Solutions

CBSE AI Class X (Session 2024-25)

Section-A (Objective Type Questions)

Question 1: Answer any 4 out of the given 6 questions on employability skills: $4 \times 1 = 4$4×1=4

1. **(i)** Which of the following does not help in stress management?
    - **(D) Negative thoughts**
2. **(ii)** Spam refers to:
    - **(C) Junk mails**
3. **(iii)** Assertion (A): Sustainable agriculture is environment friendly.
    - **(A) Both (A) and (R) are correct and (R) is the correct explanation of (A).**
4. **(iv)** Which of the following is not a step to build self-motivation?
    - **(C) Being indisciplined**
5. **(v)** Which of the following types of communication takes place when the number of people is small enough to communicate with each other effectively?
    - **(D) Small group communication**
6. **(vi)** Reema has started her own restaurant. She keeps on trying new ideas to make different dishes for her customers. As an entrepreneur, Reema is:
    - **(B) Creative**

Question 2: Answer any 5 out of the given 6 questions: $5 \times 1 = 5$5×1=5

1. **(i)** Assertion (A): When a machine is able to mimic human traits, it is said to be artificially intelligent.
    - **(C) (A) is correct but (R) is not correct.**
2. **(ii)** Platforms such as Spotify, Facebook, Instagram, Amazon, Netflix etc. show recommendations on the basis of what you like. Which is the technology behind this?
    - **(C) Artificial Intelligence**
3. **(iii)** Statement 1: In "When" block of 4Ws canvas we find the stakeholders.
    - **(D) Statement 2 is correct but Statement 1 is incorrect.**
4. **(iv)** Whenever we want an AI project to be able to predict an output, we need to _____.

- **(B) first train it using the data.**

5. **(v)** What does the term “image processing” refer to in Computer Vision?
   - **(B) Extracting meaningful information from images**
6. **(vi)** A corpus contains 4 documents in which the words such as ‘an, is, the’ were appearing frequently. Identify the term that is used for such words.
   - **(A) Stop word**

Question 3: Answer any 5 out of the given 6 questions: $5\times1=55\times1=5$

1. **(i)** Identify the logo of an application of AI given below. It helps us to navigate to places.
   - **Google Maps**
2. **(ii)** Which of the following data science applications is not associated with genetics and genomics?
   - **(D) To search the house address of a relative on the Internet.**
3. **(iii)** In Computer Vision, which of the following tasks is used for a single object?
   - **(B) Classification + Localization**
4. **(iv)** It is a domain-specific language that is designed for managing data held in different kinds of DBMS (Database Management System). It is particularly useful in handling structured data. Which computer language is this?
   - **(A) SQL**
5. **(v)** Which application of NLP helps to provide an overview of a news item or blog post? It also avoids redundancy from multiple sources and maximizes the diversity of content obtained.
   - **(D) Automatic Summarization**
6. **(vi)** Which condition of evaluation does the following diagram indicate?
   - **(B) False Negative**

Question 4: Answer any 5 out of the given 6 questions: $5\times1=55\times1=5$

1. **(i)** Which of the following is the correct expansion of CSV?
   - **(B) Comma Separated Values**
2. **(ii)** Statement 1: Overfitting is not recommended for evaluation of a model.
   - **(A) Both Statement 1 and Statement 2 are correct.**
3. **(iii)** It is one of the parameters for evaluating a model's performance and is defined as the percentage of true positive cases versus all the cases where the prediction is true. Which of the following evaluation parameter is this?
   - **(A) Precision**

4. **(iv)** Which form of learning-based approach does the following diagram indicate?
    - **(B) Classification**
5. **(v)** Which of the following applications of NLP (Natural Language Processing) is associated with spam filtering in e-mails?
    - **(C) Text Classification**
6. **(vi)** Raghav can turn on and off any appliance remotely using an internet-enabled device. This is an example of _____.
    - **(B) Internet of Things (IoT)**

Question 5: Answer any 5 out of the given 6 questions: $5\times1=55\times1=5$

1. **(i)** Musical intelligence is a concept that:
    - **(D) describes a person's ability to recognize and create sounds, rhythms and sound patterns.**
2. **(ii)** With respect to evaluation, for which of the following does the prediction and reality match?
    - **(B) True positive and True negative**
3. **(iii)** Statement 1: Various search engines and e-commerce portals now have a new feature called image-based search using computer vision.
    - **(C) Statement 1 is correct but Statement 2 is incorrect.**
4. **(iv)** In the context of NLP, which of the following words represents a stem resulting from stemming for "Studies"?
    - **(A) Study**
5. **(v)** Which of the following scenarios might have a high False Negative (FN) cost?
    - **(A) Viral Disease Outbreak**
6. **(vi)** Which type of chat-bot has a wide functionality, is flexible and powerful, and works on bigger databases directly?
    - **Contextual Chatbot**

Section-B (Subjective Type Questions)

Question 6: Explain the importance of following a healthy lifestyle in effectively dealing with stress. Write any one common factor that causes stress among the children nowadays.

- **Answer:** A healthy lifestyle, including regular exercise, balanced diet, and adequate sleep, helps in managing stress by improving physical and mental health. One common factor causing stress among children is academic pressure.

Question 7: If you are a team leader of a team of 20 people in an organization, mention any two methods that you will use for effective communication with your team members.

- **Answer:**
    1. **Regular Meetings:** Schedule regular team meetings to discuss progress, address concerns, and share updates.
    2. **Open Communication Channels:** Use tools like email, chat apps, and project management software to ensure open and continuous communication.

Question 8: Write any two tasks that entrepreneurs do when they run their business.

- **Answer:**
    1. **Planning and Strategy:** Entrepreneurs develop business plans and strategies to achieve their goals.
    2. **Marketing and Sales:** They focus on marketing their products/services and managing sales to generate revenue.

Question 9: Enlist any two measures that an individual should follow to take care of his/her digital devices.

- **Answer:**
    1. **Regular Updates:** Keep the device's software and applications updated to ensure security and performance.
    2. **Antivirus Protection:** Install and regularly update antivirus software to protect against malware and viruses.

Question 10: Discuss the following problems related to sustainable development:

- **(i) Water:** Water scarcity and pollution are major issues affecting sustainable development. Efficient water management and conservation are essential.
- **(ii) Fuel:** Over-reliance on fossil fuels leads to environmental degradation. Transitioning to renewable energy sources is crucial for sustainability.

Question 11: Differentiate between Computer Vision (CV) and Natural Language Processing (NLP).

- **Answer:**

    - **Computer Vision (CV):** Focuses on enabling machines to interpret and understand visual information from the world, such as images and videos.
    - **Natural Language Processing (NLP):** Deals with the interaction between computers and human language, enabling machines to understand, interpret, and generate human language.

Question 12: Define the following with respect to AI project cycle:

- **(i) Data Exploration:** The process of analyzing and understanding the data to identify patterns, trends, and insights.
- **(ii) Data Features:** Specific characteristics or attributes of the data that are used as inputs for AI models to make predictions.

Question 13: One of the applications of Data Science is Airline Route Planning. List any two tasks that airline companies can do using Data Science.

- **Answer:**
    1. **Optimizing Flight Routes:** Use data to determine the most efficient routes, reducing fuel consumption and travel time.
    2. **Predicting Demand:** Analyze historical data to predict passenger demand and adjust flight schedules accordingly.

Question 14: Give any two key impacts of Computer Vision on medical imaging.

- **Answer:**
    1. **Improved Diagnosis:** Computer Vision can enhance the accuracy of medical imaging, leading to better diagnosis of diseases.
    2. **Automated Analysis:** It can automate the analysis of medical images, reducing the workload on healthcare professionals.

Question 15: What is the primary difference between Human Language and Computer Language?

- **Answer:**
    - **Human Language:** Complex, nuanced, and context-dependent, often involving emotions and cultural references.
    - **Computer Language:** Precise, structured, and unambiguous, designed for clear and logical execution of instructions.

Question 16: Suppose you are developing an AI model to detect fraudulent financial transaction risk. Describe False Positives and False Negatives in this context.

- **Answer:**
  - **False Positive:** The model incorrectly flags a legitimate transaction as fraudulent.
  - **False Negative:** The model fails to identify an actual fraudulent transaction.

Question 17: What do you understand by AI Bias and AI Access? Give one example of each to support your answer.

- **Answer:**
  - **AI Bias:** When an AI system produces prejudiced results due to biased training data. Example: A facial recognition system that performs poorly on certain ethnic groups.
  - **AI Access:** The availability and accessibility of AI technologies to different users. Example: Limited access to AI tools in underdeveloped regions.

Question 18: What is the use of problem statement template with respect to 4Ws of problem scoping? Draw a problem statement template depicting all key elements.

- **Answer:**
  - **Use:** The problem statement template helps in clearly defining the problem by addressing the 4Ws: Who, What, Where, and Why.
  - **Template:**
    - **Who:** Who is affected by the problem?
    - **What:** What is the problem?
    - **Where:** Where does the problem occur?
    - **Why:** Why is it important to solve the problem?

Question 19: Consider the following diagram. It explains how a system of organized machine learning algorithms perform certain tasks. Identify the concept and explain its working.

- **Answer:**
  - **Concept:** Ensemble Learning

- **Working:** Ensemble learning combines multiple machine learning models to improve performance. Each model makes predictions, and the final output is a combination (e.g., average, majority vote) of these predictions, leading to more accurate and robust results.

Question 20: Consider the following documents:

- **Document 1:** NLP is a domain of AI.
- **Document 2:** NLP stands for Natural Language Processing.
- **Implement all the four steps of Bag of Words (BoW) model to create a document vector table.**
- **Answer:**
  1. **Tokenization:** Split the text into individual words.
     - Document 1: ["NLP", "is", "a", "domain", "of", "AI"]
     - Document 2: ["NLP", "stands", "for", "Natural", "Language", "Processing"]
  2. **Vocabulary Creation:** Create a list of unique words.
     - Vocabulary: ["NLP", "is", "a", "domain", "of", "AI", "stands", "for", "Natural", "Language", "Processing"]
  3. **Vectorization:** Create vectors for each document based on word frequency.
     - Document 1: [1, 1, 1, 1, 1, 1, 0, 0, 0, 0, 0]
     - Document 2: [1, 0, 0, 0, 0, 0, 1, 1, 1, 1, 1]
  4. **Document Vector Table:** Represent the documents as vectors.
     -

Word	Document 1	Document 2
NLP	1	1
is	1	0
a	1	0
domain	1	0
of	1	0
AI	1	0
stands	0	1
for	0	1
Natural	0	1
Language	0	1
Processing	0	1

Question 21: An AI model has been developed to test specimens of blood/urine/cough etc. to diagnose ailments (diabetes/liver infection etc.). The model was tested on a data-set of about 630 tests and the resulting confusion matrix is as follows:

- **Confusion Matrix:**
  -
    -

	Reality: Yes	**Reality: No**
Prediction: Yes	110	60
Prediction: No	50	410

- **(A) How many total cases are True Negative in the above scenario?**
  - **Answer:** 410
- **(B) Calculate Precision, Recall and F1 Score.**
  - **Precision:** True Positives / (True Positives + False Positives) = 110 / (110 + 60) = 110 / 170 ≈ 0.647
  - **Recall:** True Positives / (True Positives + False Negatives) = 110 / (110 + 50) = 110 / 160 ≈ 0.688
  - **F1 Score:** 2 * (Precision * Recall) / (Precision + Recall) = 2 * (0.647 * 0.688) / (0.647 + 0.688) ≈ 0.666