Reg. No.											
----------	--	--	--	--	--	--	--	--	--	--	--



MANIPAL INSTITUTE OF TECHNOLOGY MANIPAL

(A constituent institution of MAHE, Manipal)

II SEMESTER M.TECH. (INDUSTRIAL AUTOMATION AND ROBOTICS)

END SEMESTER EXAMINATIONS, APR 2018

SUBJECT: ARTIFICIAL INTELLIGENCE AND EXPERT SYSTEMS IN AUTOMATION [MTE 5132]

(27/04/2018)

Time: 3 Hours

MAX. MARKS: 50

Instructions to Candidates:

✤ Answer ALL 5 questions.

- Data not provided may be suitably assumed
- 1A. Consider the tree shown below. The numbers on the arcs are the arc lengths 06



Figure Q.1A

The goal is state G as shown in Figure Q.1A. What order would the states be expanded by each type of search? Write only the sequence of states expanded by each search mentioned below.

- a. Breadth First Search
- b. Depth First Search
- c. Uniform Cost Function
- **1B.** Convert the following statements into first order predicate logic:

04

- a) Either everything is bitter or everything is sweet
- b) Nobody is loved by no one
- c) Some frogs are not green
- d) If someone is noisy, everybody is annoyed

[MTE 5132]

2A.	Elaborate what is an expert system. Discuss any three types of typical expert systems.	05
2B.	Elucidate the role of Probabilistic reasoning in AI? Explain Bayes theorem and solve the following problem: The doctor knows that bird flu causes a fever 95% of the time. If a person is selected randomly from the population, there is a 10 ⁻⁷ chance of the person having bird flu. In general 1 in 100 people in the population suffer from fever. What is the probability that a person has bird flu?	05
3A.	Implement an XNOR gate using Neural Networks and tabulate the truth table for the same.	06
3B.	Using Propositional Logic prove the following: a. [(P→Q)∧P]→Q is a tautology b. [(P∨Q)∧[(¬P)∧(¬Q)] is a contradiction	04
4A.	What is linear regression with single variable? Extend the concept to linear regression for multi variables. Using suitable equations solve the following : Suppose you have m=23 training examples with n=5 features (excluding the additional all-ones feature for the intercept term, which you should add). The normal equation is $\theta = (X^T X)^{-1} X^T y$. For the given values of m and n, what are the dimensions of θ , X, and y in this equation?	04
4B.	 Using the following "weather" sentences: 1) <i>P</i> means "It is hot" 2) <i>Q</i> means "It is humid" 3) <i>R</i> means "It is raining" Deduce the truth table and conclude if the query sentence R entailed by KB. Where KB = (((P ^ Q) => R) ^ (Q => P) ^ Q). 	06
5A.	For 4 queen's problem in chess (Place 4 queens so that none attacks none) define initial state, goal state, operator and full set of states. Also formulate a solution using CSP showing the intermediate steps.	05
5B.	What is the difference between the followinga. Monotonic and Non monotonic Reasoning.b. Forward and Backward Reasoning.Cite appropriate examples.	03
5C.	Considering the proliferation of AI and its increased presence in our day to day life, how is consulting an Expert system instead of a doctor in forthcoming days going to be feasible?	02