CENTRAL BOARD OF SECONDARY EDUCATION

CBSE 2026-27

Artificial Intelligence

Subject Code: 417 | Class X

Solutions

Sample Question Paper – Set 6

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 the following is a barrier to effective communication?

(a) Clear message (b) Timely feedback (c) Noise in the room (d) Active listening

(ii) Which of the following does not help in stress management?

(a) Negative thoughts (b) Healthy food (c) Sound sleep (d) Yoga asanas

(iii) In SMART goals, 'M' stands for:

(a) Manageable (b) Modest (c) Measurable (d) Motivated

(iv) Which practice helps protect a computer against viruses?

(a) Installing anti-virus software and a firewall
(b) Opening all unknown attachments
(c) Disabling updates
(d) Sharing passwords

(v) Srishti is a young woman who makes earrings. She buys jute from a farmer and makes earrings from that. She sees that most women in her village do not work. So, she hires two women to help her. As her orders increase, she hires three more women to work for her. How was she helping her village grow?

(a) By selling earrings to women without a job
(b) By purchasing earrings from the local market
(c) By buying jute from the local farmer and by providing jobs to local women
(d) By attracting the women in her village with her creative earrings

(vi) Which of these is an eco-friendly innovation mentioned in the NCERT textbook?

(a) Thermocol plates (b) Edible cutlery made from grain
(c) Plastic bags (d) Steel-coated plastic spoons

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

(i) A team starts an AI project. It first states the problem, then collects data, then gives the data a visual form, then builds a model and finally tests the model on newly fetched data. Which stages of the AI project cycle are shown by these steps?

(a) Problem Scoping, Data Acquisition, Data Exploration, Modelling, Evaluation
(b) Data Acquisition, Problem Scoping, Modelling, Evaluation, Deployment
(c) Modelling, Evaluation, Deployment, Problem Scoping, Data Acquisition
(d) Evaluation, Deployment, Problem Scoping, Data Acquisition, Data Exploration

(ii) Which value-based framework prioritises the protection of human rights and dignity?

(a) Utility-based framework (b) Virtue-based framework
(c) Rights-based framework (d) Sector-based framework

(iii) Supervised learning uses a dataset that is:

(a) Labelled (b) Unlabelled (c) Random noise (d) Only images

(iv) **Assertion (A):** An overfitted model gives excellent accuracy on its training data.
Reason (R): It has memorised the training data and does not generalise to unseen data.

(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.

(v) Convolution with a kernel is performed:

(a) once for the whole image (b) only at the corners
(c) at every valid position of the image (d) only on the first colour channel

(vi) Stemming the word 'playing' removes the affix '-ing' and gives:

(a) playing (b) player (c) plays (d) play

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

(i) Why do we need ethical frameworks for AI?
(a) To make AI systems faster
(b) To increase the accuracy metric only
(c) To reduce the cost of data collection
(d) To ensure AI makes morally acceptable choices and avoid unintended outcomes

(ii) The column that the model is trained to predict (for example, Pass or Fail) is called the _____.

(iii) The error rate |actual - predicted| / actual is used mainly for:
(a) Classification with two labels
(b) Clustering of unlabelled data
(c) Cleaning raw text
(d) Regression-type numerical predictions

(iv) State True or False: In machine learning, the error is used to see how accurately the model can predict data.

(v) Which of these is NOT a valid input for a Computer Vision system?
(a) Plain typed text documents
(b) Photographs
(c) Videos
(d) Thermal sensor images

(vi) Which two things does the Bag of Words algorithm give?
(a) A vocabulary and the frequency of its words
(b) A speech recording and captions
(c) A sentiment score and a label
(d) Pixel values and resolution

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

(i) **Assertion (A):** Problem Scoping is the first stage of the AI project cycle.
Reason (R): In this stage, we set the goal of the project by stating the problem we wish to solve.
(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) A perceptron has four inputs with the values and weights shown below, and a bias of 0.3. Using y = w1x1 + w2x2 + w3x3 + w4x4 + (1 × b), what is the value of y?

Attribute (input)	Input x	Weight w
Has a degree in data science	1	0.6
Prior internship experience	0	0.4
Proficient in Python	1	0.5
Strong communication skills	1	0.3

(a) 1.7 (b) 1.2 (c) 1.4 (d) 2.0

(iii) A model is tested on 200 emails. It has TP = 60, FP = 20 and FN = 10. The number of True Negatives is:
(a) 100 (b) 130 (c) 90 (d) 110

(iv) Which of the following scenarios might have a high False Negative (FN) cost?
(a) Viral Disease Outbreak
(b) Spam
(c) Mining
(d) Image Search

(v) **Assertion (A):** Pooling layers increase the size of feature maps.
Reason (R): Pooling layers reduce the size of feature maps.
(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.

(vi) Count and write the number of tokens in the sentence: 'Words with adequate occurrence in a corpus are considered frequent and often reflect the main subject of the document, unlike stop words whose frequency is high but value is low.'

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

(i) Which AI domain would be most suitable for developing a price comparison website?

(a) Computer Vision (b) Natural Language Processing
(c) Robotics (d) Statistical Data

(ii) Which layer performs most of the computation in a neural network, using weights and biases?

(a) Input layer (b) Output layer (c) Testing layer (d) Hidden layer

(iii) Which of the following is a likely cause of underfitting?

(a) The model is trained on too many labelled examples
(b) The model is too simple to capture the pattern in the data
(c) The testing data is kept separate from the training data
(d) The model is evaluated using a confusion matrix

(iv) _____ is the number of pixels along the width and height of an image.

(v) Mention any two commonly used applications of NLP.

(vi) Which stage of NLP divides a large chunk of text into paragraphs, sentences and words?

(a) Semantic analysis (b) Discourse integration
(c) Pragmatic analysis (d) Lexical analysis

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. Identify the type of barrier in: 'Seema and Riya do not talk because of a long-standing personal dispute.' Explain it and suggest a way to resolve it. **[2]**

Q7. List any 4 activities that help in stress management. **[2]**

Q8. What is encryption? Why do banks encrypt customer data? **[2]**

Q9. List any two common misconceptions about entrepreneurship. **[2]**

Q10. Name two types of pollution and state one cause of each. **[2]**

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

Q11. What is Natural Language Processing? Name its two real-life applications. **[2]**

Q12. Define reinforcement learning with one example. **[2]**

Q13. Explain labelled data and unlabelled data with one example each. **[2]**

Q14. Distinguish between 'error' and 'error rate' of a model. **[2]**

Q15. Explain two applications of Computer Vision in retail. **[2]**

Q16. Differentiate between tokenisation and removal of stop words. Give one example of each. **[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 hospital uses an AI tool to identify patients at high risk so that extra care resources can be directed to those who need them most. The tool was trained on healthcare expense data as a measure of illness. Because less money had historically been spent on patients from one community, the tool marked genuinely sicker patients of that community as low risk, so they received less care than equally ill patients from other communities.

(i) How does the 'respect for autonomy' principle apply to this tool? Give two measures. (2)

(ii) How would 'do not harm' and 'justice' have changed the outcome for the community's patients? (2)

Q18. A school uses one AI model to group students into clusters by their study habits, and another AI model to predict their exam marks. Identify the learning model used in each case and explain your answer. **[4]**

Q19. A bank website chatbot answers only questions already written in its rules, while another chatbot learns from users' conversations. Identify the approach used by each, and explain one limitation of the first chatbot. **[4]**

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

A clinic tested an AI model that screens 500 patients for a disease. The model correctly flagged 80 patients who have the disease (TP), missed 20 patients who have the disease (FN), wrongly flagged 40 healthy patients (FP), and correctly cleared 360 healthy patients (TN).

	Reality: Disease	**Reality: Healthy**
Prediction: Disease	80 (TP)	40 (FP)
Prediction: Healthy	20 (FN)	360 (TN)

(i) How many patients actually have the disease? (1)

(ii) Calculate the accuracy of the model. (1)

(iii) Calculate the precision of the model. (1)

(iv) Calculate the recall of the model. (1)

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

A news portal stores three short farming articles. The table shows the term frequency (TF) of four words in each article. The corpus has N = 3 documents.

Word	**Doc 1**	**Doc 2**	**Doc 3**
water	2	1	0
crops	0	2	1
farmer	1	0	0
the	3	3	3

(i) Find the document frequency (DF) of 'water' and of 'crops'. (1)

(ii) Using IDF = N divided by DF (before taking the log), find the IDF of 'farmer'. (1)

(iii) Which word is a stop word? Justify your answer. (1)

(iv) Using TFIDF = TF $\times$ log10(N divided by DF), which word has the highest TF-IDF in Doc 1? (1)

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