CBSE | DEPARTMENT OF SKILL EDUCATION

ARTIFICIAL INTELLIGENCE (SUBJECT CODE - 417)

Blue-print for Sample Question Paper for Class X (Session 2026-2027)

Max. Time: 2 Hours **Max. Marks: 50**

PART A - EMPLOYABILITY SKILLS (10 MARKS):

UNIT NO.	NAME OF THE UNIT	OBJECTIVE TYPE QUESTIONS	SHORT ANSWER TYPE QUESTIONS	TOTAL QUESTIONS
		1 MARK EACH	2 MARKS EACH	
1	Communication Skills – II	1	1	2
2	Self-Management Skills – II	2	1	3
3	ICT Skills – II	1	1	2
4	Entrepreneurial Skills – II	1	1	2
5	Green Skills – II	1	1	2
TOTAL QUESTIONS		**6**	**5**	**11**
NO. OF QUESTIONS TO BE ANSWERED		**Any 4**	**Any 3**	**07**
TOTAL MARKS		**1 x 4 = 4**	**2 x 3 = 6**	**10 MARKS**

PART B - SUBJECT SPECIFIC SKILLS (40 MARKS):

UNIT NO.	NAME OF THE UNIT	OBJECTIVE TYPE QUESTIONS	SHORT ANSWER TYPE QUESTIONS	DESCRIPTIVE/ LONG ANS. TYPE QUESTIONS	TOTAL QUESTIONS
		1 MARK EACH	2 MARKS EACH	4 MARKS EACH	
1	Unit 1: Revisiting AI Project Cycle & Ethical Frameworks for AI	5	1	1	7
2	Unit 2: Advanced Concepts of Modeling in AI	4	2	2	8
3	Unit 3: Evaluating Models	6	1	1	8
4	Unit 5: Computer Vision	4	1	-	5
5	Unit 6: Natural Language Processing	5	1	1	7
TOTAL QUESTIONS		**24**	**6**	**5**	**35**
NO. OF QUESTIONS TO BE ANSWERED		**Any 20**	**Any 4**	**Any 3**	**Any 27**
TOTAL MARKS		**1 x 20 = 20**	**2 x 4 = 8**	**4 x 3 = 12**	**40 MARKS**

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ARTIFICIAL INTELLIGENCE (SUBJECT CODE - 417)

Sample Question Paper for Class X (Session 2026-2027)

Max. Time: 2 Hours **Max. Marks: 50**

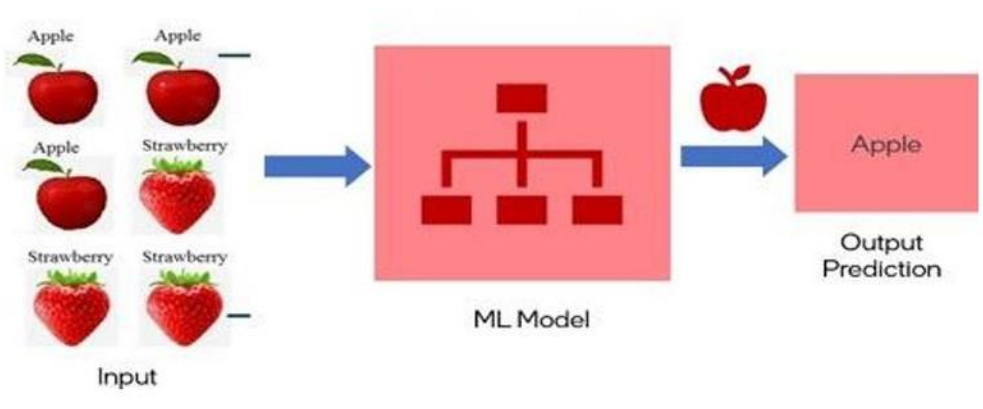
General Instructions:

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):**
   - **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.

SECTION A: OBJECTIVE TYPE QUESTIONS

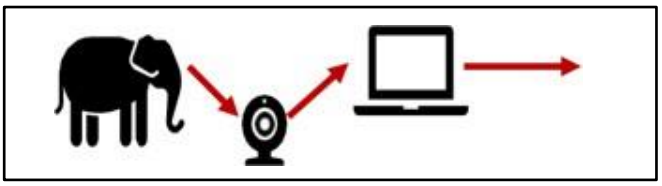
Q. 1	**Answer any 4 out of the given 6 questions on Employability Skills (1 x 4 = 4 marks)**	
i.	Which of the following is NOT an element of communication within the communication process cycle? a) Channel b) Receiver c) Sender d) Time	1

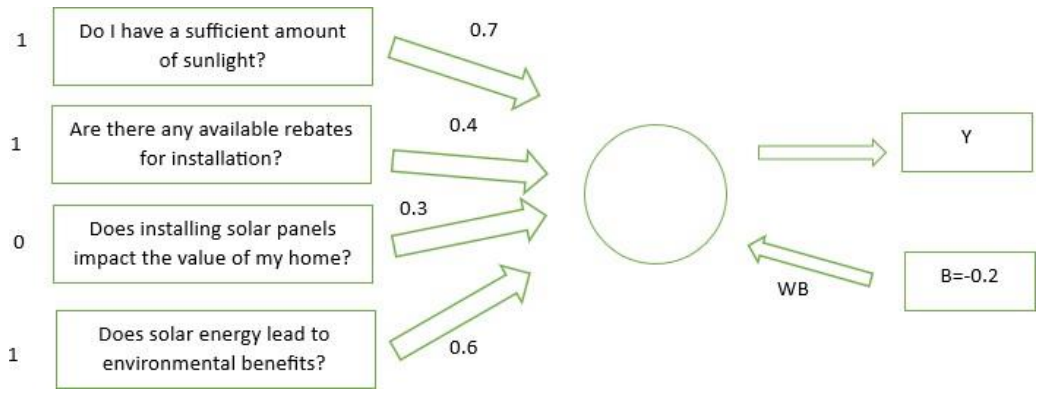
ii.	Identify the correct sequence of steps to manage stress. i. Apply stress management methods. ii. Be aware that you are stressed. iii. Identify what is causing you stress. a) i -> ii -> iii b) ii -> i -> iii c) iii -> i -> ii d) ii -> iii -> i	1
iii.	Ravi works hard to get the best student award at the end of the year. What type of motivation is this? a) Internal b) External c) Both internal and external d) Not any specific type of motivation	1
iv.	Which of the following is a valid file extension for Notepad file? a) .jpg b) .doc c) .text d) .txt	1
v.	Having launched a new business, Sanchi is confused about the functions of an entrepreneur. Which of the following is not a function of an entrepreneur? a) Managing the business and taking a risk b) Creating a new method, idea or product c) Blaming employees for wrong decisions d) Divide income	1
vi.	Narayana Peesapaty made edible cutlery made out of a grain — these spoons can be eaten and even if they are not eaten, they will easily decompose in the soil enriching it. Identify the SDG covered in this case. a) Responsible Consumption and Production b) Zero Hunger c) Clean Water and Sanitation d) Affordable and Clean Energy	1
Q. 2	**Answer any 5 out of the given 6 questions (1 x 5 = 5 marks)**	

i.	Which stage of NLP is shown in the image given below:-  a) Syntactic Analysis b) Syntactic Parsing c) Discourse Integration d) Pragmatic Analysis	1
ii.	Assertion (A): Computer vision enables machines to interpret and understand images and videos. Reason (R): Computer vision systems use sensors to feel the texture of objects. a) Both A and R are true, and R is the correct explanation of A b) Both A and R are true, but R is not the correct explanation of A c) A is true, but R is false d) A is false, but R is true	1
iii.	What is the main purpose of the "Model Building" stage in the AI project cycle? a) Visualizing data b) b) Collecting feedback c) Training and testing AI algorithms d) Choosing the target audience	1
iv.	A high F1 score generally suggests: a) A significant imbalance between precision and recall b) A good balance between precision and recall c) A model that only performs well on specific data points d) The need for more training data	1
v.	 	1

	Analyse the above image and identify the type of learning model. a) Classification b) Regression c) Clustering d) Association	
vi.	An AI model is deployed to issue flood warnings for surrounding villages, enabling residents and authorities to take preventive measures. One day, the model alerts of a possible flood, but it turns out to be a false alarm. What does this scenario represent? a) True Positive b) True Negative c) False Positive d) False Negative	1
Q. 3	**Answer any 5 out of the given 6 questions (1 x 5 = 5 marks)**	
i.	Which of the following sentences uses "bark" to refer to the outer covering of a tree? a) The dog's bark startled the sleeping baby. b) The bark of the tree was rough and peeling. c) He barked orders at the team during the meeting. d) She heard a bark echo through the alley	1
ii.	What is object detection in computer vision? a) Finding hidden files in a computer b) Detecting objects in images or videos c) Searching for emails d) Identifying the location	1
iii.	What does the ethical principle of "Non-maleficence" mean? a) Always tell the truth b) Do no harm c) Share data openly d) Collect as much data as possible	1
iv.	**Statement 1:** Value-based frameworks guide AI systems to align with human values such as fairness, privacy, and respect. **Statement 2:** Value-based frameworks encourage AI developers to ignore social and cultural diversity while designing AI systems. a) Both Statement 1 and Statement 2 are correct. b) Both Statement 1 and Statement 2 are incorrect. c) Only Statement 1 is correct. d) Only Statement 2 is correct.	1

v.	A video game AI is being trained to learn strategies by playing against itself and receiving rewards for winning and penalties for losing. Identify the type of learning. a) Supervised Learning b) Unsupervised Learning c) Reinforcement Learning d) Rule-Based Learning	1
vi.	Precision is one of the evaluation metrics. a) Defined as the fraction of positive cases that are correctly identified, taking into account the true reality cases. b) Ratio of total number of correctly classified positive examples and the total number of predicted positive examples. c) Defined as the percentage of correct predictions out of all the observations. d) Comparison between the prediction and reality	1
Q. 4	**Answer any 5 out of the given 6 questions (1 x 5 = 5 marks)**	
i.	In online retail (e-commerce), computer vision is used for:- a) Detecting fake reviews b) Suggesting product names c) Visual search and virtual try-on d) Managing bank accounts	1
ii.	Which of the following is a lemma of the word " happier"? a) happiest b) happiness c) happily d) happy	1
iii.	Which of the following is an example of following an ethical framework? a) Using personal data without permission b) Testing AI for bias before deployment c) Hiding how AI makes decisions d) Using only one type of data source	1
iv.	How many tokens are in the sentence: *AI, ML and NLP are changing the world.* a) 8 b) 9 c) 10 d) 11	1
v.	**Assertion (A):** Supervised learning is not suitable for tasks like clustering. **Reason (R) :** Clustering algorithms require labelled data to group similar data points. a) Both A and R are true, and R is the correct explanation of A b) Both A and R are true, but R is not the correct explanation of A c) A is true, but R is false d) A is false, but R is true	1

vi.	A new medical test is being evaluated for its ability to detect a particular disease. Out of 200 tests conducted: ● 80 tests correctly identified the presence of the disease. ● 30 tests incorrectly identified the disease when it wasn't present. ● 40 tests failed to detect the disease even though it was present. What is the precision of the test? a) 0.73 b) 0.50 c) 0.64 d) 0.57	1
Q. 5	**Answer any 5 out of the given 6 questions (1 x 5 = 5 marks)**	
i.	What is the main objective of **keyword extraction** in NLP? a) Translate text into another language b) Identify the most relevant words or phrases that represent the main topics of a text c) Remove stopwords from a document d) Generate a summary of the entire document	1
ii.	Based on the image given below, select the correct answer-  a) Real object → Interpreting Device →Sensing device b) Interpreting Device →Sensing device→Real object c) Real object →Sensing device→ Interpreting Device d) Sensing device→ Real object → Interpreting Device	1
iii.	The train-test split is a technique for evaluating the performance of a machine learning algorithm. What is not true about this technique? a) It is appropriate when there is a sufficiently large dataset available b) It can be used for any unsupervised learning algorithm c) The procedure involves taking a dataset and dividing it into two subsets: The training dataset and the testing dataset d) The objective is to estimate the performance of the machine learning model on new data	1
iv.	A homeowner is deciding whether to invest in solar panels for their house. The model considers four key attributes, each assigned a weight based on importance.	1

	 A bias value of -**0.2** is added. The formula used is: $y=w_1x_1+w_2x_2+w_3x_3+w_4x_4+(1\times b)$ **What will be the value of y for the given scenario?** a) 2.1 b) 1.5 c) 1.9 d) -0.2 **Note: Questions related to **Perceptron** will be asked in this objective (MCQ) format.*	
v.	What happens during the Data Exploration stage? a) We build the AI model b) We create a project plan c) We clean, visualize, and understand the data d) We publish the results	1
vi.	An AI model was developed to predict the prices of smartphones based on their features. The model was tested on a smartphone, and the following predictions were made: Actual Price (₹)= 20,000 and Predicted Price (₹)=19,200 Error rate and accuracy for the smartphone is: a) 0.08 and 0.92 b) 0.15 and 0.85 c) 0.25 and 0.75 d) 0.04 and 0.96	1

SECTION B: SUBJECTIVE TYPE QUESTIONS

Answer any 3 out of the given 5 questions on Employability Skills (2 x 3 = 6 marks)

Answer each question in 20 – 30 words.

Q. 6	List the different types of verbal communication.	2
Q. 7	What is SMART in goal setting?	2

Q. 8	What are the qualities of an entrepreneur?	2
Q. 9	Explain how the Trojan Horse virus works.	2
Q. 10	Explain the importance of education towards sustainable development.	2

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

Q. 11	What is bioethics? List any two principles of bioethics.	2
Q. 12	What is an association rule in machine learning? Explain how association rules help in finding relationships between products using an example.	2
Q. 13	What is anomaly detection in machine learning? Support your answer with a relevant example.	2
Q. 14	What is the need for model evaluation? Why is it important to evaluate a model on unseen data?	2
Q. 15	Differentiate between Object detection and Instance Segmentation.	2
Q. 16	A newspaper company uses an AI model that can automatically sort articles into categories like *Sports*, *Politics*, *Health*, and *Technology*. Identify this NLP application and explain how it helps.	2

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

Q. 17	Read the case study below and answer the following questions: A school installs **AI-powered cameras** to monitor student behavior and reduce bullying. The AI can recognize facial expressions and body language, then alert teachers if it detects aggression or stress. Some parents and students support it for safety purposes. Others are concerned about constant surveillance and personal privacy. a) What ethical concerns should be discussed before installing the AI-powered cameras ? b) How can the system avoid violating user privacy? Should the AI be allowed to make decisions without human oversight?	4
Q. 18	You are designing a smart assistant that can recognize objects in pictures – like identifying a dog or a tree. You decide to use a neural network for this task. Explain what a neural network is and how it would process the image using the input layer, hidden layers, and output layer. What role does each layer play in helping the assistant learn and give the correct answer?	4
Q. 19	Imagine you're building a help chatbot for a school website to answer routine queries like "What are the school timings?" or "When will exams be held?"	4

	a) Would you use a rule-based or learning-based approach? b) Explain the approach you have chosen. c) What are the limitations of your chosen approach in this situation? d) Suggest one way to improve the chatbot if students start asking new types of questions that are not covered in the original rules.	
Q. 20	A sentiment analyzer is used to classify responses as positive(1) or negative(0). Out of 500 responses. - True Positives(TP): 150 responses were correctly classified as positive. - False Positives(FP): 100 responses were incorrectly classified as positive. - True Negatives(TN): 200 responses were correctly classified as negative. - False Negatives(FN): 50 responses were incorrectly classified as negative. Calculate accuracy, precision, recall and F1-score.	4
Q. 21	Answer the questions given below- ● Document 1: "The cat sat on the mat" ● Document 2: "The dog is barking" ● Document 3: "Both are good pets" **Questions:** a) Find out the frequency of a word in one document. b) Construct the document frequency table. c) Draw Inverse Document frequency table. d) What is the formula of TFIDF for any word W.	4

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MARKING SCHEME FOR CLASS X (SESSION 2026-2027)

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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):**
   - **i.** This section has 05 questions.
   - **ii.** There is no negative marking.
   - **iii.** Do as per the instructions given.
   - **iv.** Marks allotted are mentioned against each question/part.
7. **SECTION B – SUBJECTIVE TYPE QUESTIONS (26 MARKS):**
   - **i.** This section contains 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.

SECTION A: OBJECTIVE TYPE QUESTIONS

Q. No.	QUESTION	Source Material (NCERT/PSSCIVE/ CBSE Study Material)	Unit/ Chap. No.	Page no. of source material	Marks
Q. 1	**Answer any 4 out of the given 6 questions on Employability Skills (1 x 4 = 4 marks)**				
i	d) Time	NCERT	1	16	**1**
ii	d) ii -> iii -> i	NCERT	2	42	**1**
iii	b) External	NCERT	2	64	**1**
iv	d) .txt	NCERT	3	80	**1**
v	c) Blaming employees for wrong decisions	NCERT	4	103	**1**
vi	a) Responsible Consumption and Production	NCERT	5	117	**1**

Q. 2	**Answer any 5 out of the given 6 questions (1 x 5 = 5 marks)**				
i	d) Pragmatic Analysis	CBSE Study material	6	160	**1**
ii	c) A is true, but R is false	CBSE Study material	5	125	**1**
iii	c) Training and testing AI algorithms	CBSE Study material	1	8	**1**
iv	c) Evaluating a model to determine its performance	CBSE Study material	3	62	**1**
v	a) Classification	CBSE Study material	2	39	**1**
vi	c) False Positive	CBSE Study material	3	73	**1**
Q. 3	**Answer any 5 out of the given 6 questions (1 x 5 = 5 marks)**				
i	b) The bark of the tree was rough and peeling.	CBSE Study material	6	153	**1**
ii	b) Detecting objects in images or videos	CBSE Study material	5	126	**1**
iii	b) Do no harm	CBSE Study material	1	16	**1**
iv	c) Only Statement 1 is correct.	CBSE Study material	1	15	**1**
v	c) Reinforcement Learning	CBSE Study material	2	36	**1**
vi	b) Ratio of total number of correctly classified positive examples and the total number of predicted positive examples.	CBSE Study material	3	77	**1**
Q. 4	**Answer any 5 out of the given 6 questions (1 x 5 = 5 marks)**				
i	c) Visual search and virtual try-on	CBSE Study material	5	124	**1**
ii	d) happy	CBSE Study material	6	167	**1**
iii	b)Testing AI for bias before deployment	CBSE Study material	1	15	**1**

iv	c) 10	CBSE Study material	6	165	**1**
v	c) A is true, but R is false	CBSE Study material	2	42	**1**
vi	a) 0.73	CBSE Study material	3	77	**1**
Q. 5	**Answer any 5 out of the given 6 questions (1 x 5 = 5 marks)**				
i	b) Identify the most relevant words or phrases that represent the main topics of a text	CBSE Study material	6	156	1
ii	c) Real object →Sensing device→ Interpreting Device	CBSE Study material	5	122	**1**
iii	b) It can be used for any unsupervised learning algorithm	CBSE Study material	3	63	**1**
iv	b) 1.5	CBSE Study material	2	48	**1**
v	c) We clean, visualize, and understand the data	CBSE Study material	1	9	**1**
vi	d) 0.04 and 0.96	CBSE Study material	3	66	**1**

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

SECTION B: SUBJECTIVE TYPE QUESTIONS

Q. No.	**QUESTION**	**Source Material (NCERT/PSSCIVE/ CBSE Study Material)**	**Unit/ ChapNo.**	**Page no. of source material**	**Marks**
6.	Verbal communication includes sounds, words, language, and speech. Type of Verbal Communication are- Interpersonal Communication, Written Communication, Small Group Communication and Public Communication. ½ marks for any each type	NCERT	1	17	**2**
7.	**SMART** is a goal-setting framework that ensures goals are **Specific, Measurable, Achievable, Relevant, and Time-bound**. It helps individuals or teams create clear, realistic objectives with defined outcomes and deadlines. (½ mark for each point)	NCERT	2	63	**2**

8.	• An entrepreneur is someone who takes initiative, shows creativity, and is willing to take risks to start and grow a business. • They are confident, they have patience • Take responsibility for my actions and mistakes. • They work hard on every task. • They think of different ways to solve a problem. • They are creative. • They are good decision makers. • They do not give up when I face a problem. (½ mark for each point mentioned above or any relevant point)	NCERT	4	100	**2**
9.	A Trojan Horse virus disguises itself as a legitimate program to trick users into installing it. Once activated, it can damage files, steal information, or give hackers remote access to the infected computer without the user's knowledge. (1 mark for each point)	NCERT	3	90	**2**
10.	Education for sustainable development helps people learn how to take care of the Earth and use resources wisely. It teaches us to make choices that protect the environment and help everyone live better now and in the future. (1 mark for each point)	NCERT	5	123	**2**
Answer any 4 out of the given 6 questions in 20 – 30 words each (2 x 4 = 8 marks)					
11.	Bioethics is an ethical framework used in healthcare and life sciences. It deals with ethical issues related to health, medicine, and biological sciences, ensuring that AI applications in healthcare adhere to ethical standards and considerations. Principles of bioethics: ● Respect for Autonomy. ● Do not harm. ● Ensure maximum benefit for all. ● Give justice. (1 mark for explanation and 1/2 mark for any 2 example)	CBSE Study material	1	16	**2**
12.	Association Rule is an unsupervised learning method that is used to find interesting relationships between variables from the database. For example- Consider a supermarket wherein- Customer A buys bread, butter and milk. Customer B buys rice, bread and butter. Based on the purchase pattern of other customers, we can predict that there is a high probability	CBSE Study material	2	43	**2**

	that any customer x who buys bread will most probably buy butter. (1 mark for explanation and 1 mark for example)				
13.	Anomaly detection helps us find the unexpected things hiding in our data. For example, tracking your heart rate, and finding a sudden spike could be an anomaly, flagging a potential issue. (1 mark for explanation and 1 mark for example)	CBSE Study material	2	26	**2**
14.	It helps you understand its strengths, weaknesses, and suitability for the task at hand. Remember that It's not recommended to use the data we used to build the model to evaluate it. This is because our model will simply remember the whole training set, and will therefore always predict the correct label for any point in the training set. This is known as overfitting. (1 mark for each point)	CBSE Study material	3	64	**2**
15.	**Computer Vision Vs. Image Processing** **Computer Vision**: • Computer vision deals with extracting information from the input images or videos toinfer meaningful information and understanding them to predict the visual input • Computer Vision is a superset of ImageProcessing. • Examples - Object detection, Handwritingrecognition, etc. **Image Processing**: • Image processing is mainly focused on processing the raw input images to enhance them or preparing them to do other tasks • Image Processing is a subset of ComputerVision. • Examples - Rescaling image, Correcting brightness, Changing tones, etc. (½ mark for each point)	CBSE Study material	5	123	**2**
16.	A newspaper company uses an AI model that can automatically sort articles into categories like *Sports*, *Politics*, *Health*, and *Technology*. Identify this NLP application and explain how it helps.The newspaper company is using **text classification**, a type of Natural Language Processing (NLP).It helps by automatically sorting news articles into groups like Sports, Politics, Health, and Technology. This saves time, makes it easier for readers to find what they like, and helps the company manage news better. (1 mark for the correct application, 1 mark for explanation)	CBSE Study material	6	156	**2**
Answer any 3 out of the given 5 questions in 50– 80 words each (4 x 3 = 12 marks)					

17.	a) What ethical concerns should be discussed before installing the AI-powered cameras ? i. The ethical concerns to discuss include **respect for privacy**, ensuring that students' personal space and dignity are protected. ii. The school should also promote **fairness and accountability**, making sure the AI does not wrongly target or misjudge students, and that human oversight is in place for all decisions. Lastly, the system should reflect **transparency and trust**, with clear communication and consent from students and parents. (1 mark for each reason) b)How can the system avoid violating user privacy? Should the AI be allowed to make decisions without human oversight? I. To protect privacy, the system should **collect only necessary information**, **keep it safe**, and **use it only to help keep students safe**. Ii. The AI should **not make decisions on its own** — a teacher or adult should always check and decide what to do. This makes sure the system is fair and trustworthy. (1 mark for each reason)	CBSE Study material	1	15	**4**
18.	Neural networks are loosely modelled after how neurons in the human brain behave. It is divided into multiple layers and each layer is further divided into several blocks called nodes. Each node has its own task to accomplish which is then passed to the next layer. (1mark) ● The first layer of a Neural Network is known as the input layer. The job of an input layer is to acquire data and feed it to the Neural Network. No processing occurs at the input layer. (0.5 marks) ● Next to it, are the hidden layers. Hidden layers are the layers in which the whole processing occurs. Their name essentially means that these layers are hidden and are not visible to the user. Each node of these hidden layers has its own machine learning algorithm which it executes on the data received from the input layer. The hidden layer performs computation by means of weights and biases Information passes from one layer to the other after the value found from this calculation passed through a selected activation function. The process of finding the right output begins with trial and error until the network finally learns. With each try, the weights are adjusted based on the error	CBSE Study material	2	46,47	**4**

	found between the desired output and the network output. There can be multiple hidden layers in a neural network system and their number depends upon the complexity of the function for which the network has been configured. Also, the number of nodes in each layer can vary accordingly. (2 mark) (any 2 relevant points) ● The last hidden layer passes the final processed data to the output layer which then gives it to the user as the final output. (0.5 marks)				
19.	a) We use rule-based approach b) Rule Based Approach refers to the AI modelling where the relationship or patterns in data are defined by the developer. The machine follows the rules or instructions mentioned by the developer, and performs its task accordingly. c) A drawback/feature for this approach is that the learning is static. The machine once trained, does not take into consideration any changes made in the original training dataset. That is, if you try testing the machine on a dataset which is different from the rules and data you fed it at the training stage, the machine will fail and will not learn from its mistake. d) We can improve the chatbot by switching to a learning-based model, which can learn from new questions over time. (1 mark for each point)	CBSE Study material	2	29,30	4
20.	A sentiment analyzer is used to classify responses as positive(1) or negative(0). Out of 500 responses. - True Positives(TP): 150 responses were correctly classified as positive. - False Positives(FP): 100 responses were incorrectly classified as positive. - True Negatives(TN): 200 responses were correctly classified as negative. - False Negatives(FN): 50 responses were incorrectly classified as negative. Calculate accuracy, precision, recall, and F1-score. $$\text{Accuracy} = \frac{TP + TN}{TP + TN + FP + FN}$$ $$= \frac{150 + 200}{500} = \frac{350}{500} = 0.70$$ **Accuracy** = 70%	CBSE Study material	3	76,77,78 ,79	**4**

$$\text{Precision} = \frac{TP}{TP + FP}$$

$$= \frac{150}{150 + 100} = \frac{150}{250} = 0.60$$

Precision=0.60

$$\text{Recall} = \frac{TP}{TP + FN}$$

$$= \frac{150}{150 + 50} = \frac{150}{200} = 0.75$$

Recall=0.75

$$\text{F1-score} = \frac{2 \times (\text{Precision} \times \text{Recall})}{\text{Precision} + \text{Recall}}$$

$$= \frac{2 \times (0.60 \times 0.75)}{0.60 + 0.75} = \frac{2 \times 0.45}{1.35} = \frac{0.90}{1.35} \approx 0.667$$

F1Score=0.667

(½ mark for formula; ½ mark for the answer)

21. a) Find out the frequency of a word in one document. Term frequency is the frequency of a word in one document. Term frequency can easily be found in the document vector table as in that table we mention the frequency of each word of the vocabulary in each document.

	the	cat	sat	on	mat	dog	is	barking	both	are	good	pets
Doc1	2	1	1	1	1	0	0	0	0	0	0	0
Doc2	1	0	0	0	0	1	1	1	0	0	0	0
Doc3	0	0	0	0	0	0	0	0	1	1	1	1

(1 mark for the table)

b) Document Frequency is the number of documents in which the word occurs irrespective of how many times it has occurred in those documents.

the	cat	sat	on	mat	dog	is	barking	both	are	good	pets
2	1	1	1	1	1	1	1	1	1	1	1

(1 mark for the table)

c) In inverse document frequency, we need to put the document frequency in the denominator while the total number of documents is the numerator.

the	cat	sat	on	mat	dog	is	barking	both	are	good	pets
3/ 2	3/1	3/1	3/1	3/1	3/1	3/1	3/1	3/1	3/1	3/1	3/1

CBSE Study material | 6 | 173,174 | **4**

	(1 mark for the table) d) The formula of TFIDF for any word W is: TFIDF(W) = TF(W) * log(IDF(W)) Here, log is to the base of 10. (1 mark for the formula)				

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ARTIFICIAL INTELLIGENCE (SUBJECT CODE - 417)

Blue-print for Sample Question Paper for Class X (Session 2025-2026)

Max. Time: 2 Hours **Max. Marks: 50**

PART A - EMPLOYABILITY SKILLS (10 MARKS):

UNIT NO.	NAME OF THE UNIT	OBJECTIVE TYPE QUESTIONS	SHORT ANSWER TYPE QUESTIONS	TOTAL QUESTIONS
		1 MARK EACH	2 MARKS EACH	
1	Communication Skills – II	1	1	2
2	Self-Management Skills – II	2	1	3
3	ICT Skills – II	1	1	2
4	Entrepreneurial Skills – II	1	1	2
5	Green Skills – II	1	1	2
TOTAL QUESTIONS		**6**	**5**	**11**
NO. OF QUESTIONS TO BE ANSWERED		**Any 4**	**Any 3**	**Any 7**
TOTAL MARKS		**1 x 4 = 4**	**2 x 3 = 6**	**10 MARKS**

PART B - SUBJECT SPECIFIC SKILLS (40 MARKS):

UNIT NO.	NAME OF THE UNIT	OBJECTIVE TYPE QUESTIONS	SHORT ANSWER TYPE QUESTIONS	DESCRIPTIVE/ LONG ANS. TYPE QUESTIONS	TOTAL QUESTIONS
		1 MARK EACH	2 MARKS EACH	4 MARKS EACH	
1	Unit 1: Revisiting AI Project Cycle & Ethical Frameworks for AI	5	1	1	7
2	Unit 2: Advanced Concepts of Modeling in AI	4	2	2	8
3	Unit 3: Evaluating Models	6	1	1	8
4	Unit 5: Computer Vision	4	1	-	5
5	Unit 6: Natural Language Processing	5	1	1	7
TOTAL QUESTIONS		**24**	**6**	**5**	**35**
NO. OF QUESTIONS TO BE ANSWERED		**Any 20**	**Any 4**	**Any 3**	**Any 27**
TOTAL MARKS		**1 x 20 = 20**	**2 x 4 = 8**	**4 x 3 = 12**	**40 MARKS**

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ARTIFICIAL INTELLIGENCE (SUBJECT CODE - 417)

Sample Question Paper for Class X (Session 2025-2026)

Max. Time: 2 Hours **Max. Marks: 50**

General Instructions:

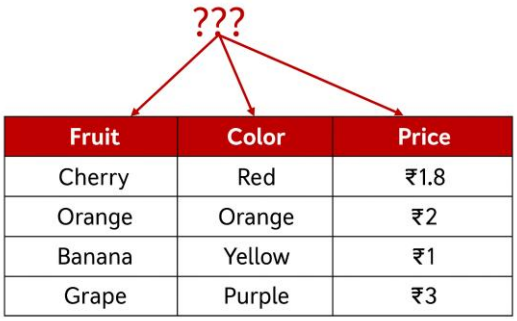
1. Please read the instructions carefully.
2. This Question Paper consists of **21 questions** in two sections: Section A & Section B.
3. Section A has Objective type questions whereas Section B contains Subjective type questions.
4. **Out of the given (5 + 16 =) 21 questions, a candidate has to answer (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):**
    - **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.

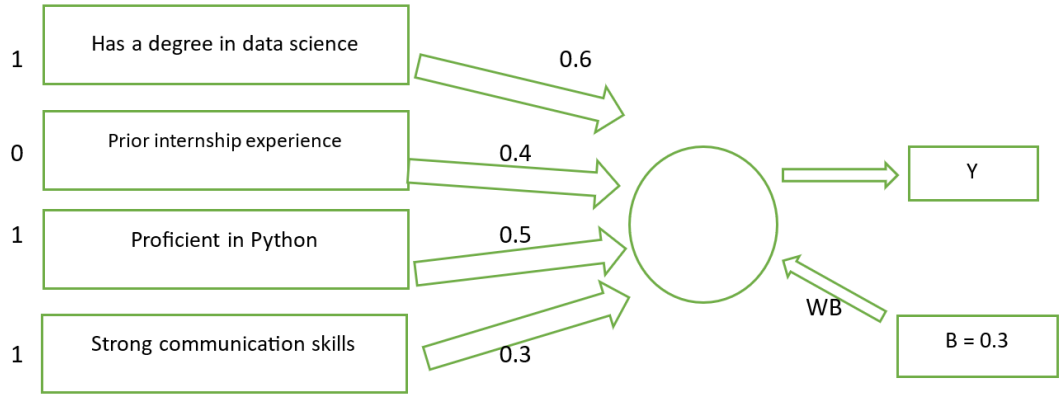
SECTION A: OBJECTIVE TYPE QUESTIONS

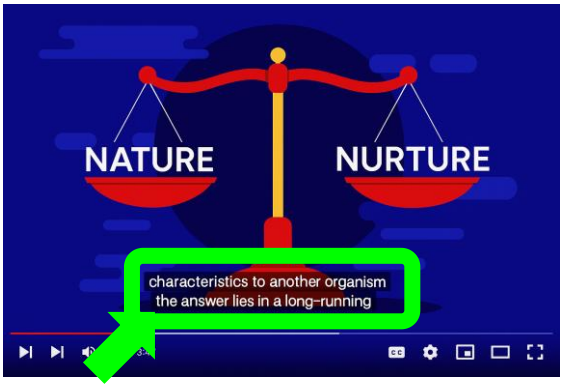
Q. 1	**Answer any 4 out of the given 6 questions on Employability Skills (1 x 4 = 4 marks)**	
i.	Which type of non-verbal communication is shown by actions like raising a hand to greet or pointing a finger at someone? a) Facial Expression b) Posture c) Gesture d) Eye Contact	**1**
ii.	You take ownership of a task, complete it sincerely, and report honestly even if it is delayed. Which of the following best describes this behaviour as one of the skills you must master to succeed in life? a) Self-awareness b) Responsibility c) Time management d) Adaptability	**1**
iii.	Which of the following is **not** one of the suggested steps to manage emotional intelligence? a) Making decisions purely based on emotions b) Observing your own behaviour to understand your emotions c) Practising meditation and yoga to stay calm d) Thinking rationally before making decisions	**1**
iv.	What is the action called when you place the mouse pointer over a file in File Explorer and it displays the file's details without clicking? a) Click b) Drag c) Scroll d) Hover	**1**
v.	Sanjana opened a small grocery store in her neighbourhood. Despite competition from nearby stores, her business attracted regular customers. Within a year, she expanded her store and later opened four more branches across the city. She now plans to expand to two more cities. **Which stage of the career or entrepreneurial process is she currently in?** a) Survive b) Enter c) Grow d) Retire	**1**
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	**1**

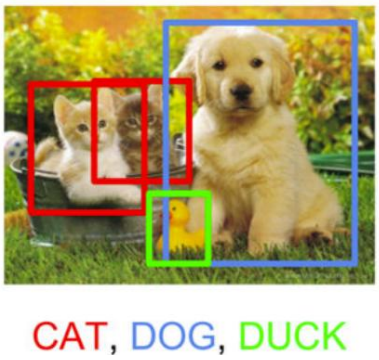
Q. 2	**Answer any 5 out of the given 6 questions (1 x 5 = 5 marks)**	
i.	With respect to the type of data fed into the AI model, AI model can be broadly classified into ____ domains.	**1**
ii.	**Assertion(A)** : Virtue-based framework focuses on the character and intentions of individuals involved in 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	**1**
iii.	A teacher uses a rule-based program to grade students' essays. The program was trained to look for specific keywords and phrases to assign grades. However, when students start using new words and expressions not included in the training, the program gives incorrect grades. **What is the most likely reason for this issue?** a) The rule-based program was not trained on enough essays. b) The rule-based approach is static and cannot adapt to new words or expressions. c) The students wrote essays that were too long. d) The program was not tested properly.	**1**
iv.	_____ 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.	**1**
v.	**_____** is mainly focused on enhancing raw input images or preparing them for other tasks, such as rescaling, correcting brightness, or changing tones. It is a subset of **_____**. a) Computer Vision; Image Processing b) Machine Learning; Artificial Intelligence c) Image Processing; Computer Vision d) Object Detection; Image Processing	**1**
vi.	*State True or False:* In natural language, it is important to understand that a word can have multiple meanings and the meanings fit into the statement according to the context of it.	**1**

Q. 3	**Answer any 5 out of the given 6 questions (1 x 5 = 5 marks)**	
i.	A self-driving car fails to detect pedestrians crossing at night, resulting in a near accident. Which domain of AI technology should be enhanced to improve safety? a) Natural Language Processing b) Statistical Data c) Recommendation Systems d) Computer Vision	**1**

ii.	 In the given fruit dataset, what do we call Fruit, Color and Price as? a) Instances b) Values c) Models d) Features	**1**
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	**1**
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	**1**
v.	Identify the application of Computer Vision from the given picture: a) Facial Recognition b) CV in Retail c) Medical Imaging d) Face Filters 	**1**
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.	**1**

Q. 4	**Answer any 5 out of the given 6 questions (1 x 5 = 5 marks)**	
i.	What do frameworks provide in the context of problem-solving? a) Step-by-step guidance b) Random solutions c) Legal advice d) Ethical justifications	**1**
ii.	**Statement 1**: The testing data set is a collection of examples given to the model to analyze and learn. **Statement 2**: The training data set is used to test the accuracy of the model. Which of the following is correct? a) Both Statement 1 and Statement 2 are correct. b) Both Statement 1 and Statement 2 are incorrect. c) Only Statement 1 is correct. d) Only Statement 2 is correct.	**1**
iii.	A company is using a simple AI model to **screen job applicants** for an entry-level data analyst position. The model considers four key attributes, each assigned a weight based on importance.  A bias value of **0.3** is added. The formula used is: $y=w_1x_1+w_2x_2+w_3x_3+w_4x_4+(1\times b)$ **What will be the value of y for the given scenario?** a) 1.2 b) 1.4 c) 1.7 d) 2.0 **Note: Questions related to **Perceptron** will be asked in this objective (MCQ) format.*	**1**
iv.	Why is it **not recommended** to evaluate a machine learning model using the same data on which it was trained? a) It helps the model learn faster b) It reduces bias in the dataset c) It improves the performance of the model on unseen data d) It may lead to overfitting and give an overly optimistic accuracy	**1**
v.	The numbers **1280x1024**, **1920x1080**, and **640x480** 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	**1**

vi.	Identify the application of NLP shown in the given picture: a) Autogenerated captions b) Sentiment Analysis c) Text Classification d) Keyword Extraction 	**1**

Q. 5	**Answer any 5 out of the given 6 questions (1 x 5 = 5 marks)**	
i.	You are deciding to donate to a charity. One recipient is a local school in your neighbourhood, while another is a school in a distant country. Which factor might unconsciously influence your decision? a) Location of the recipient b) Design of the charity logo c) Weather on the day of donation d) The type of pen used to sign the donation form	**1**
ii.	A house was predicted to cost **₹4,53,000**, but the actual selling price was **₹4,88,000**. What is the **error rate** of this prediction (rounded to three decimal places)? a) 0.058 b) 0.071 c) 0.092 d) 0.117	**1**
iii.	 The term that refers to the process of identifying and locating real-world objects like faces, bicycles, or buildings in images or videos, and is used in applications such as image retrieval and automated vehicle parking systems is _____. a) Image Classification b) Image Segmentation c) Object Detection d) Feature Extraction	**1**
iv.	_____ is the outcome of the model wrongly predicting the negative class as positive class.	
v.	Which type of bot is easy to create, works based on pre-written instructions, is mostly free, easy to integrate with messaging platforms, requires little or no language processing skills, and has limited functionality? a) Script Bot b) Smart Bot c) Cleaning Bot d) Talbot	**1**
vi.	What are the stemmed and lemmatized forms of the word **'flies'**? a) Stemmed: fly, Lemmatized: flies b) Stemmed: fly, Lemmatized: fly c) Stemmed: flies, Lemmatized: flies d) Stemmed: fli, Lemmatized: fly	

SECTION B: SUBJECTIVE TYPE QUESTIONS

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

Q. 6	What is a pronoun? Give an example.	**2**
Q. 7	List four steps to build self-motivation.	**2**
Q. 8	"Security break is leakage of information stored in a computer". Explain two ways in which personal information can be lost or leaked.	**2**
Q. 9	**Reema runs a small handmade soap business. Every morning, she decides what products to make, how many soaps to produce, and where to sell them. She also arranges raw materials and assigns tasks to her staff.** From the paragraph, identify and write the two functions of an entrepreneur that are being described.	**2**
Q. 10	What is organic farming? Mention any two benefits of practising organic farming.	**2**

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

Q. 11	What do you do in the second and third stages of an AI Project cycle?	**2**
Q. 12	Identify the type of deep learning model. a) This deep learning model processes input images by learning to assign importance (weights and biases) to various features in the image, allowing it to distinguish one object from another. b) This deep learning model is inspired by the structure of the human brain. It can automatically extract features from large datasets without explicit programming. Each node in the network acts like a small machine learning algorithm.	**2**
Q. 13	How is reinforcement learning different from supervised and unsupervised learning?	**2**
Q. 14	What is model evaluation in machine learning, and how does it help improve an AI model?	**2**
Q. 15	What is a "byte image" format in the context of digital images?	**2**
Q. 16	Identify the stage of NLP and explain. ❌ **We are to the zoo going tomorrow.** ✅ **We are going to the zoo tomorrow.**	**2**

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

Q. 17	**Read the case study below and answer the following questions:** *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.* a) Identify two reasons why the algorithm gave biased results. b) Mention two bioethics principles that can help solve such a problem and explain how they apply.	**4**
Q. 18	a) What is the name of the learning model that works with *unlabeled data* to identify hidden patterns or structures in the data? b) Name the two main categories of this learning model. c) Explain each category briefly and provide one example for each.	**4**
Q. 19	Identify the name of the application of Machine Learning (ML) or Deep Learning (DL) being used in the following scenarios. a) A fitness tracker uses AI to monitor your heart rate and learn what is normal for you. One evening, while you're relaxing and watching a horror movie, the tracker suddenly flags a spike in your heart rate as an anomaly — thinking something might be wrong. b) A wildlife camera is equipped with AI to monitor animals in a forest. It not only records movement of animals, but also identifies and classifies them into categories like “bird”, “mammal”, “insect”, etc., c) A smart refrigerator is equipped with an internal camera and an AI system. One of its door features a display screen that shows a real-time image of the inside, capturing all the food items on various shelves. For each item, the system not only shows its actual image but also places an AI-generated label on top of it, such as: 🥛 “Milk Carton”, 🍎 “Apple”, 🍦 “Ice Cream”. d) Imagine an app that helps you unlock your bike. Instead of typing a password, you simply scribble a numerical code like “5281” on your phone screen using your finger — even if your handwriting is a bit messy after a tough workout.	**4**
Q. 20	**Read the following paragraph and answer the questions that follow:** A school recently tested an AI model designed to predict whether students would pass or fail their final exams. Out of 100 students, the model correctly predicted that 40 students would pass and they actually did. It also correctly identified 30 students who were going to fail. However, the model predicted that 20 students would pass, but they ended up failing. Additionally, it predicted that 10 students would fail, but they actually passed. a) Draw the confusion matrix based on the above information. (2) b) Calculate the accuracy of this classification model. Show your working. (1) c) Write the total number of wrong predictions made by the model. (1)	**4**

Q. 21	**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 performing basic text pre-processing (removing punctuation, converting to lowercase, and tokenizing), the documents become: ● Document 1: [students, love, studying, ai] ● Document 2: [ai, is, transforming, education] ● Document 3: [teachers, and, students, explore, ai, tools] **Questions:** a) Create the dictionary (vocabulary) of unique words from all three documents. b) Construct the document vector for **Document 3** using the dictionary. c) Explain how Bag of Words help in feature extraction. d) Why is the order of words not considered important in Bag of Words?	**4**

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ARTIFICIAL INTELLIGENCE (SUBJECT CODE - 417)

MARKING SCHEME FOR CLASS X (SESSION 2025-2026)

Max. Time: 2 Hours **Max. 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):**
   - **i.** This section has 05 questions.
   - **ii.** There is no negative marking.
   - **iii.** Do as per the instructions given.
   - **iv.** Marks allotted are mentioned against each question/part.
7. **SECTION B – SUBJECTIVE TYPE QUESTIONS (26 MARKS):**
   - **i.** This section contains 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.

SECTION A: OBJECTIVE TYPE QUESTIONS

Q. No.	QUESTION	Source Material (NCERT/PSSCIVE/ CBSE Study Material)	Unit/ Chap. No.	Page no. of source material	Marks
Q. 1	**Answer any 4 out of the given 6 questions on Employability Skills (1 x 4 = 4 marks)**				
i.	c) Gesture	NCERT	1	11	**1**
ii.	b) Responsibility	NCERT	2	40	**1**
iii.	a) Making decisions purely based on emotions	NCERT	2	44	**1**
iv.	d) Hover	NCERT	3	67	**1**
v.	c) Grow	NCERT	4	100	**1**
vi.	a) SDG 12 – Responsible Consumption and Production	NCERT	5	112	**1**
Q. 2	**Answer any 5 out of the given 6 questions (1 x 5 = 5 marks)**				
i.	Three	CBSE Study material	1	9	**1**
ii.	a) Both A and R are correct, and R is the correct explanation of A	CBSE Study material	1	16	**1**
iii.	b) The rule-based approach is static and cannot adapt to new words or expressions.	CBSE Study material	2	30	**1**

iv.	Evaluation	CBSE Study material	3	62	**1**
v.	c) Image Processing; Computer Vision	CBSE Study material	5	123	**1**
vi.	True	CBSE Study material	6	154	**1**
Q. 3	**Answer any 5 out of the given 6 questions (1 x 5 = 5 marks)**				
i.	d) Computer Vision	CBSE Study material	1	10	**1**
ii.	d) Features	CBSE Study material	2	28	**1**
iii.	a) 0.80	CBSE Study material	3	77	**1**
iv.	a) Both A and R are correct, and R is the correct explanation of A.	CBSE Study material	3	65	**1**
v.	d) Face Filters	CBSE Study material	5	124	**1**
vi.	32	CBSE Study material	6	165	**1**
Q. 4	**Answer any 5 out of the given 6 questions (1 x 5 = 5 marks)**				
i.	a) Step-by-step guidance	CBSE Study material	1	12	**1**
ii.	b) Both Statement 1 and Statement 2 are incorrect.	CBSE Study material	2	28,29	**1**
iii.	c) 1.7	CBSE Study material	2	51	**1**
iv.	d) It may lead to overfitting and give an overly optimistic accuracy	CBSE Study material	3	64	**1**
v.	b) Resolution	CBSE Study material	5	128	**1**
vi.	a) Autogenerated captions	CBSE Study material	6	155	**1**
Q. 5	**Answer any 5 out of the given 6 questions (1 x 5 = 5 marks)**				
i.	a) Location of the recipient	CBSE Study material	1	14	**1**
ii.	b) 0.071	CBSE Study material	3	66	**1**
iii.	c) Object Detection	CBSE Study material	5	126	**1**
iv.	False Positive	CBSE Study material	3	73	**1**
v.	a) Script Bot	CBSE Study material	6	163	**1**
vi.	d) Stemmed: fli, Lemmatized: fly	CBSE Study material	6	167,168	**1**

SECTION B: SUBJECTIVE TYPE QUESTIONS

Q. No.	QUESTION	Source Material (NCERT/ PSSCIVE/ CBSE Study Material)	Unit / Chap No.	Page no. of source material	Marks
Answer any 3 out of the given 5 questions on Employability Skills in 20 – 30 words each (2 x 3 = 6 marks)					
Q. 6	Words used in place of a noun are called pronouns. Eg: Kavita bought a book. She has a great book collection. 'She' is used in place of the noun 'Kavita'. (1 mark for explanation and 1 mark for example)	NCERT	1	26	**2**
Q. 7	The four steps to build self-motivation are: 1. Find out your strengths 2. Set and focus on your goals 3. Develop a plan to achieve your goals 4. Stay loyal to your goals (½ mark for each point)	NCERT	2	52	**2**
Q. 8	Personal information can be lost or leaked in two ways: 1. We are not careful in giving out personal information over the Internet. For example, we share our account details and password on unsecure sites. 2. A person gets unauthorised access to our computer. This can happen in the office if we leave our computer without logging out. (1 mark for each point)	NCERT	3	80	**2**
Q. 9	● Making Decisions ● Managing the Business (1 mark for each point)	NCERT	4	93	**2**
Q. 10	Organic farming is where farmers do not use chemical pesticides and fertilisers to increase their production. **Benefits:** 1. It helps in growing better quality, chemical-free crops. 2. It maintains the soil quality for future use. (1 mark for definition; ½ mark for each benefit)	NCERT	5	107	**2**
Answer any 4 out of the given 6 questions in 20 – 30 words each (2 x 4 = 8 marks)					
Q. 11	In the second stage, we need to acquire data, which becomes the base of our project. This data helps us understand the parameters related to problem scoping. We collect it from various reliable and authentic sources. In the third stage, we give the acquired data a visual representation using graphs, databases, flowcharts, maps, etc. Since the data is often large in quantity, visualizing it helps us interpret patterns more easily and draw meaningful insights. (1 mark for each explanation)	CBSE Study material	1	9	**2**

Q. 12	a) Convolutional Neural Network (CNN) b) Artificial Neural networks (ANN) (1 mark for each)	CBSE Study material	2	45	**2**
Q. 13	1. For supervised learning and unsupervised learning, you need to have a pretty good idea of the data that you have, what's going on, and how to solve the problem. 2. However, you will frequently encounter situations where you have to deal with large complex problem spaces. 3. You may need to respond to unforeseen environments, and you don't have sufficient data on those specific scenarios. 4. The environment may change. Hence your system needs to be adaptive. (any 2 points; one mark for each point)	CBSE Study material	2	37	**2**
Q. 14	Model evaluation is the process of using different evaluation metrics to understand a machine learning model's performance. It helps us understand the model's strengths, weaknesses, and suitability for the task at hand. An AI model gets better with constructive feedback. We build a model, get feedback from metrics, make improvements, and continue this process until we achieve a desirable accuracy. This feedback loop is essential for building trustworthy and reliable AI systems. (1 mark for definition, 1 mark for explanation)	CBSE Study material	3	62,63	**2**
Q. 15	The most common pixel format is the byte image, where each pixel value is stored as an 8-bit integer, giving a range of possible values from 0 to 255. In this format, 0 is typically taken as no colour or black, and 255 is taken as full colour or white. In computer systems, data is represented in the binary system, using ones and zeros. Each bit can have two possible values, and since 1 byte = 8 bits, this results in 256 possible values, ranging from 0 to 255. Therefore, each pixel in a byte image uses 1 byte of data. (1 mark for correctly stating the definition; 1 mark for explaining how the binary system relates to this format)	CBSE Study material	5	128	**2**
Q. 16	The stage of NLP is Syntactic Analysis / Parsing. It is the process of checking the grammar of sentences and phrases. It forms a relationship among words and eliminates logically incorrect sentences. (1 mark for identifying the stage; 1 mark for relevant explanation)	CBSE Study material	6	159	**2**

Answer any 3 out of the given 5 questions in 50– 80 words each (4 x 3 = 12 marks)					
Q. 17	a) Two reasons why the algorithm gave biased results: 1. The algorithm unfairly penalized students who are not fluent in English, assuming slower form completion indicates lower competence, when it may simply reflect language challenges. 2. Students without access to a computer or stable internet at home took longer to complete the application, but this delay is due to external socio-economic factors, not lack of ability or confidence. (1 mark for each valid reason) b) Two bioethics principles that can solve this problem are: 1. **Do Not Harm:** The algorithm unintentionally harms students from less privileged backgrounds by reducing their chances of selection. To follow this principle, the AI system should be redesigned to avoid causing unfair disadvantages. 2. **Give Justice:** Justice requires that all students are treated fairly and equitably. The system should not discriminate based on factors like language fluency or digital access. Incorporating diverse data and adjusting evaluation criteria would help ensure equal opportunity for all applicants. (½ mark for each correct bioethics principle and ½ mark for the each relevant explanation)	CBSE Study material	1	18,19	**4**
Q. 18	a) The learning model is called Unsupervised Learning. (1 mark) b) The two categories of this learning model are Clustering and Association. (½ mark each) c) **Clustering**: This involves finding similarities between objects and placing them in the same cluster and differentiating them from objects in other clusters. *Example: Grouping customers based on purchasing behaviour.* (1 mark – ½ for explanation, ½ for example) **Association**: This involves finding relationships or correlations between variables in large datasets. *Example: Market basket analysis (e.g., customers who buy bread often buy butter)*. (1 mark – ½ for explanation, ½ for example)	CBSE Study material	2	41,42, 43	**4**
Q. 19	a) Anomaly Detection b) Object Classification c) Object Identification d) Digit Recognition (1 mark each)	CBSE Study material	2	26,27	**4**

<table>
<tr>
<td>Q. 20</td>
<td>a)
<table>
<tr><td colspan="2" rowspan="2">Confusion Matrix</td><td colspan="2">Prediction</td></tr>
<tr><td>Yes</td><td>No</td></tr>
<tr><td rowspan="2">Reality</td><td>Yes</td><td>40 (TP)</td><td>10 (FN)</td></tr>
<tr><td>No</td><td>20 (FP)</td><td>30 (TN)</td></tr>
</table>
(½ mark each for correctly identifying and writing values of TP, FP, TN,FN)

b) Classification Accuracy
Accuracy $= \frac{Correct\ Predictions}{Total\ Predictions}$
$= \frac{TP + TN}{TP + FP + TN + FN}$
$= \frac{40 + 30}{40 + 20 + 30 + 10}$
$= \frac{70}{100}$ = 0.7
Accuracy% = 70%
(½ mark for formula; ½ mark for the answer)

c)
Wrong Predictions = FP+FN =20+10 =30
(½ mark for formula; ½ mark for the answer)</td>
<td>CBSE Study material</td>
<td>3</td>
<td>75,76</td>
<td>4</td>
</tr>
<tr>
<td>Q. 21</td>
<td>a) Dictionary of unique words will be
students, love, studying, ai, is, transforming, education, teachers, and, explore, tools
(1 mark for correctly listing all unique words for the vocabulary)

b) Document vector for Document 3
<table>
<tr><td>students</td><td>love</td><td>studying</td><td>ai</td><td>is</td><td>transforming</td><td>education</td><td>teachers</td><td>and</td><td>explore</td><td>tools</td></tr>
<tr><td>1</td><td>0</td><td>0</td><td>1</td><td>0</td><td>0</td><td>0</td><td>1</td><td>1</td><td>1</td><td>1</td></tr>
</table>
(1 mark for accurately constructing the document vector for Document 3 using the given vocabulary)

c) Bag of Words (BoW) helps in feature extraction by converting text documents into fixed-length numerical vectors based on the frequency or presence of words from a defined vocabulary. This allows machine learning models to process and analyze text data just like numeric input, enabling tasks such as text classification, sentiment analysis, and topic modeling.
(1 mark for clearly explaining how Bag of Words helps in feature extraction by counting word occurrences)

d) In Bag of Words, the focus is on what words appear, not how or where they appear in the sentence. The model treats text as a "bag" of words, ignoring grammar, syntax, and word order.
(1 mark for correctly stating that word order is not important in BoW as it only considers frequency or presence of words)</td>
<td>CBSE Study material</td>
<td>6</td>
<td>169, 170,171</td>
<td>4</td>
</tr>
</table>

CBSE | DEPARTMENT OF SKILL EDUCATION

ARTIFICIAL INTELLIGENCE (SUBJECT CODE - 417)

BLUE PRINT FOR SAMPLE QUESTION PAPER - 1 (PRACTICE PAPER-1)

CLASS X (SESSION 2024-2025)

Max. Time: 2 Hours **Max. Marks: 50**

PART A - EMPLOYABILITY SKILLS (10 MARKS):

UNIT NO.	NAME OF THE UNIT	OBJECTIVE TYPE QUESTIONS	SHORT ANSWER TYPE QUESTIONS	TOTAL QUESTIONS
		1 MARK EACH	2 MARKS EACH	
1	Communication Skills -II	1	1	2
2	Self-Management Skills - II	2	1	3
3	ICT Skills - II	1	1	2
4	Entrepreneurial Skills - II	1	1	2
5	Green Skills - II	1	1	2
TOTAL QUESTIONS		**6**	**5**	**11**
NO. OF QUESTIONS TO BE ANSWERED		**Any 4**	**Any 3**	**07**
TOTAL MARKS		**1 x 4 = 4**	**2 x 3 = 6**	**10 MARKS**

PART B - SUBJECT SPECIFIC SKILLS (40 MARKS):

UNIT NO.	NAME OF THE UNIT	OBJECTIVE TYPE QUESTIONS	SHORT ANSWER TYPE QUESTIONS	DESCRIPTIVE/ LONG ANS. TYPE QUESTIONS	TOTAL QUESTIONS
		1 MARK EACH	2 MARKS EACH	4 MARKS EACH	
1	Introduction to AI	5	1	1	7
2	AI Project Cycle	3	1	2	6
3	Advance Python	-	-	-	-
4	Data Sciences	3	1	-	4
5	Computer Vision	3	1	-	4
6	Natural Language Processing	5	1	1	7
7	Evaluation	5	1	1	7
TOTAL QUESTIONS		**24**	**6**	**5**	**35**
NO. OF QUESTIONS TO BE ANSWERED		**20**	**Any 4**	**Any 3**	**27**
TOTAL MARKS		**1 x 20 = 20**	**2 x 4 = 8**	**4 x 3 = 12**	**40 MARKS**

CBSE | DEPARTMENT OF SKILL EDUCATION

ARTIFICIAL INTELLIGENCE (SUBJECT CODE - 417)

SAMPLE QUESTION PAPER - 1 (PRACTICE PAPER-1)

CLASS X (SESSION 2024-2025)

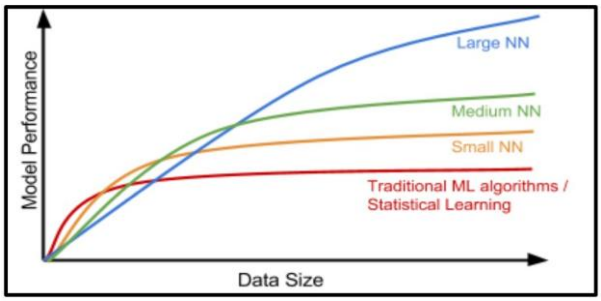
Max. Time: 2 Hours **Max. Marks: 50**

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):**
    - **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.

SECTION A: OBJECTIVE TYPE QUESTIONS

Q. 1	**Answer any 4 out of the given 6 questions on Employability Skills (1 x 4 = 4 marks)**	
i.	"*M D Gulati started with a small shop with his focus, dedication and clear ideas, MDH became one of the most popular brands in India besides having a good reputation all over the world*". Which self-management skill is clearly visible in the given statement?	**1**
ii.	When you bring the mouse over a file in File Explorer, it will show the details of that file. This is known as (a) Drag and drop (b) Double click (c) Hover (d) Single click	**1**
iii.	Assertion(A): A doctor works for a renowned hospital. Reason(R): The statement given above is an example of wage employment. (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 not correct (d) A is not correct but R is correct	**1**
iv.	_____ the work is all about identifying and noting how we spent our time, and analysing how to spend our time effectively. (a) Organising (b) Prioritising (c) Controlling (d) Tracking	**1**
v.	Remya traveled to Sweden from India to pursue her higher education. But she doesn't know how to speak Swedish (language of Sweden). Because of this, she was unable to find a part time job. This is an example of _____ (a) Interpersonal barrier (b) Physical barrier (c) Organisational barrier (d) Linguistic barrier	**1**
vi.	"Efforts are made to increase the solar power generation so that our electricity needs are met and at the same time we do not pollute the environment or use up natural resources". Which SDG can you relate this statement to? (a) Life on land (b) Clean water and sanitation (c) Affordable and clean energy (d) Reduced inequalities	**1**

Q. 2	**Answer any 5 out of the given 6 questions (1 x 5 = 5 marks)**	
i.	Assertion (A)– One can be a good singer while the other can be a great athlete. Reason(R) – Humans possess different types of intelligences but at different levels. (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 not correct (d) A is not correct but R is correct.	**1**
ii.	The Indian Government banned a few apps stating – "*servers in the hostile nation are receiving and using the acquired data improperly*". Which terminology suits best for this action? (a) AI Ethics (b) Data Privacy (c) AI Bias (d) AI Access	**1**
iii.	Statment1: There are four layers in a neural network. Statement2:The first layer of the neural network is known as the output layer. (a) Both Statement1 and Statement2 are correct (b) Both Statement1 and Statement2 are incorrect (c) Statement1 is correct but Statement2 is incorrect (d) Statement2 is correct but Statement1 is incorrect	**1**
iv.	Observe the given graph and fill in the blank:  _____ the neural network, better is the performance.	**1**
v.	_____ is a simple file format that stores data separated by commas. (a) jpg (b) doc (c) csv (d) png	**1**
vi.	A corpus contains 4 documents in which the word 'diet' was appearing once in document1. Identify the term in which we can categorise the word 'diet'. (a) Stop word (b) Rare word (c) Frequent word (d) Removable word	**1**

Q. 3	**Answer any 5 out of the given 6 questions (1 x 5 = 5 marks)**	
i.	Read the examples given below- i. Using Chat GPT to write an email ii. Face unlock technology of mobile phones using camera iii. Turning off lights with IoT device iv. Hand sanitizer dispenser having sensor Choose the options that are **not** AI (a) i and ii (b) iii and i (c) iii and iv (d) i, iii and iv	**1**
ii.	_____ refer to the type of features that we want to collect.	**1**
iii.	Which of the following is an application of data science? (a) Text summarization (b) Target Advertisements (c) Face lock in smartphones (d) Email filters	**1**
iv.	____ is the process of finding instances of real-world objects in images or videos. (a) Instance segmentation (b) Object detection (c) Classification (d) Image segmentation	**1**
v.	Identify the given Chat bot type: It learns from its environment and experience. It also builds on its capabilities based on the knowledge. These can collaborate with humans, working along-side them and learning from their behavior.	**1**
vi.	F1 Score is the measure of the balance between (a) Accuracy and Precision (b) Precision and Recall (c) Recall and Accuracy (d) Recall and Reality	**1**

Q. 4	**Answer any 5 out of the given 6 questions (1 x 5 = 5 marks)**	
i.	Srishti learnt about AI terminologies but was not able to recollect the term that is used to refer to machines that perform tasks with vast amounts of data using neural networks. Help her with the correct term.	**1**
ii.	Statment1: The output given by the AI model is known as reality. Statement2:The real scenario is known as Prediction. (a) Both Statement1 and Statement2 are correct (b) Both Statement1 and Statement2 are incorrect (c) Statement1 is correct but Statement2 is incorrect (d) Statement2 is correct but Statement1 is incorrect	**1**

iii.	Rajat has made a model which predicts the performance of Indian Cricket players in upcoming matches. He collected the data of players' performance with respect to stadium, bowlers, opponent team and health. His model works with good accuracy and precision value. Which of the statement given below is incorrect? (a) Data gathered with respect to stadium, bowlers, opponent team and health is known as Testing Data. (b) Data given to an AI model to check accuracy and precision is Testing Data. (c) Training data and testing data are acquired in the Data Acquisition stage. (d) Training data is always larger as compared to testing data.	**1**
iv.	How many channels does a colour image have?	**1**
v.	Which feature of NLP helps in understanding the emotions of the people mentioned with the feedback? (a) Virtual Assistants (b) Sentiment Analysis (c) Text classification (d) Automatic Summarization	**1**
vi.	Sarthak made a face mask detector system for which he had collected the dataset and used all the dataset to train the model. Then, he used the same data to evaluate the model which resulted in the correct answer all the time but was not able to perform with unknown dataset. Name the concept.	**1**

Q. 5	**Answer any 5 out of the given 6 questions (1 x 5 = 5 marks)**	
i.	Aditi, a student of class XII developed a chatbot that clarifies the doubts of Economics students. She trained the software with lots of data sets catering to all difficulty levels. If any student would type or ask questions related to Economics, the software would give an instant reply. Identify the domain of AI in the given scenario. (a) Computer Vision (b) Data Science (c) Natural Language Processing (d) None of these	**1**
ii.	Which evaluation parameter takes into consideration all the correct predictions?	**1**
iii.	_____ means a picture element which is the smallest unit of information that makes up a picture. (a) Vision (b) Pics (c) Pixel (d) Piskel	**1**
iv.	What do you mean by syntax of a language? (a) Meaning of a sentence (b) Grammatical structure of a sentence (c) Semantics of a sentence (d) Synonym of a sentence	**1**

v.	Which algorithms result in two things, a vocabulary of words and frequency of the words in the corpus? (a) Sentence segmentation (b) Tokenisation (c) Bag of words (d) Text normalisation	**1**
vi.	Which one of the following scenario result in a high false positive cost? (a) viral outbreak (b) forest fire (c) flood (d) spam filter	**1**

SECTION B: SUBJECTIVE TYPE QUESTIONS

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

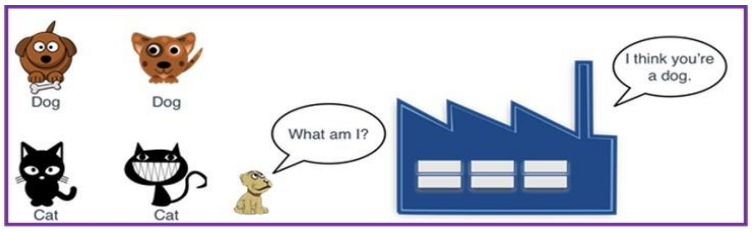
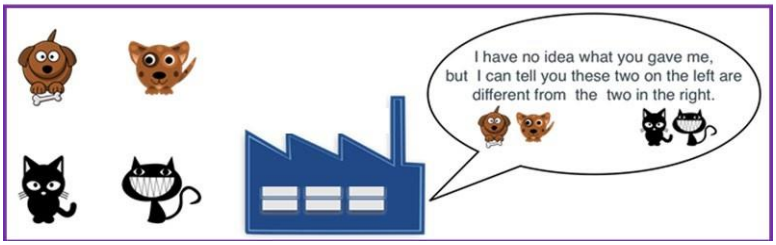
Q. 6	List two best practices for effective communication.	**2**
Q. 7	What is the importance of setting goals in life?	**2**
Q. 8	"*The Trojan Horse was a wooden horse said to have been used by the Greeks during the Trojan War to enter the city of Troy and win the war".* What does Trojan horse mean in computer terminology?	**2**
Q. 9	How is society helping entrepreneurs in their business?	**2**
Q. 10	Mention any two human activities that lead to environmental degradation.	**2**

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

Q. 11	All of us use smartphones. When we install a new app, it asks us for several permissions to access our phone's data in different ways. Why do apps collect such data?	**2**
Q. 12	Sirisha and Divisha want to make a model which will organize the unlabeled input data into groups based on features. Which learning model should they use and why?	**2**
Q. 13	Ajay wants to access data from various sources. Suggest him any two points that he needs to keep in mind while accessing data from any data source.	**2**
Q. 14	Explain the term resolution with an example.	**2**
Q. 15	Identify any two stop words which should not be removed from the given sentence and why? Get help and support whether you're shopping now or need help with a past purchase. Contact us at abc@pwershel.com or on our website www.pwershel.com	**2**
Q. 16	Draw the confusion matrix for the following data • the number of true positive = 100	**2**

	• the number of true negative 47 • the number of false positive = 62 • the number of false negative = 290	

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

Q. 17	Your grandmother watches you use AI applications. She wants to understand more about it. Help her understand the term artificial intelligence by giving the right definition and explain to her with an example how machines become artificially intelligent.	**4**
Q. 18	Akhil wants to learn how to scope the problem for an AI Project. Explain him the following: (a) 4W Problem Canvas (b) Problem Statement Template	**4**
Q. 19	Identify and explain the types of the learning-based approaches in the figures given below.  **Figure 1**  **Figure 2**	**4**
Q. 20	We, human beings, can read, write and understand many languages. But computers can understand only machine language. Do you think we might face any challenges if we try to teach computers how to understand and interact in human languages? Explain.	**4**
Q. 21	An AI model made the following sales prediction for a new mobile phone which they have recently launched: (i) Identify the total number of wrong predictions made by the model. (ii) Calculate precision, recall and F1 Score.	**4**

Confusion Matrix		Reality	
		Yes	No
Prediction	Yes	50	40
	No	12	10

CBSE | DEPARTMENT OF SKILL EDUCATION

ARTIFICIAL INTELLIGENCE (SUBJECT CODE - 417)

MARKING SCHEME FOR CLASS X (SESSION 2024-2025)

Max. Time: 2 Hours **Max. 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):**
   - **i.** This section has 05 questions.
   - **ii.** There is no negative marking.
   - **iii.** Do as per the instructions given.
   - **iv.** Marks allotted are mentioned against each question/part.
7. **SECTION B – SUBJECTIVE TYPE QUESTIONS (26 MARKS):**
   - **i.** This section contains 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.

SECTION A: OBJECTIVE TYPE QUESTIONS

Q. No.	QUESTION	Source Material (NCERT/PSSCIVE/ CBSE Study Material)	Unit/ Chap. No.	Page no. of source material	Marks
Q. 1	**Answer any 4 out of the given 6 questions on Employability Skills (1 x 4 = 4 marks)**				
i.	Self-Motivation	NCERT	2	52	**1**
ii.	(c) Hover	NCERT	3	67	**1**
iii.	(a) Both A and R are correct and R is the correct explanation of A	NCERT	4	100	**1**
iv.	(d) Tracking	NCERT	2	60	**1**
v.	(d) Linguistic barrier	NCERT	1	21	**1**
vi.	(c) Affordable and clean energy	NCERT	5	111	**1**
Q. 2	**Answer any 5 out of the given 6 questions (1 x 5 = 5 marks)**				
i.	(a) Both A and R are correct and R is the correct explanation of A	Facilitator Handbook	1	11	**1**
ii.	(b) Data Privacy	Facilitator Handbook	1	24	**1**

iii.	(a) Both Statement1 and Statement2 are incorrect	Facilitator Handbook	2	40	**1**
iv.	Larger	Facilitator Handbook	2	40	**1**
v.	(c) csv	Facilitator Handbook	4	63	**1**
vi.	(b) Rare word	Facilitator Handbook	6	115	**1**
Q. 3	**Answer any 5 out of the given 6 questions (1 x 5 = 5 marks)**				
i.	(c) iii and iv	Facilitator Handbook	1	16	**1**
ii.	Data Features/Data	Facilitator Handbook	2	35	**1**
iii.	(b) Target Advertisements	Facilitator Handbook	4	56	**1**
iv.	(b) Object Detection	Facilitator Handbook	5	78	**1**
v.	Smart Bot	Facilitator Handbook	6	105	**1**
vi.	(b) Precision and Recall	Facilitator Handbook	7	127	**1**
Q. 4	**Answer any 5 out of the given 6 questions (1 x 5 = 5 marks)**				
i.	Deep Learning	Facilitator Handbook	1	21	**1**
ii.	(b) Both Statement1 and Statement2 are incorrect	Facilitator Handbook	7	119	**1**
iii.	(a) Data gathered with respect to stadium, bowlers, opponent team and health is known as Testing Data.	Facilitator Handbook	4	60	**1**
iv.	Three Channels	Facilitator Handbook	5	83	**1**
v.	(b) Sentiment Analysis	Facilitator Handbook	6	100	**1**
vi.	Overfitting	Facilitator Handbook	7	119	**1**
Q. 5	**Answer any 5 out of the given 6 questions (1 x 5 = 5 marks)**				
i.	(c) Natural Language Processing	Facilitator Handbook	1	22	**1**
ii.	Accuracy	Facilitator Handbook	7	123	**1**
iii.	(c) Pixel	Facilitator Handbook	5	79	**1**
iv.	(b) Grammatical structure of a sentence	Facilitator Handbook	6	106	**1**
v.	(c) Bag of words	Facilitator Handbook	6	112	**1**
vi.	(d) spam filter	Facilitator Handbook	7	126	**1**

SECTION B: SUBJECTIVE TYPE QUESTIONS

Q. No.	QUESTION	Source Material (NCERT/PSSCIVE/ CBSE Study Material)	Unit/ Chap. No.	Page no. of source material	Marks
Answer any 3 out of the given 5 questions on Employability Skills in 20 – 30 words each (2 x 3 = 6 marks)					
Q. 6	1. Use simple language 2. Be respectful of others' opinions 3. Do not form assumptions on culture, religion or geography 4. Try to communicate in person as much as possible 5. Use visuals 6. Take help of a translator to overcome differences in language (2 marks for any two correct points from the above)	NCERT	1	22	**2**
Q. 7	1. The process of goal setting in your life helps you decide on how to live your life, where you want to be, and how you want to be in the future. 2. It helps you to focus on the end result instead of less important work. 3. This will make you successful in your career and personal life. (2 marks for any one valid justification given above or any relevant answer)	NCERT	2	55	**2**
Q. 8	A Trojan Horse is a type of malware which disguises itself i.e., it appears to be a useful software program but once it reaches a computer it starts behaving like a virus and destroys data. (1 mark for acting like useful program and, 1 mark for the words destroying/corrupting/deleting data) or (only ½ marks will be allotted if only malware/harmful program/virus/ term is mentioned)	NCERT	3	81	**2**
Q. 9	Society is helping entrepreneurs by 1. Creating needs 2. Providing raw material 3. buying/selling of items 4. making money (2 marks for any two valid points)	NCERT	4	85	**2**

Q. 10	1. Use of fertilisers, pesticides,etc for increasing the production of crops. 2. Cutting down of forests for personal use such as construction of buildings, factories etc (1 mark for each valid point, or any two relevant answers other than the above)	NCERT	5	103	**2**
Answer any 4 out of the given 6 questions in 20 – 30 words each (2 x 4 = 8 marks)					
Q. 11	1. To provide customized notifications and recommendations. 2. To improve the efficiency and accuracy of the app. (2 marks for any one correct point with explanation)	Facilitator Handbook	Unit 1	25, 26	**2**
Q. 12	Clustering model/Unsupervised learning is used to organize the unlabeled input data into groups based on features. Clustering is an unsupervised learning algorithm which can cluster unknown data according to the patterns or trends identified out of it. The patterns observed might be the ones which are known to the developer or it might even come up with some unique patterns out of it. (1 mark for identifying the name of the algorithm and 1 mark for explanation)	Facilitator Handbook	Unit 2	39	**2**
Q. 13	While accessing data from any of the data sources, following points should be kept in mind: 1. Data which is available for public usage only should be taken up. 2. Personal datasets should only be used with the consent of the owner. 3. One should never breach someone's privacy to collect data. 4. Data should only be taken from reliable sources as the data collected from random sources can be wrong or unusable. 5. Reliable sources of data ensure the authenticity of data which helps in the proper training of the AI model. 6. Data should be relevant to the problem. (any two; 1 mark for each valid point)	Facilitator Handbook	Unit 4	63	**2**

<table>
<tr><td>Q. 14</td><td>Resolution of an image refers to the number of pixels in an image, across the width and height. For example a monitor resolution of 1280×1024. This means there are 1280 pixels from one side to the other, and 1024 from top to bottom.

(1 mark for explanation; 1 mark for example)</td><td>Facilitator Handbook</td><td>Unit 5</td><td>80</td><td>2</td></tr>
<tr><td>Q. 15</td><td>Stopwords in the given sentence which should not be removed are:
@, . (fullstop) ,_(underscore) , 123(numbers)
These tokens are generally considered as stopwords, but in the above sentence, these tokens are part of email id. removing these tokens may lead to invalid website address and email ID. So these words should not be removed from the above sentence.

(1 mark for identifying any two stop words from the above, and 1 mark for the valid justification.)</td><td>Facilitator Handbook</td><td>Unit 6</td><td>110</td><td>2</td></tr>
<tr><td>Q. 16</td><td><table><tr><td colspan="2">Confusion Matrix</td><td>Reality</td><td></td></tr><tr><td colspan="2"></td><td>Yes</td><td>No</td></tr><tr><td rowspan="2">Prediction</td><td>Yes</td><td>100</td><td>62</td></tr><tr><td>No</td><td>290</td><td>47</td></tr></table>(½ marks each for mapping the values in the correct section, ½ *4=2 marks)</td><td>Facilitator Handbook</td><td>Unit 7</td><td>122</td><td>2</td></tr>
<tr><td colspan="6">Answer any 3 out of the given 5 questions in 50– 80 words each (4 x 3 = 12 marks)</td></tr>
<tr><td>Q. 17</td><td>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 artificial intelligence. In other words, you can say that a machine is artificially intelligent when it can accomplish tasks by itself - collect data, understand it, analyse it, learn from it, and improve it.

Machines become intelligent once they are trained with some data which helps them achieve their tasks. AI machines also keep updating their knowledge to optimise their output. For example, Netflix gives us recommendations on the basis of what we like. Whenever we start liking a new genre, it updates and gives better suggestions.</td><td>Facilitator Handbook</td><td>Unit 1</td><td>14, 15</td><td>4</td></tr>
</table>

<table>
<tr><td></td><td>(2 marks for definition of Artificial intelligence which includes any of the highlighted terms,
2 mark for an example explanation of how machines become intelligent)
or
(only 1 mark for any AI machine example which mimic human traits without explanation)</td><td></td><td></td><td></td><td></td></tr>
<tr><td>Q. 18</td><td>The 4Ws Problem canvas helps in identifying the key elements related to the problem. The 4Ws are Who, What, Where and Why
● The “Who” block helps in analysing the people getting affected directly or indirectly due to the problem.
● The “What” block helps us to determine the nature of the problem.
● The “Where” block helps us to look into the situation in which the problem arises, the context of it, and the locations where it is prominent.
● The “Why” block suggests to us the benefits which the stakeholders would get from the solution and how it will benefit them as well as the society

Problem Statement Template
<table><tr><td>Our</td><td>[stakeholders]</td><td>Who</td></tr><tr><td>Have a problem that</td><td>[need]</td><td>What</td></tr><tr><td>When/while</td><td>[context/ location/ situation]</td><td>Where</td></tr><tr><td>An ideal solution would be</td><td>[solution]</td><td>Why</td></tr></table>
(½ mark each for explanation of 4w s; 2 marks for drawing the problem statement template with correct words in it or explaining the problem statement template)
or
(1 mark to be allotted if only 4Ws are written without explanation)</td><td>Facilitator Handbook</td><td>Unit 2</td><td>31-34</td><td>4</td></tr>
<tr><td>Q. 19</td><td>The learning-based approaches shown in the given figures are Supervised learning and Unsupervised learning.</td><td>Facilitator Handbook</td><td>Unit 2</td><td>37, 38</td><td>4</td></tr>
</table>

	Figure 1: In a supervised learning model, the dataset which is fed to the machine is **labelled**. In other words, we can say that the **dataset is known to the person** who is training the machine only then he/she is able to label the data. A label is some information which can be used as a tag for data. Here, labelled images of dog and cat are fed into the model and trained. The model correctly identifies the given input as dog. Figure 2: An unsupervised learning model works on **unlabelled dataset**. This means that the data which is fed to the machine is random and there is a possibility that the person who is training the model does not have any information regarding it. The **unsupervised learning models are used to identify relationships, patterns and trends out of the data which is fed into it.** It helps the user in understanding what the data is about and what are the major features identified by the machine in it. Here, images of a set of animals are fed into the AI model and the model clusters them based on similar features (1 mark each for identifying each term supervised learning and unsupervised learning; 1 mark per explanation of each term)				
Q. 20	Yes, we might face any challenges if we try to teach computers how to understand and interact in human languages. The possible difficulties are: 1. Arrangement of the words and meaning - the computer has to identify the different parts of a speech. Also, it may be extremely difficult for a computer to understand the meaning behind the language we use. 2. Multiple Meanings of a word - same word can be used in a number of different ways which according to the context of the statement changes its meaning completely. 3. Perfect Syntax, no Meaning - Sometimes, a statement can have a perfectly correct syntax but it does not mean anything. For example, take a look at this statement:	Facilitator Handbook	Unit 6	106, 107	**4**

	Chickens feed extravagantly while the moon drinks tea. This statement is correct grammatically but does this make any sense? In Human language, a perfect balance of syntax and semantics is important for better understanding. (1 mark for Yes and 1 mark each for the points on possible difficulties)				
Q. 21	Ans: (i)the total number of wrong predictions made by the model is the sum of false positive and false negative. FP+FN=40+12= 52 (ii) Precision=TP/(TP+FP) =50/(50+40) 50/90 =0.55 Recall=TP/(TP+FN) =50/(50+12) =50/62 =.81 F1 Score = 2*Precision*Recall/(Precision+Recall) =2*0.55*.81/(.55+.81) =.891/1.36 =0.65 (1 marks for part (i) and ½ mark for each formula and ½ mark each for substitution of values in part(ii)) Please note: the mathematical calculations can be ignored	Facilitator Handbook	Unit 7	126,127	**4**