

**KENDRIYA VIDYALAYA SANGATHAN, LUCKNOW REGION FIRST
PRE-BOARD EXAMINATION (2024-25)
CLASS – X**

**SUBJECT – ARTIFICIAL INTELLIGENCE (417) MARKING
SCHEME**

Max. Time: 2 Hours

Max. Marks: 50

General Instructions:

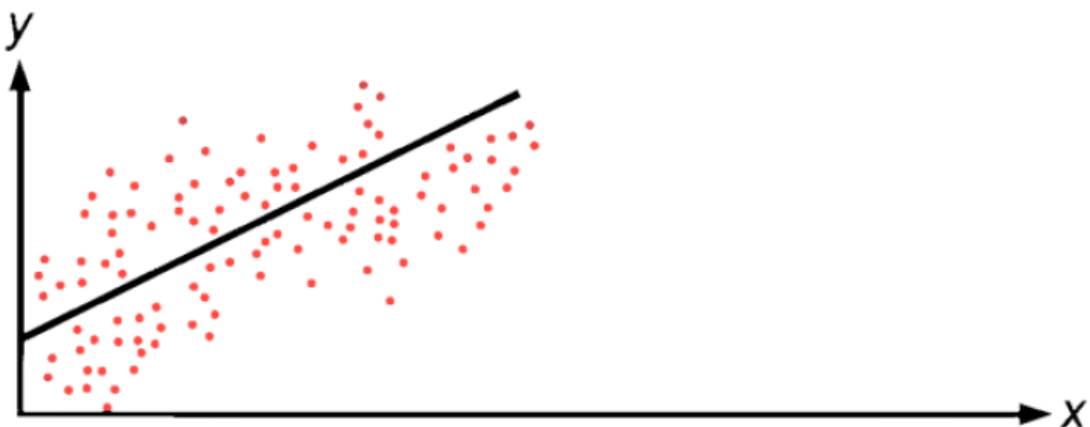
- Please read the instructions carefully.
- This Question Paper consists of **21 questions** in two sections: **Section A & Section B.**
- **Section A** has **Objective type questions** whereas **Section B** contains **Subjective type questions.**
- **Out of the given (5 + 16 =) 21 questions, a candidate has to answer (5 + 10 =) 15 questions in the allotted (maximum) time of 2 hours.**
- All questions of a particular section must be attempted in the correct order.
- **SECTION A - OBJECTIVE TYPE QUESTIONS (24 MARKS):**
 - This section has 05 questions.
 - Marks allotted are mentioned against each question/part.
 - There is no negative marking.
 - Do as per the instructions given.
- **SECTION B – SUBJECTIVE TYPE QUESTIONS (26 MARKS):**
 - This section has 16 questions.
 - A candidate has to do 10 questions.
 - Do as per the instructions given.
 - Marks allotted are mentioned against each question/part.

SECTION A: OBJECTIVE TYPE QUESTIONS

Q. 1	Answer any 4 out of the given 6 questions on Employability Skills (1 x 4 = 4 marks)	
i.	<p>_____ is the final component in the process of communication as it defines the response given by the receiver to the sender.</p> <p>(a) Response (b) Request (c) Feedback (d) Notice</p> <p>Ans: Feedback</p>	1
ii.	<p>Sameer gets up at 6 am and goes to his hobby classes. Then he comes home and finishes her homework before going to school. He does this all by himself. No one tells him to do it. This is an example of</p> <p>(a) Self-motivation (b) External motivation (c) Both self and external motivation (d) Not any specific type of motivation</p> <p>Ans: (a) Self-Motivation</p>	1
iii.	<p>Assertion (A): An entrepreneur takes risks. Reason (R): An entrepreneur is self-confident.</p> <p>(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</p> <p>Ans : (a) Both A and R are correct and R is the correct explanation of A</p>	1

iv.	_____ act as an interface between the user and the computer. (a) Operating System (b) MS Excel (c) Impress (d) Digital Documentation Ans: (a) Operating System	1
v.	_____ refers to recruitment, employment, selection, training, development and compensation of the employees with an organization. (a) Entrepreneurs (b) Management (c) Human Resource Management (d) Employer Ans: (c) Human Resource Management	1
vi.	Choose the option which is not a sustainable development goal according to United Nations. (a) Clean Water and Sanitation (b) Gender Equality (c) Population (d) Reduced Inequalities Ans: (c) Population	1
Q. 2	Answer any 5 out of the given 6 questions (1 x 5 = 5 marks)	
i.	Choose the five stages of AI project cycle in correct order: (a) Evaluation -> Problem Scoping -> Data Exploration -> Data Acquisition -> Modelling (b) Problem Scoping -> Data Exploration -> Data Acquisition -> Evaluation -> Modelling (c) Data Acquisition -> Problem Scoping -> Data Exploration -> Modelling ->Evaluation (d) Problem Scoping > Data Acquisition -> Data Exploration -> Modelling ->Evaluation Ans:(d) Problem Scoping > Data Acquisition -> Data Exploration -> Modelling ->Evaluation	1
ii.	Online Company had been working on a secret AI recruiting tool. The machine-learning specialists uncovered a big problem: their new recruiting engine did not like women. The system taught itself that male candidates were preferable. It penalized resumes that included the word "women". This led to the failure of the tool. This is an example of- (a) Data Privacy (b) AI access (c) AI Bias (d) Data Exploration Ans : (c) AI Bias	1
iii	Spam filter is an application of _____. (a) Natural Language Processing (c) Computer Vision (b) Data Science (d) Segmentation Ans: (a) Natural Language Processing	1
iv.	Shalu is working on a project that involves over a lakh of records. Which of the following should she use to make the best project? (a) Traditional programming (b) Manual processing (c) IoT (d) Neural networks Ans : (d) Neural networks	1

v.	<p>Divyam was learning neural networks. He understood that there were three layers in a neural network. Help her identify the layer that does processing in the neural network.</p> <p>(a) Output layer (b) Hidden layer (c) Input layer (d) Data layer</p> <p>Ans: (b) Hidden layer</p>	1
vi.	<p>State True / False Machine Learning is a subset of Deep Learning.</p> <p>Ans: False</p>	1
Q. 3	Answer any 5 out of the given 6 questions (1 x 5 = 5 marks)	
i.	<p>WhiteSmoke is an example of _____ domain of AI</p> <p>(a) Data Science (b) Computer Vision (c) NLP (d) None of these</p> <p>Ans: (c) NLP</p>	1
ii.	<p>Assertion: Rule based AI model is a static model. Reasoning: Rule based model can evolve over changing data set.</p> <p>(a) Both A and R are true and R is the correct explanation for A (b) Both A and R are true and R is not the correct explanation for A (c) A is True but R is False (d) A is false but R is True</p> <p>Ans: (c) A is True but R is False</p>	1
iii.	<p>Which search engine(s) make use of data science algorithms?</p> <p>(a) Google only (b) Yahoo, Bing, Ask, AOL, and Google (c) Yahoo and Bing only (d) AOL, Ask, and Google only</p> <p>Ans: (b) Yahoo, Bing, Ask, AOL, and Google</p>	1
iv.	<p>A _____ system is a computer vision based technology that identifies or verifies or matches a digital image (live or stored) of a human face against a database of stored face images.</p> <p>(a) Face filter (b) Identification (c) Facial recognition (d) None of these</p> <p>Ans : (c) Facial recognition</p>	1
v.	<p>How does AI contribute to the field of Data Science?</p> <p>(a) It makes data collection easier and faster. (b) It provides predictions and suggestions based on collected data. (c) It eliminates the need for human involvement in analyzing data. (d) It enhances technological knowledge for data collection.</p> <p>Ans: (b) It provides predictions and suggestions based on collected data.</p>	1
vi.	<p>_____ can be defined as the measure of balance between precision and recall.</p> <p>(a) Recall (b) Accuracy (c) Precision (d) F1 Score</p> <p>Ans: (d) F1 Score</p>	1
Q. 4	Answer any 5 out of the given 6 questions (1 x 5 = 5 marks)	

i.	<p>Identify the data modelling technique.</p>  <p>(a) Regression (b) Classification (c) Clustering (d) Dimensionality reduction</p> <p>Ans: (a) Regression</p>	1
ii.	<p>Kamal was learning the conditions that make up the confusion matrix. He came across a scenario in which the machine that was supposed to predict a furniture was always predicting not a furniture. What is this condition called?</p> <p>(a) False Positive (b) True Positive (c) False Negative (d) True Negative</p> <p>Ans : (c) False Negative</p>	1
iii.	<p>Assertion (A): Image classification is the process of categorizing and labelling groups of pixels or vectors within an image based on specific rules.</p> <p>Reasoning (R): Image classification is a crucial step in medical imaging, allowing for the diagnosis of diseases from X-rays or MRI scans.</p> <p>(a) Both A and R are true, and R is the correct explanation for A. (b) Both A and R are true, but R is not the correct explanation for A. (c) A is true, but R is false. (d) A is false, but R is true.</p> <p>Ans: (b) Both A and R are true, but R is not the correct explanation for A.</p>	1
iv.	<p>_____ is the name of the popular programming language used in data science?</p> <p>Answer: Python (or R, SQL, etc.).(or any given right answer)</p>	1
v.	<p>Preeti has an Alexa device which is able to answer her questions based on the available data. This is an example of NLP, So which of the following is the type of data used by NLP applications?</p> <p>(a) Images (b) Numerical data (c) Graphical data (d) Text and Speech</p> <p>Ans : (d) Text and Speech</p>	1
vi.	<p>The F1 score ranges from _____ to _____</p> <p>Ans:0 to 1 (1/2 mark for each)</p>	1
Q. 5	Answer any 5 out of the given 6 questions (1 x 5 = 5 marks)	
i.	<p>What does a pixel represent in an image?</p> <p>(a) A segment of a video (b) The smallest unit of an image (c) The colour depth of an image</p>	1

	(d) The brightness of an image Ans: (b) The smallest unit of an image	
ii.	What do we call the process of dividing a string into component words? (a) Regression (b) Word Tokenization (c) Classification (d) Clustering Ans (b) Word Tokenization	1
iii.	“Converting text to a common case” is a step in Text Normalisation. (True/False) Ans: True	1
iv.	When the prediction is False and reality is True, that condition is called _____ (a) TN (b) TF (c) FP (d) FN Ans: (d) FN	1
v.	TFIDF stands for _____. (a) Team Frequency and Inverse Document Frequency (b) Term Frequency and Inverse Document Frequency (c) Top Frequency and Inverse Document Frequency (d) Table Frequency and Inverse Document Frequency Ans : (b) Term Frequency and Inverse Document Frequency	1
vi.	The percentage of true positive cases versus all the cases where the prediction is true is defined as (a) Precision (b) Accuracy (c) F1 Score (d) None of these Ans: (a) Precision	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	Feedback is the final component and one of the most important factors in the process of communication. Give two reasons to justify why feedback is important. Ans: It validates effective listening: The person providing the feedback knows they have been understood (or received) and that their feedback provides some value. • It motivates: Feedback can motivate people to build better work relationships and continue the good work that is being appreciated. • It is always there: Every time you speak to a person, we communicate feedback so it is impossible not to provide one. • It boosts learning: Feedback is important to remain focussed on goals, plan better and develop improved products and services. • It improves performance: Feedback can help to form better decisions to improve and increase performance. (1 mark for each valid point, or any two relevant answers other than the above)	2

Q. 7	<p>Ram is eager to know about the use of ICT, especially the role of ICT in education, so help him to know more about this term.</p> <p>Ans: Information and Communication technology (ICT) play a significant role in all aspects of modern Society.</p> <ul style="list-style-type: none"> • ICT enables use of innovative resources and renewal of learning methods. • It establishes a more active collaboration of students. • Simultaneous acquisition of technical knowledge. <p>(2 marks complete explanation)</p>	2
Q. 8	<p>Swara is always punctual at school. She has a regular schedule that she follows every day. She plans for study and play time in advance. Enlist the four steps Swara must have followed for effective time management.</p> <p>Ans: The four steps of effective time management which Swara must have followed are:</p> <ol style="list-style-type: none"> Organise Prioritise Control Track <p>(1/2 mark for each step)</p>	2
Q. 9	<p>Kunal has a small convenience shop in his locality. There are many other convenience shops in the area. Yet, Kunal's shop survives the competition and does well.</p> <p>Which stage of an entrepreneur's career process can you relate this to? Explain.</p> <p>Ans: This stage is the Survive stage of an entrepreneur's career process. In this stage, even if there are many entrepreneurs in the market, the new entrepreneur has to remain in a competitive market.</p> <p>(1 mark for mentioning the stage; 1 mark for correct explanation)</p>	2
Q. 10	<p>"With increasing population and income, the consumption of goods is increasing day by day." - Comment</p> <p>Ans: "With increasing population and income, the consumption of goods is increasing day by day."</p> <p>This has led to increase in production and utilization of natural resources, which are required for producing goods. Society must thus change its development strategy to a new form where development will not destroy the environment.</p> <p>(2 marks for complete explanation)</p>	2
Answer any 4 out of the given 6 questions in 20 – 30 words each (2 x 4 = 8 marks)		
Q. 11	<p>Write down some applications of AI in daily life.</p> <p>Ans:</p> <ol style="list-style-type: none"> AI in E-Commerce websites (Examples: Amazon, Flipkart, Myntra and etc.) AI in Virtual Assistants (Examples: Google Assistant, Alexa, Siri and etc) AI in Self Driving Cars (Examples: Tesla, XUV 700 and etc) AI in Health care (Examples: Medical Image Analysis, AI Enabled Medical Diagnosis and etc.) AI in Gaming (Examples: Cricket, FIFA, Racing Games and etc.) <p>(2 for description Or any other correct answer)</p>	2

Q. 12	<p>Why we need to explore data through visualization?</p> <p>Ans:</p> <ol style="list-style-type: none"> 1) We want to quickly get a sense of the trends, relationships, and patterns contained within the data. 2) It helps us define strategy for which model to use at a later stage. 3) Visual representation is easier to understand and communicate to others. <p>(2 marks for complete explanation)</p>	2
Q. 13	<p>Ankur is collecting data for his business through various resources on the internet. While accessing data from any of the data source, suggest any two points that needs to keep in mind while accessing data from any data source.</p> <p>Ans :</p> <ol style="list-style-type: none"> 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. <p>Data should only be taken form reliable sources as the data collected from random sources can be wrong or unusable.</p> <p>Reliable sources of data ensure the authenticity of data which helps in proper training of the AI model.</p> <p>Or Any two can be mentioned with example</p> <p>(1 mark for each point)</p>	2
Q. 14	<p>Describe an application of Computer Vision in the automotive industry.</p> <p>Ans:</p> <p>In the automotive industry, Computer Vision is used in autonomous vehicles for tasks such as lane detection, pedestrian recognition, and traffic sign recognition, enhancing safety and enabling self-driving capabilities</p> <p>(2 marks for correct explanation)</p>	2
Q. 15	<p>Explain the difference between Stemming and Lemmatization.</p> <p>Ans:</p> <p>Stemming: Stemming is a rudimentary rule-based process of stripping the suffixes ("ing", "ly", "es", "s" etc) from a word.</p> <p>Stemming is a process of reducing words to their word stem, base or root form (for example, books — book, looked — look).</p> <p>Lemmatization: Lemmatization, on the other hand, is an organized & step by step procedure of obtaining the root form of the word, it makes use of vocabulary (dictionary importance of words) and morphological analysis (word structure and grammar relations).</p> <p>(1 mark for each explanation)</p>	2
Q. 16	<p>Explain the concept of overfitting with respect to AI model evaluation.</p> <p>Ans:</p> <p>Overfitting is a problem where the evaluation of machine learning algorithms on training data is different from unseen data.</p> <p>(2 marks for correct explanation)</p>	2
	Answer any 3 out of the given 5 questions in 50– 80 words each (4 x 3 = 12 marks)	
Q. 17	<p>Kavya went spending holidays to Nainital with her friend. She called a cab and the driver navigated the route using Google Maps on his smartphone. After they arrived, she was amazed to see that the Hotel door opened automatically as they approached it. They then went to a shop and bought some grocery and walked out without going through the cash counter and afterwards, she scanned a QR code and paid for the items purchased. Which technology was employed in everything she had experienced? Is the same technology used everywhere?</p> <p>Ans :</p> <p>The driver navigated the route using Google Maps on his smartphone: The technology behind Google Maps is Artificial Intelligence. Google Maps provide</p>	4

	<p>useful directions and real-time traffic information to millions of users.</p> <p>(ii) The door opened automatically: The automatic door operates with a motion-detecting sensor so it cannot be counted as Artificial Intelligence. The door will open as soon as some pressure or motion is detected and when the sensor can no longer detect anything, the door will close.</p> <p>(iii) Walked out without going through the cash counter and afterwards she scanned a QR code and paid: This is an example of an Artificial Intelligence-based shop, where cameras are used to track the actions of each customer, sensors are used to track items, QR codes are provided for the payments that can be debited when customers exit the store and send them a receipt. According to the scenario given in the question, Artificial intelligence technology is used in Google Maps and AI-enabled shops while automatic door does not employ this technology.</p> <p>(3 marks for identifying technology & 1 marks for description for same technology used everywhere)</p>	
Q. 18	<p>Name and explain with example the 4Ws of problem canvases under the problem scoping stage of the AI Project Cycle.</p> <p>Ans)</p> <p>a. Who, b. What c. Where d. Why</p> <p>4W Problem Canvas is a Problem Scoping framework prepared to understand scope of the project and prepare Problem Statement Template. It has 4 components – who, what, where, why</p> <ol style="list-style-type: none"> Who are the stakeholders facing the problem and need solution? What is the nature of the problem and its severity? Where is the Location, Context, Situation and Frequency of the problem? Why is the problem occurring? <p>ExampleAs the exams are near you observe all your friends as well as you are tired and sleepy. The school counsellor says this is due to inadequate sleep and outdoor activity. And this is the problem you are trying to solve.</p> <p>Here are the answers to the 4Ws for this problem:</p> <ul style="list-style-type: none"> Who is facing the problem – Students of your class What is the problem – Not enough sleep or outdoor activity (two painpoints here) Where is the problem – At home or school or wherever they are. Come to think of it, the problem is within themselves. Why you want to solve this problem – You can design an app that tracks all their activities and sends alerts when they're not sleeping or spending time outdoors adequately. Or any relevant example <p>(1 for naming them , 2 for explaining , 1 for Example)</p>	4
Q. 19	<p>Do ethics in AI hamper data acquisition stage? Justify your answer with taking an example.</p> <p>Ans:</p> <p>Data acquisition is the most important factor or stage as the entire project development is based on the acquired data. There are several ethical issues which must always be considered when planning any type of data collection. We need to understand that the data which is collected is ethical only if the provider agrees to provide. For example, in case of smartphone users, data is collected by clicking on allow when it asks for permission and by agreeing to all the terms and conditions. But at the same time if one does not want to share his/her data with anyone then this ethical issue hampers the acquisition process and lowers the</p>	4

	accuracy or amount of data required for development. Hence Regardless of the type of data collection, it is absolutely necessary to gain the approval of the community from which the data will collected otherwise. (1 mark for yes /no; 2 mark each for explanation and 1 mark for example)																										
Q. 20	<p>Alice, a student of class X was exploring the Natural Language Processing domain. She got stuck while performing the text normalization. Help her to normalize the text on the segmented sentences given below:</p> <p>Document 1: Sunderlal and Badri are best friends.</p> <p>Document 2: Sunderlal likes to play Guitar but Badri prefers to play keyboard.</p> <p>Ans:</p> <p>1. Tokenisation Sunderlal, and, Badri, are, best, friends Sunderlal, likes, to, play, Guitar, but, Badri , prefers, to, play, keyboard</p> <p>2. Removal of stop words Sunderlal, Badri, best, friends Sunderlal, likes, play, Guitar, Badri, prefers, play, keyboard</p> <p>3. Converting text to a common case sunderlal, badri, best, friends sunderlal, likes, play, guitar, badri, prefers, play, keyboard</p> <p>4. Stemming / Lemmatisation sunderlal, badri, best, friend sunderlal, like, play, guitar, badri, prefer, play, keyboard</p> <p>(1 mark for each step)</p>	4																									
Q. 21	<p>Calculate Accuracy, Precision, Recall and F1 Score for the following Confusion Matrix on Water Shortage in Schools: Also suggest which metric would not be a good evaluation parameter here and why?</p> <table><tr><th>The Confusion Matrix</th><th>Reality: 1</th><th>Reality: 0</th></tr><tr><th>Prediction: 1</th><td>75</td><td>5</td></tr><tr><th>Prediction: 0</th><td>5</td><td>15</td></tr></table> <table><tr><th>The Confusion Matrix</th><th>Reality: 1</th><th>Reality: 0</th><th></th></tr><tr><th>Prediction: 1</th><td>75</td><td>5</td><td>80</td></tr><tr><th>Prediction: 0</th><td>5</td><td>15</td><td>20</td></tr><tr><td></td><td>80</td><td>20</td><td>100</td></tr></table> <p>Ans:</p> <p>Calculation:</p> <p>Accuracy is defined as the percentage of correct predictions out of all the observations Where True Positive (TP), True Negative (TN), False Positive (FP) and False Negative</p> $Accuracy = \frac{Correct\ prediction}{Total\ cases} * 100\%$ $Accuracy = \frac{(TP + TN)}{(TP + TN + FP + FN)} * 100\%$ <p>(FN) Where True Positive (TP), True Negative (TN), False Positive (FP) and False Negative (FN).</p> <p>= (75+15) / (75+15+5+5)</p> <p>= (90 / 100)</p>	The Confusion Matrix	Reality: 1	Reality: 0	Prediction: 1	75	5	Prediction: 0	5	15	The Confusion Matrix	Reality: 1	Reality: 0		Prediction: 1	75	5	80	Prediction: 0	5	15	20		80	20	100	4
The Confusion Matrix	Reality: 1	Reality: 0																									
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Prediction: 1	75	5	80																								
Prediction: 0	5	15	20																								
	80	20	100																								

=0.9

Precision is defined as the percentage of true positive cases versus all the cases where the prediction is true.

$$\text{Precision} = \frac{\text{True Positive}}{\text{All Predicted Positives}} * 100\%$$

$$\text{Precision} = \frac{TP}{TP + FP} * 100\%$$

$$= 75 / (75+5)$$

$$= 75 / 80$$

$$= 0.9375$$

Recall is defined as the fraction of positive cases that are correctly identified.

$$\text{Recall} = \frac{\text{True Positive}}{\text{True Positive} + \text{False Negative}}$$

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

$$= 75 / (75+5)$$

$$= 75 / 80$$

$$= 0.9375$$

F1 score is defined as the measure of balance between precision and recall.

$$= 2 * ((0.9375 * 0.9375) / (0.9375 + 0.9375))$$

$$\text{F1 Score} = 2 * \frac{\text{Precision} * \text{Recall}}{\text{Precision} + \text{Recall}}$$

Therefore,

$$= 2 * (0.8789 / 1.875)$$

$$= 2 * 0.46875 = 0.9375$$

Accuracy= 0.9%

Precision=0.9375%

Recall=0.9375%

F1 Score=0.

Here precision, recall, accuracy, f1 score all are same
