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Name of the College (Please tick, symbol is given)	:	**COES**	✓	**CMES**		**COLS**	
Program/Course	:	**B. Tech ICE**					
Semester	:	**VIII**					
Name of the Subject	:	**Fuzzy and Neural Network**					
Subject Code	:	**ICEG 441**					
Name of Question Paper Setter	:	**Dr. Mukul Kumar Gupta**					
Employee Code	:	**40000536**					
Mobile & Extension	:	**9639977496**					
Note: Please mention additional Stationery to be provided, during examination such as Table/Graph Sheet etc. else mention "NOT APPLICABLE":							

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Date of Examination	:	
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Note: - Pl. start your question paper from next page

SET A

Roll No: ----------

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES

End Semester Examination, April, 2017

Program Name: B. Tech ICE **Semester – VIII**
Course Name : Fuzzy Logic and Neural Network **Max. Marks : 100**
Course Code :ICEG 441 **Duration : 3 Hrs**
No. of page/s:

Note: All the questions are compulsory.

Section – A (5×4= 20)

Q1-What do you understand by sigmoidal activation function for nonlinear neural network?

Q2- Differentiate between linear and nonlinear neural networks?

Q3- What do you understand by sigmoidal activation function for nonlinear neural network?

Q4- What do you understand by fuzzy operators?

Q5- What do you understand by fuzzy compositional rules?

Section – B (8x5 = 40)

Q6- Derive the back propagation algorithm for an MLN with three layers. Use generalized delta rule.

Q7- What are components of ANN. Draw the architecture of Multilayer Networks in detail.

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?

Q9- For the following scalar nonlinear function $\dot{x} = -x^3 + u$ using Lyapunov approach comment on the stability?

Q10- 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'= $\left\{\frac{0.4}{70},\frac{0.6}{80},\frac{0.8}{90},\frac{0.9}{100}\right\}$

$F = '\,fast\,' = \left\{\frac{0.3}{1},\frac{0.5}{2},\frac{0.7}{3},\frac{0.9}{4}\right\}$,

$H' = 'mod\,ratelyhot\,' = \left\{\frac{0.2}{70},\frac{0.4}{80},\frac{0.6}{90},\frac{0.8}{100}\right\}$

Given the above rule base , find F'.

Section – C (2×20=40)

Q11(a) 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)

(b) How fuzzy logic controller is differentiated form PID Controller. Explain with the closed loop controller diagram. (10)

Q12- 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

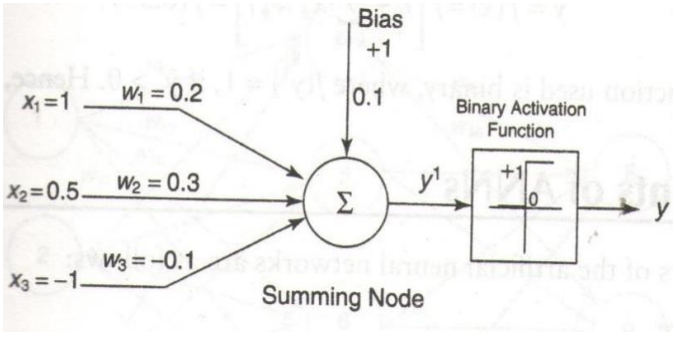

Figure 1

Roll No: ----------

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES

End Semester Examination, April, 2017

Program Name: B. Tech ICE **Semester – VIII**
Course Name : Fuzzy Logic and Neural Network **Max. Marks : 100**
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Note: All the questions are compulsory.

Section – A (5×4= 20)

Q1- What do you understand with structure of artificial neuron? Also compare with biological neuron to artificial Neuron?

Q2- Differentiate between feedback and feedforward neural network?

Q3- Differentiate between linear and nonlinear neural networks?

Q4- What do you understand by fuzzy operators?

Q5- What do you understand by fuzzy linguistic variable?

Section – B (8x5 = 40)

Q6- What are components of ANN. Draw the architecture of Multilayer Networks in detail.

Q7- What do you understand with structure of artificial neuron? Also compare with biological neuron to artificial Neuron?

Q8- Given

R=

	y1	y2	y3	y4
x1	1	0	1	0
x2	0	0	0	1
x3	0	0	0	0

And

S=

	z1	z2
y1	0	1
y2	0	0
y3	0	1

y4	0	0

Find T= R o S Using Max Product Composition?

Q09-What do you understand by Fuzzy PI Controller. Obtain the derivation for discrete time system. How the rule can be made in fuzzy control?

Q10- For the following scalar nonlinear function $\dot{x} = -x^3 + u$ using Lyapunov approach comment on the stability?

Section – C(2×20=40)

Q11- (a) What do you understand by associative property of human brain to train a neural network. Draw the structure of two layer discrete perceptron network. (10)

(b) Obtain the mathematical derivation of back propagation algorithm. (10)

Q12- 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

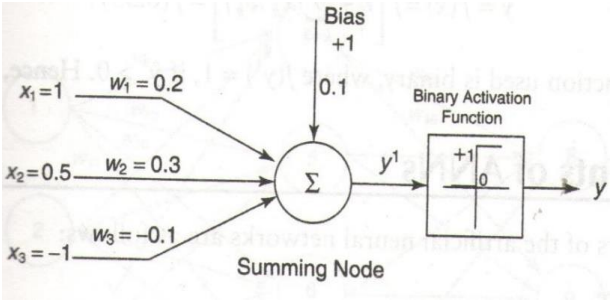

Figure1