Total No. of Questions : 8]

SEAT No. :

PB-3982

[Total No. of Pages : 2

[6262]-325
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, Q. No.7 or Q.No.8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Use of Calculator is allowed.***
5) ***Assume Suitable data necessary.***

Q1) a) Explain with suitable example hidden Markov model in machine learning. **[9]**

b) In genetic algorithm, a certain variable is coded in binary form as 1101. What will be its actual value if lower bound and upper bound of the variable are 4 and 10 respectively? **[8]**

OR

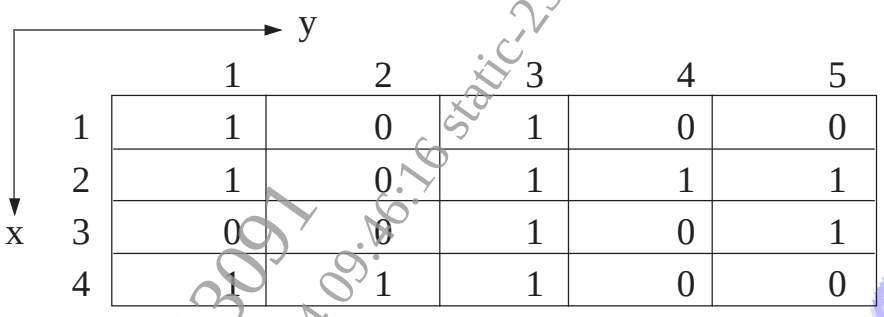
Q2) a) Ant colony optimization is used to solve a travelling salesmen problem with 5 stations. The distance matrix is given below. Considering starting station as A, what is the % probability that an ant will choose the path A to D? Assume initial pheromone deposition level as 1. **[10]**

	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) Write note on : Support vector machine. **[7]**

P.T.O.

Q3) a) Determine the centroid of the image given below. **[10]**



x \ y	1	2	3	4	5
1	1	0	1	0	0
2	1	0	1	1	1
3	0	0	1	0	1
4	1	1	1	0	0

b) Explain the application of machine vision system in robotics. **[7]**

OR

Q4) a) Determine the gradient of intensity of a pixel having intensity 4 in the image given below. Use Prewitt operator. **[10]**

3	5	7
5	4	3
2	8	5

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

Q5) a) Explain the applications of intelligent systems for mobile Robot Motion Planning. **[10]**

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

OR

Q6) a) What are the different algorithms for localisation and obstacle avoidance? **[8]**

b) Explain application of artificial neural network in robot path planning. **[10]**

Q7) a) Explain with suitable example techniques for automatic tool path generation. **[9]**

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]**