Assignment 3

Class 10

Subject: Artificial Intelligence

A. Multiple Choice Questions (1 mark each)

(5 × 1 = 5 marks)

1. Which of the following best describes the role of *model evaluation* in the AI Project Cycle?
   A) To train models on large data sets
   B) To test and improve the model's performance using unseen data
   C) To visualize raw data patterns
   D) To finalize model deployment
2. When a neural network automatically extracts features from raw data without explicit programming, it is demonstrating —
   A) Rule-based reasoning   B) Reinforcement Learning   C) Deep Learning   D) Supervised Clustering
3. In the context of **Computer Vision**, the process of distinguishing objects within an image and drawing bounding boxes around them refers to —
   A) Image Segmentation   B) Object Detection   C) Classification   D) Feature Mapping
4. Which of the following is an ethical concern during model evaluation?
   A) Model accuracy
   B) Transparency and accountability
   C) Data visualization
   D) Dataset normalization
5. Which stage of **Natural Language Processing (NLP)** focuses on understanding the meaning of words in context?
   A) Lexical Analysis   B) Semantic Analysis   C) Syntactic Analysis   D) Pragmatic Analysis

B. Short-Answer Questions (2 marks each)

(2 × 2 = 4 marks)

6. Differentiate between **Precision** and **Recall** in model evaluation. Provide an example scenario where Recall is more critical than Precision.
7. Explain the importance of the **hidden layers** in a neural network. How do they affect the learning capacity of the model?

C. Application-Based / Analytical Questions (3 marks each)

(2 × 3 = 6 marks)

8. Consider a dataset used to predict crop yield based on temperature, soil moisture, and rainfall.
   a) Identify the appropriate **type of AI model** (classification/regression) for this problem.
   b) Discuss how **train-test split** and **evaluation metrics** would ensure reliability of the model.
9. Compare **Computer Vision** and **Natural Language Processing** in terms of:
   - Type of data processed
   - Tools or libraries used
   - Real-life applications that demonstrate ethical concerns

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D. Long-Answer Case-Based Question (5 marks)

(1 × 5 = 5 marks)

10. **Case Study: Ethical and Technical Evaluation of AI Models**
    An organization designed an AI-powered recruitment system to shortlist candidates based on resumes. Later, it was discovered that the model exhibited **gender bias** and favored male candidates.

Task:
Using your knowledge from **AI Project Cycle**, **Model Evaluation**, and **Ethical Frameworks (especially Bioethics and Value-based ethics)**, analyze:

- Where in the AI Project Cycle bias could have been introduced.
- Which evaluation metrics might reveal the bias.
- How ethical principles (Autonomy, Justice, Non-maleficence, and Beneficence) could guide the redesign of this model to make it fair and transparent.