Q1)

i) Define the term *Artificial Neural Network (ANN)*. Briefly describe how it mimics the human brain. (1 marks)

ii) Explain the structure and function of a perceptron. Illustrate with a simple example. (1 marks)

iii) Using an example, explain the concept of forward propagation in neural networks. (2 marks)

iv) Discuss the key differences between expert systems and neural networks in terms of: (2 marks)

v) What are *hybrid intelligent systems*? Explain how neural networks and expert systems can be combined to form a *neural expert system*. Discuss the structure and benefits of such a system. (4 marks)

Q2)

i) What is a genetic algorithm? Describe the biological principles that inspired its design. (1 marks)

ii) List and briefly explain three key genetic operators used in GAs. (2 marks)

iii) With the help of an example, explain how *crossover* and *mutation* affect the evolution of solutions in a GA. (2 marks)

iv) Compare *value-based*, *policy-based*, and *model-based* approaches in reinforcement learning. Include a relevant use case for each. (2 marks)

v) Describe the Bellman Optimality Equation in reinforcement learning. How does it relate to decision making in uncertain environments? (3 marks)