CENTRAL BOARD OF SECONDARY EDUCATION

CBSE 2026-27

Artificial Intelligence

Subject Code: 417 | Class X

Solutions

Sample Question Paper – Set 1

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) Using a language that the audience does not understand is an example of a _____ barrier.

(a) Physical (b) Linguistic (c) Organisational (d) Cultural

(ii) Emotional intelligence means:

(a) Ignoring one's emotions
(b) Relying only on academic knowledge
(c) Avoiding people
(d) Recognising and managing one's own and others' emotions

(iii) Which of these causes stress?

(a) Regular sleep (b) Healthy food
(c) Physical exercise (d) Being unable to meet high expectations

(iv) The top-most directory of a hierarchical file system is called the:

(a) Subfolder (b) Desktop (c) Icon (d) Root directory

(v) Which of the following correctly lists the entrepreneurial career process in order?

(a) Survive, Enter, Retire, Grow (b) Enter, Survive, Grow, Retire
(c) Grow, Enter, Survive, Retire (d) Enter, Grow, Retire, Survive

(vi) Donating things we do not use, such as clothes, books, furniture, or food, contributes to which Sustainable Development Goal?

(a) SDG 12 - Responsible Consumption and Production
(b) SDG 3 - Good Health and Well-being
(c) SDG 1 - No Poverty
(d) SDG 4 - Quality Education

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

(i) **Assertion (A):** Virtue-based framework focuses on the character and intentions of individuals involved in decision-making.
Reason (R): Virtue-based framework evaluates whether actions align with principles such as honesty, compassion, and integrity.

(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 AI Project Cycle mainly has _____ stages.

(iii) **Assertion (A):** A rule-based system cannot adapt to new situations on its own.
Reason (R): Its behaviour is fixed by the rules that a programmer wrote in advance.

(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.

(iv) Which expression gives the accuracy of a classification model?

(a) TP / (TP + FP)
(b) TP / (TP + FN)
(c) (TP + TN) / (TP + TN + FP + FN)
(d) 2 × Precision × Recall / (Precision + Recall)

(v) What is the range of possible pixel values in a byte image format?

(a) 0 to 100 (b) 0 to 255 (c) 1 to 256 (d) –128 to 127

(vi) Which normalisation step removes words such as 'the', 'is' and 'and' that add little meaning?

(a) Stemming (b) Tokenisation
(c) Lemmatisation (d) Removing stop words

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

(i) A city council must choose between two AI traffic systems. It picks the one that gives the greatest benefit to the largest number of residents while minimising harm. Which value-based framework is being applied?

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

(ii) In reinforcement learning, an agent learns by:

(a) Reading labelled examples only (b) Copying a fixed rule book
(c) Trial and error with rewards and penalties (d) Clustering unlabelled data

(iii) While evaluating a model's performance, the recall parameter considers: (i) False positive (ii) True positive (iii) False negative (iv) True negative. Choose the correct option.

(a) Only (ii) (b) (i) and (iv)
(c) (ii) and (iii) (d) (i), (iii) and (iv)

(iv) Precision is defined as:

(a) The ratio of correctly predicted positive observations to total predicted positive observations.
(b) The ratio of correctly predicted positive observations to total observations.
(c) The ratio of correctly predicted negative observations to total observations.
(d) The harmonic mean of true positives and true negatives.

(v) Anita and Surjit are creating an AI application that will classify different types of fruits. The Computer Vision task that will identify the type of fruit and assign a label to it is called _____.

(a) Segmentation (b) Classification
(c) Classification + Localization (d) Object Detection

(vi) For a word to get a high TF-IDF value in a document, it should have:

(a) high term frequency and low document frequency
(b) low term frequency and high document frequency
(c) high term frequency and high document frequency
(d) low term frequency and low document frequency

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

(i) Ethical frameworks are primarily designed to:

(a) Increase the efficiency of AI algorithms.
(b) Ensure that the choices we make do not cause unintended harm.
(c) Reduce the cost of AI development.
(d) Speed up the AI project cycle.

(ii) _____ learning learns by trial and error using rewards and penalties.

(iii) In a spam email detection system, out of 1000 emails received, 300 are spam. The system correctly identifies 240 spam emails as spam, but it also marks 60 legitimate emails as spam. What is the precision of the system?

(a) 0.80 (b) 0.70 (c) 0.75 (d) 0.90

(iv) **Assertion (A):** In machine learning, a model with lower error is considered to perform better on a given dataset.
Reason (R): Error helps us evaluate how accurately a model can predict both training and unseen data, which is why it is used to select the best-performing 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.

(v) How many channels does a colour image have?

(vi) _____ is a term used for any word or number or special character occurring in a sentence.

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

(i) The stage of the AI Project Cycle in which data is collected from various reliable and authentic sources

is:

(a) Data Exploration (b) Modelling (c) Evaluation (d) Data Acquisition

(ii) Which of the following is the broadest term among AI, ML and DL?

(a) Artificial Intelligence (b) Deep Learning
(c) Machine Learning (d) Data Science

(iii) _____ is an integral part of the model development process that helps to find the best model that represents our data and how well the chosen model will work in the future.

(iv) The numbers 1280×1024, 1920×1080, and 640×480 represent the number of pixels in width and height of an image or display. What is the correct term used to describe this measurement?

(a) Pixel Depth (b) Resolution (c) Colour Depth (d) Classification

(v) Which normalisation technique always gives a root that is a meaningful dictionary word?

(a) Stemming (b) Lemmatisation
(c) Tokenisation (d) Sentence segmentation

(vi) In the context of NLP, which word represents the stem resulting from stemming of 'Studies'?

(a) Study (b) Stud (c) Studi (d) Studied

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. Explain how a linguistic barrier affects communication and suggest one way to overcome it. **[2]**

Q7. List four steps to build self-motivation. **[2]**

Q8. 'Security break is leakage of information stored in a computer.' Explain two ways in which personal information can be lost or leaked. **[2]**

Q9. State any two qualities to become a successful entrepreneur. **[2]**

Q10. Define green skills. Why are they important? **[2]**

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

Q11. What is a framework? Why are frameworks useful in problem-solving? **[2]**

Q12. Differentiate between the rule-based approach and the learning-based approach. **[2]**

Q13. Differentiate between training data and testing data. **[2]**

Q14. Differentiate between precision and recall. **[2]**

Q15. What is a 'byte image' format in the context of digital images? **[2]**

Q16. Write down the steps to implement the Bag of Words algorithm. **[2]**

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

Q17. What is Bioethics? Explain its four principles in detail. **[4]**

Q18. Read the following and answer the questions that follow: **[4]**

Read each scenario and name the application of Machine Learning (ML) or Deep Learning (DL) being used.

(i) A fitness tracker learns your normal heart rate. While you watch a horror movie, it flags a sudden spike as an anomaly. Name the application. (1)

(ii) A wildlife camera identifies animals and classifies them into categories such as bird, mammal and insect. Name the application. (1)

(iii) A smart refrigerator places an AI-generated label such as 'Milk Carton' on each food item in its live image. Name the application. (1)

(iv) A bike-unlock app recognises a numerical code such as '5281' scribbled with a finger, even when the handwriting is messy. Name the application. (1)

Q19. Differentiate between rule-based and learning-based approaches with one example of each. Which approach is more suitable for an email spam filter, and why? **[4]**

Q20. A fraud detection model is tested on 10,000 transactions in which only 1% are fraudulent. A model that labels every transaction as legitimate gets a high accuracy. Explain why accuracy is misleading here and which metrics should be used instead. **[4]**

Q21. Explain the features of natural language, giving an example for each. **[4]**

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