

ARTIFICIAL INTELLIGENCE (SUBJECT CODE - 417)

Class X (Session 2023-2024) PRE-BOARD EXAM

Max. Time: 2 Hours



Max. Marks: 50

General Instructions:

1. Please read the instructions carefully.
2. This Question Paper consists of **20 questions** in two sections: Section A & Section B.
3. Section A has Objective/Short type questions whereas Section B contains Subjective type questions.
4. All questions of a particular section must be attempted in the correct order.
5. **SECTION A - OBJECTIVE TYPE QUESTIONS / SHORT ANSWERS (24 MARKS):**
 - i. Marks allotted are mentioned against each question/part.
 - ii. There is no negative marking.
 - iii. Do as per the instructions given.
6. **SECTION B – SUBJECTIVE TYPE QUESTIONS (26 MARKS):**
 - i. A candidate has to do 10 questions.
 - ii. Do as per the instructions given.
 - iii. 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>Why Feedback is important in communication cycle?</p> <p>Ans: Feedback is the backbone of a communication cycle. It helps to review the mistakes and gives change to improve them. Without feedback communication is incomplete.</p> <p>Feedback can be given at different times of the tasks. Therefore it can be divided into two categories:</p> <p>1) Formative Feedback is given at the mid of the task so its helps to improve and prevent from making the same mistakes. Verbal method is used to give Formative Feedback.</p> <p>2) Summative Feedback is given at the end of the task. It gives specific information in written form. Verbal method is used to give Summative Feedback.</p>	1
ii.	<p>What are the 7Cs of communication barrier?</p> <p>Ans: The 7 Cs of Communication help you to communicate more effectively. The 7 Cs stand for: clear, concise, concrete, correct, coherent, complete, and courteous.</p> <p>Though there are a few variations. You can use the 7 Cs as a checklist in your written and spoken messages.</p>	1

	<ul style="list-style-type: none"> • Credit Card Fraud Detection: Given credit card transactions for a customer in a month, identify those transactions that were made by the customer and those that were not. A program with a model of this decision could refund those transactions that were fraudulent. • Digit Recognition: Given a zip codes hand written on envelopes, identify the digit for each hand written character. A model of this problem would allow a computer program to read and understand handwritten zip codes and sort envelopes by geographic region. • Speech Understanding: Given an utterance from a user, identify the specific request made by the user. A model of this problem would allow a program to understand and make an attempt to fulfil that request. The iPhone with Siri has this capability. • Face Detection: Given a digital photo album of many hundreds of digital photographs, identify those photos that include a given person. A model of this decision process would allow a program to organize photos by person. Some cameras and software like iPhoto has this capability. <p>(Name any two)</p>	
iii.	<p>What is the term for the process of making an AI system understand and interpret human language?</p> <ul style="list-style-type: none"> a) Natural Language Processing (NLP) b) Artificial Language Understanding (ALU) c) Language Recognition System (LRS) d) Linguistic Data Analysis (LDA) 	1
iv.	<p>In the context of AI ethics, what does "Explainability" refer to?</p> <ul style="list-style-type: none"> a) The ability to clarify the problem definition b) Transparency in AI decision-making c) Training AI models d) The speed of AI algorithms 	1
v.	<p>Draw the icons of the following SDGs:</p> <ul style="list-style-type: none"> (a) Gender Equality (b) Clean Water and sanitation <p>Ans:</p> <div style="display: flex; justify-content: space-around; align-items: center;">   </div> <p>(1/2 each)</p>	1
vi.	<p>Differentiate between a script-bot and a smart-bot.</p>	1

Script-bot	Smart-bot
<ul style="list-style-type: none"> • A scripted chatbot doesn't carry even a glimpse of A.I • Script bots are easy to make • Script bot functioning is very limited as they are less powerful. • Script bots work around a script which is programmed in them • No or little language processing skills • Limited functionality 	<ul style="list-style-type: none"> • Smart bots are built on NLP and ML. • Smart -bots are comparatively difficult to make. • Smart-bots are flexible and powerful. • Smart bots work on bigger databases and other resources directly • NLP and Machine learning skills are required. • Wide functionality

(Any 1 point from each)

Q. 4	Answer any 5 out of the given 6 questions (1 x 5 = 5 marks)	
i.	Mention four examples of artificially intelligent applications in our smartphones. Ans: Phone Smart Lock / Snapchat filter / Shopping websites / Netflix / YouTube / Face Detection / Google Maps / Emotions recognition / Google assistant / Natural language recognition / image detection / beauty filters etc. (2 marks for any four right examples)	1
ii.	Which type of learning involves the AI system learning through trial and error? a) Supervised Learning b) Unsupervised Learning c) Reinforcement Learning d) Semi-Supervised Learning	1
iii.	Which of the following are the methods of data collection? a. Surveys & rumours b. AI models and applications c. Imaging and internet d. Web scraping and sensors	1
iv.	Which of the following is not a technique of data exploration? a. Bar chart b. Pie chart c. Google Survey d. Tally Table	1
v.	Which of the following is not an application of Computer Vision: a) Face filters b) Chatbots c) Self Driving Car	1

	d) Damage analysis	
vi.	<p>What is the term for unexpected and biased behavior in AI systems due to training data?</p> <p>a) Overfitting b) Underfitting c) Biasing d) Generalization</p>	1

Q. 5	Answer any 5 out of the given 6 questions (1 x 5 = 5 marks)	
i.	<p>A school uses an AI-based system to manage the learning process by delivering customized study materials. To assign appropriate subjects to students, the system takes into consideration all the factors such as gender, race, ongoing learning, economic level, minority status and previous educational institute. However, because it ignores a fundamental aspect of learning as an ongoing process based on an individual's abilities and knowledge, this approach may lead to a student's future prospects being hidden. What is the significance of this scenario?</p> <p>a) Deep fakes b) Algorithm bias c) Safety concerns d) Explainable AI</p>	1
ii.	<p>Out of four Ws in 4W Framework, which W refers to the problem statement?</p> <p>a. Where b. What c. Why d. Who</p>	1
iii.	<p>Testing data is used after which of the following:</p> <p>a. Big data b. Problem scoping c. Training data d. Evaluation</p>	1

iv.	<p>State the difference between a List and a Tuple.</p> <p>Ans:</p> <table border="1" data-bbox="272 293 1098 745"> <thead> <tr> <th data-bbox="272 293 683 338">List</th> <th data-bbox="691 293 1098 338">Tuple</th> </tr> </thead> <tbody> <tr> <td data-bbox="272 338 683 472">1) List is a Group of Comma separated Values within Square Brackets and Square Brackets are mandatory. Eg: i = [10, 20, 30, 40]</td> <td data-bbox="691 338 1098 472">1) Tuple is a Group of Comma separated Values within Parenthesis and Parenthesis are optional. Eg: t = (10, 20, 30, 40) t = 10, 20, 30, 40</td> </tr> <tr> <td data-bbox="272 472 683 607">2) List Objects are Mutable i.e. once we creates List Object we can perform any changes in that Object. Eg: i[1] = 70</td> <td data-bbox="691 472 1098 607">2) Tuple Objects are Immutable i.e. once we creates Tuple Object we cannot change its content. t[1] = 70 → ValueError: tuple object does not support item assignment.</td> </tr> <tr> <td data-bbox="272 607 683 663">3) If the Content is not fixed and keep on changing then we should go for List.</td> <td data-bbox="691 607 1098 663">3) If the content is fixed and never changes then we should go for Tuple.</td> </tr> <tr> <td data-bbox="272 663 683 745">4) List Objects can not used as Keys for Dictionries because Keys should be Hashable and Immutable.</td> <td data-bbox="691 663 1098 745">4) Tuple Objects can be used as Keys for Dictionries because Keys should be Hashable and Immutable.</td> </tr> </tbody> </table>	List	Tuple	1) List is a Group of Comma separated Values within Square Brackets and Square Brackets are mandatory. Eg: i = [10, 20, 30, 40]	1) Tuple is a Group of Comma separated Values within Parenthesis and Parenthesis are optional. Eg: t = (10, 20, 30, 40) t = 10, 20, 30, 40	2) List Objects are Mutable i.e. once we creates List Object we can perform any changes in that Object. Eg: i[1] = 70	2) Tuple Objects are Immutable i.e. once we creates Tuple Object we cannot change its content. t[1] = 70 → ValueError: tuple object does not support item assignment.	3) If the Content is not fixed and keep on changing then we should go for List.	3) If the content is fixed and never changes then we should go for Tuple.	4) List Objects can not used as Keys for Dictionries because Keys should be Hashable and Immutable.	4) Tuple Objects can be used as Keys for Dictionries because Keys should be Hashable and Immutable.	1
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v.	<p>What is a Convolutional Neural Network ?</p> <p>Ans:</p> <p>A Convolutional Neural Network (CNN) is a Deep Learning algorithm which can take in an input image, assign importance (learnable weights and biases) to various aspects/objects in the image and be able to differentiate one from the other. The process of deploying a CNN is as follows:</p> <div style="display: flex; justify-content: space-around; align-items: center; margin-top: 20px;"> <div data-bbox="288 1055 564 1137" style="background-color: #007bff; color: white; padding: 10px; border-radius: 5px;">Input an image</div> <div data-bbox="703 1055 979 1137" style="background-color: #007bff; color: white; padding: 10px; border-radius: 5px;">Process image</div> <div data-bbox="1043 1055 1319 1137" style="background-color: #007bff; color: white; padding: 10px; border-radius: 5px;">Output probability values</div> </div>	1										
vi.	<p>What is Testing Dataset?</p> <p>Ans: The dataset provided to the model ML. algorithm after training the algorithm. (explanation)</p>	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	<p>What are SMART goals? Elaborate.</p> <p>Ans: The SMART in SMART goals stands for Specific, Measurable, Achievable, Relevant, and Time-Bound. Defining these parameters as they pertain to your goal helps ensure that your objectives are attainable within a certain time frame.</p> <p><i>(Elaborate each)</i></p>	2
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<p>Q. 7</p>	<p>Palak 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 Palak must have followed for effective time management.</p> <p>Ans: mastering time management at work</p> <ol style="list-style-type: none"> 1. Figure out how you're currently spending your time. ... 2. Create a daily schedule—and stick with it. ... 3. Prioritize wisely. ... 4. Group similar tasks together. ... 5. Avoid the urge to multitask. ... 6. Assign time limits to tasks. ... 7. Build in buffers. ... 8. Learn to say no. 	<p>2</p>
<p>Q. 8</p>	<p>How to create strong password?</p> <p>Ans: A strong password is:</p> <ol style="list-style-type: none"> 1. At least 12 characters long but 14 or more is better. 2. A combination of uppercase letters, lowercase letters, numbers, and symbols. 3. Not a word that can be found in a dictionary or the name of a person, character, product, or organization. 4. Significantly different from your previous passwords. 	<p>2</p>
<p>Q. 9</p>	<p>What are the myths about an Entrepreneurship?</p> <p>Ans: These are the myths about an Entrepreneurship:</p> <ol style="list-style-type: none"> 1) Entrepreneur Born - People believe entrepreneurs are born, can't be made. But it is false, entrepreneurship can be learned. 2) Huge Investment - It is assumed for starting a business a huge amount of money is needed. But one can start with a small business and gradually grow it with proper planning. 3) Instant Profit - All companies don't make profit after starting a business, but they take many years to establish a market before making profit. 4) Good Idea for Business - For starting a business, a good idea isn't everything, but the factors like leadership, good planning, and communication skills also play important role. 	<p>2</p>

	5) Luxuries Life - Entrepreneurs have luxuries life, but they work 24 x 7 without any break to stand a company.	
Q. 10	<p>What are the various causes of Stress and how is Stress Management important?</p> <p>Answer: Some factors that contribute to stress are:</p> <ul style="list-style-type: none"> • Threat • Dangerous situations • Irrational demands • Unrealistic goals • Expectations • Financial loss • Discrimination <p>Stress Management is important as:</p> <ul style="list-style-type: none"> • It allows a person to react positively in stressful situations. • It provides ways to measure the different levels of stress so that the inflicted person can resort to self-help or seek help from a professional. • It helps to identify distinct stressors, which can either be good or bad. They can be self-induced or be triggered due to external situations. They can be categorised as: <ul style="list-style-type: none"> → Positive stressors → Dangerous stressors (leads to stressful situations) → Irrelevant stressors • After successfully recognising the stressors, stress management provides practical measures to target those stressors. • It infuses a sense of control and accomplishment. It equips you with the ability to handle any situation efficiently. • It helps to bring about a healthy change in one's perception of events, people, or situations. • Stress management helps to bridge the gap between the available resources and the unrealistic demands surrounding them. • Stress management also enhances the physiology of a person. It boosts his immune system and makes him healthy. It emphasizes on a balanced diet, sound sleep, and exercise. Thus, it helps in bringing a positive change in the outlook and lifestyle of a person. 	2

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

Q. 11	<p>How do you understand whether a machine/application is AI based or not? Explain with the help of an example.</p> <p>Ans: Any machine that has been trained with data and can make decisions/predictions on its own can be termed as AI.</p> <p>Eg: The bot or the automation machine is not trained with any data is not an AI while a chatbot that understands and processes human language is an AI.</p> <p><i>(Elaborate)</i></p>	2
Q. 12	<p>Name and explain some popular Generative AI models?</p> <p>Ans: Generative AI models have revolutionized the field of artificial intelligence, offering remarkable capabilities in generating content, from text to images and beyond.</p>	2

	<p>a. GPT-4 (Generative Pre-trained Transformer 4): GPT-4, developed by OpenAI, is a standout among Generative AI models. With billions of parameters, it has demonstrated remarkable text generation abilities. GPT-4 can answer questions, write essays, generate code, and even create conversational agents that engage users in natural language.</p> <p>b. DALL·E: If you're interested in generative art, DALL·E is a model to watch. Developed by OpenAI, this model can generate images from textual descriptions. It takes creativity to new heights by creating visuals based on written prompts, showing the potential of Generative AI in the visual arts.</p>	
Q. 13	<p>Pick the odd one out and justify your answer:</p> <ol style="list-style-type: none"> Snap Chat Filter Face Lock in Phone Chatbot Image search Option <p>Ans: Chatbot (1 marks), as it is NLP based, the other three are Computer vision based (1marks for justification).</p>	2
Q. 14	<p>Explain the following:</p> <ol style="list-style-type: none"> Supervised Learning Unsupervised Learning <p>Ans:</p> <ul style="list-style-type: none"> • Supervised learning is an approach to creating artificial intelligence (AI), where the program is given labelled input data and the expected output results. OR • Supervised learning is a learning in which we teach or train the machine using data which is well labelled that means some data is already tagged with the correct answer. After that, the machine is provided with a new set of examples (data) so that supervised learning algorithm analyses the training data (set of training examples) and produces a correct outcome from labelled data. In a supervised learning model, the dataset which is fed to the machine is labelled. It means some data is already tagged with the correct answer. 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. • Unsupervised Learning: An unsupervised learning model works on unlabeled 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. OR • Unsupervised learning is the training of a machine using information that is neither classified nor labelled and allowing the algorithm to act on that information without guidance. Here the task of the machine is to group unsorted information according to similarities, patterns and differences without any prior training of data. 	2
Q. 15	<p>What do we get from the "bag of words" algorithm?</p> <p>Ans: Whenever we apply any algorithm in NLP, it works on numbers. We cannot directly feed our text into that algorithm. Hence, Bag of Words model is used to preprocess the text by converting it into a bag of words, which keeps a count of the total occurrences of most frequently used words.</p>	2
Q. 16	<p>Should AI replace laborious jobs? Is there an alternative for major unemployment?</p> <p>Ans: Yes, AI should replace laborious jobs. • AI can replace laborious jobs like lifting of heavy items, working in mines etc. • AI can indeed automate most repetitive and physical tasks. • In future, AI would be a good option in the field of architecture and construction.</p> <p>OR</p>	2

	<p>No, AI should not replace laborious jobs completely as if it replaces laborious jobs completely, then there will be no source of income for the daily wage workers due to unemployment. So, industry owners can use some machines but more of man power. Hence the production will not get affected as humans are smarter than machines since they were the ones who invented AI.</p> <p>Note: As this is an open-ended question so both the answers (yes/No) are correct but it must be with correct justification.</p> <p>Is there an alternative for major unemployment?</p> <ul style="list-style-type: none"> ● AI taking over laborious jobs won't create unemployment. It is just a groundless fear. The standard view of technical change is that some jobs are displaced by the substitution of machines for labour, but that the fear of total displacement is misplaced because new jobs are created, largely due to the technology-fuelled increase in productivity. Humans have always shifted away from work suitable for machines and to other jobs. ● The basic fact is that technology eliminates jobs, not work. If this level of AI revolution will happen, lots of job opportunities will be created. For example: 20-30 years ago, being an accountant was a lucrative job, but AI took over this job but this created a lot of opportunities, it raised the demand of a software engineer, data scientist, etc. ● It will open doors to skillful jobs rather than doing laborious tasks. ● Thus, we will be 	
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Answer any 3 out of the given 4 questions in 50– 80 words each (4 x 3 = 12 marks)

<p>Q. 17</p>	<p>(Case Study) AI and robotics have raised some questions regarding liability. Take for example the scenario of an 'autonomous' or AI-driven robot moving through a factory. Another robot surprisingly crosses its way and our robot draws aside to prevent collision. However, by this manoeuvre the robot injures a person.</p> <p>a) Who can be held liable for damages caused by autonomous systems? b) List two AI Ethics.</p> <p>Ans:</p> <p>a) Who can be held liable for damages caused by autonomous systems? It is actually very difficult to blame anyone in such a scenario. Here is the situation where AI Ethics come in to the picture. Here, the choices might differ from person to person and one must understand that nobody is wrong in this case. Every person has a different perspective and hence he/she takes decisions according to their moralities. But still if someone is to be liable then it should be the programmer who has designed the algorithm of the autonomous vehicle as he/she should have considered all the exceptional conditions that could arise.</p> <p>b) List two AI Ethics. (Any two out of the following) AI Bias, AI Access, Data privacy, AI for kids.</p>	<p>4</p>
<p>Q. 18</p>	<p>"Google take inputs from the images that the user sends to it. Then it uses Artificial Intelligence technology to identify the shapes in the image" – Identify this domain of AI.</p> <p>Write various applications, how the same is being used?</p> <p>Ans: Computer Vision</p> <p>i) Defect Detection: Traditionally, defect detection is a time consuming task which is carried out by trained people in selected batches, and total production control is usually not possible. With Computer Vision technology, anyone can detect defects such as cracks in metals, paint defects, bad prints, etc.</p> <p>ii) Gaming: Microsoft Kinect is an excellent example of a popular commercial product which is totally oriented around AI and utilizes CV technology.</p> <p>iii) Driverless Cars: In self-driving cars, Computer Vision is one of the key enabling</p>	<p>4</p>

technologies for detecting traffic signals , traffic lights and weather conditions
 iv) Face Recognition – It is used for applying filters and recognizing images. Google photos, Snapchat, Facebook etc are all using this technology.
 v) Image retrieval – It is used for the images for objects. Search Engines like Google, Bing etc use this technology to provide results of image searches
 Surveillance – it includes identifying criminals or illegal or suspicious behavior etc from video feed

Q. 19 How AI helps in giving you personalized experience online?
 Ans: AI based recommendations: AI uses advanced machine learning algorithms to analyze browser history, page clicks, social interactions (likes, shares), past purchases, the duration for which a page was viewed, location, etc. to gauge customer interests and preferences. AI can help deliver product recommendations based on frequently bought items, or related products. It can even help customize web pages and elements to suit a customer’s needs. For instance, Netflix does intense behavior analysis based on behavior and demographic data to determine the content that will resonate with their customers. Chatbots and Automated Messaging: AI-powered chatbots and messaging agents can enhance the customer experience across channels. They can answer simple queries, engage customers, efficiently handle multiple interactions, Automated Service Interactions: AI-driven programs can send automated messages to customers regarding a pending service, a part replacement, or a regular order. Curating Select Products: Amazon has come up with the concept of the Amazon 4-star retail store. Products that have received a multitude of 4-star ratings will be offered in this physical store. Amazon will use its product recommendation engine to identify trending products and customers’ favorites and bring them to a brick and mortar setting.

Q. 20 Calculate Accuracy, Precision, Recall and F1 Score for the following Confusion Matrix on Heart Attack Risk. Also suggest which metric would not be a good evaluation parameter here and why?

The Confusion Matrix	Reality: 1	Reality: 0
Prediction: 1	50	20
Prediction: 0	10	20

The Confusion Matrix	Reality: 1	Reality: 0	
Prediction: 1	50	20	70
Prediction: 0	10	20	30
	60	40	100

Ans:
 Calculation: Accuracy: Accuracy is defined as the percentage of correct predictions out of all the observations

$$Accuracy = \frac{Correct\ prediction}{Total\ cases} * 100\%$$

$$Accuracy = \frac{(TP + TN)}{(TP + TN + FP + FN)} * 100\%$$

Where True Positive (TP), True Negative (TN), False Positive (FP) and False Negative (FN).
 Accuracy = (50+20) / (50+20+20+10) = (70/100) = 0.7 Precision: Precision is defined as the

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

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

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

= (50 / (50 + 20)) = (50/70) = 0.714 Recall: It is defined as the fraction of positive cases that are correctly identified.

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

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

= 50 / (50 + 60) = 50 / 110 = 0.5 F1 Score: F1 score is defined as the measure of balance between precision and recall

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

= 2 * (0.714 * 0.5) / (0.714 + 0.5) = 2 * (0.357 / 1.214) CBSE Question Bank – AI – Class 10 – Chapter- 8 Evaluation 9 = 2* (0.29406) = 0.58 Therefore, Accuracy= 0.7 Precision=0.714 Recall=0.5 F1 Score=0.588 Here within the test there is a tradeoff. But Recall is not a good Evaluation metric. Recall metric needs to improve more. Because, False Positive (impacts Precision): A person is predicted as high risk but does not have heart attack. False Negative (impacts Recall): A person is predicted as low risk but has heart attack. Therefore, False Negatives miss actual heart patients, hence recall metric need more improvement. False Negatives are more dangerous than False Positives.