CBSE Class 10 AI 417 Question Paper 2023-24 with Solution

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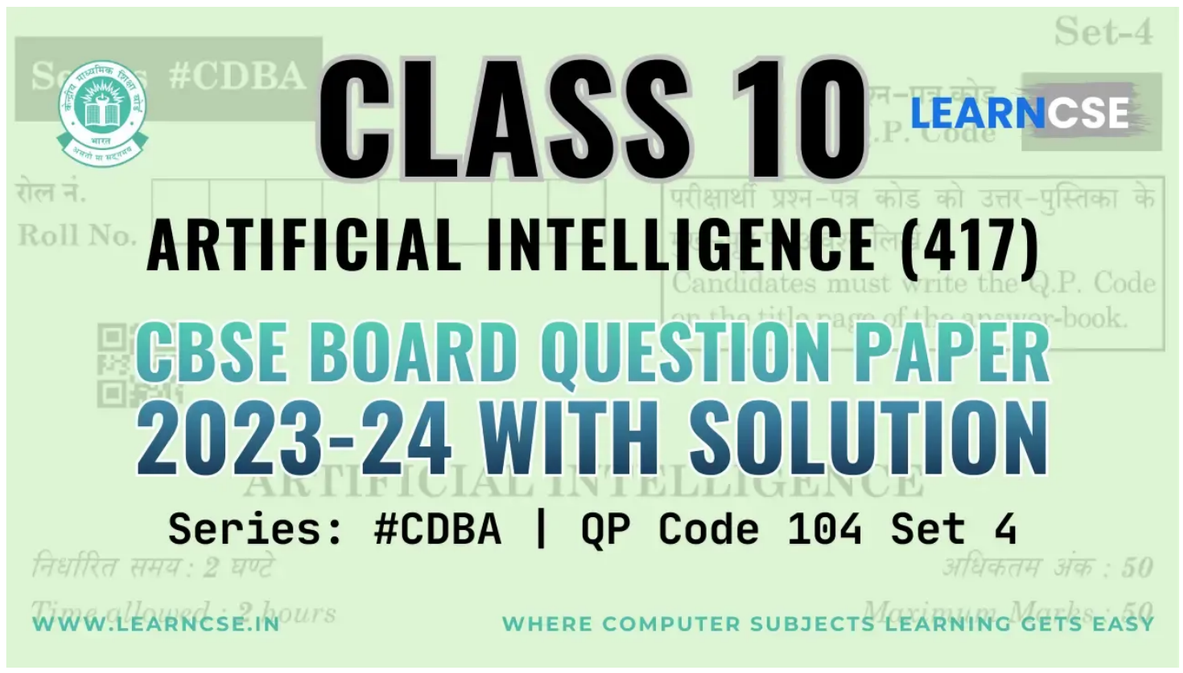

This CBSE Class 10 AI Code 417 question paper is designed strictly as per the CBSE curriculum and blueprint, making it an essential tool for effective board exam preparation.

CBSE CLASS 10 ARTIFICIAL INTELLIGENCE (417) - SOLUTION

Class 10 AI (Code 417) - Previous Year Question Paper
(Session 2023-24)

Series #CDBA
Question Paper Code 104 Set 4

Time allowed : 2 hour
Maximum Marks : 50

General Instructions:

1. Please read the instructions carefully.
2. This Question Paper consists of 21 questions in two sections: Section A & Section B.
3. Section A has Objective type questions whereas Section B contains Subjective type questions.
4. 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.
5. All questions of a particular section must be attempted in the correct order.
6. SECTION A – OBJECTIVE TYPE QUESTIONS (24 MARKS):
   - This section has 05 questions.
   - Marks allotted are mentioned against each question/part.
   - There is no negative marking.
   - Do as per the instructions given.
7. SECTION B – SUBJECTIVE TYPE QUESTIONS (26 MARKS):
   - This section has 16 questions.
   - A candidate has to do 10 questions.
   - Do as per the instructions given.
   - Marks allotted are mentioned against each question/part.

SECTION A: OBJECTIVE TYPE QUESTIONS

Q.1 Answer any 4 out of the given 6 questions on Employability Skills (1X4=4 marks)

(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

(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

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

(a) Hard working

(b) Resistance to change

(c) Lazy

(d) Less-confident

(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

(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

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

Reason (R): Organic farming technique prioritise environment friendly and sustainable practices such as using natural fertilisers, 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

Q.2 Answer any 5 out of the given 6 questions (1X5=5 marks)

(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

(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 maximising the diversity of content obtained. Which is this application?

(a) Chatbot

(b) Virtual Assistant

(c) Sentiment Analysis

(d) Automatic Summarisation

(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

(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

(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 visualisation skills

(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

Q.3 Answer any 5 out of the given 6 questions (1X5=5 marks)

(i) is one of the parameter 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

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

(a) Data Exploration, Problem Scoping, Modelling, Evaluation, Data Acquisition

(b) Problem Scoping, Data Acquisition, Data Exploration, Modelling, Evaluation

(c) Modelling. Data Acquisition, Evaluation, Problem Scoping, Data Exploration

(d) Data Acquisition, Data Exploration, Problem Scoping. Modelling, Evaluation

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(c) Modelling. Data Acquisition, Evaluation, Problem Scoping, Data Exploration

(d) Data Acquisition, Data Exploration, Problem Scoping. Modelling, Evaluation

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

(a) Computer Vision

(b) Natural Language Processing

(c) Data Science

(d) Computer Science

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

(a) Classification

(b) Classification + Localisation

(c) Instance Segmentation

(d) Localisation

(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

(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

Q.4 Answer any 5 out of the given 6 questions (1X5=5 marks)

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

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

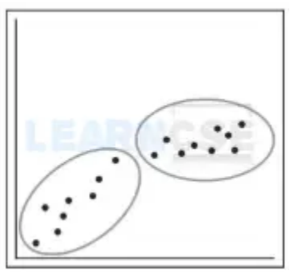
(a) Both Statement 1 and Statement 2 are correct

(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

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



(a) Clustering

(b) Regression

(c) Reinforcement learning

(d) Classification

(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)

(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

(v) Name any two search engines.

Ans: Google, Bing, Yahoo, DuckDuckGo

(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

Q.5 Answer any 5 out of the given 6 questions (1X5=5 marks)

(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

(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

(iii) Statement 1: To evaluate a models' 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

(iv) The concept of media platforms. is used to apply face filters on various social
(a) NLP
(b) Computer Vision
(c) Data Science
(d) Block chain Technology

(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) When
(b) Where
(c) What
(d) Why

(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)

SECTION B: SUBJECTIVE TYPE QUESTIONS

Answer any 3 out of the given 5 questions on Employability Skills (2X3=6 marks) Answer each question in 20 – 30 words.

6. Give any two examples of how individual choices and behaviours can contribute in achieving sustainable development.
Ans: Individual choices like reducing waste and using sustainable transportation can minimize environmental impact, while adopting energy efficient practices at home can conserve resources, contributing to sustainable development.

7. List any two common misconceptions about entrepreneurship.
Ans: Two common misconceptions about entrepreneurship are:
(i) Entrepreneurs are born, not made
(ii) Entrepreneurship is all about taking big risks.

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.
Ans: Effective time management helps prioritize tasks, reduce procrastination, and create a sense of control, reducing stress. One strategy is the “Pomodoro Technique,” where work is broken into intervals with short breaks in between to maintain focus and productivity.

9. Mention any two measures that individuals or organisations can take to protect their data from theft and viruses.
Ans: Two measures individuals or organizations can take to protect their data are:
(i) Implementing strong password policies and using multi-factor authentication.
(ii) Regularly updating software and installing antivirus programs to safeguard against viruses and malware.

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.
Ans: The four factors to consider when choosing the right method of communication are:
(i) Audience: Consider the preferences, expectations, and communication styles of your peers, superiors, and customers.
(ii) Message Complexity: Determine the complexity and sensitivity of the message to decide whether it’s best communicated verbally, in writing, or face-to-face.
(iii) Urgency: Evaluate the urgency of the message and choose a communication method that ensures timely delivery and response.
(iv) Context: Take into account the context of the communication, including the physical environment, cultural norms, and technological capabilities, to ensure effective communication and relationship-building.

Answer any 4 out of the given 6 questions (2X4=8 marks) Answer each question in 20 – 30 words.

11. Differentiate between Machine Learning (ML) and Deep Learning (DL).
Ans: **Machine Learning (ML)** involves algorithms that learn from data to make predictions.
Deep Learning (DL) is a subset of ML that uses artificial neural networks with multiple layers for learning.

12. What are the primary differences between Script-bots and Smart-bots?
Ans: Script-bots follow predefined scripts or instructions, while Smart-bots utilize artificial intelligence and machine learning algorithms to adapt and learn from interactions, making them more flexible and capable of handling diverse situations.

13. What do you mean by Evaluation of an AI model? Also explain the concept of overfitting with respect to AI model Evaluation.
Ans: Evaluation of an AI model refers to assessing its performance and effectiveness in solving a particular task or problem. This process involves testing the model using data that it hasn’t seen before, measuring its accuracy, precision, recall, or other relevant metrics, and comparing the model’s predictions or outcomes against the ground truth.

Overfitting is a phenomenon in machine learning where a model learns to perform extremely well on the training data but fails to generalize well to new, unseen data. This occurs when the model captures noise or random fluctuations in the training data rather than the underlying patterns, resulting in poor performance on test or validation data. Overfitting often happens when the model is too complex or when it's trained with insufficient data. To address overfitting, techniques such as regularization, cross validation, and early stopping can be used

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.

Ans: For the healthcare organization's objective of predicting disease outbreaks and efficiently allocating resources through the analysis of medical records, I would recommend using supervised learning as the preferred machine learning approach. Supervised learning is suitable when there are labeled data available, which in this case would include historical medical records with information about disease outbreaks and resource allocations. By training a supervised learning model on this labeled data, the model can learn patterns and relationships between various factors (such as symptoms, demographics, geographic locations) and disease outbreaks, enabling accurate predictions and informed resource allocation decisions.

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

Ans: Data plays a crucial role in AI-based applications as it serves as the foundation for training, testing, and improving machine learning models. The quality, quantity, and diversity of data directly impact the performance and accuracy of AI systems.

Two sources of online data collection for building AI based applications are:

(i) Application programming interfaces (APIs): Accessing data from online services or platforms through APIs, which provide a structured way to interact with and retrieve data from various sources such as social media platforms, weather services, or financial databases.

(ii) Web scraping: Extracting data from websites by automatically retrieving and parsing information from web pages.

16. Differentiate between grayscale and RGB images.

Ans: Grayscale images contain only shades of gray, ranging from black to white, representing the intensity of light at each pixel. RGB images, on the other hand, are composed of three colour channels (red, green, and blue), allowing each pixel to have a combination of different colours, resulting in a wider range of colours and the ability to represent full colour images.

Answer any 3 out of the given 5 questions (4X3=12 marks) Answer each question in 50 – 80 words.

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

Ans: Neural networks are computational models inspired by the structure and functioning of the human brain, used in machine learning. They consist of interconnected nodes arranged into layers:

(i) Input Layer: Receives input data where data is fed into the network.

(ii) Hidden Layers: Perform computations and feature extraction, using weighted connections and activation functions.

(iii) Output Layer: Produces the final output, representing predictions or classifications. Hidden layers allow neural networks to learn complex patterns from data through iterative optimization processes. Each layer's nodes (neurons) apply transformations to the input data using weights and activation functions, allowing the network to learn complex patterns and make predictions.

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

Ans: Four examples of AI applications commonly seen around us include:

(i) Medical diagnosis systems that analyze the patient data to assist healthcare professionals in identifying diseases and recommending treatments. These applications demonstrate AI's versatility in improving efficiency and decision making across various domains.

(ii) Virtual assistants like Siri and Alexa, which use natural language processing to understand and respond to user queries.

(iii) Recommendation systems used by streaming services and e-commerce platforms to suggest content or products based on user preferences.

(iv) Autonomous vehicles, which employ computer vision and machine learning algorithms to navigate and make driving decisions.

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.

Ans: **Step 1:** Tokenization - Split each document into individual words:

- Document 1: [ML, and, DL, are, part, of, AI]
- Document 2: [DL, is, a, subset, of, ML]

Step 2: Build a vocabulary - Create a set of unique words from all documents:

- Vocabulary: [ML, and, DL, are, part, of, AI, is, a, subset]

Step 3: Count word occurrences - Count the frequency of each word in each document:

- Document 1: [1, 1, 1, 1, 1, 1, 1, 0, 0, 0]
- Document 2: [1, 0, 1, 0, 0, 1, 0, 1, 1, 1]

Step 4: Create document vectors - Represent each document as a vector using word frequencies:

Document Vector Table:

	ML	and	DL	are	part	of	AI	is	a	subset
Doc 1	1	1	1	1	1	1	1	0	0	0
Doc 2	1	0	1	0	0	1	0	1	1	1

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.

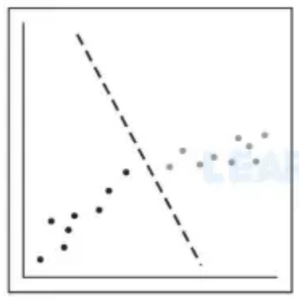


Figure 1

Figure 2

Ans: As described the graphs in Figure 1 and Figure 2.
Figure 1 is Classification Model and Figure 2 is Regression Model.
We will explain two types of supervised learning models in artificial intelligence along with suitable examples:
(i) Classification Model: Classification models are used to predict categorical labels or classes or input data points. In Figure 1, if this graph represents a classification model, it might depict distinct clusters or regions representing different classes.
Example: Classifying emails as spam or not spam based on features such as sender, subject line, and content. By training a classification model on a labeled dataset of emails (spam or non-spam), the model can learn to classify new emails into the appropriate category.
(ii) Regression Model: Regression models are used to predict continuous numerical values based on input features. In Figure 2, if this graph represents a regression model, it might depict a scatter plot of data points where the goal is to find a line (or curve) that best fits the data.
Example: Predicting house prices based on features such as square footage, number of bedrooms, and location. Given historical data of house prices and corresponding features, a regression model can be trained to predict the price of a new house

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	No
Predicted	Yes	45	15
	No	20	420

(A) How many total cases are True Negative in the above scenario?
Ans: To find the total True Negatives (TN), we look at the confusion matrix where the predicted label is “No” and the actual label is also “No”.
From the matrix, the True Negatives (TN) are 420.
Precision, Recall, and F1-Score are calculated as follows:
From the confusion matrix we have:
TP (True Positives) = 420
FP (False Positives) = 15
FN (False Negatives) = 20

(B) Calculate Precision, Recall and F1-Score.
Ans: To find Precision:
Precision = TP / (TP + FP) = 420 / (420 + 15)
= 420 / 435 = 0.9655
To find Recall:
Recall = TP / (TP + FN) = 420 / (420 + 20)
= 420 / 440 = 0.9545
To find F1 score:
F1-Score = 2 * (Precision * Recall) / (Precision + Recall)
F1-Score = 2 * (0.9655 * 0.9545) / (0.9655 + 0.9545) = 0.9600
Therefore, Precision = 0.9655, Recall = 0.9545, and F1-Score = 0.9600

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