Faculty of Science & Technology
Eighth Semester B.Tech. Computer Science & Engineering Examination/CE/IT/CT
REINFORCEMENT LEARNING
PROG ELE-VI

Time : Three Hours] [Maximum Marks : 70

INSTRUCTIONS TO CANDIDATES

(1) All questions carry marks as indicated.

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

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

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

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

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

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

(8) Assume suitable data whenever necessary.

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

1. (a) What is reinforcement learning, and how does it differ from other machine learning approaches ? 7

(b) Give examples of real-world applications where reinforcement learning is used. 7

OR

2. (a) Explain bandit algorithm and its role in decision-making. 7

(b) Describe UCB algorithm to decide which arm to pull in a multi-armed bandit scenario. 7

3. (a) How does Median Elimination algorithm work in bandit problems, and why is it useful ? 7

(b) What is a policy gradient in bandit algorithms, and how does it help the agent learn to make better decisions over time ? 7

OR

4. (a) Explain full RL algorithm in detail. 7

(b) What are Markov Decision Processes (MDPs), and how do they structure decision-making problems in reinforcement learning ? 7

5. (a) Describe Bellman optimality in reinforcement learning. 7

(b) Why is Bellman optimality important for agents to learn and improve their decision-making abilities ? 7

OR

6. (a) What is dynamic programming ? How does it help agents to solve problems in reinforcement learning ? 7

(b) How do TD (Temporal Difference) methods assist agents in learning from experiences ? 7

7. (a) Give a brief overview of eligibility traces. 7

(b) What is the use of Function Approximation ? Explain its two types. 7

OR

8. (a) Discuss the Least Squares Methods used in reinforcement learning. 5

(b) Write short notes on :

(i) Fitted Q

(ii) DQN

(iii) Policy Gradient. 9

9. (a) What are the advantages of Hierarchical Reinforcement Learning ? 7

(b) Describe the key components of Hierarchical Reinforcement Learning. 7

OR

10. (a) Explain POMDP. 5

(b) What are the key components of a POMDP ? 9