CENTRAL BOARD OF SECONDARY EDUCATION

CBSE 2026-27

Artificial Intelligence

Subject Code: 417 | Class X

Solutions

Sample Question Paper – Set 4

Time Allowed: 2 Hours **Maximum Marks: 50**

General Instructions

1. Please read the instructions carefully.
2. This Question Paper consists of 21 questions in two sections: Section A and 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):** (i) This section has 05 questions. (ii) Marks allotted are mentioned against each question/part. (iii) There is no negative marking. (iv) Do as per the instructions given.
7. **SECTION B – SUBJECTIVE TYPE QUESTIONS (26 MARKS):** (i) This section has 16 questions. (ii) A candidate has to do 10 questions. (iii) Do as per the instructions given. (iv) Marks allotted are mentioned against each question/part.
8. Part A (Employability Skills) carries 10 marks and Part B (Subject Specific Skills) carries 40 marks. Practical work (50 marks) is assessed separately.

Exam Pattern

Section	Type of Questions	No. of Qs	Marks each	Total Marks
A	Q1: Objective (MCQ) – Employability Skills (answer any 4 of 6)	6 (any 4)	1	4
A	Q2–Q5: Objective (MCQ / Assertion–Reason / fill-in / one-word) – Subject Specific Skills (answer any 5 of 6 in each)	24 (any 20)	1	20
B	Q6–Q10: Short Answer (20–30 words) – Employability Skills (answer any 3 of 5)	5 (any 3)	2	6
B	Q11–Q16: Short Answer (20–30 words) – Subject Specific Skills (answer any 4 of 6)	6 (any 4)	2	8
B	Q17–Q21: Long Answer / Case-based (50–80 words) – Subject Specific Skills (answer any 3 of 5)	5 (any 3)	4	12
	Total	**46 items in 21 Qs (any 34)**		**50**

Unit-wise Weightage of Marks

Unit	Unit Name	Chapter	Marks
A-1	Communication Skills – II	Ch. 1	2
A-2	Self-Management Skills – II	Ch. 2	2

Unit	Unit Name	Chapter	Marks
A-3	ICT Skills – II	Ch. 3	2
A-4	Entrepreneurial Skills – II	Ch. 4	2
A-5	Green Skills – II	Ch. 5	2
B-1	Revisiting AI Project Cycle & Ethical Frameworks for AI	AI project cycle; AI domains; ethical frameworks; bioethics	7
B-2	Advanced Concepts of Modeling in AI	AI vs ML vs DL; rule/learning based; supervised, unsupervised, reinforcement; ANN/CNN; neural networks	11
B-3	Evaluating Models	Evaluation; train-test split; accuracy & error; confusion matrix; precision, recall, F1; ethics	10
B-4	Statistical Data	Assessed through practicals only	–
B-5	Computer Vision	CV applications & tasks; pixels, resolution, grayscale & RGB images	4
B-6	Natural Language Processing	Applications; stages of NLP; chatbots; text normalisation; BoW; TF-IDF	8
B-7	Advance Python	Assessed through practicals only	–
	Total		**50**

SECTION – A

Objective Type Questions (24 marks)

Q1. Answer any 4 out of the given 6 questions on Employability Skills (1 × 4 = 4 marks) **[4]**

(i) Which of these is descriptive, specific feedback?
(a) Good job.
(b) Your work is nice.
(c) Your presentation kept the audience engaged because you used clear examples.
(d) You are always careless.

(ii) Which of the following is NOT a suggested step to manage emotional intelligence?
(a) Observing your own behaviour to understand your emotions
(b) Practising meditation and yoga to stay calm
(c) Making decisions purely based on emotions
(d) Thinking rationally before making decisions

(iii) Which password is the strongest?
(a) 1234 (b) rahul (c) Ta9#Qm2! (d) password

(iv) Which function of an entrepreneur involves trying a new method, idea or product for the business?
(a) Dividing income (b) Creating a new method, idea or product
(c) Managing the business (d) Taking risks

(v) Which SDG is 'Decent Work and Economic Growth'?
(a) SDG 12 (b) SDG 8 (c) SDG 3 (d) SDG 13

(vi) Which of the 3 Rs means using fewer resources in the first place?
(a) Reduce (b) Recycle (c) Reuse (d) Dispose

Q2. Answer any 5 out of the given 6 questions (1 × 5 = 5 marks) **[5]**

(i) **Assertion (A):** Our intuition and values can knowingly or unknowingly influence the AI models we design.
Reason (R): Culture, religion, intuition and values, and the value of humans and non-humans, all play a role in our decision-making.
(a) Both A and R are correct, and R is the correct explanation of A.
(b) Both A and R are correct, but R is not the correct explanation of A.
(c) A is correct, but R is incorrect.
(d) A is incorrect, but R is correct.

(ii) The sector-based ethical framework used in healthcare and life sciences is called _____.

(iii) Clustering is a type of:
(a) Supervised learning (b) Unsupervised learning
(c) Reinforcement learning (d) Rule-based learning

(iv) Precision = 1 and recall = 0.5. The F1 score is:
(a) 0.50 (b) 0.75 (c) 1.50 (d) 0.67

(v) Drawing a bounding box to show where an object is located in an image is called _____.

(vi) A word occurs in all 5 documents of a corpus. Its IDF (total documents divided by document frequency, before the log) is _____.

Q3. Answer any 5 out of the given 6 questions (1 × 5 = 5 marks) **[5]**

(i) Identify the incorrect statement from the following: (i) AI models can be broadly categorised into four domains. (ii) Data sciences is one of the domains of AI models. (iii) Price comparison websites are examples of data science. (iv) The information extracted through data science can be used to make decisions.
(a) Only (i) (b) (ii) and (iv) (c) (i) and (iii) (d) Only (iv)

(ii) **Assertion (A):** A testing dataset is used to change the weights of the model.
Reason (R): Testing data is unseen data used to check the accuracy of the model.

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

(iii) _____ 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

(iv) In a confusion matrix, a True Positive is a case where:
(a) The actual value is negative and the prediction is negative
(b) The actual value is negative and the prediction is positive
(c) The actual value is positive and the prediction is positive
(d) The actual value is positive and the prediction is negative

(v) Which statement correctly describes a grayscale image?
(a) Each pixel has one intensity value (b) Each pixel has three values
(c) It has no pixels (d) Each pixel is stored in 16 bits

(vi) In TF-IDF, the term frequency of a word in a document is:
(a) the number of documents that contain the word
(b) the number of times the word appears in that document
(c) the total number of documents in the corpus
(d) the number of letters in the word

Q4. Answer any 5 out of the given 6 questions ($1 \times 5 = 5$ marks) **[5]**

(i) Ethical frameworks for AI can be categorised into:
(a) Legal and illegal frameworks (b) Historical and contemporary frameworks
(c) Sector-based and value-based frameworks (d) Theoretical and practical frameworks

(ii) _____ learning uses labelled data to train a model.

(iii) Which expression represents precision?
(a) TP / (TP + FN) (b) TN / (TN + FP)
(c) (TP + TN) / total observations (d) TP / (TP + FP)

(iv) A model gives 99% accuracy on the data used to train it but only 60% on new data. The model has most likely been:
(a) Underfitted (b) Evaluated correctly
(c) Tested on too much data (d) Overfitted

(v) 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

(vi) **Assertion (A):** Converting text to lowercase is preferable in text preprocessing.
Reason (R): It ensures that 'Hello' and 'hello' are treated as the same word by the machine.
(a) Both A and R are correct, and R is the correct explanation of A.
(b) Both A and R are correct, but R is not the correct explanation of A.
(c) A is correct, but R is incorrect.
(d) A is incorrect, but R is correct.

Q5. Answer any 5 out of the given 6 questions ($1 \times 5 = 5$ marks) **[5]**

(i) Which value-based framework asks whether the actions of individuals or organisations align with principles such as honesty, compassion and integrity?
(a) Utility-based framework (b) Rights-based framework
(c) Sector-based framework (d) Virtue-based framework

(ii) Which scenario best represents a regression problem?
(a) Identifying whether an email is spam. (b) Grouping customers by behaviour.
(c) Recognizing faces in photos. (d) Predicting tomorrow's temperature.

(iii) The number of cases that are actually negative and correctly predicted as negative is called _____.

(iv) In convolution, a kernel is:
(a) A complete image file
(b) A small matrix of weights that slides over the image
(c) A type of pixel colour
(d) A neural network output layer

(v) A corpus contains 4 documents in which words such as 'an', 'is' and 'the' appear frequently. What is the term used for such words?
(a) Stop word (b) Rare word (c) Missing word (d) Removable word

(vi) Which type of bot is easy to create, works based on pre-written instructions, is mostly free, is easy to integrate with messaging platforms, requires little or no language processing skill, and has limited functionality?
(a) Script Bot (b) Smart Bot (c) Cleaning Bot (d) Talbot

SECTION – B

Subjective Type Questions (26 marks)

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

Q6. Differentiate between specific and non-specific feedback with one example of each. **[2]**

Q7. (a) What is emotional intelligence? (b) Name any two skills included in emotional intelligence. **[2]**

Q8. What does Trojan horse mean in computer terminology? **[2]**

Q9. Explain how the Survive stage is different from the Grow stage. **[2]**

Q10. Name any four man-made disruptions that cause ecological imbalance. **[2]**

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

Q11. Define an ethical framework for AI. Why does AI need such frameworks? **[2]**

Q12. Name the three types of machine learning and give one application of any two of them. **[2]**

Q13. What are weights and biases in a neural network? **[2]**

Q14. Explain the difference between overfitting and underfitting of a model, with one example of each. **[2]**

Q15. How do computers store RGB images? **[2]**

Q16. How is stemming different from lemmatisation? Explain how the word 'Wolves' would be processed by stemming and by lemmatisation. **[2]**

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

Q17. Read the following and answer the questions that follow: **[4]**

A school develops an AI system to shortlist students for a competitive scholarship. The algorithm is trained to prioritize students who complete online application forms quickly — assuming that faster completion reflects confidence, competence, and tech-savviness. However, students who are not fluent in English, or who do not have access to a computer at home, take longer to fill out the form. As a result, many deserving students are unfairly rejected by the algorithm.

(i) Identify two reasons why the algorithm gave biased results. (2)

(ii) Mention two bioethics principles that can help solve such a problem and explain how they apply. (2)

Q18. Answer the following: **[4]**

(a) What is the name of the learning model that works with unlabelled data to identify hidden patterns or structures in the data? (1)

(b) Name the two main categories of this learning model. (1)

(c) Explain each category briefly and provide one example for each. (2)

Q19. Identify and explain the type of learning-based approach in each situation. Situation 1: Two dogs and two cats are fed into a machine as pictures, each labelled Dog or Cat, and the machine then correctly identifies a new dog. Situation 2: Four unlabelled animal pictures (two dogs and two cats) are given to the machine without any labels, and it groups the two similar pairs together. **[4]**

Q20. Read the following and answer the questions that follow: **[4]**

A hospital uses an AI tool to predict whether a patient needs a follow-up scan. The tool was tested on data in which 85% of the patients were men. It shows 92% overall accuracy, but its accuracy for women is only 70%. The hospital publishes only the overall accuracy figure.

(i) Name the ethical concern in this evaluation. (1)

(ii) Explain why the overall accuracy hides this concern. (1)

(iii) Name the ethical principle that requires the hospital to publish detailed results. (1)

(iv) Suggest one step to reduce this concern. (1)

Q21. Read the following and answer the questions that follow: **[4]**

Read the following three documents and answer the questions that follow. Document 1: 'Students love studying AI'. Document 2: 'AI is transforming education'. Document 3: 'Teachers and students explore AI tools'. After basic text pre-processing (removing punctuation, converting to lowercase and tokenising), the documents become: Document 1: [students, love, studying, ai]; Document 2: [ai, is, transforming, education]; Document 3: [teachers, and, students, explore, ai, tools].

(a) Create the dictionary (vocabulary) of unique words from all three documents. (1)

(b) Construct the document vector for Document 3 using the dictionary. (1)

(c) Explain how Bag of Words helps in feature extraction. (1)

(d) Why is the order of words not considered important in Bag of Words? (1)

***** END OF PAPER *****