

1	S	J						
---	---	---	--	--	--	--	--	--



SJC INSTITUTE OF TECHNOLOGY

(An Autonomous Institute under VTU, Belagavi)

FIRST SEMESTER M.Tech DEGREE SEMESTER END EXAMINATIONS

MARCH 2026

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

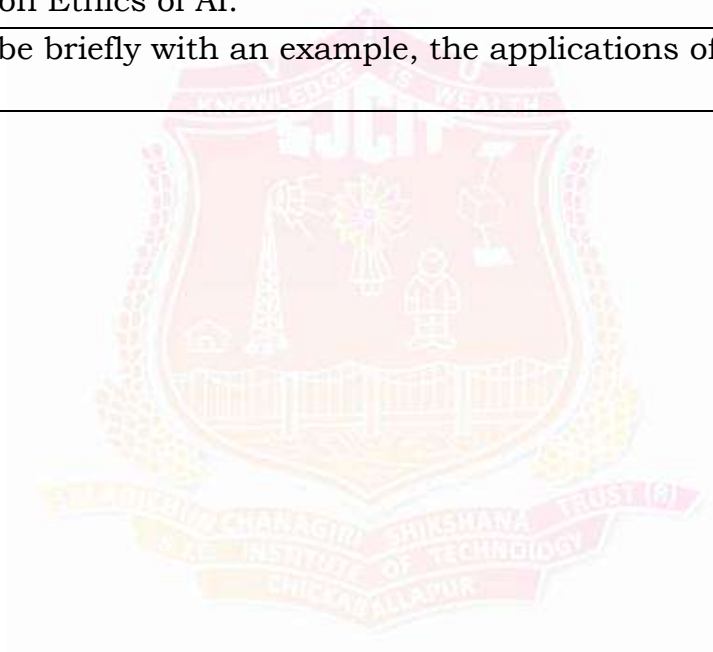
Note:

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

Q. No.	MODULE - 1	Marks	CO	RBTL																																							
Q1	<p>a With an example, define the following terms.</p> <ul style="list-style-type: none"> i. Transition Model. ii. Branching Factor. 	4	2	L1																																							
	<p>b Briefly describe the following agents.</p> <ul style="list-style-type: none"> i. Simple Reflex Agent. ii. Model Based Reflex Agent. 	8	1	L2																																							
	<p>c The road map and heuristic values are given below:</p> <p>Values of h(heuristic):</p> <table border="0"> <tr> <td>Arad</td> <td>366</td> <td>Mehadia</td> <td>241</td> </tr> <tr> <td>Bucharest</td> <td>0</td> <td>Neamt</td> <td>234</td> </tr> <tr> <td>Craiova</td> <td>160</td> <td>Oradea</td> <td>380</td> </tr> <tr> <td>Drobeta</td> <td>242</td> <td>Pitesti</td> <td>100</td> </tr> <tr> <td>Eforie</td> <td>161</td> <td>Rimnicu Vilcea</td> <td>193</td> </tr> <tr> <td>Fagaras</td> <td>176</td> <td>Sibiu</td> <td>253</td> </tr> <tr> <td>Giurgiu</td> <td>77</td> <td>Timisoara</td> <td>329</td> </tr> <tr> <td>Hirsova</td> <td>151</td> <td>Urziceni</td> <td>80</td> </tr> <tr> <td>Iasi</td> <td>226</td> <td>Vaslui</td> <td>199</td> </tr> <tr> <td>Lugoj</td> <td>244</td> <td>Zerind</td> <td>374</td> </tr> </table> <p>Source: Arad Destination: Bucharest. Apply A* Search algorithm and show 6 stages.</p>	Arad	366	Mehadia	241	Bucharest	0	Neamt	234	Craiova	160	Oradea	380	Drobeta	242	Pitesti	100	Eforie	161	Rimnicu Vilcea	193	Fagaras	176	Sibiu	253	Giurgiu	77	Timisoara	329	Hirsova	151	Urziceni	80	Iasi	226	Vaslui	199	Lugoj	244	Zerind	374	8	2
Arad	366	Mehadia	241																																								
Bucharest	0	Neamt	234																																								
Craiova	160	Oradea	380																																								
Drobeta	242	Pitesti	100																																								
Eforie	161	Rimnicu Vilcea	193																																								
Fagaras	176	Sibiu	253																																								
Giurgiu	77	Timisoara	329																																								
Hirsova	151	Urziceni	80																																								
Iasi	226	Vaslui	199																																								
Lugoj	244	Zerind	374																																								

MODULE – 2					
Q2	a	List any 4 examples of problems which can be represented as Constraint Satisfaction Problems and define any two.	4	3	L1
	b	Describe the issues in knowledge representation.	8	3	L2
	c	Distinguish the different types of local Consistency.	8	3	L3
MODULE – 3					
Q3	a	Compare regression and progression in Classical Planning.	6	4	L2
	b	Apply and Write the PDDL description of the simple spare tire problem.	8	4	L3
	c	Consider the following sets of facts involved in Marcus. i. Marcus was a man ii. Marcus was a pompeian iii. All Pompeians were Romans iv. Ceasar was a Ruler v. All Romans were either loyal to Ceasar 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).	6	3	L4
OR					
Q4	a	Illustrate the steps of unification algorithm.	6	3	L2
	b	Write an algorithm for conversion of proposition/predicate logic to clause form.	8	3	L2
	c	Apply and Write the PDDL description of an air cargo transportation planning problem.	6	4	L3
MODULE – 4					
Q5	a	List the main tasks issues in NLP.	4	5	L1
	b	Write a short note on Dempster-Shafer theory and Bayes theorem.	6	3	L2
	c	Consider the following grammar: S->AB BB A->CC AB a B->BB CA b C->BA AA b i. Show all the parse trees in this grammar for the sentence abba. ii. Show all the table entries that would be made by a (non-probabilistic) CYK parser on this sentence.	10	5	L4
OR					
Q6	a	List the risk of a word appearing out of vocabulary in N-gram models.	4	5	L1
	b	Show that MYCIN's combining rules satisfy the three properties.	6	3	L2
	c	Consider the following set of propositions: Patient has spots Patient has measles Patient has high fever Patient has Rocky Mountain Spotted Fever Patient has previously been inoculated against measles	10	3	L4

		Patient was recently bitten by a tick Patient has an allergy i. Create a network that defines the casual connections among these nodes. ii. Make it a Bayesian network by constructing the necessary conditional probability matrix.			
MODULE - 5					
Q7	a	What are the characteristics of the environments in which robots operate and why?	4	5	L1
	b	Distinguish between Supervised and unsupervised learning in robot perception.	8	5	L2
	c	Analyze the potential threats from AI technology to society. What threats are most serious and how might they be combated? How do they compare to the potential benefits?	8	5	L4
OR					
Q8	a	What kind of problems is robotics solving?	4	5	L1
	b	Write a short note on Ethics of AI.	8	5	L2
	c	Identify and describe briefly with an example, the applications of robotic technology.	8	5	L4



1	S	J							
---	---	---	--	--	--	--	--	--	--



SJC INSTITUTE OF TECHNOLOGY
(An Autonomous Institute under VTU, Belagavi)
FIRST SEMESTER M.Tech DEGREE SEMESTER END EXAMINATIONS
MARCH 2026

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	What is Internet of Things? Explain the different views to define IoT.	7	1	L1
	b	Describe the scope of IOT.	5	1	L2
	c	Discuss any four applications of automotives.	8	1	L3
MODULE - 2					
Q2	a	List all the key technologies for IoT.	4	2	L1
	b	Mention the main features of COAP. Explain the request/response model used by COAP.	8	2	L2
	c	Inspect about M2M in Third Generation Partnership Project (3GPP)-Architecture.	8	2	L3
MODULE - 3					
Q3	a	Explain IPV6 tunneling mechanism.	6	3	L1
	b	Describe the architecture of Bluetooth system with HDP.	8	3	L2
	c	Discuss QOS capabilities in IPV6.	6	3	L3
OR					
Q4	a	Explain with neat sketch IEEE 802.15.4 frame formats.	10	3	L1
	b	Define is LTE? With suitable diagram explain EPS Network Architecture.	10	3	L2
MODULE - 4					
Q5	a	Outline about Raspberry Pi Interfaces.	5	4	L1
	b	Build a program in python for controller native service for smart parking.	8	4	L3
	c	Interpret the deployment design of the weather monitoring system.	7	4	L2
OR					

Q6	a	Construct a program in python for controller native service for home intrusion detection.	8	4	L3
	b	Briefly explain the IoT for Agriculture.	7	4	L2
	c	Outline the smart lighting IOT systems.	5	4	L1
MODULE - 5					
Q7	a	Write a short note on Apache Storm for real time data analysis.	8	5	L1
	b	Describe with neat sketch components of the Apache Spark cluster.	7	5	L2
	c	Examine steps involved in setting up a Hadoop Cluster.	5	5	L4
OR					
Q8	a	What is YARN? Explain the key components of YARN ?	10	5	L2
	b	Analyze How does a Hadoop map reduce workflow for batch analysis of IOT data works? Discuss in with neat diagram.	10	5	L4



1	S	J							
---	---	---	--	--	--	--	--	--	--



SJC INSTITUTE OF TECHNOLOGY
 (An Autonomous Institute under VTU, Belagavi)
FIRST SEMESTER M.Tech DEGREE SEMESTER END EXAMINATIONS
MARCH 2026

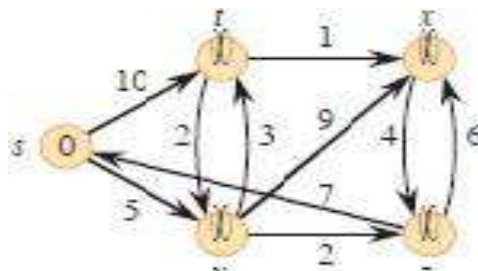
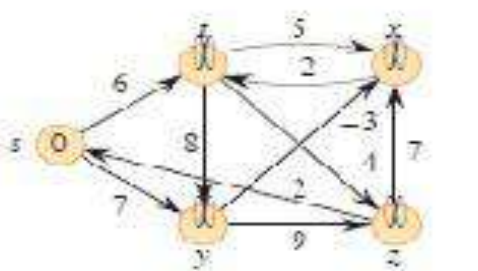
Course:	ADVANCED DATA STRUCTURES AND ALGORITHMS			
Course Code:	MCS103	Program:	M.Tech in Computer Science & Engineering	
Max Marks:	100	Duration:	03 Hours	

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	Define Binary Search Tree with suitable example	4	1	L2
	b	Convert a Binary Search Tree into a List Using Various Traversal Techniques	6	1	L2
	c	Design the insertion function that inserts a new node in the Red-Black Tree and ensures the tree remains balanced by performing necessary rotations.	10	1	L3
MODULE - 2					
Q2	a	What is a segment tree and how is it used to efficiently solve range queries?	4	2	L1
	b	Illustrate Interval Tree with suitable example.	6	2	L2
	c	Develop a function to construct a balanced KD-Tree from a given set of points in a k-dimensional space.	10	2	L3
MODULE - 3					
Q3	a	What requirements must be met in order for the correct heap to exist?	4	3	L1
	b	Develop the program sections that generate the heap from the balanced search tree.	8	3	L3
	c	Determine the procedures needed to remove the heap's minimal element and how the binomial trees should be reorganized to preserve heap properties.	8	3	L3
OR					
Q4	a	What is a binomial tree and how is it structured?	6	3	L1
	b	Summarize Fibonacci heap along with their properties.	6	3	L2
	c	Implement a method to delete a specific element from an array-based heap while maintaining the heap property. Describe your approach and discuss its efficiency in terms	8	3	L3

MODULE - 4

Q5	a	What are properties of flow networks? Explain in detail.	4	4	L1
	b	Apply Dijkstra's Algorithm to find shortest path from the given source vertex 's'. 	8	4	L3
	c	Write Bellman ford algorithm for solving single source shortest paths problems. Trace it for the following graph. 	8	4	L4

OR

Q6	a	What is the recursive FFT (Fast Fourier Transform) algorithm, and how does it improve the efficiency of computing the Discrete Fourier Transform (DFT)?	4	4	L1
	b	Explain efficient polynomial multiplication process with neat diagram.	8	4	L2
	c	Write Dijkstra's algorithm to find shortest path from a source node to all other nodes in a weighted graph.	8	4	L4

MODULE - 5

Q7	a	What is the Rabin-Karp algorithm for string matching, and how does it work?	4	5	L1
	b	Apply the Bayer-Moore algorithm for the following text and pattern Text: BESS_KNEW_ABOUT_BAOBABS Pattern: BAOBAB	8	5	L3
	c	Describe the Knuth -Morris-Pratt (KMP) algorithm and also compute the prefix function for the pattern 'ababaca'.	8	5	L3

OR

Q8	a	Write the transition state diagram and transition function δ for the string matching automation that accepts all the string containing the pattern 'ababaca'.	10	5	L2
	b	Write the Naïve String Matching algorithm to find the pattern "aab" in the text "acaabc". Apply the algorithm to this example, and explain the steps taken during the search process. Also, analyze the time complexity of the Naïve String Matching algorithm for this case.	10	5	L4

1	S	J							
---	---	---	--	--	--	--	--	--	--



SJC INSTITUTE OF TECHNOLOGY

(An Autonomous Institute under VTU, Belagavi)

FIRST SEMESTER M.Tech DEGREE SEMESTER END EXAMINATIONS

MARCH 2026

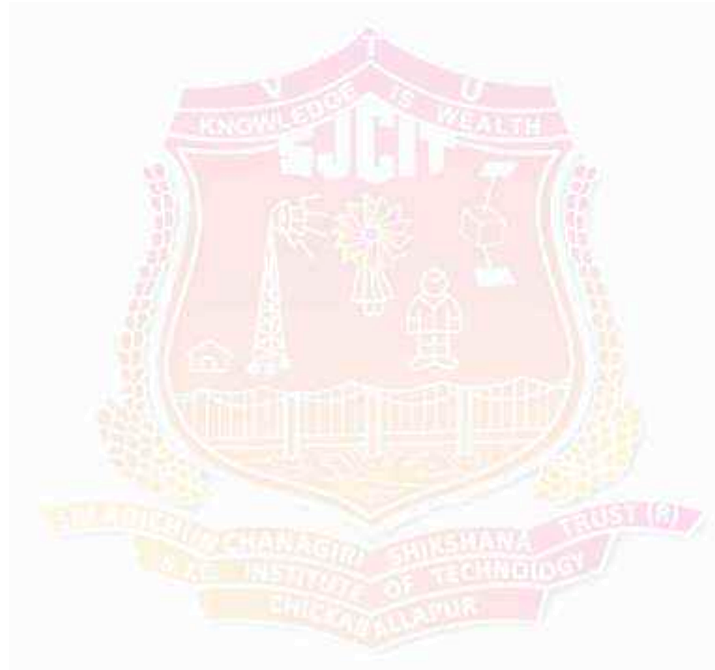
Course:	CYBER SECURITY AND CYBER LAWS			
Course Code:	MCS104D	Program:	M.Tech in Computer Science & Engineering	
Max Marks:	100	Duration:	03 Hours	

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	Describe Cyber Security. Discuss the classification of cyber crimes along with the suitable examples.	10	1	L2
	b	Give a brief explanation of how criminals prepare for cyber attacks.	10	1	L2
MODULE - 2					
Q2	a	Outline the organizational security policies and measures in mobile computing Era.	10	2	L2
	b	Mobile devices, integral to modern life, present several security challenges. What are the main threats and vulnerabilities associated with their widespread use? Discuss concisely.	10	2	L2
MODULE - 3					
Q3	a	Describe with an example how SQL injection can be used to get into a table with two fields login and password.	10	3	L2
	b	Summarize the concept of identity theft and its techniques.	10	3	L2
OR					
Q4	a	Discuss the following type of DoS attack: i) Bandwidth attack ii) Logic attacks iii) Protocol attacks.	10	3	L2
	b	Compare Viruses and Worms with suitable example.	10	3	L2
MODULE - 4					
Q5	a	Show the neat sketch of Digital forensic life cycle? Explain briefly	10	4	L2
	b	Discuss the Historical Background of Cyber forensics.	10	4	L2
OR					
Q6	a	Identify how the concept of chain of custody is important to computer/digital forensics while looking into a data breach in a global corporation. Give justification.	10	3	L2

	b	Explain the relevance of OSI 7 layer model to computer forensics.	10	2	L2
MODULE – 5					
Q7	a	Briefly discusses the ISO standards to be considered while laying down the policies.	10	5	L2
	b	Outline the steps involved in policy review process.	10	5	L2
OR					
Q8	a	Summarize the objective and its scope of IT Act 2000.	10	5	L2
	b	Describe the following keywords: i) Patents ii) Copy Right Law iii) Software License iv) Cyber laws.	10	5	L2



1	S	J							
---	---	---	--	--	--	--	--	--	--



SJC INSTITUTE OF TECHNOLOGY

(An Autonomous Institute under VTU, Belagavi)

FIRST SEMESTER M.Tech DEGREE SEMESTER END EXAMINATIONS

MARCH 2026

Course:	MULTIMEDIA COMMUNICATIONS			
Course Code:	MCS105B	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	Compare and contrast network QoS and application QoS in multimedia communications. Illustrate with suitable examples.	10	2	L2
	b	Implement a simple multimedia communication model for a live video streaming application over a wireless network. Identify the QoS parameters required to maintain video quality.	10	1	L3
MODULE - 2					
Q2	a	Classify the different text compression techniques (Run-length, Huffman, LZW) and explain their working principles with examples.	10	2	L2
	b	A document contains the string MULTIMEDIA. Apply Huffman coding to compress it and show all intermediate steps.	10	2	L3
MODULE - 3					
Q3	a	Compare and contrast DPCM and ADPCM audio compression techniques. Explain in which scenarios each is more efficient.	10	3	L2
	b	Carry out a basic video compression workflow using MPEG principles for a 10-second clip. Identify the types of frames (I, P, B) and explain their role in reducing data size.	10	3	L3
OR					
Q4	a	Explain the working principle of Code-Excited Linear Prediction (CELP) in audio compression. Illustrate how perceptual coding reduces file size without significant loss of quality.	10	3	L2
	b	A simple audio signal has sample values: [3, 5, 8, 6, 9]. Apply ADPCM compression to encode the signal and show all steps.	10	3	L3
MODULE - 4					
Q5	a	Develop a simple video streaming scenario using MPEG-2 compression. Identify the steps involved in encoding and decoding, and explain how frame types (I, P, B) are used.	10	4	L3
	b	Construct a workflow to compress a short video clip using H.263 standard. Show how reversible VLCs (Variable Length Codes) are applied in the process.	10	4	L4

OR					
Q6	a	Analyze the differences between MPEG-1, MPEG-2, and MPEG-4 standards in terms of compression efficiency, application domain, and scalability. Which standard would you choose for online video conferencing and why?	10	4	L3
	b	Examine the MPEG-7 multimedia content description process. Identify potential challenges in indexing and searching multimedia content efficiently.	10	4	L4
MODULE - 5					
Q7	a	Develop a timeline synchronization model for a multimedia presentation that includes text, images, and audio. Identify the steps to ensure all media streams are aligned correctly.	10	4	L3
	b	Build a reference model for synchronization in multimedia systems. Distinguish between continuous media and discrete media synchronization requirements, and discuss their impact on presentation quality.	10	4	L4
OR					
Q8	a	Apply process management techniques to design a scheduling strategy for a multimedia OS handling multiple video streams simultaneously. Explain how resource conflicts are resolved.	10	4	L3
	b	Examine different resource management techniques in multimedia operating systems. Evaluate how CPU, memory, and network bandwidth allocation affect real-time multimedia performance.	10	4	L4

