

Total No. of Questions : 8]

SEAT No. :

PD-4863

[Total No. of Pages : 2

[6404]-394

**B.E. (Artificial Intelligence and Data Science)
REINFORCEMENT LEARNING
(2019 Pattern) (Semester - VIII) (417533D) (Elective - VI)**

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates :

- 1) Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right side indicate full marks.
- 4) Assume Suitable data if necessary.

- Q1)** a) Discuss dynamic programming for the Markov decision process and define formulation of planning in MDPs. [6]
b) List and Explain the principles of optimality. [5]
c) Elaborate Iterative policy evaluation and policy iteration. [6]

OR

- Q2)** a) Elaborate proof of contraction mapping property of Bellman expectation and optimality operators. [7]
b) Discuss Banach fixed point theorem. [5]
c) Explain a proof of convergence of policy evaluation and value iteration algorithms. [5]

- Q3)** a) Discuss the role of Monte Carlo methods for model-free Reinforcement Learning and Monte Carlo control. [8]
b) Explain on-policy and off-policy learning techniques. [4]
c) Elaborate first visit and every visit to Monte Carlo in Reinforcement Learning. [6]

OR

- Q4)** a) Discuss Discounting-aware Importance Sampling and Per-decision Importance Sampling with examples. [12]
b) Elaborate Monte Carlo tree search along with examples. [6]

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Q5) a) Elaborate Deep Q-networks with convolution neural networks and single-layer neural networks. [12]

b) Compare Model based learning and model-free learning with applications. [6]

OR

Q6) a) Elaborate Temporal difference learning technique. [6]

b) Explain the Separate target network and discuss the role of the Separate target network in computing the target Q-values. [6]

c) Elaborate Double DQN and Dueling DQN in reinforcement learning. [6]

Q7) a) Elaborate Multi-agent Reinforcement Learning with Rollout and Policy Iteration. [6]

b) Discuss Trajectory Sampling and Real-time Dynamic Programming with respect to learning. [6]

c) Comment on Planning at Decision Time along with its importance. [5]

OR

Q8) a) Elaborate Heuristic Search and Rollout Algorithms in reinforcement learning. [6]

b) Discuss Integrated Planning, Acting and Learning in Planning and Learning. [6]

c) Explain Trajectory Sampling, and Real-time Dynamic Programming. [5]

