



**BK BIRLA CENTRE FOR EDUCATION**  
SARALA BIRLA GROUP OF SCHOOLS  
SENIOR SECONDARY CO-ED DAY CUM BOYS' RESIDENTIAL SCHOOL  
PERIODIC TEST - 02 (2024-25)



**ARTIFICIAL INTELLIGENCE (843)**  
**MARKING SCHEME**

**Class : XI SCIENCE/COMMERCE/ARTS**

**Date : 06-12-2024**

**Admission No.:**

**Duration : 1 Hr**

**Max. Marks : 25**

**Roll No.:**

**General Instructions:**

Try to attempt all questions in the given order.

All questions are compulsory.

The Question Paper is divided into three sections Section A to C.

- Section A has 10 questions and carry 1 mark each.
- Section B has 6 questions and carry 2 marks each.
- Section C has 1 question and carry 3 marks each.

**Section-A**

1. \_\_\_\_\_ is a branch of artificial intelligence that deals with the interaction between computers and humans using the natural language. 1  
(a) Computer Vision (b) Natural Language Processing (c) **Computer Language Processing** (d) Human Language Processing
2. Which feature of NLP helps in understanding the emotions of the people mentioned with the feedback ? 1  
(a) Virtual Assistant (b) **Sentiment Analysis** (c) Text classification  
(d) Automation Summarization
3. The main function of smart assistants like Apple Siri and Amazon Alexa is 1  
(a) Neural Network (b) Computer Vision (c) Data Science (d) **Natural language Processing**
4. When a machine possesses the ability to mimic the following human traits, it is said to have artificial intelligence. Identify the positive traits that an AI machine should possess. 1  
(i) make decisions (ii) bias (iii) predict (d) learn and improve on its own.  
(a) (i) and (iii) only (b) **(i), (iii) and (iv) only** (c) (ii) and (iv) only (d) (i), (ii) and (iv) only.
5. The Indian Government banned a few apps stating – “servers in the hostile nation are receiving and using the acquired data improperly”. Which terminology suits best for this nation ? 1  
(a) AI Ethics (b) **Data Privacy** (c) AI Bias (d) AI Access
6. Amazon had been working on a secret AI recruiting tool. The machine-learning specialists uncovered a big problem: their new recruitment engine did not like women. The system taught itself that male candidates were preferable. It penalized resumes that included the word “women”. This led to the failure of the tool. This is an example of : 1  
(a) Data Privacy (b) AI Access (c) **AI Bias** (d) Data Exploration

### Assertion & Reasoning:

7. Statement 1: Sentiment analysis can be used to gauge customer satisfaction with a product. 1  
Statement 2: Sentiment analysis can identify positive and negative words in customer reviews.  
(a) Statement 1 is correct, but statement 2 is incorrect.  
(b) Statement 1 is incorrect, but statement 2 is correct.  
**(c) Both the statements are correct.**  
(d) Both the statements are incorrect.
8. Statement 1: Natural Language Processing does not use different techniques like parsing 1  
techniques, text recognition, and parts of speech tagging for implementation.  
Statement 2: The range of NLP also include generating sentences in natural languages by  
computers just like humans do.  
(a) Statement 1 is correct, but statement 2 is incorrect.  
**(b) Statement 1 is incorrect, but statement 2 is correct.**  
(c) Both the statements are correct.  
(d) Both the statements are incorrect.
9. Statement 1: Transparency in AI is not always achievable or desirable, especially for complex 1  
deep learning models.  
Statement 2: Explaining the inner workings of complex AI might not be easily understandable  
and could compromise intellectual property.  
(a) Statement 1 is correct, but statement 2 is incorrect.  
(b) Statement 1 is incorrect, but statement 2 is correct.  
**(c) Both the statements are correct.**  
(d) Both the statements are incorrect.
10. Statement 1: Developing ethical guidelines for AI is unnecessary because technology will 1  
eventually solve its own ethical issues.  
Statement 2: Technological advancements will lead to AI systems that are inherently fair and  
unbiased.  
(a) Statement 1 is correct, but statement 2 is incorrect.  
(b) Statement 1 is incorrect, but statement 2 is correct.  
(c) Both the statements are correct.  
**(d) Both the statements are incorrect.**

### Section- B

11. Differentiate between Extraction based and Abstraction based summarisation. 2

Ans: 1. Extraction-Based vs. Abstraction-Based Summarization

#### Aspect

Extraction-Based Summarization

Abstraction-Based Summarization

#### Definition

Selects and compiles key sentences directly from the text.

Generates summaries by paraphrasing and using new sentences.

#### Technique

Relies on identifying important phrases or sentences.

Uses NLP techniques to create human-like summaries.

#### Output

Directly taken from the original text, maintaining the exact wording.

May contain new words or phrases not in the original text.

#### Complexity

Simpler and faster to implement.

More complex, requiring deep learning models like transformers.

**Use Case:**

Useful for factual data like reports and news articles.

Suitable for creative or context-rich content.

12. Define the following: (Any two with examples)

2

(a) Intent (b) Entity (c) Dialog

Ans: **(a) Intent**

Definition: In NLP, an intent represents the purpose or goal behind a user's text or speech input. It reflects what the user wants to accomplish.

Example:

User Input: "Can you tell me the weather in London?"

Intent: GetWeather

User Input: "I'd like to order a pizza."

Intent: OrderFood

**(b) Entity**

Definition: An entity is a specific piece of information in the user's input that provides context or parameters needed to fulfill the intent. Entities can include names, dates, locations, times, or numbers.

Example:

User Input: "Book a table for two at 7 PM in Olive Garden."

Intent: BookTable

Entities:

Number of people: two

Time: 7 PM

Restaurant: Olive Garden

User Input: "What's the weather like in Paris tomorrow?"

Intent: GetWeather

Entities:

Location: Paris

Date: tomorrow

**(c) Dialog**

Definition: In NLP, a dialog is the structured conversation flow between the user and the system (chatbot, virtual assistant, etc.). It involves prompts, responses, and transitions to achieve the intent, often leveraging identified entities.

Example:

Dialog for Booking a Flight:

Bot: "Where do you want to travel?"

User: "Paris."

Bot: "What date would you like to travel?"

User: "December 15th."

Bot: "Booking a flight to Paris on December 15th. Is that correct?"

User: "Yes."

The dialog uses both the intent (BookFlight) and entities (Destination: Paris, Date: December 15th) to guide the conversation.

13. List the different phases of NLP (Natural Language Processing). Explain any two:

2

Ans: Lexical Analysis (Tokenization): Breaking down the text into smaller units like words or phrases (tokens).

Syntactic Analysis (Parsing): Analyzing the grammatical structure of a sentence.

Semantic Analysis: Extracting the meaning of a sentence based on its content.

Discourse Integration: Understanding the context across multiple sentences or paragraphs.  
Pragmatic Analysis: Interpreting meaning based on the context and real-world knowledge.  
Named Entity Recognition (NER): Identifying entities such as names, dates, and places in the text.  
Sentiment Analysis: Determining the sentiment or emotion conveyed in the text.

14. Give some examples where AI is being used for good.

2

Ans: **1. Healthcare**

Early Disease Detection: AI helps detect diseases like cancer, Alzheimer's, and diabetes through medical imaging and pattern analysis.

Example: IBM Watson Health assists doctors in diagnosing and recommending treatments.

Personalized Treatment: AI tailors treatments to patients based on genetic and medical history.

Example: Tempus uses AI for personalized cancer care.

**2. Disaster Management**

Predicting Natural Disasters: AI models predict earthquakes, floods, and hurricanes by analyzing geological and weather data.

Example: Google's AI provides flood forecasts in vulnerable regions.

Rescue Operations: AI-powered drones assist in search and rescue missions after disasters.

**3. Education**

Personalized Learning: AI adapts educational content to students' learning paces and styles.

Example: Duolingo uses AI to tailor language lessons.

Access for the Differently Abled: AI-powered tools like speech-to-text converters and real-time translations enhance learning accessibility.

**4. Environment and Wildlife Conservation**

Wildlife Protection: AI detects and prevents poaching through surveillance systems.

Example: TrailGuard AI monitors and protects endangered species.

Climate Change Monitoring: AI tracks deforestation and carbon emissions using satellite imagery.

Example: Global Forest Watch uses AI to detect illegal logging.

**5. Accessibility**

Assisting the Visually Impaired: AI tools like screen readers and smart glasses enable visually impaired individuals to navigate their surroundings.

Example: Microsoft's Seeing AI app describes the environment to visually impaired users.

Speech and Hearing Assistance: AI-powered speech recognition helps individuals with speech disorders.

**6. Social Good Initiatives**

Combating Human Trafficking: AI analyzes online patterns to identify and combat trafficking activities.

Example: Thorn uses AI to locate victims and criminals.

Reducing Hunger: AI optimizes agricultural practices, improving crop yields and reducing waste.

Example: Blue River Technology uses AI for precision farming.

**7. Fighting Fake News**

AI identifies and curbs the spread of misinformation by analyzing patterns and verifying sources.

Example: Fact-checking tools like ClaimBuster.

15. What do you understand about AI bias ? List the types and explain it briefly with examples. 2
- Ans: AI bias occurs when artificial intelligence systems produce unfair or prejudiced outcomes due to flawed algorithms, training data, or human oversight. It arises when the AI unintentionally reflects the biases present in the data it was trained on or in its design process.

Types of AI Bias and Examples:

### 1. Data Bias

This occurs when the training data does not represent the diversity of the real-world population or includes biased information.

Example:

A facial recognition system trained primarily on lighter-skinned individuals may struggle to recognize darker-skinned faces accurately.

Biased hiring tools that favor male resumes if the training data reflects a history of gender inequality in hiring.

### 2. Algorithmic Bias

This happens when the algorithm's design or decision-making process introduces bias, regardless of the data quality.

Example:

Loan approval algorithms that prioritize certain zip codes, inadvertently discriminating against low-income neighborhoods.

Predictive policing systems disproportionately targeting specific communities based on historical crime data.

### 3. Cognitive Bias

Cognitive biases in AI occur when the system reflects the biases of its human developers or users, such as anchoring, availability bias, or stereotyping.

Example:

A hiring AI that ranks candidates higher if their resume matches specific formats or keywords commonly associated with past successful hires, showing anchoring bias.

A recommendation system overemphasizing recent trends due to recency bias, while neglecting older but relevant data.

16. Imagine you are a data scientist working on training an AI model for facial recognition. During the developed phase, you discover that the AI system shows a significant bias against individuals with darker skin tones, leading to higher error rates in identifying them accurately. As an ethical data scientist, how would you approach this issue to ensure fairness and minimize discrimination in the facial recognition AI model ? 2

Ans: Discovering bias in a facial recognition AI model is a serious issue that requires immediate attention. Here's a step-by-step approach to address the bias and ensure fairness:

1. **Acknowledge the Problem:** The first step is to acknowledge the existence of the bias and its potential negative consequences. This involves understanding the root cause of the bias, which could be due to various factors such as biased training data, algorithmic limitations, or societal prejudices reflected in the data.
2. **Investigate the Bias:** Conduct a thorough investigation to understand the nature and extent of the bias. This includes analyzing the model's performance on different demographic groups, identifying the specific features that contribute to the bias, and understanding how the bias manifests in real-world applications.
3. **Address the Bias:** Once the root cause of the bias is identified, take appropriate steps to mitigate it. This could involve:
  - o **Data Augmentation:** Increase the diversity of the training data by collecting more images of individuals with darker skin tones. This can help the model learn to recognize a wider range of facial features.

- Ans:
- **Algorithm Modification:** Modify the algorithm to be less sensitive to certain facial features that may be more prevalent in certain demographic groups. This could involve using more robust feature extraction techniques or adjusting the model's decision thresholds.
  - **Fairness Metrics:** Incorporate fairness metrics into the model evaluation process to ensure that the model performs equally well on all demographic groups. This could involve using metrics such as demographic parity or equalized odds.
  - **Regular Monitoring:** Continuously monitor the model's performance to detect and address any emerging biases. This could involve regular retraining with new data and re-evaluation of the model's fairness metrics.
  - 4. **Ethical Considerations:** Throughout the process, prioritize ethical considerations and ensure that the model is developed and deployed responsibly. This includes consulting with domain experts, ethicists, and legal professionals to ensure that the model aligns with ethical guidelines and avoids perpetuating harmful stereotypes.
  - 5. **Transparency:** Be transparent about the model's limitations and potential biases. This involves documenting the model's development process, sharing information about its performance on different demographic groups, and providing clear guidelines for its use.
  - 6. **Collaboration:** Collaborate with other researchers and organizations to share knowledge and best practices for developing fair and unbiased AI systems. This could involve participating in open-source initiatives, attending conferences, and publishing research papers.

By following these steps, data scientists can take significant steps towards mitigating bias in facial recognition AI models and ensuring that these technologies are used in a fair and equitable manner.

17. Discuss different strategies and techniques for Mitigating bias in AI. Explain them briefly. 3

Ans: Techniques for Mitigating Bias in AI

**a) Using Diverse Data**

**Representative Data:** Ensure that the training data includes a diverse range of individuals from various backgrounds, including different races, genders, ages, and socioeconomic statuses. This helps the AI model learn from a broader range of experiences and reduces the risk of bias.

**b) Detecting Bias**

**Fairness Metrics:** Employ various fairness metrics to assess the model's performance across different demographic groups. These metrics can help identify potential biases in the model's predictions.

**Sensitivity Analysis:** Analyze how the model's predictions change when different input features are modified. This can help identify features that disproportionately affect certain groups.

**c) Fair Algorithms**

**Fairness-Aware Algorithms:** Utilize algorithms that explicitly consider fairness constraints during training. These algorithms aim to minimize disparities in outcomes across different groups.

**Post-processing Techniques:** Apply techniques like calibration or re-ranking to adjust the model's predictions to reduce bias and mitigate biases.

**d) Being Transparent**

**Model Interpretability:** Make the model's decision-making process transparent by using techniques like feature importance analysis or decision trees. This helps understand how the model arrives at its predictions and identify potential biases.

**Documentation:** Document the entire development process, including data collection, preprocessing, model selection, and evaluation. This transparency can help identify and

**e) Inclusive Teams**

**Diverse Teams:** Involve individuals from diverse backgrounds in the AI development process. This helps bring different perspectives and reduces the risk of bias.

**Ethical Guidelines:** Establish ethical guidelines and principles to ensure that AI is developed and used responsibly.

\*\*\*\*\* **BEST OF LUCK** \*\*\*\*\*