POKHARA UNIVERSITY

Level: Bachelor	Semester: Fall	Year	: 2025
Programme: BE		Full Marks	: 100
Course: Artificial Intelligence and Neural Network (New)		Pass Marks	: 45
		Time	: 3 hrs.

Candidates are required to give their answers in their own words as far as practicable.
The figures in the margin indicate full marks.
Attempt all the questions.

1. a) What is AI? How can AI system like Deepseek help human? Discuss the ethical implications of Artificial Intelligence (AI) in society, focusing on its impact on employment, privacy, and security. (7 marks)
   b) Differentiate between Goal based intelligent agent and Utility based intelligent agent with appropriate example. (8 Marks)

2. a) What is state space of a problem? Represent the state space for the following problem:
   You are given two jugs: a 4-liter jug and a 3-liter jug, along with a pump that provides an unlimited supply of water. There are no measurement markings on either jug, and you can pour water onto the ground if necessary. How can you measure exactly 2 liters of water in the 4-liter jug? (7 marks)
   b) The greedy best-first search in not complete. It may stuck in a loop. What is the reason behind this? How can you overcome this problem? Explain with example. (8 marks)

   OR

   What is the multi-agent environment? Explain the role of alpha (α) and beta (β) for optimizing Mix-Max algorithm with an appropriate example.

3. a) How does probabilistic reasoning, specifically Bayesian networks, help in reasoning under uncertainty? While watching a game of the Nepal Premier League in a café, you observe someone who is supporting Janakpur Bolts in the game. Using Bayes' Rule, calculate the probability that they were actually born withing 30 miles of Janakpur. Assume that: (7 marks)
   - The probability that a randomly selected person in a typical local bar environment is born within 30 miles of Janakpur is 1/29.
   - The chance that a person born withing 30 miles of Janakpur actually supports Janakpur Bolts is 7/19.
   - The probability that a person not born within 30 miles of Janakpur supports Janakpur Bolts is 1/19.

   b) What is the role of knowledge engineer in knowledge acquisition for an expert system? Explain in detail. (8 marks)
4. a) Explain supervised learning and Unsupervised learning algorithm based on their learning models with appropriate examples. (7 marks)
   b) How does an artificial neuron is inspired from the biological neuron? Explain in detail. (8 marks)

5. a) What is Feedforward neural network? Explain backpropagation in training neural network in detail with an appropriate example. (7 marks)
   b) How is the performance of any machine learning model evaluated? Describe any two evaluation methods in detail. (8 marks)

   OR

   What is the purpose of a loss function in training a neural network? How does it influence the optimization process during backpropagation? Explain with an example.
6. a) Explain the structure of a Convolutional Neural Network (CNN) in detail. (5 marks)
   b) What is recurrent Neural Network (RNN)? How do Long Short-Term Memory (LSTM) networks and Gated Recurrent Unites (GRU) address the limitations of traditional RNNs? Explain in detail. (10 marks)
7. Write short notes on: (Any two) (2x5 marks)
   a. Genetic Algorithm
   b. Semantic Net and Frames
   c. Resolution in predicate logic