

Module – 5

Q7	a	Explain the different categories of Intellectual Properties (IPR) defined in India.	6	5	L1
	b	Describe various standards and regulations available for information security.	7	5	L2
	c	In a world where insider threats and human error account for a significant share of data breaches, how can organizations design adaptive information security policies that go beyond compliance to foster a culture of proactive cyber hygiene and resilience?	7	5	L4

OR

Q8	a	Elaborate the significance of cyber law? How it is useful in the India computer field.	6	5	L1
	b	Discuss the Objective and Scope of the it Act, 2000, with an example	7	5	L2
	c	As semiconductor innovation drives global tech advancement, how can intellectual property laws around layout-designs be strengthened to balance open innovation with protection against design piracy in a rapidly globalizing electronics market?	7	5	L4

USN	1	S	J						

SJC INSTITUTE OF TECHNOLOGY

(An Autonomous Institute under VTU, Belagavi)

1st SEMESTER M.Tech DEGREE SEMESTER END EXAMINATIONS APRIL 2025

Course:		AGILE TECHNOLOGIES		
Course Code:	MCS105C	Program:	M.Tech in Computer Science & Engineering	
Max Marks:	100		Duration:	03 Hours

Note:

1. Answer ONE question from each MODULE and Question 1 & 2 is compulsory.

2. Any missing Data can be suitably assumed.

Q.No.		Module - 1	Marks	CO	RBTL
Q1	a	What do you mean by Agile? Outline Agile Methods.	4	1	L1
	b	Show Different Types of Success in Detail with Diagram.	8	1	L2
	c	What are the advantages of XP programming and how to master agile development.	8	1	L3
		Module – 2			
Q2	a	Differentiate Between Waterfall life cycle and Iterative life cycle.	4	1	L1
	b	With a neat diagram, Illustrate XP life cycle.	10	1	L2
	c	List and illustrate the XP Concepts	6	1	L3
		Module – 3			
Q3	a	Outline the techniques XP uses to achieve No Bugs in detail	10	2	L2
	b	Illustrate the Incremental Design and Architecture	10	2	L3
		OR			
Q4	a	Summarise the Real Customer Involvement in Collaborating XP.	10	2	L2
	b	How do u find root causes? When to fix and not to fix Root causes?	10	2	L3
		Module – 4			
Q5	a	Illustrate the Values, Principles and practices in Agile Development	10	2	L2
	b	Describe how to improve the process in Agile Methods.	10	2	L3
		OR			

Q6	a	Discuss how we build effective relationship with people	10	3	L2
	b	Show how we Build to eliminate waste from your process to increase Agility	10	3	L3

Module – 5

Q7	a	Summarise exploit the agility is related to deliver Values.	10	3	L2
	b	Outline the Universal design principles of Agile development	10	3	L3

OR

Q8	a	Illuminate Releasable Code have value to Customer needs.	10	3	L2
	b	Identify some conclusions for great design which gives the design quality	10	3	L3