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

| Question Paper Code | 13781 |
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## M.E. - DEGREE EXAMINATIONS, APRIL / MAY 2025
Second Semester
### M.E. - Power Electronics and Drives
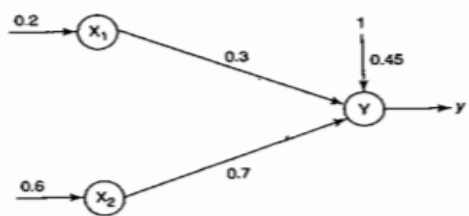### 20PPEEL202 - SOFT COMPUTING TECHNIQUES
Regulations - 2024

Duration: 3 Hours                                                                Max. Marks: 100

### PART - A (10 × 2 = 20 Marks)
Answer ALL Questions

| | | Marks | K-Level | CO |
|---|---|---|---|---|
| 1. | Find net input of the network shown including Bias input: | 2 | K1 | CO1 |



| | | | | |
|---|---|---|---|---|
| 2. | Construct OR function using McCulloch pitts model. | 2 | K3 | CO1 |
| 3. | Illustrate euclidean distance with one example. | 2 | K2 | CO2 |
| 4. | Explain the role of learning rate in training the network. | 2 | K2 | CO2 |
| 5. | For the fuzzy relation R, find the λ cut relation for λ=0.7. | 2 | K1 | CO3 |

$$R = \begin{bmatrix} 0.2 & 0.5 & 0.7 & 1 & 0.9 \\ 0.3 & 0.5 & 0.7 & 1 & 0.8 \\ 0.4 & 0.6 & 0.8 & 0.9 & 0.4 \\ 0.9 & 1 & 0.8 & 0.6 & 0.4 \end{bmatrix}$$

| | | | | |
|---|---|---|---|---|
| 6. | Define bounded difference of fuzzy set | 2 | K1 | CO3 |
| 7. | Infer the role of fitness function in GA? | 2 | K2 | CO4 |
| 8. | Explain single point crossover with one example. | 2 | K2 | CO4 |
| 9. | Explain dispOpt function in FIS. | 2 | K2 | CO5 |
| 10. | State limitations of neural networks and fuzzy systems when operated individually. | 2 | K1 | CO5 |

### PART - B (5 × 13 = 65 Marks)
Answer ALL Questions

| | | | | | |
|---|---|---|---|---|---|
| 11. | a) | Construct the Adaline architecture of and write the step by step procedure for training the Adaline with necessary flowchart. | 13 | K3 | CO1 |

**OR**

| | | | | | |
|---|---|---|---|---|---|
| | b) | Make use of the architecture of BPN and write the step by step procedure for training the BPN with necessary flowchart. | 13 | K3 | CO1 |

*K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyze; K5 – Evaluate; K6 – Create*                **13781**

*1*

12. a) Consider full CPN net shown in figure. Using input pair x=[0 1 1 0] and y=[0 1], perform the phase I training (one step only0.Analyze the activation of cluster layer units and update the weights using learning rates α=0.2 and β= 0.3.   *13 K4 CO2*
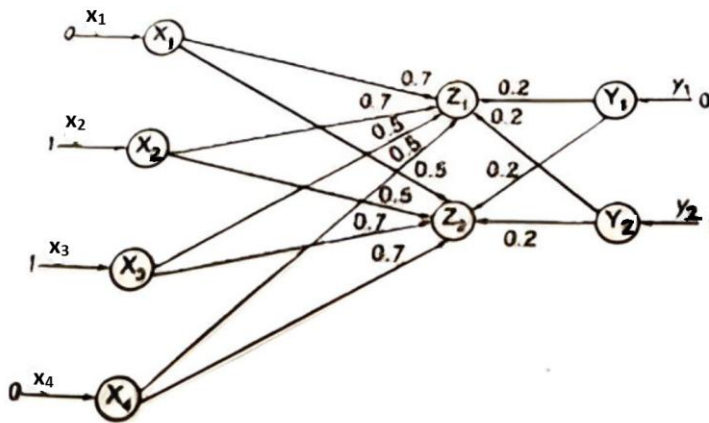


**OR**

b) Examine the architecture of hetro associative memory with necessary diagrams.   *13 K4 CO2*

13. a) Consider two fuzzy sets:   *13 K4 CO3*

$$A = \left\{ \frac{1}{2} + \frac{0.3}{4} + \frac{0.5}{6} + \frac{0.2}{8} \right\}$$

$$B = \left\{ \frac{0.5}{2} + \frac{0.4}{4} + \frac{0.1}{6} + \frac{1}{8} \right\}$$

Analyze i) A∩B ii) (A)' iii) (B)' iv) A∩(B)' v) (A)'∩B

**OR**

b) Analyze computer software to perform image processing and locate objects within the scene. The two fuzzy sets representing the plane and train images are:   *13 K4 CO3*
Plane = {0.2/train +0.5/bike +0.3/boat +0.8/plane +0.1/house}
Train = {1/train +0.2/bike +0.4/boat +0.5/plane +0.2/house}
Find i. Plane ∪ Train   ii. Plane ∩ train   iii. (Plane)'   iv. (train)'   v. (Plane ∩ train )'  vi.  Train ∪ (train)'.

14. a) Build Flow chart for the working of Genetic programming and explain.   *13 K3 CO4*

**OR**

b) Apply GA approach solve the problem of maximizing the function $f(x) = x^2$ where x is permitted to vary between 0 to 31.   *13 K3 CO4*

15. a) Build and Explain the Genetic Fuzzy Rule Based Systems with appropriate block diagrams.   *13 K3 CO5*
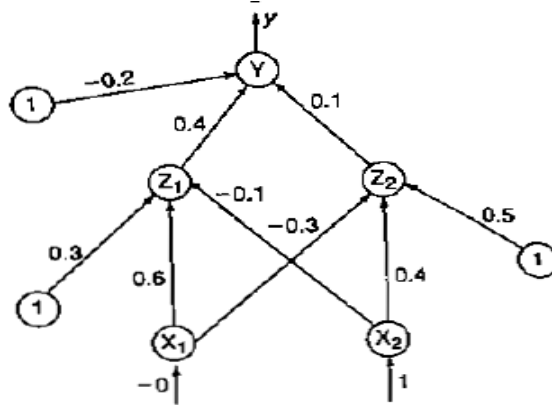
**OR**

b) Identify the commands used in the Fuzzy logic toolbox.   *13 K3 CO5*

*K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyze; K5 – Evaluate; K6 – Create*   **13781**

16. a) Using BPN, Apply new weights for network shown in figure. The *15 K3 CO1* network presented with input pattern [0,1] and target output is 1. Learning rate 0.25. Use bisigmoidal activation function.



**OR**

b) Choose the weights requires to perform the following classification *15 K3 CO1* using perceptron network. The vectors (1, 1, 1, 1) and (-1, 1, -1, -1) are belong to the class (so have target value 1) and vectors (1, 1, 1, -1) and (1, -1, -1, 1) are not belonging to class (so have target value -1). Assume learning rate as '1' & initial weight as '0'.