



CBSE Class X Artificial Intelligence (QP Code 104)



Time Allowed :2 Hours	Maximum Marks :50	Total Questions :21
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General Instructions

Please read the instructions carefully.

1. This question paper consists of 21 questions in two Sections : Section A and Section B.
2. Section A has Objective type questions, whereas Section B contains Subjective type questions.
3. Out of the given $(5 + 16) = 21$ questions, a candidate has to answer $(5 + 10) = 15$ questions in the allotted (maximum) time of 2 hours.
4. All questions of a particular section must be attempted in the correct order. .
5. Section A : Objective Type Questions (24 marks) :
 - (a) This section has 5 questions.
 - (b) There is no negative marking.
 - (c) Do as per the instructions given.
 - (d) Marks allotted are mentioned against each question/part
6. Section B : Subjective Type Questions (26 marks) :
 - (a) This section has 16 questions.
 - (b) A candidate has to do 10 questions.
 - (c) Do as per the instructions given.
 - (d) Marks allotted are mentioned against each question/part.

Section - A

1. Answer any 4 out of the given 6 questions:

(i) SMART method can be used to set goals to make you successful in your career and personal life. What does 'A' in SMART stand for?

- (A) Abrupt
- (B) Accountable
- (C) Achievable
- (D) Admirable

Correct Answer: (C) Achievable.

Solution: In the SMART method, 'A' stands for Achievable. SMART is an acronym for Specific, Measurable, Achievable, Relevant, and Time-bound. The 'A' emphasizes setting realistic

and attainable goals. Goals should be challenging but not impossible to achieve. Ensuring a goal is achievable helps maintain motivation and fosters success.

💡 Quick Tip

Achievable goals are key to success. Setting unrealistic goals can lead to frustration and demotivation.

(ii) Which of the following is not a key element of self-management skills?

- (A) Prioritising your work
- (B) Not taking feedback
- (C) Goal setting
- (D) Staying updated about new practices

Correct Answer: (B) Not taking feedback.

Solution: Self-management skills involve managing your time, tasks, and emotions effectively. These skills include prioritizing work, setting goals, and staying updated on new practices. The key element that is not part of self-management is not taking feedback, as feedback is crucial for personal and professional growth. Being open to feedback helps improve performance and adapt to new situations.

💡 Quick Tip

Feedback is essential for growth. Ignoring it can hinder personal and professional development.

(iii) Which of the following is a quality of successful entrepreneurs?

- (A) Hard working
- (B) Resistance to change
- (C) Lazy
- (D) Less-confident

Correct Answer: (A) Hard working.

Solution: Successful entrepreneurs are typically hardworking individuals. They put in the time and effort necessary to achieve their goals and overcome challenges. They are driven by their passion and dedication to their business. Resistance to change, laziness, and lack of confidence are qualities that can hinder entrepreneurial success. Entrepreneurs must be adaptable, driven, and proactive.



💡 Quick Tip

Hard work, adaptability, and confidence are essential qualities for successful entrepreneurs.

(iv) The most important software in any computer is the _____. This is the software that starts working as soon as we switch on a computer.

- (A) Web Browsers
- (B) Operating System
- (C) Office Software
- (D) Designing Software

Correct Answer: (B) Operating System.

Solution: The operating system is the most important software on a computer. It is responsible for managing hardware and software resources and allows the computer to run applications. It starts as soon as the computer is switched on and serves as the foundation for other programs to run. Examples of operating systems include Windows, macOS, and Linux.

💡 Quick Tip

The operating system is essential for managing computer resources and enabling software applications to function.

(v) Which of the following types of communication takes place when one individual addresses a large gathering?

- (A) Written communication
- (B) Public communication
- (C) Small group communication
- (D) Interpersonal communication

Correct Answer: (B) Public communication.

Solution: Public communication occurs when one individual addresses a large audience or gathering. This type of communication is typically used in speeches, presentations, and public speaking events. It involves conveying information or persuading a large group of people, usually in a formal or structured setting. In contrast, written communication, small group communication, and interpersonal communication involve smaller audiences or direct interactions.

💡 Quick Tip

Public communication is essential for reaching and influencing large audiences, often used in speeches and public speaking.



(vi) **Assertion (A):** Organic farming technique is an example of a green skill that is essential for sustainable agriculture.

Reason (R): Organic farming technique prioritizes environment-friendly and sustainable practices such as using natural fertilizers, avoiding synthetic pesticides, and promoting soil health.

- (a) Both (A) and (R) are true and (R) is the correct explanation for (A).
- (b) Both (A) and (R) are true and (R) is not the correct explanation of (A).
- (c) (A) is true, but (R) is false.
- (d) (A) is false, but (R) is true.

Correct Answer: (a) Both (A) and (R) are true and (R) is the correct explanation for (A).

Solution: The assertion (A) is correct because organic farming is indeed an essential green skill that focuses on sustainability and the environment. The reason (R) provides a clear explanation for the assertion by emphasizing the environmental benefits of organic farming, such as using natural fertilizers and avoiding harmful pesticides. Therefore, both the assertion and reason are true, and the reason correctly explains the assertion.

💡 Quick Tip

Organic farming is considered a green skill as it promotes sustainability through practices like using natural fertilizers and reducing chemical pesticides.

2. Answer any 5 out of the given 6 questions:

(i) **Which of the following contributes to the efficiency of an AI project?**

- (A) High Model Complexity
- (B) Relevant and Authentic Training Data
- (C) Minimal Preprocessing
- (D) Limited Hardware Resources

Correct Answer: (B) Relevant and Authentic Training Data.

Solution: Relevant and authentic training data is crucial for the success of AI projects. High-quality, accurate, and representative data allows the AI model to learn effectively and make accurate predictions. The efficiency of an AI model is highly dependent on the data it is trained on. While other factors such as model complexity and preprocessing are important, the data quality and relevance are the most significant factors.

💡 Quick Tip

Data quality directly impacts the performance of AI models. Relevant and authentic data is essential for training accurate models.



(ii) This real-life application of NLP is used to provide an overview of a news item or blog post, while avoiding redundancy from multiple sources and maximizing the diversity of content obtained. Which is this application?

- (A) Chatbot
- (B) Virtual Assistant
- (C) Sentiment Analysis
- (D) Automatic Summarisation

Correct Answer: (D) Automatic Summarisation.

Solution: Automatic summarisation in Natural Language Processing (NLP) refers to the process of generating a concise summary of a larger content piece, such as a news item or blog post. This technique avoids redundancy by pulling the most relevant information from multiple sources and presents it in a concise form. It is useful for efficiently obtaining the key points from long documents or articles.

💡 Quick Tip

Automatic summarisation extracts the most important information from a large body of text to provide a shorter, concise version.

(iii) Which of the following represent a machine that is smart but not considered Artificial Intelligence (AI) enabled?

- (A) A robotic vacuum cleaner that can navigate and clean floors autonomously.
- (B) A chatbot that engages in natural language conversations and answers questions.
- (C) A smartphone with facial recognition for unlocking the device.
- (D) A digital alarm clock that rings at a set time every morning.

Correct Answer: (D) A digital alarm clock that rings at a set time every morning.

Solution: A digital alarm clock, while smart in functionality, does not qualify as an AI-enabled device because it does not adapt, learn, or process data in an intelligent manner. AI involves machines that can learn from data, make decisions, and improve over time, which is not the case with a simple alarm clock that operates based on pre-set functionality.

💡 Quick Tip

AI-enabled devices learn and adapt, unlike simpler machines such as a digital alarm clock, which perform fixed tasks.

(iv) Which of the following words represent an example of a lemma resulting from lemmatisation for “caring” in context to Natural Language Processing (NLP)?

- (A) Care



- (B) Cared
- (C) Cares
- (D) Car

Correct Answer: (A) Care.

Solution: In Natural Language Processing (NLP), lemmatisation is the process of reducing a word to its base or root form. For the word “caring,” the lemma is “care,” which is the root form. Lemmatization ensures that variations of a word, such as ”caring” or ”cared,” are reduced to the same base form, allowing NLP algorithms to process text more effectively.

💡 Quick Tip

Lemmatization reduces words to their base form, allowing NLP systems to treat different word variations as the same entity.

(v) Intrapersonal Intelligence is a concept that:

- (A) Measures an individual’s ability to understand others’ emotions and feelings.
- (B) Assesses one’s proficiency in mathematics and logical reasoning.
- (C) Describes the level of self-awareness someone has, starting from realizing weaknesses, strengths, to recognizing their own feelings.
- (D) Evaluates an individual’s spatial navigation and visualization skills.

Correct Answer: (C) Describes the level of self-awareness someone has, starting from realizing weaknesses, strengths, to recognizing their own feelings.

Solution: Intrapersonal intelligence refers to the capacity for self-awareness, introspection, and the ability to understand one’s own emotions, motivations, and inner thoughts. This type of intelligence is concerned with how well an individual can recognize their own strengths and weaknesses, as well as manage their feelings and thoughts effectively. This intelligence allows people to be more reflective and in tune with their own emotional and mental states.

💡 Quick Tip

Intrapersonal intelligence helps individuals become more self-aware and manage their emotions and thoughts effectively.

(vi) For Data Science, usually the data is collected in the form of tables. These tabular datasets can be stored in different formats. Which of the following formats is not used for storing data in a tabular format?

- (A) CSV
- (B) Website
- (C) SQL
- (D) Spreadsheet



Correct Answer: (B) Website.

Solution: For data science, data is typically stored in structured formats such as CSV (Comma Separated Values), SQL databases, and spreadsheets like Excel. These formats allow data to be organized in rows and columns, making it easier to analyze and process. Websites, however, are not a format used for storing tabular data, as they are more focused on displaying and providing content rather than structuring it for data analysis.

💡 Quick Tip

Data in Data Science is typically stored in CSV, SQL, and spreadsheet formats, while websites are used for content display, not data storage.

3. Answer any 5 out of the given 6 questions:

(i) ___ is one of the parameters for evaluating a model's performance and is defined as the fraction of positive cases that are correctly identified.

- (A) Precision
- (B) Accuracy
- (C) Recall
- (D) F1

Correct Answer: (A) Precision.

Solution: Precision is a metric used to evaluate the performance of a classification model. It measures the proportion of true positive predictions out of all the positive predictions made by the model. In other words, precision tells us how many of the predicted positive cases are actually correct. A high precision indicates that the model does not frequently misclassify negative cases as positive.

💡 Quick Tip

Precision helps assess the accuracy of positive predictions made by the model, ensuring fewer false positives.

(ii) In the AI project cycle, which of the following represents the correct order of steps?

- (A) Data Exploration, Problem Scoping, Modelling, Evaluation, Data Exploration.
- (B) Problem Scoping, Data Acquisition, Modelling, Evaluation.
- (C) Modelling, Data Acquisition, Evaluation, Problem Scoping, Data Exploration.
- (D) Data Acquisition, Data Exploration, Problem Scoping, Modelling, Evaluation.

Correct Answer: (D) Data Acquisition, Data Exploration, Problem Scoping, Modelling,



Evaluation.

Solution: The correct order of steps in an AI project cycle begins with Data Acquisition, where relevant data is gathered. Next, Data Exploration takes place to understand the dataset and its properties. After that, Problem Scoping is done to define the problem and determine how the data can be used to solve it. Then, Modelling is performed, where machine learning models are created. Finally, Evaluation is done to assess the performance of the models. This sequence ensures a structured approach to building and deploying AI models.

💡 Quick Tip

The AI project cycle involves clear stages starting from data collection to evaluation, ensuring systematic model development.

(iii) -- is a concept to unify statistics, data analysis, machine learning and their related methods in order to understand and analyze actual phenomena with data.

- (A) Computer Vision
- (B) Natural Language Processing
- (C) Data Science
- (D) Computer Science

Correct Answer: (C) Data Science.

Solution: Data Science is an interdisciplinary field that uses scientific methods, processes, algorithms, and systems to extract knowledge and insights from structured and unstructured data. It combines various techniques from statistics, machine learning, data analysis, and related fields to understand and analyze actual phenomena with data. This makes Data Science a powerful tool for problem-solving and decision-making across various domains.

💡 Quick Tip

Data Science combines several fields like statistics, machine learning, and analysis to gain insights from data.

(iv) In computer vision which of the following tasks is used for multiple objects?

- (A) Classification
- (B) Classification + Localization
- (C) Instance Segmentation
- (D) Localization

Correct Answer: (C) Instance Segmentation.

Solution: Instance segmentation is a computer vision task that involves detecting and delineating each object instance in an image. Unlike traditional segmentation, which only labels



regions as objects, instance segmentation also differentiates between individual objects of the same class, making it useful for tasks involving multiple objects. This task is crucial for applications that require precise object identification and segmentation, such as autonomous vehicles or medical imaging.

💡 Quick Tip

Instance segmentation identifies and differentiates individual objects within the same category in images.

(v) In spam email detection, which of the following will be considered as "False Negative"?

- (A) When a legitimate email is accurately identified as not spam.
- (B) When a spam email is mistakenly identified as legitimate.
- (C) When an email is accurately recognised as spam.
- (D) When an email is inaccurately labelled as important.

Correct Answer: (B) When a spam email is mistakenly identified as legitimate.

Solution: A False Negative occurs when a spam email is mistakenly classified as legitimate, meaning the model fails to identify it as spam. This is problematic because spam emails are allowed through the system and could lead to unwanted consequences, such as security breaches or spam content being delivered to the user's inbox. In contrast, False Positives occur when legitimate emails are incorrectly flagged as spam.

💡 Quick Tip

False Negatives in spam detection result in spam emails being incorrectly classified as legitimate.

(vi) Which of the following applications is not associated with Natural Language Processing (NLP)?

- (A) Sentiment Analysis
- (B) Speech Recognition
- (C) Spam Filtering in emails
- (D) Stock Market Analysis

Correct Answer: (D) Stock Market Analysis.

Solution: Natural Language Processing (NLP) is a field of Artificial Intelligence that focuses on the interaction between computers and human language. Applications such as Sentiment Analysis, Speech Recognition, and Spam Filtering in emails all involve NLP as they deal with analyzing, understanding, and processing human language in text or speech. However, Stock Market Analysis does not directly involve NLP, as it is more related to financial analysis and



data modeling, though NLP may sometimes be applied for processing market-related news and reports.

💡 Quick Tip

NLP applications focus on tasks related to human language understanding, such as sentiment analysis and speech recognition.

4. Answer any 5 out of the given 6 questions:

(i) Statement 1: Confusion matrix is an evaluation metric.

Statement 2: Confusion Matrix is a record which helps in evaluation.

- (a) Both Statement 1 and Statement 2 are correct.
- (b) Both Statement 1 and Statement 2 are incorrect.
- (c) Statement 1 is correct and Statement 2 is incorrect.
- (d) Statement 2 is correct and Statement 1 is incorrect.

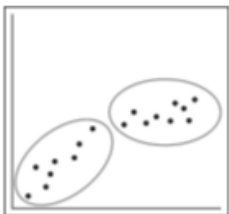
Correct Answer: (a) Both Statement 1 and Statement 2 are correct.

Solution: A confusion matrix is a fundamental evaluation metric in machine learning, used for assessing the performance of classification algorithms. It is a table that summarizes the number of correct and incorrect predictions made by a model, broken down by class. Statement 1 is correct because the confusion matrix is used for evaluation, and Statement 2 is also correct because it records the predicted vs actual outcomes, providing insights into model performance.

💡 Quick Tip

Confusion matrices help evaluate the performance of classification models by showing true positives, false positives, true negatives, and false negatives.

(ii) Which form of unsupervised learning does the following diagram indicate?



- (A) Clustering
- (B) Regression
- (C) Reinforcement learning
- (D) Classification

Correct Answer: (A) Clustering.

Solution: The diagram represents a common form of unsupervised learning known as clustering. Clustering is a technique where similar data points are grouped together based on their features, without predefined labels. This technique is used in scenarios where the algorithm needs to find patterns or groupings within data that are not previously labeled. For example, customer segmentation based on purchasing behavior.

💡 Quick Tip

Clustering groups similar data points without labels, making it a key technique in unsupervised learning.

(iii) Bag of Words is a ___ model which helps in extracting features out of the text which can be helpful in machine learning algorithms.

- (A) Data Science (DS)
- (B) Virtual Reality (VR)
- (C) Natural Language Processing (NLP)
- (D) Computer Vision (CV)

Correct Answer: (C) Natural Language Processing (NLP).

Solution: The Bag of Words (BoW) model is a representation used in Natural Language Processing (NLP) to extract features from text. It represents text data in the form of a "bag" of words, ignoring grammar and word order but keeping track of the frequency of words. This model is useful for text classification tasks, where each document is represented as a vector of word counts. NLP algorithms such as spam detection and sentiment analysis often use BoW for feature extraction.

💡 Quick Tip

BoW is a text representation model used in NLP, focusing on word frequency and ignoring the order of words.

(iv) Which of the following represents an example of a recommendation system?

- (A) An online clothing store that offers a wide variety of clothing options.
- (B) A search engine that retrieves relevant web pages based on user queries.
- (C) An e-commerce website that displays customer reviews and ratings for products.
- (D) A music streaming platform that suggests songs and playlists based on user listening history.

Correct Answer: (D) A music streaming platform that suggests songs and playlists based on user listening history.

Solution: A recommendation system is designed to suggest products, content, or services



to users based on their preferences, behavior, or historical data. The example of a music streaming platform that suggests songs and playlists based on user listening history is a classic recommendation system. It uses user interaction data to predict and recommend new music that aligns with the user's tastes.

💡 Quick Tip

Recommendation systems use user data to provide personalized suggestions, enhancing user experience and engagement.

(v) Name any two search engines.

Solution: Two widely used search engines are: 1. Google – The most popular search engine, known for its speed, accuracy, and vast database of indexed web pages. 2. Bing – A search engine developed by Microsoft, offering features like image search, video search, and integration with other Microsoft products.

💡 Quick Tip

Search engines like Google and Bing allow users to find relevant information quickly from the vast expanse of the internet.

(vi) What is the primary need for evaluating an AI model's performance in the AI Model Development process?

- (A) To increase the complexity of the model.
- (B) To visualize the data.
- (C) To assess how well the chosen model will work in future.
- (D) To reduce the amount of data used for training.

Correct Answer: (C) To assess how well the chosen model will work in future.

Solution: Evaluating an AI model's performance is crucial to determine how well it will perform in real-world scenarios. The evaluation helps assess the model's accuracy, generalization, and robustness, ensuring it will work effectively on new, unseen data. This evaluation process involves measuring performance metrics such as accuracy, precision, recall, and F1-score, helping decide if the model is ready for deployment or needs further refinement.

💡 Quick Tip

Evaluating an AI model helps determine its effectiveness in real-world applications and guides decisions for improvement.

5. Answer any 5 out of the given 6 questions:



(i) **Assertion (A):** The term used to refer to the number of pixels in an image is resolution.

Reason (R): Resolution in an image denotes the total number of pixels it contains, usually represented as height x width.

- (a) Both (A) and (R) are true and (R) is the correct explanation for (A).
- (b) Both (A) and (R) are true and (R) is not the correct explanation for (A).
- (c) (A) is true, but (R) is false.
- (d) (A) is false, but (R) is true.

Correct Answer: (a) Both (A) and (R) are true and (R) is the correct explanation for (A).

Solution: Resolution refers to the clarity of an image, determined by the number of pixels it contains. The higher the resolution, the more pixels the image has, which results in more detail and sharpness. The assertion (A) is true, and the reason (R) accurately explains that resolution is determined by the total number of pixels, represented by height and width.

💡 Quick Tip

Higher resolution means more pixels, which provides greater clarity in the image.

(ii) **When a machine possesses the ability to mimic human traits, i.e., make decisions, predict the future, learn, and improve on its own, it is said to have:**

- (A) Computational Skills
- (B) Learning Capability
- (C) Artificial Intelligence
- (D) Cognitive Processing

Correct Answer: (C) Artificial Intelligence.

Solution: Artificial Intelligence (AI) is the field of computer science that focuses on creating systems capable of performing tasks that typically require human intelligence. This includes learning from data, making decisions, predicting future outcomes, and adapting based on experiences. AI encompasses many methods such as machine learning and deep learning to enable machines to mimic human cognitive abilities.

💡 Quick Tip

AI enables machines to learn and perform tasks that require human-like intelligence, such as decision-making and problem-solving.

(iii) **Statement 1:** To evaluate a model's performance, we need either precision or recall.



Statement 2: When the value of both Precision and Recall is 1, the F1 score is 0.

- (a) Both statement 1 and statement 2 are correct.
- (b) Both statement 1 and statement 2 are incorrect.
- (c) Statement 1 is correct, but statement 2 is incorrect.
- (d) Statement 1 is incorrect, but statement 2 is correct.

Correct Answer: (c) Statement 1 is correct, but statement 2 is incorrect.

Solution: Precision and Recall are performance metrics used to evaluate classification models. Precision measures the accuracy of positive predictions, while recall measures the ability to capture all positive instances. The F1 score is the harmonic mean of precision and recall, and when both precision and recall are 1, the F1 score is also 1, not 0. Hence, Statement 1 is correct, and Statement 2 is incorrect.

💡 Quick Tip

The F1 score is 1 when both precision and recall are 1, reflecting a perfect model performance.

(iv) The concept of __ is used to apply face filters on various social media platforms.

- (A) NLP
- (B) Computer Vision
- (C) Data Science
- (D) Block chain Technology

Correct Answer: (B) Computer Vision.

Solution: Computer Vision is a field of AI that enables machines to interpret and understand visual information, such as images and videos. It is used in applications like face recognition, object detection, and augmented reality, including the application of face filters on social media platforms. Computer vision algorithms process and analyze facial features to apply various filters in real-time.

💡 Quick Tip

Computer Vision powers face recognition and filters on social media, enabling real-time image manipulation.

(v) The 4 W's Problem Canvas helps in identifying the key elements related to the given problem.

Which of the following is NOT one of the blocks of the Problem Canvas?

- (A) Who
- (B) Where
- (C) What
- (D) Why



Correct Answer: (B) Where.

Solution: The 4 W's Problem Canvas is a tool used in problem-solving to identify the key components of a problem. It focuses on the Who, What, Why, and When aspects of the problem. The Where aspect is not part of the 4 W's framework. These elements help teams understand the problem from various angles and generate solutions effectively.

💡 Quick Tip

The 4 W's Problem Canvas focuses on understanding a problem through Who, What, Why, and When.

(vi) Which domain of AI is used for interacting with virtual assistants such as Siri and Alexa?

- (A) Machine Learning (ML)
- (B) Computer Vision (CV)
- (C) Natural Language Processing (NLP)
- (D) Technical Vision (TV)

Correct Answer: (C) Natural Language Processing (NLP).

Solution: Virtual assistants like Siri and Alexa rely on Natural Language Processing (NLP) to interpret and respond to human speech. NLP allows computers to understand, interpret, and generate human language in a way that is valuable for interaction. It is a subfield of Artificial Intelligence that enables voice-based AI systems to process spoken language, understand context, and generate meaningful responses, making it essential for voice assistants.

💡 Quick Tip

NLP is the backbone of virtual assistants, enabling them to process and understand human speech for effective communication.

Section - B

Answer any 3 out of the given 5 questions on Employability Skills. Answer each question in 20-30 words each.

6. Give any two examples of how individual choices and behaviours can contribute in achieving sustainable development.

Solution: 1. Reducing Waste: By making conscious choices to reduce waste, such as reusing items, recycling, and avoiding single-use plastics, individuals can reduce their environmental



impact. This contributes to sustainable development by conserving resources and reducing pollution. 2. Energy Conservation: Choosing energy-efficient appliances, reducing electricity consumption, and using renewable energy sources like solar power contribute to sustainability by minimizing the carbon footprint and reducing dependence on non-renewable energy resources.

💡 Quick Tip

Small individual actions, such as reducing waste and conserving energy, can collectively contribute to achieving sustainable development.

7. List any two common misconceptions about entrepreneurship.

Solution: 1. Entrepreneurs are born, not made: Many people believe that entrepreneurship is an innate skill. However, entrepreneurship involves learned skills such as problem-solving, resilience, and adaptability. 2. Entrepreneurship is only for risk-takers: While entrepreneurship does involve taking risks, it also requires careful planning, research, and strategy. Entrepreneurs often take calculated risks rather than blind risks.

💡 Quick Tip

Entrepreneurship requires learned skills and calculated risks, not just innate talent or reckless decisions.

8. What is the importance of time management in effectively dealing with stress? Provide any one strategy for improving time management skills to reduce stress.

Solution: Time management is essential in reducing stress because it helps prioritize tasks, avoid procrastination, and allocate sufficient time for rest and recreation. Effective time management enables individuals to break down large tasks into smaller, more manageable ones, reducing feelings of being overwhelmed. Strategy: One strategy is to use the Pomodoro Technique, which involves working for 25 minutes, followed by a 5-minute break. This promotes focus and productivity while preventing burnout and stress.

💡 Quick Tip

The Pomodoro Technique encourages short bursts of focused work followed by breaks, helping reduce stress and improve productivity.

9. Mention any two measures that individuals or organisations can take to protect their data from theft and viruses.

Solution: 1. Use Strong Passwords: Implementing strong, unique passwords for all accounts and changing them regularly reduces the risk of unauthorized access. Organizations should



also consider multi-factor authentication. 2. Install Antivirus Software: Installing and regularly updating antivirus software helps protect against viruses, malware, and other malicious software that can compromise data security.

💡 Quick Tip

Strong passwords and antivirus software are essential for safeguarding data from theft and viruses.

10. The method of communication that you choose could affect the relationship with your peers, superiors, and customers. Write the four factors on the basis of which you can choose the right method of communication.

Solution: The four factors to consider when choosing the right method of communication are: 1. Audience: Consider who the message is intended for (peers, superiors, customers) and their preferred communication style. 2. Message Complexity: If the message is complex or requires detailed explanation, face-to-face or written communication may be preferable. 3. Urgency: For urgent matters, instant messaging or a phone call may be more effective. 4. Formality: Formal messages may require professional channels like email, while informal communications can be done through quick chats.

💡 Quick Tip

Choose the communication method based on your audience, the complexity of the message, urgency, and formality.

Answer any 4 out of given 6 questions in 20-30 words each:

11. Differentiate between Machine Learning (ML) and Deep Learning (DL).

Solution: Machine Learning (ML): ML involves algorithms that learn from data and make predictions based on patterns in the data. It does not require large amounts of data and can operate on traditional computational methods. Deep Learning (DL): DL is a subset of ML that uses neural networks with many layers (hence "deep") to learn from large amounts of unstructured data. It is particularly useful in tasks like image and speech recognition but requires more data and computational power.

💡 Quick Tip

Deep Learning is a more advanced, data-hungry version of Machine Learning that excels in complex tasks.

12. What are the primary differences between Script-bots and Smart-bots?



Solution: Script-bots: Script-bots follow pre-written rules or scripts to perform simple tasks, with limited flexibility. They can handle structured and repetitive tasks but are not capable of learning from data. Smart-bots: Smart-bots are AI-powered bots that can learn from user interactions, adapt to new situations, and make decisions. They can handle more complex tasks and are powered by machine learning algorithms.

💡 Quick Tip

Script-bots are rule-based and limited, while smart-bots learn from interactions and adapt over time.

13. What do you mean by Evaluation of an AI model? Also explain the concept of overfitting with respect to AI model Evaluation.

Solution: Evaluation of an AI model refers to the process of assessing the performance of a machine learning model using various metrics such as accuracy, precision, recall, and F1-score. It helps in understanding how well the model performs on both training and unseen data. Overfitting occurs when an AI model learns the noise or details from the training data to the extent that it negatively impacts the model's performance on new data. Overfitting leads to high accuracy on training data but poor generalization to real-world scenarios.

💡 Quick Tip

Overfitting happens when a model becomes too complex and performs well on training data but poorly on new data.

14. For a healthcare organisation's objective of predicting disease outbreaks and efficiently allocating resources through the analysis of medical records, would you recommend using supervised learning or unsupervised learning as the preferred machine learning approach? Explain your choice briefly.

Solution: In this case, supervised learning would be more appropriate. Supervised learning algorithms work by training a model on labeled data, where the outcome (e.g., whether a disease outbreak occurred) is known. This allows the model to learn patterns from the medical records that can predict future outbreaks or help allocate resources effectively. Unsupervised learning, on the other hand, would be useful for clustering or anomaly detection tasks but may not provide direct predictions based on labeled outcomes like supervised learning can.

💡 Quick Tip

Supervised learning is ideal when predicting outcomes based on labeled data, making it suitable for predicting disease outbreaks.



15. What role does data play in AI-based applications? Name any two sources of online data collection for building any AI-based application.

Solution: Data plays a crucial role in AI-based applications by providing the foundation for training machine learning models. The quality and quantity of data determine the performance and accuracy of AI models. Data is used to train, test, and validate models so they can make predictions, classifications, or decisions based on patterns learned from the data. Two sources of online data collection for AI applications are: 1. Web Scraping: Collecting data from websites, blogs, or forums to gather text, images, and other information. 2. Public Datasets: Many organizations and institutions publish datasets that can be used for training AI models, such as Kaggle, UCI Machine Learning Repository, and government databases.

💡 Quick Tip

Web scraping and public datasets are two valuable sources for collecting data to train AI models.

16. Differentiate between grayscale and RGB images.

Solution: Grayscale Images: Grayscale images consist of shades of gray, ranging from black to white, with no color information. Each pixel in a grayscale image contains only one value representing its intensity level. RGB Images: RGB images consist of three color channels—Red, Green, and Blue. Each pixel contains three values representing the intensity of these primary colors. RGB images can display a wide range of colors by mixing these three color intensities.

💡 Quick Tip

Grayscale images use a single channel for intensity, while RGB images use three channels for color representation.

Answer any 3 out of the 5 given questions in 50-80 words each:

17. What are Neural networks? Briefly explain all the layers of a neural network.

Solution: Neural Networks are a class of machine learning models inspired by the human brain's structure. They consist of layers of interconnected nodes (neurons) that process information. The main layers of a neural network are: 1. Input Layer: The first layer that receives the input data. 2. Hidden Layers: Layers where the actual processing takes place, consisting of neurons that apply activation functions to the data. 3. Output Layer: The final layer that provides the predicted output.



💡 Quick Tip

Neural networks are composed of input, hidden, and output layers, with each layer transforming data at different stages.

18. Give any four examples of applications of AI that we see around us.

Solution: 1. Speech Recognition: Virtual assistants like Siri and Alexa use AI to understand and process voice commands. 2. Recommendation Systems: Platforms like Netflix and Amazon use AI to recommend products or movies based on user preferences. 3. Autonomous Vehicles: Self-driving cars use AI to navigate roads, detect objects, and make driving decisions. 4. Medical Diagnosis: AI-based tools help doctors by analyzing medical images and providing diagnostic suggestions.

💡 Quick Tip

AI applications such as speech recognition, recommendation systems, and autonomous vehicles are increasingly integrated into daily life.

19. Consider the following two documents:

Document 1: ML and DL are part of AI.

Document 2: DL is a subset of ML.

Implement all four steps of the Bag of Words (BoW) model to create a document vector table. Depict the outcome of each step.

Solution: Document 1 is true because Machine Learning (ML) and Deep Learning (DL) are subfields of Artificial Intelligence (AI). AI is the broad field, with ML and DL being specific approaches used for data processing and learning. Document 2 is also true because Deep Learning (DL) is a more advanced subset of Machine Learning (ML). DL uses neural networks with many layers (deep neural networks) and requires a large amount of data, while ML algorithms can work with smaller datasets.

💡 Quick Tip

Deep Learning is a subset of Machine Learning, which is itself a subset of Artificial Intelligence.

20. Consider the following graphs (Figure 1 and Figure 2) that demonstrate the two types of Supervised Learning Models of Artificial Intelligence. Identify and explain each model giving suitable examples of each.



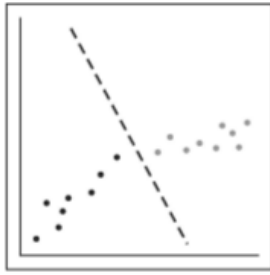


Figure 1

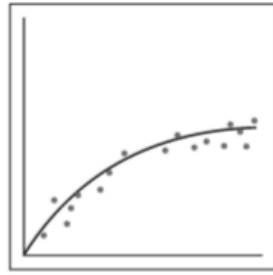


Figure 2

Solution: Figure 1: This graph represents Linear Regression (a regression model) where a straight line fits the data points, predicting a continuous output. Example: Predicting house prices based on square footage. Figure 2: This graph represents Logistic Regression (a classification model) where data points are classified into two categories, usually indicated by a sigmoid curve. Example: Classifying emails as spam or not.

💡 Quick Tip

Regression models predict continuous outcomes, while classification models predict categorical outcomes.

21. A binary classification model has been developed to classify news articles as either “Fake News” or “Real News”. The model was tested on a dataset of 500 news articles, and the resulting confusion matrix is as follows:

Confusion Matrix	Reality Yes	Reality No
Predicted Yes	45	15
Predicted No	20	420

(A) How many total cases are True Negative in the above scenario?

Solution: True Negative (TN) refers to the number of cases where the model correctly predicted “No” when the actual value was also “No”. From the confusion matrix, we see that there are 420 cases where the model predicted “No” and the reality was also “No”. Therefore, the total number of True Negative cases is 420.

(B) Calculate Precision, Recall, and F1-Score.

Solution: We calculate the following metrics using the confusion matrix values: - True Positives (TP): 45 - False Positives (FP): 15 - False Negatives (FN): 20 - True Negatives (TN): 420
Precision (P): Precision is the proportion of positive predictions that are actually correct. It is given by:

$$P = \frac{TP}{TP + FP} = \frac{45}{45 + 15} = \frac{45}{60} = 0.75$$

Recall (R): Recall is the proportion of actual positive cases that are correctly identified. It is

given by:

$$R = \frac{TP}{TP + FN} = \frac{45}{45 + 20} = \frac{45}{65} \approx 0.6923$$

F1-Score: F1-Score is the harmonic mean of Precision and Recall. It is given by:

$$F1 = 2 \times \frac{P \times R}{P + R} = 2 \times \frac{0.75 \times 0.6923}{0.75 + 0.6923} \approx 2 \times \frac{0.5192}{1.4423} \approx 0.718$$

Therefore, the results are: - Precision = 0.75 - Recall = 0.6923 - F1-Score = 0.718

💡 Quick Tip

Precision indicates the accuracy of positive predictions, while Recall measures the ability to find all positive cases. F1-Score is the balance between Precision and Recall.