

Duration: 3 hrs

Branch: IT/COMP

Semester: V



Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri(West), Mumbai 400058-India (An Autonomous Institute Affiliated to University of Mumbai

## End Semester Examination December 2022

Max. Marks: 100

Class: TEIT/TECOMP

Course Code: 17303B/CS 303B

Course: Artificial Intelligence and Machine Learning

Instructions:

(1) All Questions are Compulsory

(2) Draw neat diagrams

(3) Assume suitable data if necessary

Questi on No.		Max. Marks	co	BL
Q1(a)	Why is it necessary for AI to think rationally?	4+	1	2
	Can there be more than one agent program that implements a given	2+	100 000 11	
	agent function? Why?	4		
	Write PEAS for vacuum cleaning ROBOT.	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		B
Q1 (b)	Differentiate between Informed and uninformed search technique? Find the path from Sibiu to Bucharest using uniform cost search algorithm.	5+ 5	2	4
	Sibiu 99 Fagaras		:4	
	Rimnicu Vilcea		±0.1	
	The state of the s			
	97 Pitesti 214			-
	97	7,7		
	Ò			
	Bucharest			
		= -		
		11-12-11-11		

2(a)	Traverse the	0		1- C :- 4	ha start s	tate and	G is goal	values for state.	A Karawa assetji sa Marawa		bar :	
	all states is	given i	n the tal	ole. S is t nd the or	timal pat	th? How	many ite	rations are				
1	needed to	reach th	e goal s	tate?	Julius Par	<del>******</del>			a waton		=	
	necucu to	The state of the s	J							1 Char	194	24
					St	ate	h(n)		=			-
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	- 17 Y			here a side	Y L	#. A.	A* alga-	rithm The	100	2	6	
2 (a)	Solve th	e follov	ving 8	Puzzle	problem	using	A* algor	rithm. The	10(	2	6	
2 (a)	Solve th	used is	no of n	nisplaced	problem tiles. Gi	using ive State	A* algores	rithm. The	8+	2	6	
2 (a)	Solve th heuristic and path	used is from Sta	no of nart to go	nisplaced al state.	problem tiles. Gi	using ive State	A* algore Space at	rithm. The each level	10( 8+ 2)	2	6	
2 (a)	Solve th heuristic and path Start state	used is from State g=0, h	no of nart to go	nisplaced al state.	problem tiles. Gi	using ive State	A* algore Space at	rithm. The each level	8+	2	6	
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Q3A	Find the overall impulse response of the system if following	10	LCO2	112
Q3/1		10	CO3	L.2
-	given systems are connected in cascade.			
	$h_1(n) = \left(\frac{1}{4}\right)^n u(n-1),  h_2(n) = \left[1 + \left(\frac{1}{2}\right)^n\right] u(n)$			
	Comment on stability of the overall system.			
Q3B	Given	10	CO4	L2
	$H(z) = \frac{10 z}{z - 0.5}$			
	(1) Find the response of the system to the input			
*	$x[n] = 10 - 5 \sin(0.2 \pi n) + 20 \cos(0.4 \pi n + 0.5 \pi).$			
	(2) Identify the filter based on passband of the filter			-
Q4A	A Linear - time invariant system is characterized by the	10	CO4	L3
ar in	system function:	annie t	ind a pr	iu juzi
	$3-4z^{-1}$			2.71
1.11	H(z) = $\frac{3-4z^{-1}}{1-3.5z^{-1}+1.5z^{-2}}$			- 1 -
500	1. Specify ROC of H(z) and determine h(n) for following			
	conditions:			
	(i) The system is stable.			
	(ii) The system is causal.			
	(iii) The system is anti-causal			
	2. Find the difference equation of above system.			
E#	3. Show Parallel realization diagram of system using		_	
	minimum number of unit delay blocks.			
Q4B	Frequency response of FIR filter is given below:	10	CO5	1.3
	$H(e^{jw}) = e^{-3jw} (2 + 1.8 \cos 3w + 1.2 \cos 2w + 0.5 \cos w)$			
	Find: (i) Impulse Response of the filter.		-	
-	(ii) Response of the filter to the input $x[n] = (0.5)^n u[n]$ .			
	OR			
	Contradict Or justify the following statement.			
- 73	Impulse Invariant method is not suitable for LPF		5	
-	and HPF.		-	



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	2) Frequency warping is needed to perform in BLT			T
	technique but not in Impulse Invariance Technique			
	(IIT).			
Q5A	Impulse response of desired Linear Phase High Pass FIR filter	[10]	CO5	L3
	is given below-			
	$hd[n] = \left[ \frac{\sin[(n-2)\pi]}{[(n-2)\pi]} - \frac{7}{10} \frac{\sin((n-2)0.7\pi)}{((n-2)0.7\pi)} \right]$			
	(1) Truncate the values of hd[n] using following window			
	function and obtain realizable finite length h[n].			
	$w[n] = \left[0.54 - 0.46 \cos\left(\frac{2\pi n}{N-1}\right)\right]$	±		
	(2) Plot Magnitude & Phase spectrum of the designed filter.			
Q5B	A Digital Butterworth is required to meet the following specifications:	10	CO5	L3
	$0.85 \le  H(e^{jw})  \le 1.0 \text{ for } 0 \le F \le 0.22 \pi$			7
	$ H(e^{jw})  \le 0.25$ for $0.72 \pi \le F \le \pi$			
	Fs = 1  KHz.			
=	1. Design a filter using BLT			
	2. Draw filter realization diagram			.
	3. What is the value of magnitude response of the			
			===	- 1