

Index Number : EG/2020/4247

EE6250

2025 JUNE

Q1)

i) An Artificial Neural Network (ANN) is a computational model inspired by the structure and function of biological neural networks in the human brain. It consists of interconnected nodes (neurons) that process information and learn from data. ANNs mimic the human brain by using layers of neurons that transmit signals, adjusting connection weights based on experience (training data), and learning patterns or features from input data.

ii) A perceptron has inputs and outputs. It can be used for classification.

- iii) Forward propagation is the process of moving data from the output layer back to the input layer to update weights.

iv) Expert systems use rules and logic to make decisions, while neural networks learn from data and adapt based on patterns

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v) Hybrid intelligent systems combine different AI techniques, such as neural networks and expert systems, to leverage their strengths. A neural expert system integrates the learning and pattern recognition abilities of neural networks with the rule-based reasoning of expert systems.

Structure: The system uses a neural network to process input data and extract features, then applies expert system rules to make decisions or provide explanations.

Benefits: Improved accuracy, better handling of uncertainty, and the ability to explain decisions.

Q2)

i) genetic algorithms are inspired by biology and use mutation

ii) Addition : Adding new data to the algorithm

iii) Suppose you are optimizing a schedule. Crossover combines parts of two good schedules to create a new one, possibly better than both parents. Mutation randomly changes a part of the schedule, helping to explore new solutions and avoid getting stuck in local optima.

iv) Value-based learns values. Policy-based learns policies. Model-based uses models.

v) The Bellman Optimality Equation states that the value of a state under an optimal policy is equal to the immediate reward plus the discounted value of the next state. It helps agents make decisions that maximize long-term rewards in uncertain environments.

