(3 hours) **Total Marks: 80**

N.B. 1. Question No. **1** is **compulsory**
2. Attempt any **Three** out of remaining
3. Assume suitable data if **necessary** and **justify** the assumptions
4. Figures to the **right** indicate full marks

Q1. [A] Explain any two Fuzzy membership functions. 05

[B] Show Mc-culloh Pit Model to implement OR gate. 05

[C) Explain with diagram different activation functions used in Neural Network. 05

[D] Explain with an example Union and Intersection of two fuzzy sets. 05

Q2 [A] What is learning? Explain the different types of learning with example. Compare the different learning rules. 10

[B] Let X be the Universe of well-known objects such as 10

X = {car, boat, house, bike, tree, Mountain}

Let Y be the Universe of simple geometrical shapes such as

Y={square, octagon, triangle, circle, ellipse}

Following are the fuzzy sets of objects such as "car", "square" and "corner"

A = car = {1.0/car + 0.7/boat + 0.3/house + 0.2/bike + 0.4/tree + 0.0/Mountain}

B = square = {1.0/square + 0.5/octagon + 0.6/triangle + 0.0/circle + 0.1/ellipse}

C = corner = {0.6/square + 0.8/octagon + 0.5/triangle + 0.0/circle + 0.2/ellipse}

i. Find the relation R between "car" and "square".

ii. Find the relation S between "square" and "corner".

iii. Find the relation T between "car" and "corner" using Max-Min composition.

Q3 [A] Determine the weights after one iteration for Hebbian learning of a single neuron network starting with initial weight vector w = [1, 0, -1, 0.5] and inputs as 10

X_1 = [1, -2, 0.5, -1],

X_2 = [1, -1.5, -2, -0.5],

X_3 = [1, 0, -1, 1.5] and c=1.

Use bipolar binary activation function.

[B] Explain with example Centre of largest area and weighted average method of Defuzzification. 10

Q4 [A] Describe in brief Single Solution Particle Swarm Optimization method. 10

[B] Explain the steps in Genetic Algorithm with a suitable Example. 10

Q5 [A] Explain with examples Binary SVM. 10

[B] With the help of a flow chart explain the working of Learning Vector Quantization. 10

Q6 Describe the methods (**any two**) 20

a. Natural Immune System

b. TSP, Best path finding using Ant algorithm

c. Color Recipe prediction - Single MLP approach

(3 Hours) Total Marks: 80

N.B. 1) Question No.1 is compulsory.

2) Attempt any three questions out of remaining five questions.

3) Assume suitable data whenever required but justify the same.

4) Assumption made should be clearly stated.

Q.No. 1 a)	Briefly explain the following: a. Differentiate DOS and Middleware b. Issues in load balancing c. Issues of fault tolerance d. Characteristics of RTOS	20
Q.No. 2(a)	Explain Non-Two-Phase Locking Algorithm. What are its advantages over two-phase-locking algorithm?	10
Q.No. 2(b)	With example, explain how Lamport's Algorithm provides Mutual Exclusion. Also explain how this algorithm can be further optimized.	10
Q.No. 3(a)	Compare the performances of receiver-initiated Vs sender initiated load sharing.	10
Q.No. 3(b)	Discuss the pros and cons of Distributed Database Systems.	10
Q.No. 4(a)	What are the requirements of a DBOS? Discuss the problem of concurrency control.	10
Q.No. 4(b)	Discuss the unbounded waiting condition for resource sharing in RTOS. Explain how it is handled in RTOS using PIP.	10
Q.No. 5(a)	Elaborate on the system model used for studying Agreement Problems	10
Q.No. 5(b)	Explain the rollback recovery algorithm and compare it with check point algorithm.	10
Q.No. 6	Write short notes on a. Mobile OS b. Scheduling real time tasks c. Distributed Deadlock	20

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(3 Hours) [Total Marks: 80]

N. B.: (1) Question No. 1 is compulsory.

(2) Attempt any **THREE** questions from the remaining five questions.

(3) Assume suitable data if necessary.

(4) Figures to the right indicate full marks.

Q1. Attempt **any four** questions. **20**

a) Can the overload protection circuit also be used for providing thermal protection for a switching device? Explain.

b) Explain in short the concept of Zero Order Hold (ZOH) for DC-DC converters in digital control.

c) Explain reactive power control in a microgrid.

d) Explain in brief the neutral point clamped inverter.

e) Explain Euler's method for ODE solver.

Q2. a) Explain the EMI-EMC issues in case of a power electronic circuit. What effect these have on its performance? **10**

b) What do you understand by a stiff differential equation? What features are necessary for the solver of such stiff differential equations? Explain with an example. **10**

Q3. a) Drive the ZOH and FOH models for DC-AC and AC-DC converters. **10**

b) Explain PID control for DC-DC converter in detail with the help of necessary block diagrams. **10**

Q4. a) List the necessary conditions that must be satisfied for the successful parallel operation of two inverters. Compare the droop control and master & slave control methods for parallel operation of inverters. **10**

b) "The 3-leg inverters cannot maintain balanced terminal voltages across an unbalanced three-phase load." Justify this statement. Explain how a 4-leg inverter is able to maintain balanced voltage for an unbalanced load. **10**

Q5. a) Explain with examples the different inverter interfacing strategies for transferring energy from a nonconventional energy source to grid. **10**

b) Explain in detail the process of synchronization of isolated energy sources (like a non-conventional source) with grid. **10**

Q6. Write short notes on (**any two)** **20**

i) Static switches.

ii) On-off control of AC voltage converters.

iii) Selection criteria for switching device.

iv) Clarke transformation.
