

CBSE | DEPARTMENT OF SKILL EDUCATION

ARTIFICIAL INTELLIGENCE (SUBJECT CODE: 417)

Marking Scheme for the Sample Question Paper for Class X (Session 2020-2021)

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	<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>_____ refers to focusing human efforts for maintaining a healthy body and mind capable of better withstanding stressful situations</p> <p>a) Mental Health b) Emotional Health c) Self-Management d) Stress Management</p> <p>Ans: d) Stress Management</p>	1
iii	<p>Having conscious knowledge of your own self, capabilities, feelings and one's own character is called _____.</p> <p>a) Self-awareness b) Self-motivation c) Self-control d) Independence</p> <p>Ans: a) Self-awareness</p>	1
iv	<p>A _____ is a software program that attaches itself to other programs and alters their behavior.</p> <p>a) Operating system b) Firewall c) Antivirus d) Computer Virus</p> <p>Ans: d) Computer Virus</p>	1
v	<p>_____ refers to recruitment, employment, selection, training, development and compensation of the employees with an organization.</p> <p>a) Entrepreneurs b) Management c) Human Resource Management d) Employer</p> <p>Ans: c) Human Resource Management</p>	1
vi	<p>_____ is caused when natural or a man-made disturbance disrupts the natural balance of an ecosystem.</p> <p>a) Pollution b) Damage c) Natural disaster d) Ecological Imbalance</p> <p>Ans: d) Ecological Imbalance</p>	1

Q. 2	Answer any 5 out of the given 6 questions (1 x 5 = 5 marks)	
i	<p>A _____ is divided into multiple layers and each layer is further divided into several blocks called nodes.</p> <p>a) Neural Networks b) Convolutional Neural Network (CNN) c) Machine learning algorithm d) Hidden Layers</p> <p>Ans: a) Neural Network</p>	1
ii	<p>The _____ canvas helps you in identifying the key elements related to the problem.</p> <p>a) Problem scoping b) 4Ws Problem c) Project cycle d) Algorithm</p> <p>Ans: b) 4Ws Problem</p>	1
iii	<p>_____ is a domain of AI that depicts the capability of a machine to get and analyse visual information and afterwards predict some decisions about it.</p> <p>a) NLP b) Data Sciences c) Augmented Reality d) Computer Vision</p> <p>Ans: d) Computer Vision</p>	1
iv	<p>_____ is defined as the percentage of correct predictions out of all the observations.</p> <p>a) Predictions b) Accuracy c) Reality d) F1 Score</p> <p>Ans: b) Accuracy</p>	1
v	<p>_____ is the sub-field of AI that is focused on enabling computers to understand and process human languages.</p> <p>a) Deep Learning b) Machine Learning c) NLP d) Data Sciences</p> <p>Ans: c) NLP</p>	1
vi	<p>In _____, the machine is trained with huge amounts of data which helps it in training itself around the data.</p> <p>a) Supervised Learning b) Deep Learning c) Classification d) Unsupervised Learning</p> <p>Ans: b) Deep Learning</p>	1

Q. 3	Answer any 5 out of the given 6 questions (1 x 5 = 5 marks)	
i	<p>Expand CBT_____</p> <p>a) Computer Behaved Training b) Cognitive Behavioural Therapy c) Consolidated Batch of trainers d) Combined Basic Training</p> <p>Ans: b) Cognitive Behavioural Therapy</p>	1
ii	<p>Name any 2 methods of collecting data.</p> <p>a) Surveys and Interviews b) Rumors and Myths c) AI models and applications d) Imagination and thoughts</p> <p>Ans: a) Surveys and Interviews (Any two of the following) Surveys, Observing the therapist's sessions, Databases available on the internet, Interviews, etc.</p>	1
iii	<p>What is the role of modelling in an NLP based AI model?</p> <p>a) Modelling in NLP helps in processing of AI model b) Modelling is required to make an AI model c) In NLP, modelling requires data pre-processing only after which the data is fed to the machine. d) Modelling is used in simplification of data acquisition</p> <p>Ans: c)In NLP, modelling requires data pre-processing only after which the data is fed to the machine.</p>	1
iv	<p>What will be the outcome, if the Prediction is "Yes" and it matches with the Reality? What will be the outcome, if the Prediction is "Yes" and it does not match the Reality?</p> <p>a) True Positive, True Negative b) True Negative, False Negative c) True Negative, False Positive d) True Positive, False Positive</p> <p>Ans: d) True Positive, False Positive</p>	1
v	<p>Recall-Evaluation method is</p> <p>a) defined as the fraction of positive cases that are correctly identified. b) defined as the percentage of true positive cases versus all the cases where the prediction is true. c) defined as the percentage of correct predictions out of all the observations. d) comparison between the prediction and reality</p> <p>Ans: a) defined as the fraction of positive cases that are correctly identified.</p>	1
vi	<p>Give 2 examples of Supervised Learning models.</p> <p>a) Classification and Regression b) Clustering and Dimensionality Reduction c) Rule Based and Learning Based d) Classification and Clustering</p> <p>Ans: a) Classification and Regression</p>	1

Q. 4	Answer any 5 out of the given 6 questions (1 x 5 = 5 marks)	
i	<p>Define Machine Learning.</p> <ul style="list-style-type: none"> a) Machine learning is the study of computer algorithms that improve automatically through experience. b) Refers to any technique that enables computers to mimic human intelligence. c) Machine learning refers to computer systems (both machines and software) enables machines to perform tasks for which it is programmed. d) Machine Learning refers to projects that allow the machine to work on a particular logic. <p>Ans: a) Machine learning is the study of computer algorithms that improve automatically through experience.</p>	1
ii	<p>Give one example of an application which uses augmented reality.</p> <p>Ans: Self Driving Cars</p>	1
iii	<p>Differentiate between Prediction and Reality.</p> <ul style="list-style-type: none"> a) Prediction is the input given to the machine to receive the expected result of the reality. b) Prediction is the output given to match the reality. c) The prediction is the output which is given by the machine and the reality is the real scenario in which the prediction has been made. d) Prediction and reality both can be used interchangeably. <p>Ans: c) The prediction is the output which is given by the machine and the reality is the real scenario in which the prediction has been made.</p>	1
iv	<p>The term Sentence Segmentation is</p> <ul style="list-style-type: none"> a) the whole corpus is divided into sentences b) to undergo several steps to normalise the text to a lower level c) in which each sentence is then further divided into tokens d) the process in which the affixes of words are removed <p>Ans: a) the whole corpus is divided into sentences.</p>	1
v	<p>Which of the following statements is true for the term Evaluation?</p> <ul style="list-style-type: none"> a) Helps in classifying the type and genre of a document. b) It helps in predicting the topic for a corpus. c) Helps in understanding the reliability of any AI model d) Process to extract the important information out of a corpus. <p>Ans: c) Helps in understanding the reliability of any AI model</p>	1
vi	<p>Which of the following is not part of the AI Project Cycle?</p> <ul style="list-style-type: none"> a) Data Exploration b) Modelling c) Testing d) Problem Scoping <p>Ans: (c) Testing</p>	1

Q. 5	Answer any 5 out of the given 6 questions (1 x 5 = 5 marks)	
i	<p>_____ refers to the AI modelling where the machine learns by itself.</p> <ul style="list-style-type: none"> a) Learning Based b) Rule Based c) Machine Learning d) Data Sciences <p>Ans: (a) Learning Based</p>	1
ii	<p>Prediction and Reality can be easily mapped together with the help of :</p> <ul style="list-style-type: none"> a) Prediction b) Reality c) Accuracy d) Confusion Matrix <p>Ans: (d) Confusion Matrix</p>	1
iii	<p>_____ is an example of Applications of Natural Language Processing.</p> <ul style="list-style-type: none"> a) Evaluation b) Automatic Summarization c) Deep Learning d) Problem Scoping <p>Ans: (b) Automatic Summarization</p>	1
iv	<p>_____ is the last stage of the AI project Life cycle.</p> <ul style="list-style-type: none"> a) Problem Scoping b) Evaluation c) Modelling d) Data Acquisition <p>Ans: (b) Evaluation</p>	1
v	<p>In _____, the machine is trained with huge amounts of data which helps it in training itself around the data.</p> <ul style="list-style-type: none"> a) Machine Learning b) Artificial Intelligence c) NLP d) Deep Learning <p>Ans: (d) Deep Learning</p>	1
vi	<p>In _____, input to machines can be photographs, videos and pictures from thermal or infrared sensors, indicators and different sources.</p> <ul style="list-style-type: none"> a) Computer Vision b) Data Acquisition c) Data Collection d) Machine learning <p>Ans: (a) Computer Vision</p>	1

SECTION B: SUBJECTIVE TYPE QUESTIONS

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

Part A: Employability Skills

Q. 6	<p>Name the four main categories of Communication Styles.</p> <p>Ans: Verbal, Non - Verbal, Written and Visual</p>	2
Q. 7	<p>List any 4 activities that help in stress management.</p> <p>Ans: (Any 4 out of the following or any other appropriate activity)</p> <ul style="list-style-type: none"> • Positive Thinking, • Physical Exercise, • Yoga, • Meditation, • Nature Walks, • Vacations, • Laughing aloud, • Listening to good music 	2
Q. 8	<p>What are antivirus? Name any 2 antiviruses.</p> <p>Ans:</p> <ul style="list-style-type: none"> • Antivirus software is a program designed to detect and remove malicious programs from the computer. • Examples: (Any 4 out of the following or any other correct name of the antivirus): Microsoft Security essentials, Microsoft Defender, McAfee Virus Scan, Norton AntiVirus, Quick Heal. 	2
Q. 9	<p>Name any 4 qualities of an entrepreneur.</p> <p>Ans: (Any 4 out of the following)</p> <ul style="list-style-type: none"> • Hard working, • Optimistic, • Independent, • Energetic, • Self-confident, • Perseverant 	2
Q. 10	<p>Name any 4 man-made disruptions that cause ecological imbalance.</p> <p>Ans: (Any 4 out of the following)</p> <ul style="list-style-type: none"> • Deforestation, • Degradation of Land and Soil Erosion, • Overexploitation of Resources, • Industrial and Atmospheric Pollution, • Faulty Mining Practices, • E waste generation 	2

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

<p>Q. 11</p>	<p>Give 2 points of difference between a script-bot and a smart-bot</p> <p>Ans:</p> <table border="1" data-bbox="271 280 1372 817"> <thead> <tr> <th data-bbox="271 280 798 347">Script-bot</th> <th data-bbox="798 280 1372 347">Smart-bot</th> </tr> </thead> <tbody> <tr> <td data-bbox="271 347 798 414">Script bots are easy to make</td> <td data-bbox="798 347 1372 414">Smart-bots are flexible and powerful</td> </tr> <tr> <td data-bbox="271 414 798 548">Script bots work around a script with instructions of program stored inside them</td> <td data-bbox="798 414 1372 548">Smart bots work on bigger databases and other resources directly</td> </tr> <tr> <td data-bbox="271 548 798 649">Mostly are Free and are Easy to Integrate</td> <td data-bbox="798 548 1372 649">Smart bots learn on its own with more data</td> </tr> <tr> <td data-bbox="271 649 798 750">No or very little language processing skills</td> <td data-bbox="798 649 1372 750">Coding is required to take this up on board</td> </tr> <tr> <td data-bbox="271 750 798 817">Limited functionality</td> <td data-bbox="798 750 1372 817">Has wide functionality</td> </tr> </tbody> </table>	Script-bot	Smart-bot	Script bots are easy to make	Smart-bots are flexible and powerful	Script bots work around a script with instructions of program stored inside them	Smart bots work on bigger databases and other resources directly	Mostly are Free and are Easy to Integrate	Smart bots learn on its own with more data	No or very little language processing skills	Coding is required to take this up on board	Limited functionality	Has wide functionality	<p>2</p>
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<p>Q. 12</p>	<p>Define the term Machine Learning. Also give 2 applications of Machine Learning in our daily lives.</p> <p>Ans:</p> <p>Machine Learning: It is a subset of Artificial Intelligence which enables machines to improve at tasks with experience (data). The intention of Machine Learning is to enable machines to learn by themselves using the provided data and make accurate Predictions/ Decisions.</p> <p>Machine Learning is used in Snapchat Filters, NETFLIX recommendation system.</p>	<p>2</p>												
<p>Q. 13</p>	<p>Differentiate between Classification and Regression.</p> <p>Ans:</p> <table border="1" data-bbox="271 1422 1372 1892"> <thead> <tr> <th data-bbox="271 1422 798 1489">Classification</th> <th data-bbox="798 1422 1372 1489">Regression</th> </tr> </thead> <tbody> <tr> <td data-bbox="271 1489 798 1668">This model works on a discrete dataset which means the data need not be continuous.</td> <td data-bbox="798 1489 1372 1668">Such models work on continuous data.</td> </tr> <tr> <td data-bbox="271 1668 798 1892">For example, in the grading system, students are classified on the basis of the grades they obtain with respect to their marks in the examination.</td> <td data-bbox="798 1668 1372 1892">For example, if you wish to predict your next salary, then you would put in the data of your previous salary, any increments, etc and would train the model.</td> </tr> </tbody> </table>	Classification	Regression	This model works on a discrete dataset which means the data need not be continuous.	Such models work on continuous data.	For example, in the grading system, students are classified on the basis of the grades they obtain with respect to their marks in the examination.	For example, if you wish to predict your next salary, then you would put in the data of your previous salary, any increments, etc and would train the model.	<p>2</p>						
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Q. 14	<p>Explain the term Text Normalisation in Data Processing.</p> <p>Ans: The first step in Data processing is Text Normalisation. Text Normalisation helps in cleaning up the textual data in such a way that it comes down to a level where its complexity is lower than the actual data. In this we undergo several steps to normalise the text to a lower level. We work on text from multiple documents and the term used for the whole textual data from all the documents altogether is known as corpus.</p>	2
Q. 15	<p>Name any 2 applications of Natural Language Processing which are used in the real-life scenario.</p> <p>Ans: (Any 4 out of the following or any other appropriate activity)</p> <ul style="list-style-type: none"> • Automatic Summarization, • Sentiment Analysis, • Text classification, • Virtual Assistants 	2
Q. 16	<p>What is F1 Score in Evaluation?</p> <p>Ans: F1 score can be defined as the measure of balance between precision and recall.</p> $F1Score = 2 * \frac{Precision * Recall}{Precision + Recall}$	2

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

Q. 17	<p>Categorize the following under Data Sciences, Machine Learning, Computer Vision and NLP.</p> <p>The latest technological advancements have made our lives convenient. Google Home, Alexa and Siri have been a huge help to non-tech savvy people. Features like Facial recognition and Facelock have added additional security to our gadgets. These advancements have also contributed in making our needs more approachable and convenient. Now you can even check the prices with Price comparison websites and order groceries online with chatbots. Did you know that you can even find how you are going to look when you grow old? Faceapps and Snapchat filters have made this possible!</p> <p>Ans:</p> <ul style="list-style-type: none"> • Alexa, Siri-NLP, Facial Recognition - Computer Vision • Facelock - Computer Vision • Price comparison websites - Data Sciences • Chatbots - NLP • Faceapps -NLP • Snapchat Filters - Machine Learning 	4
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<p>Q. 18</p>	<p>Create a 4W Project Canvas for the following.</p> <p>As more and more new technologies get into play, risks will get more concentrated into a common network. Cybersecurity becomes extremely complicated in such scenarios and goes beyond the control of firewalls. It will not be able to detect unusual activity and patterns including the movement of data.</p> <p>Think how AI algorithms can scrape through vast amounts of logs to identify susceptible user behaviour. Use an AI project cycle to clearly identify the scope, how you will collect data, model and evaluation parameters.</p> <p>Ans:</p> <table border="1" data-bbox="268 638 1401 1205"> <tr> <td data-bbox="268 638 512 741">OUR</td> <td data-bbox="512 638 1222 741">[stakeholders] People who are using the new technology</td> <td data-bbox="1222 638 1401 741">WHO</td> </tr> <tr> <td data-bbox="268 741 512 920">HAS/ HAVE PROBLEM THAT</td> <td data-bbox="512 741 1222 920">[issue, problem, need] Cyber security is the need when so much of the flow of data is not monitored or escapes the antiviruses/ firewall systems.</td> <td data-bbox="1222 741 1401 920">WHAT</td> </tr> <tr> <td data-bbox="268 920 512 1059">WHEN/ WHILE</td> <td data-bbox="512 920 1222 1059">[context/situation] The problem is in the use of the latest technology where vast amounts of data is at risk.</td> <td data-bbox="1222 920 1401 1059">WHERE</td> </tr> <tr> <td data-bbox="268 1059 512 1205">AN IDEAL SOLUTION WOULD</td> <td data-bbox="512 1059 1222 1205">[benefit of solution to them] An effective AI system which is able to detect the flow of data and also report unusual activity</td> <td data-bbox="1222 1059 1401 1205">WHY</td> </tr> </table>	OUR	[stakeholders] People who are using the new technology	WHO	HAS/ HAVE PROBLEM THAT	[issue, problem, need] Cyber security is the need when so much of the flow of data is not monitored or escapes the antiviruses/ firewall systems.	WHAT	WHEN/ WHILE	[context/situation] The problem is in the use of the latest technology where vast amounts of data is at risk.	WHERE	AN IDEAL SOLUTION WOULD	[benefit of solution to them] An effective AI system which is able to detect the flow of data and also report unusual activity	WHY	<p>4</p>
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<p>Q. 19</p>	<p>Differentiate between stemming and lemmatization. Explain with the help of an example.</p> <p>Ans: Stemming is the process in which the affixes of words are removed and the words are converted to their base form. In lemmatization, the word we get after affix removal (also known as lemma) is a meaningful one. Lemmatization makes sure that lemma is a word with meaning and hence it takes a longer time to execute than stemming. The difference between the stemming and lemmatization can be depicted by the following example:</p> <div data-bbox="268 1720 1385 2049" style="text-align: center;"> <pre> graph LR A1(CARING) -- lemmatization --> B1(CARE) A2(CARING) -- stemming --> B2(CAR) </pre> </div>	<p>4</p>
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<p>Q. 20</p>	<p>Write the applications of NLP (Natural Language Processing). (Any four)</p> <p>Ans:</p> <ol style="list-style-type: none"> 1. Automatic Summarization: Automatic summarization is relevant not only for summarizing the meaning of documents and information, but also to understand the emotional meanings within the information, such as in collecting data from social media. 2. Sentiment Analysis: The goal of sentiment analysis is to identify sentiment among several posts or even in the same post where emotion is not always explicitly expressed. 3. Text classification : Text classification makes it possible to assign predefined categories to a document and organize it to help you find the information you need or simplify some activities. 4. Virtual Assistants: With the help of speech recognition, these assistants can not only detect our speech but can also make sense out of it. 	<p>4</p>													
<p>Q. 21</p>	<p>Imagine that you have come up with an AI based prediction model which has been deployed on the roads to check traffic jams. Now, the objective of the model is to predict whether there will be a traffic jam or not. Now, to understand the efficiency of this model, we need to check if the predictions which it makes are correct or not. Thus, there exist two conditions which we need to ponder upon: Prediction and Reality.</p> <p>Traffic Jams have become a common part of our lives nowadays. Living in an urban area means you have to face traffic each and every time you get out on the road. Mostly, school students opt for buses to go to school. Many times, the bus gets late due to such jams and the students are not able to reach their school on time.</p> <p>Considering all the possible situations make a Confusion Matrix for the above situation.</p> <p>Ans:</p> <p>Case 1: Is there a traffic Jam? Prediction: Yes Reality: Yes True Positive</p> <p>Case 2: Is there a traffic Jam? Prediction: No Reality: No True Negative</p> <p>Case 3: Is there a traffic Jam? Prediction: Yes Reality: No False Positive</p> <p>Case 4: Is there a traffic Jam? Prediction: No Reality: Yes False Negative</p> <table border="1" data-bbox="268 1868 1385 2063"> <thead> <tr> <th colspan="2" rowspan="2">Confusion Matrix</th> <th colspan="2">Reality</th> </tr> <tr> <th>Yes</th> <th>No</th> </tr> </thead> <tbody> <tr> <th rowspan="2">Prediction</th> <th>Yes</th> <td>True Positive</td> <td>False Positive</td> </tr> <tr> <th>No</th> <td>False Negative</td> <td>True Negative</td> </tr> </tbody> </table>	Confusion Matrix		Reality		Yes	No	Prediction	Yes	True Positive	False Positive	No	False Negative	True Negative	<p>4</p>
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