BRAINWARE UNIVERSITY

Term End Examination 2025-2026
Programme – M.Tech.(RA)-2025
Course Name – Artificial Intelligence and Machine Learning for Robotics
Course Code - MEC27505 (T)
(Semester II)

Full Marks : 40 **Time : 2:0 Hours**

[The figure in the margin indicates full marks. Candidates are required to give their answers in their own words as far as practicable.]

Group-A
(Multiple Choice Type Question) 1 x 10=10

1. *Choose the correct alternative from the following :*

(i) Identify an example of a machine learning application.
a) Compiler design b) Image recognition
c) Text editor d) Operating system

(ii) Select a type of learning that uses labeled data.
a) Unsupervised learning b) Reinforcement learning
c) Supervised learning d) Time series learning

(iii) Indicate the nature of linear data.
a) Randomly scattered data b) Data separable by a straight line
c) Periodic data d) Hierarchical data

(iv) Select a learning paradigm based on rewards.
a) Supervised learning b) Unsupervised learning
c) Reinforcement learning d) Batch learning

(v) Identify a property of Gaussian distribution.
a) Uniform spread b) Skewed shape
c) Bell-shaped curve d) Discrete values

(vi) Select a property of convex optimization.
a) Multiple local minima b) Guaranteed global optimum
c) Random solution d) Non-differentiable cost

(vii) Choose a criterion to analyze feasibility in constrained problems.
a) Objective value b) Constraint satisfaction
c) Learning rate d) Epoch count

(viii) Identify the purpose of perceptron learning algorithm.
a) Feature extraction b) Weight adjustment
c) Noise removal d) Data normalization

(ix) Choose a method to construct reward functions from demonstrations.

a) Q-learning
b) Inverse RL
c) Supervised learning
d) PCA

(x) Select a strategy to design an intelligent agent.

a) Fixed rules
b) Learning-based policy
c) Manual control
d) Static mapping

Group-B

(Short Answer Type Questions) 3 x 5=15

2. Explain the principle of parameter update in estimation. (3)
3. Apply optimization techniques in autonomous vehicle navigation. (3)
4. Explain the role of the confusion matrix in model evaluation. (3)
5. Create a simple reinforcement learning agent using state, action, and reward. (3)
6. Analyze the difference between linear and non-linear data representations. (3)

OR

Analyze the causes of vanishing gradients in Recurrent Neural Networks. (3)

Group-C

(Long Answer Type Questions) 5 x 3=15

7. Evaluate the suitability of Hidden Markov Models for dynamic systems. (5)
8. Define the Perceptron model and list its components. (5)
9. Illustrate a basic RNN architecture for time-series prediction. (5)

OR

Illustrate a Q-learning algorithm workflow. (5)

****