Introduction to AI



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A.	F	i			in	t	h	e	b		a	n	ks.
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1.	Problem Scoping	is the stage of AI Project Cycle, where we actu	ually deal with the different
	types of problems of	occuring during the AI Project development.	

- 2. <u>Sustainable Development</u> is the pathway to the future we want for all. It offers a framework to generate economic growth, achieve social justice, exercise environmental stewardship and strengthen governance.
- 3. <u>Data Source</u> can be documents, observations, survey and people, as these sources can provide data.
- 4. Data refers to the raw evidences, records, facts or information collected for reference or study.
- 5. Structured data is an organised way of storing the data. It can be with specific category, pattern or some set of rules.
- 6. Data features refer to the type of data you want to collect.
- 7. The data should be taken from <u>reliable</u> and <u>authentic</u> websites only.
- 8. <u>Data Visualization</u> is important because it processes the data, fast and in an organised format.
- 9. A Rule-based approach is based on the data and the rules (Input) stored to the machine, where the machine responds accordingly to deliver the desired result (Output).
- 10. <u>Decision Tree</u> follows top to bottom approach, has some roots and goes till the end downwards to get a successful decision.

B. State whether these statements are True or False.

1,	A Project Life Cycle refers to a sequence of actions which are essential to fulfill proj	ject goals or
	purposes.	True

- The major challenges for the world are to provide clean water, clean air, natural resources, sustainable energy, and education.
- 3. In Problem Scoping we start collecting the data from the various sources for an AI Project.

False

4. Structured Data is an unorganised way of storing the data. It does not have any specific category as well as can be stored in any form.



	5.	Training Data refers to the data collected as Input from the user. In other words, the Input giv						
		by the user to the system can be considered as training data.						
	6.	Some reliable data sources are Facebook, WhatsApp, Twitter, etc.						
	7.	Data Exploration can also be helpful for data experts to increase appropriate vi						
		professional data.			True			
	8.	In Pre-Project Evaluation, we evaluate the final developed project for any missing						
		or not working objective that should b	e included ir	n the project.	False			
	9.	A logical model is a graphical represer	ntation of a p	roject evaluation.	True			
	10.	A Neural Network is essentially a system of organising Machine Learning algorithms						
		perform certain tasks.			True			
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С.		ple Choice Questions (MCQs).						
	1.	Which one of the following is the seco						
		a. Evaluation	b.	Problem Scoping				
	_	c. Data Acquisition		Modelling				
2 ensures inclusive and equitable quality education and promotes								
		learning opportunities for all.		D. I. I. Ive				
		a. Gender Equality	b.	Reduced Inequalities				
	2	c. Climate Action	d.	Quality Education	V			
	3.	Which one of the following is not a reli						
		a. UN	b.	Facebook				
		c. Finance	d.	Google Scholar				
	4.	The data preparation process involve	es into	data in a file that car	n be further			
		used in a database.	b	dooning				
		a. collectingc. consolidating	b. d.	cleaning all of these				
	5.				•			
	 17 goals have been announced by the United Nations which are labelled as the The aim is to achieve these goals by the end of 2030. 							
		a. Sustainable Development Goals		Software Development Goals				
		c. Sustainable Department Goals	d.	Suitable Development Goals				
	6.	This approach takes random data which		•				
		a. Rule-Based	b.	Learning-Based				
		c. Decision-Based	d.	Predefined				
								



7.	In we evalu	ate the capability of a project before starting the develop	ment				
	process.						
	a. Pre-Project Evaluation	b. Post-Project Evaluation					
	c. Ongoing Evaluation	d. Project Training					
8.	is a subset	of AI which enables machines to improve at tasks with	data,				
	information and past experie	nces.	,				
	a. Machine Learning	b. Deep Learning					
	c. Artificial Intelligence	d. Rule-Based					
9.	are the layer	s in which the whole processing occurs.					
	a. Output layer	b. Inputlayer					
	c. Hidden layer	d. Superlayer					
`10.	This is a Machine Learning a	oproach where the machine generates its own rules or algor	ithms				
	to differentiate amongst the given dataset to achieve the pre-decided goal.						
	a. Classification	b. Clustering	1				
	c. Regression	d. Rule-Based					
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D. Answer the following questions.

1. Explain the Data Exploration stage of an Al Project Cycle.

Ans. In this stage of AI Project Cycle, we use a combination of physical methods and computerised tools such as asking queries, preparing records, charts, reports and forms. Data is frequently collected in huge, unstructured bulks from various sources. It also refers to the different techniques and tools used to visualize data through different methods. It can be an authoritative aspect in understanding the structure of data, standards deliveries, and interrelationships. Data exploration can also be helpful for data experts to increase appropriate visions into professional data.

2. What do you mean by Data Features?

Ans. Data features refer to the type of data you want to collect. After declaring the data features, you get to know what type of data is to be collected.

3. Explain all three common AI models.

Ans. Some of the common AI models are given below:

Regression: This is a type of Rule-Based AI model. In regression, the algorithm generates a mapping function from the given data, represented by the solid line.

Classification: This is another Rule-Based AI model. In classification, the algorithm is able to determine which set a given data point belongs to by means of a classification function represented by the dotted line.

Clustering: This is a Machine Learning approach where the machine generates its own rules or algorithms to differentiate amongst the given dataset to achieve the pre-decided goal.

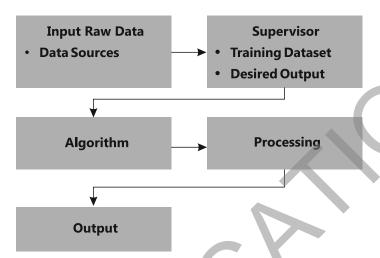


4. Explain the following:

a. Supervised Learning

b. Unsupervised Learning

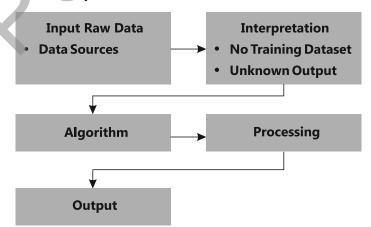
- **Ans. a. Supervised Learning:** As the name 'Supervised Learning' suggests, there is a supervisor like a teacher in a classroom who teaches or trains the students with respect to the learning outcomes for a topic/task using different examples.
 - Similarly, in this type of learning, networks are trained to provide the correct output by using several example inputs.



For example, the network can be trained on the data of students records and marks reports. After training, the network will be able to calculate the marks based on various elements like the length of the answer, correct facts written in the answers, comprehension length, etc. In 'Supervised Learning' each Input is supervised to get the Output.

b. Unsupervised Learning: The 'Unsupervised Learning' specifies that there is no supervisor as we have in 'Supervised Learning'. Students need to focus on their own tasks by themselves to get an outcome of the topic.

For example, when you get any project instruction or task to complete by your own without the help of a teacher, even you don't know what will be the outcome.



Similarly, in this learning no output related information is received by the Neural Network and it provides only input. The system evaluates and finds out how different elements are related. This method is used for solving clustering problems, estimation problems, self-organising maps, etc.



This means that in 'Unsupervised Learning' only instructions are provided to get the Output without any supervision.

5. What is the need of an AI Project Cycle? Explain.

Ans. In the AI Project Cycle we follow the step-by-step procedure involved in the AI project development, starting from the project initialisation till the project is developed and tested successfully.

A Project Life Cycle refers to a sequence of actions which are essential to fulfill project goals or purposes. Projects may vary in the size and difficulty but no matter how large or small projects are, all projects can be planned in a life cycle structure.

(Further explanation can be written by students in their own words.)

6. What is an Artificial Neural Network? Explain the layers in an Artificial Neural Network.

Ans. Note- Students should write this answer in their own words. Following paragraph is given for reference.

The name Neural Network is inspired by the human brain. Neural Networks are modelled after how neurons in the human brain behave. It is also known as trained Artificial Neural Network that copy the working of the human brain neurons system or cells inside the computers. Artificial Neural Networks (ANNs) comprise of a Node Layer, which contains an Input Layer, one or more Hidden Layers, and an Output Layer. Each node, or artificial neuron, connects to another and has an associated value. If the output of any individual node is above the specified value, that node is activated, sending data to the next layer of the network. Otherwise, no data is passed along to the next layer of the network. The Neural Network works on Machine Learning algorithms to fulfill the need of the user or perform the task. It is basically used for solving the problems for large datasets.

The greatest thing of ANN is it can extract the features of data without any programming or input. The computer can learn, recognise, and make decisions like human beings. The key advantage of Neural Networks, are that they are able to extract data features automatically without needing the input from the programmer.

7. Differentiate between Rule-Based and Learning-Based AI modelling approaches.

Ans. Rule-Based Approach: A Rule-Based approach is based on the data and the rules (Input) stored to the machine, where the machine responds accordingly to deliver the desired result (output). Here, Rule-Based approach tracks the connection or patterns in data/information defined by the developer or the programmer and also Coding is required to get the result (Output).

This means that someone has to feed data into a machine to perform the operations.

Learning-Based Approach: In a Learning-Based approach, the connection or patterns in the data is not defined at the run time by the developer or the programmer. This approach takes random data which is already stored into the machine memory and it is left to the machine to figure out the patterns or required decision.



This means that the predefined data is required and machine will learn from the stored data to perform the operations.

8. Draw the 4 W's problem canvas and explain each one of them briefly.

Ans. Following is the 4W's problem canvas:

Who?: In this framework, we research about 'who' is facing the problem.

What?: In this framework, we research about 'what' is the problem.

Where?: In this framework, we research about the place 'where' the problem has occurred.

Why?: In this framework, we research about 'why' this problem has occurred.

9. What are the different types of sources of data from where we can collect reliable and authentic datasets? Explain in brief.

Ans. There can be various sources from which data can be collected. Some of them are:

Survey	Internet	Camera	Application (API/FORMS)	
(Offline/Online)	(Web Scraping)	(Photo/Video)		
	Observation (Research)	Sensors (Calculated Values)		

Sometimes we use the internet to acquire data but the most important point to keep in mind is that the data should be taken from reliable and authentic websites only. Some reliable data sources are UN, Google scholar, Finance, CIA, Data.gov, etc.

10. What are the features of an Artificial Neural Network?

Ans. Following are the features of an Artificial Neural Network:

- Neural Network system are modelled on the human brain and nervous system.
- They are able to automatically extract features without input from the programmer.
- Every Neural Network node is essentially a Machine Learning algorithm.
- It is useful when solving problems for which the data set is very large.

11. Five Sustainable Development Goals are mentioned below. Write 2 problems under each goal that you think should be addressed for achieving the goal.

a. Quality Education

b. Reduced Inequalities

c. Life on Land

d. No Poverty

e. Clean Water and Sanitation

Ans. Note- Students will read and discuss about the SDGs in the class. They will write 2 problems under each goal, based on the discussion in the class.

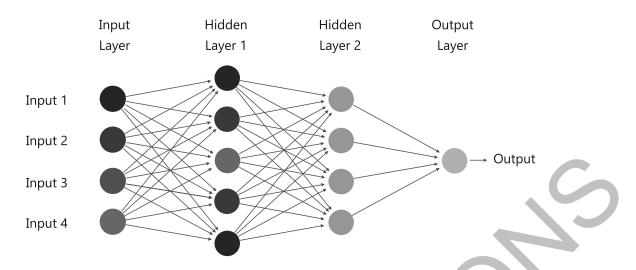
(**Remember**- Students should come up with problems that are not listed in the book.)

12. Explain the different components of Artificial Neural Network.

Ans. Following are the components of an Artificial Neural Network:

This is an illustration of how Neural Networks work. A Neural Network 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. The following figure shows the components of a Neural Network:





Input Layer: 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. Next to it, are the hidden layers.

Hidden Layer: 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.

Output Layer: The processed output is then fed to the subsequent hidden layer of the network. 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.

The last hidden layer passes the final processed data to the output layer which then gives it to the user as the final output. Similar to the input layer, output layer too does not process the data which it acquires. It is meant for user-interface.

