	CBSE | DEPARTMENT OF SKILL EDUCATION ARTIFICIAL INTELLIGENCE (SUBJECT CODE - 417) Class X Model Test Paper – 2 (Solutions)
Ans 1.	
i.	iii.
ii.	ii.
iii.	a.
iv.	c.
v.	c.
vi.	d.
Ans 2.	
i.	Linguistic
ii.	Alexa, Siri, Cortana (any two options)
iii.	iv.
iv.	ii.
v.	iv.
vi.	False
Ans 3.	
i.	Training
ii.	d.
iii.	iii.
iv.	iii.
v.	i.
vi.	iii.
Ans 4.	
i.	Speech recognition
ii.	Human languages
iii.	Token
iv.	Studi
v.	part-of-speech tagging
vi.	Script bot
Ans 5.	
i.	Evaluation
ii.	1
iii.	iv.
iv.	ii.
v.	i.
vi.	ii.
	SECTION B: SUBJECTIVE-TYPE QUESTIONS
Ans 6.	Some of the benefits of working independently are: • Ensures greater and faster learning • One feels more empowered and responsible • Better flexibility and coordination • Greater accountability
Ans 7.	Mobile operating system is specially designed for mobile phones, tablets, smartwatches, etc. Two mobile operating systems are: (i) Android OS: It is an open-source and free operating system. It is one of the most popular OS. Android OS is developed by Google. (ii) Apple iOS: It is designed to run on apple devices such as iPhones, iPad tablets, etc. Apple iOS has very strong security features.

Ans 8.

i. **Mental:** It is easy to get stressed due to examinations and assignments. There are expectations from parents and teachers besides peer pressure. This can lead to feelings of anxiety and stress.

ii. **Social:** Managing relationships and friendships can be difficult in today's time of social media and societal expectations. One feels the need to be best at everything which can create a false sense of pressure for overachievement.

Ans 9.

The taskbar is a long horizontal bar at the bottom of the screen. The components of the taskbar are:

i. **Start button:** It is located on the left of the taskbar.

ii. **Notification Area and Date/Time option:** It is located at the right of the taskbar.

iii. **Pinned applications:** Frequently used applications can be pinned on the centre of the taskbar.

Ans 10.

Hiten is working as a salaried employee in an IT company and draws a regular salary (wages) and other benefits from his office. Salary is a form of monetary compensation for employees and is paid according to the amount of time worked by the employee. It does not come under entrepreneurship activity.

Ans 11.

ML	DL
ML stands for Machine Learning. It is a subset of Artificial Intelligence which enables machines to improve at tasks with experience (data).	DL stands for Deep Learning. It is a subset of Machine Learning which enables software to train itself to perform tasks with vast amounts of data.
The intention of Machine Learning is to enable machines to learn by themselves using the provided data and make accurate Predictions/ Decisions.	In Deep Learning, the machine is trained with huge amounts of data which helps it in training itself around the data. Such machines are intelligent enough to develop algorithms for themselves.
Machine Learning uses two types of algorithms – Supervised and Unsupervised.	Deep Learning uses Neural Networks which makes it the most advanced form of Artificial Intelligence.

Ans 12.

Gender bias occurs when a model generates discriminated results based on gender. To avoid gender bias, developers should follow the following best practices:

1. Ensure diversity in the training data, i.e., using as many female audio samples as male in training data or vice versa.
2. Ensure that the developers labelling the training samples are from diverse backgrounds.
3. Ensure fairness by collecting training data from sensitive groups and applying de-biasing techniques.

Ans 13.

Supervised Learning: In a supervised learning model, the data set which is fed to the machine is labelled. It means that the data used to train the machine is already tagged with the correct answer. In other words, when the machine is provided with the new data set, the supervised learning algorithm analyses the training data and produces a correct outcome from labelled data.

Unsupervised Learning: An unsupervised learning model works on an 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.

Ans 14.	Text normalization is the process of converting textual information into computer-understandable language, i.e., binary language. The various steps involved in text normalization are: 1. **Tokenization:** In tokenization, each sentence is divided into tokens. A token is any word or number or special character occurring in a sentence. Under tokenization, every word, number and special character is considered a separate token. 2. **Removal of stop words:** In this step, the tokens which are not necessary or repeated words, known as stop words, are removed from the token list. So, the words and, are, to, an, (punctuation) will be removed. 3. **Converting text to a common case:** After the stop words removal, we convert the whole text into a similar case, preferably lowercase. 4. **Stemming/Lemmatization:** In this step, the remaining words are reduced to their root words. In other words, stemming or lemmatization is the process in which the affixes of words are removed and the words are converted to their base form.
Ans 15.	Stop words are the most frequent words in the token such as "the", "a", "on", "is", "all", etc. These words do not add any significance to the meaning and are usually removed from tokens. Special characters and numbers in tokens are to be removed or not based on certain situations. For example, email ids, pin codes, addresses, etc. contain numbers and special characters which are important in the corpus, hence not removed. Otherwise, to make it easier for the computer to focus on meaningful terms, these words, numbers or special characters are removed.
Ans 16.	An AI-based credit card fraud detection system predicts unusual financial activity and freezes a user's card if transaction activity is not normal. As per the question, the model is producing lower recall rather than higher recall which means that the model has a high number of false Negatives. Recall takes True Positives and False Negatives into consideration. True Positive means the model predicts positive, i.e., a transaction as fraud that actually is fraud and False Negative predicts negative, i.e., a transaction as legitimate but actually is fraud (incorrect). The penalty of misclassifying a fraudulent transaction as a legitimate transaction results in huge money loss to the company.
Ans 17.	Artificial Intelligence or AI for short, refers to any technique that enables computers to mimic human intelligence. AI is a form of intelligence, a type of technology and a field of study. An artificially intelligent machine works on algorithms and data fed to it and gives the desired output. 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. Some of the applications of AI are: 1. **Digital Assistants:** Apple's Siri, Google Now, Amazon's Alexa and Microsoft's Cortana are digital assistants that help users perform various tasks, from checking their schedules and web browsing, to sending commands to another app. 2. **Self-driving cars:** Self-driving and auto parking features in cars can recognize the space around a vehicle using AI. 3. **Chatbots:** Chatbots recognize words and phrases to deliver helpful content to customers who have common questions. 4**. Social media:** AI makes it easier for users to locate and communicate with friends and business associates over social media. 5. **Google Search Engine**: With the help of AI, Google Search Engine has been turned into Intelligent search, which is a new network of systems that produces direct answers. It uses voice and image searches and has incorporated deep learning to fasten the searches with more accuracy. 6. **Voice assistant**: AI is being used in voice assistants to recognize words spoken by the user. NLP has capabilities like "Speech-to-Text" to convert the natural language of the user into text for further processing. 7. **E-commerce website**: With the use of big data, AI in e-commerce is impacting customer choices by recording the data of previous purchases, searched products and online browsing habits. Product recommendations provide multiple benefits for e-commerce retailers including a higher number of returning customers.

Ans 18.	Machine Learning Algorithms are different from other standard programming algorithms because in Machine Learning Algorithm, the data itself autonomously learns and improves to create the model. These algorithms are mostly written in Python language. The different categories of machine learning algorithms are: 1. **Supervised Learning**: In supervised learning, labelled past data is fed into the system and on the basis of that data, machines predict the output. It is a process of providing input data as well as output data to the Machine Learning model so that it can predict correct output. Supervised learning is majorly used for classification and regression problems. Some of the algorithms used in supervised learning are: (i) **Classification:** This is a rule-based AI modelling technique used to classify each item in a set of data into one of a predefined sets of classes or groups. In classification, the algorithm is able to determine which points in the data set belong to either side of the classification function represented by the dotted line. Usually, the data set used for classification is labelled data and is sorted as labelling is done. For example, if we want to train a model to identify if an image is of a mango or grapes, we need to train it with multiple images of both mango and grapes along with their labels. Then the machine classifies images on the basis of the labels and predicts the correct label for test data. (ii) **Regression**: Regression is a process of finding the correlations between dependent and independent variables. It helps in predicting continuous variables such as prediction of Market Trends, prediction of House prices, etc. The task of the Regression algorithm is to find the mapping function to map the input variable (x) to the continuous output variable (y). For example, weather forecasting uses a Regression algorithm where the model is trained on past data and once the training is completed, it can easily predict the weather for future days. 2. **Unsupervised Learning**: In unsupervised learning, machines are trained using unlabelled data where the model itself finds the hidden patterns from the given data. Unsupervised learning is used to solve cluster and association problems. Some of the unsupervised algorithms are: (i) **Clustering**: In this learning model, the machine generates its own rules or algorithms. The data fed into such a model is usually unlabelled or random. The algorithms are generated on their own based on the data set and the machine needs to derive patterns or trends from the training data set to cluster the ones which follow the same pattern. The final output labels are not known in advance in Clustering. 3. **Reinforcement Learning**: It is based on the behavioural learning model and on the interaction of the agent with the environment. There is always a base start state and end state for the agent and the agent gets rewarded for success but is penalized for failure. So, in this way, the agent learns from the environment and improves. The AI system or agent learns through trial and error. A sequence of successful choices and paths will result in the process being 'reinforced' to get to the end state.
Ans 19.	A machine, being an artificial device, cannot think on its own. It can have intelligence but a machine cannot have biases of its own. Any bias can only transfer from the developer to the machine while the algorithm is being developed. In other words, AI bias is an anomaly in the output of Machine Learning algorithms, due to the prejudiced assumptions made during the algorithm development process or prejudices towards a certain gender, language, race, wealth, etc., in the training data. AI bias results in discrimination and other social consequences. AI Bias can creep into algorithms in several ways. AI systems learn to make decisions based on training data, which can include biased human decisions or reflect historical or social inequalities, even if sensitive variables such as gender, race or sexual orientation are removed. The main source of bias is flawed data sampling, in which groups are over or under-represented in the training data. For example, • Mostly, all the virtual assistants have a female voice. (Now both female and male voices have been added to these systems) • If you search on Google for doctors, the first few searches are mostly of male doctors. This assumes that if a person is searching for a doctor, in all probability it would be male. (Now both female and male doctor's images are shown by Google.)
Ans 20.	(i) The Problem Statement Template for the situation given in the question is:

Our	Faculties, Students, Accounts Staff, Dean, Owner	Who
Has/Have a problem that	Manual communication between university staff with new students to provide information about registration, streams, fees, instalments, hostel accommodation, etc., is very time-consuming.	What
When/While	The members of academic as well as accounts staff have to spend several hours to find suitable answers related to registration, streams, fees, instalments, hostel accommodation, etc.	Where
An ideal solution would	The model to manage the given situation would be deploying a chatbot. Chatbots provide automated responses to newly enrolled students' queries and help them carry out basic tasks.	Why

(ii) 1. Students would be able to get every information they need and connect with the university around the clock.
2. Institutions can attract potential students in an effective and engaging manner.

Ans 21.

i. Accuracy is defined as the percentage of correct predictions out of all the observations. A prediction can be said to be correct if it matches reality, so we take True Positive and True Negative into consideration. Accuracy counts all of the true predicted values but not the False predictions made by the machine. So high accuracy does not ensure good performance of the model.

ii. F1 score can be calculated by using the formula:

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

To calculate F1 Score, we must calculate Precision and Recall:

Confusion Matrix		Reality	
		True	False
Predicted	True	80	10
	False	5	75

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

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

= $\frac{80}{80+10}$

= 0.88

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

	Recall= $\frac{TP}{TP+FN}$ = $\frac{80}{80+5}$ = 0.94 F1 Score = $2 * \frac{0.88+0.94}{0.88* 0.94}$ = 0.91 F1 Evaluation metric is more important in any case. F1 score sort maintains a balance between the precision and recall for the classifier. If the precision is low, the F1 is low and if the recall is low again F1 score is low. The F1 score is a number between 0 and 1 and is the harmonic mean of precision and recall When we have a value of 1 (that is 100%) for both Precision and Recall. The F1 score would also be an ideal 1 (100%). It is known as the perfect value for F1 Score.