Total No. of Questions : 8]

SEAT No. :

P7743

[Total No. of Pages : 3

[6180]-272
T.E. (Robotics and Automation)
ARTIFICIAL INTELLIGENCE FOR ROBOTICS
(2019 Pattern) (Semester - II) (311509 A)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.No.1 or Q.No. 2, Q.No.3 or Q.No.4, Q.No.5 or Q.No.6 and Q.No.7 or Q.No.8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of calculator is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) Explain with suitable example difference between informed search and uninformed search algorithm. **[9]**

b) In a minimization problem, current value of a certain parameter *x* is 20. The lower and upper bounds of parameter *x* are 10 and 50 respectively. If simulated annealing algorithm is used to update *x* using 5 random numbers having sum 1.87, what will be the updated value? **[8]**

OR

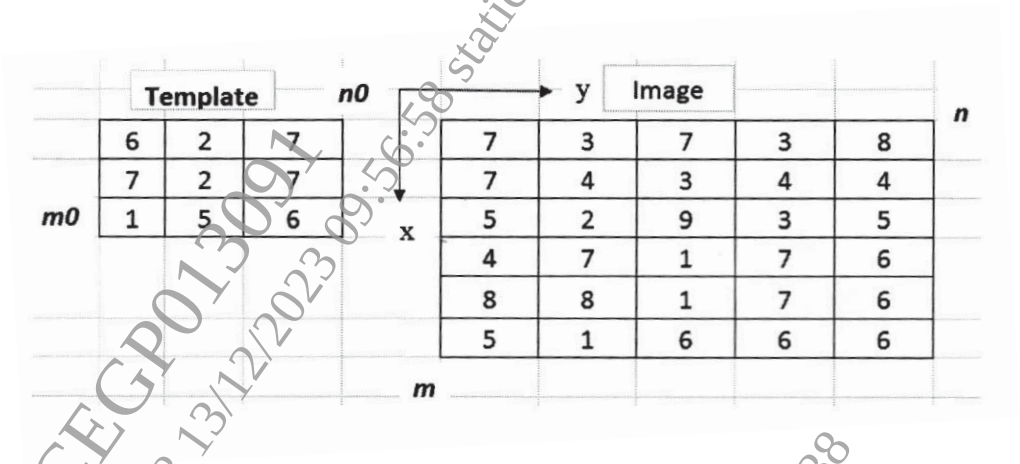
Q2) a) Ant colony optimization is used to solve a travelling salesmen problem with 5 stations. The distance matrix is given below. Considering starting station as A, what is the % probability that an ant will choose the path A to D? Assume initial pheromone deposition level as 1. **[10]**

	A	B	C	D	E
A	0	14	16	19	12
B	14	0	15	13	10
C	16	15	0	11	17
D	19	13	11	0	21
E	12	10	17	21	0

b) Explain the steps of Tabu search method. **[7]**

P.T.O.

Q3) a) For the image and template shown in Figure, determine the performance index for translation (3, 1) using template matching technique. **[10]**



Template		
6	2	7
7	2	7
1	5	6

Image				
7	3	7	3	8
7	4	3	4	4
5	2	9	3	5
4	7	1	7	6
8	8	1	7	6
5	1	6	6	6

b) Explain region growing method for image segmentation. **[7]**

OR

Q4) a) Determine the gradient of intensity of a pixel having intensity 3 in the image given below. Use Prewitt operator. **[10]**

2	6	8
4	3	2
1	7	6

b) Write note on: Robot vision system. **[7]**

Q5) a) What are different methods to deal with moving obstacles? **[10]**

b) Write note on: Path Planning Robot Control in Dynamic Environments. **[8]**

OR

Q6) a) Explain route optimization for AS/RS systems. **[8]**

b) A perceptron having weights corresponding to the three inputs have the following **[10]**

Value: w1 = 2; w2 = –4; and w3 = 1

and the activation of the unit is given by the step-function:

$\varphi(v) = 1$ if $v \geq 0$ otherwise 0

Calculate the output value y of the given perceptron for each of the following input patterns:

Pattern	P1	P2	P3	P4
X1	1	0	1	1
X2	0	1	0	1
X3	0	1	1	1

Q7) a) Use A* algorithm to determine the shortest path for an automated guided vehicle while moving from work station at (4, 6) to workstation at (1, 1) shown in Fig. below. The obstacles are in the form of tool storage racks at locations (1, 6), (2, 4) and (4, 3). **[9]**

(1,1)	(2,1)	(3,1)	(4,1)
(1,2)	(2,2)	(3,2)	(4,2)
(1,3)	(2,3)	(3,3)	(4,3)
(1,4)	(2,4)	(3,4)	(4,4)
(1,5)	(2,5)	(3,5)	(4,5)
(1,6)	(2,6)	(3,6)	(4,6)

b) Write note on: Flexible manufacturing system. **[9]**

OR

Q8) a) Explain with suitable example techniques for automatic tool path generation. **[9]**

b) What is real time scheduling in flexible manufacturing system? Explain with suitable example. **[9]**