UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, April/May 2018

Course: Fuzzy Logic and Neural Network **Semester: VIII**
Program: B.Tech ICE
Time: 03 hrs. **Max. Marks: 100**

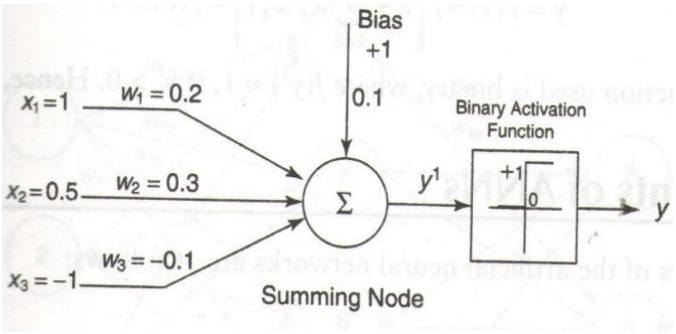
Instructions:

SECTION A

S. No.	All questions are compulsory. (5x4=20)	**Marks**	**CO**
Q 1	What do you understand with structure of artificial neuron? Also compare with biological neuron to artificial Neuron?	**5**	**CO1**
Q 2	Differentiate between linear and nonlinear neural networks?	**5**	**CO3**
Q 3	What do you understand by feedback and feedforward neural network?	**5**	**CO3**
Q 4	What are the operations on Fuzzy sets? Explain with examples?	**5**	**CO1**
Q 5	What do you understand by sigmoidal activation function for nonlinear neural network?	**5**	**CO3**

SECTION B

Q 6	Derive the back propagation algorithm for an MLN with three layers. Use generalized delta rule.	**10**	**CO3**
Q 7	What are components of ANN. Draw the architecture of Multilayer Networks in detail.	**10**	**CO4**
Q8	What do you understand by Fuzzy PID Controller. Obtain the derivation for discrete time system. How the rule can be made in fuzzy control?	**10**	**CO2**
Q 9	Single rule with discrete fuzzy set Rule 1: If temperature is hot Then Fan should run fast Rule 2 : If temperature is moderately hot, Then fan should run moderately fast The temperature is expressed in ^{o}F and the speed is expressed in 1000 rpm Given H = 'hot'= $\left\{\frac{0.4}{70}, \frac{0.6}{80}, \frac{0.8}{90}, \frac{0.9}{100}\right\}$ $F = \text{'}fast\text{'} = \left\{\frac{0.3}{1}, \frac{0.5}{2}, \frac{0.7}{3}, \frac{0.9}{4}\right\}$,	**10**	**CO2**

	$H' = 'moderatelyhot' = \left\{\frac{0.2}{70}, \frac{0.4}{80}, \frac{0.6}{90}, \frac{0.8}{100}\right\}$ Given the above rule base , find F'.		
	SECTION-C		
Q 10	Construct the rule base of fuzzy controller for any system and explain the architecture of Mamdani type Fuzzy Logic Control. How FLC is differentiated from other controller?	**20**	**CO2**
Q 11	Apply the neural network principle and calculate the net output of the neuron model as shown in figure 1. (a) without bias and activation function (b) with bias but without activation function (c) with bias and with activation function  **Figure 1**	**20**	**CO4**

Name: **Enrolment No:**	

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SECTION A

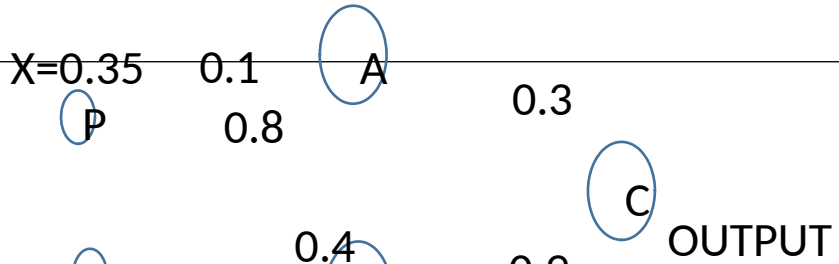
S. No.	All questions are compulsory. (5x4=20)	Marks	CO
Q 1	What do you understand with structure of artificial neuron? Also compare with biological neuron to artificial Neuron?	5	CO3
Q 2	For the following scalar nonlinear function $\dot{x} = -x^3 + u$ using Lyapunov approach comment on the stability?	5	CO3
Q 3	What do you understand by feedback and feedforward neural network?	5	CO1
Q 4	What are the applications of fuzzy logic?	5	CO1
Q 5	What do you understand by sigmoidal activation function for nonlinear neural network?	5	CO3

SECTION B

Q 6	Explain the architecture of Mamdani type Fuzzy Logic Control? Differentiate this from Tagaki Sugeno Type Fuzzy Logic Controller. How the rules are generated in Fuzzy logic Controller.	10	CO2
Q 7	What are components of ANN. Draw the architecture of Multilayer Networks in detail.	10	CO3
Q8	What do you understand by Fuzzy PI Controller. Obtain the derivation for discrete time system. How the rule can be made in fuzzy control?	10	CO2
Q 9	How fuzzy logic controller is differentiated form PID Controller. Explain with the closed loop controller diagram.	10	CO2

SECTION-C

Q 10	Construct the rule base of fuzzy controller for any system and explain the architecture of Mamdani type Fuzzy Logic Control. How FLC is differentiated from other controller?	20	CO3
Q 11	Apply the fundamental principle of back propagation algorithm and design the neural controller and calculate the error the structure shown in figure 1.	20	CO4



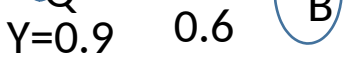


	Figure 1 Assume neuron have sigmoidal activation function and target is 0.5.		