Faculty of Science and Technology

B.Tech. (Computer Science and Engineering/CE/IT/CT) Semester—VIII (C.B.C.S.) Examination

REINFORCEMENT LEARNING

PROG. ELE. – VI

Time : Three Hours] [Maximum Marks : 70

INSTRUCTIONS TO CANDIDATES

(1) All questions carry marks as indicated.

(2) Solve question **1 OR** question No. **2**.

(3) Solve question **3 OR** question No. **4**.

(4) Solve question **5 OR** question No. **6**.

(5) Solve question **7 OR** question No. **8**.

(6) Solve question **9 OR** question No. **10**.

(7) Due credit will be given to neatness and adequate dimensions.

(8) Assume suitable data wherever necessary.

(9) Illustrate your answers wherever necessary with the help of neat sketches.

1. (a) Define the Reinforcement Learning (RL) and describe its key elements. 7

   (b) Analyze the different approaches employed in Reinforcement Learning (RL). 7

OR

2. (a) Evaluate the concept of Multi-Armed bandit and explain its key components in detail. 7

   (b) Compare the exploration and exploitation in decision-making processes. 7

3. (a) Analyze the concept of Markov Decision Processes (MDPs) in reinforcement learning. 7

   (b) Describe how Bellman Equations formalize the principles of optimality. 7

OR

4. (a) Analyze the concepts of On-Policy First-Visit and Every-Visit Monte Carlo (MC) Control in. 7

   (b) Explain the Cauchy sequence and Green's equation. 7

5. (a) Describe how Dynamic Programming methods compute optimal value functions. 7

   (b) Explain Policy Iteration and Value Iteration Algorithms. 7

OR

6. (a) Illustrate the effectiveness of Temporal Difference (TD) Learning in Reinforcement Learning. 7

   (b) Explain different types of TD control methods, such as SARSA and Q-learning to improve decision-making policies. 7

7. (a) Describe how Eligibility Tracesare used to improve the efficiency and generality of learning algorithm. 7

(b) Analyze the concept of Policy Gradients in reinforcement learning. 7

OR

8. (a) What are some common algorithms and techniques used in full Reinforcement Learning ? 7

(b) How does the Least Squares Method contribute to solving reinforcement learning problems ? 7

9. (a) Explain application of POMDPS. 7

(b) What are the core principles and components of the Deep Q-Network (DQN) algorithm in reinforcement learning ? 7

OR

10. (a) Explain REINFORCE algorithm and challenges in implementing the REINFORCE algorithm. 7

(b) What are the main components and principles underlying the architecture of Hierarchical Reinforcement Learning (HRL) ? 7