



Class: X	Department: Computer Science	Date:03-05-2023
Worksheet No: 1	ARTIFICIAL INTELLIGENCE	

CHAPTER 1: INTRODUCTION TO AI: FOUNDATIONAL CONCEPTS

One (01) Mark Questions

Fill in the Blanks:

1. The basis of decision making depends upon the availability of _____ and how we experience and understand it. (information/data/conditions/ past experience/ knowledge/awareness.)
2. A machine can also become intelligent if it is trained with _____ which helps them achieve their tasks (data)

True/False:

1. A machine is artificially intelligent when it can accomplish tasks by itself. (True)
2. Is a smart washing machine an example of an Artificially Intelligent devices? (False)
3. Platforms like Netflix, Amazon, Spotify, YouTube etc. show us recommendations on the basis of what we like. (True)

Direct Question:

1. What do you understand by linguistic Intelligence?

Linguistic intelligence means intelligence to understand and interpret human natural language and try to extract meaning out of it.

OR

Linguistic Intelligence refers to the ability of an individual to understand both written and spoken language and the additional ability to write and speak the language too.

OR

This is the intelligence of language and communication. It includes the ability to speak, articulate, and express, and convey one's thoughts and feelings to the outside world in one or more languages. This can be at an oral and written level. It also includes the ability to listen to and to understand other people.

2. What do you understand by Interpersonal Intelligence?

Understanding human emotions, feelings and influenced by them is known as interpersonal intelligence.

OR

Interpersonal intelligence is the ability to communicate with others by understanding other people's feelings, being influenced by the person.

OR

Interpersonal intelligence refers to the ability of a person to relate well with people and manage relationships. It enables people to understand the needs and motivations of those around them, which helps strengthen their overall influence.

OR

Interpersonal intelligence refers to the ability to understand social situations and the behavior of other people.

3. Define Artificial Intelligence.

A machine is artificially intelligent when it can accomplish tasks by itself - collect data, understand it, analyze it, learn from it, and improve it.

OR

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.

OR

Artificial Intelligence is a way of making a computer, a computer-controlled robot, or a software think intelligently, in a similar manner to how intelligent humans think.

OR

AI is a form of intelligence; a type of technology and a field of study. AI theory and development of computer systems (both machines and software) are able to perform tasks that normally require human intelligence.

OR

Artificial Intelligence works to implement human intelligence in machines: creating systems that understand, think, learn, and behave like humans.

OR

Artificial Intelligence or AI for short, refers to any technique that enables computers to mimic human intelligence. An artificially intelligent machine works on algorithms and data fed to it and gives the desired output.

4. Mention two types of machines which have evolved with time.

Television/Mobile Phones/ Ceiling Fans/ Microwave ovens/ Headphones / Speakers/ Harvesters/ Refrigerators/Air Conditioners etc.

(1 mark for any two right answers)

5. What do you understand by mathematical and logical reasoning?

A person's ability to regulate, measure, and understand numerical symbols, abstraction and logic.

OR

Reasoning is based on previous established facts. To establish a new fact or truth one has to put it to the test of reasoning. If the new fact coincides with the previously established facts, it is called logical or rational. It is the ability of a person to regulate, measure and understand numerical symbols, abstraction and logic.

Two (02) Mark Questions

1. Mention four examples of artificially intelligent applications in our smartphones.

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)

2. How does a machine become Artificially Intelligent?

A machine becomes intelligent by training with data and algorithm. AI machines keep updating their knowledge to optimize their output.

OR

Machines also become intelligent once they are trained with some information which helps them achieve their tasks. AI machines also keep updating their knowledge to optimize their output.

3. Mention four examples of machines that are not AI but confused with AI.

Or

Mention four examples of machines that are smart but not AI.

Automatic gates in shopping malls / remote control drones/ a fully automatic washing machine/ Air Conditioner/ Refrigerator/ Robotic toy cars/ Television etc.

4. How does learning and adapting help an AI machine in improvising itself?

An artificially intelligent machine collects real time data and tries to figure out new patterns in it. Machines learn in a similar way human being; by supervision or by observation and respond according to past experiences in similar scenarios. A machine learns from its mistakes. The more the machine gets trained on data, the more accurate result it gives.

For example:

Any virtual assistant initially trained with few basic instructions, but with time, the machine captures the data fed by the user, may be the wake-up time of the user, sleeping time, dinner time and so on. Later in time, the machine gives reminders of similar things on the basis of data and adapts these new commands.

OR

Just as humans learn how to walk and then improve this skill with the help of their experiences, an AI machine too gets trained first on the training data and then optimizes itself according to its own experiences which makes AI different from any other technological device/machine.

5. Pick the odd one out and justify your answer:

a. Snap Chat Filter

b. Face Lock in Phone

c. Chatbot

d. Image search Option

Ans: Chatbot (1 marks), as it is NLP based, the other three are Computer vision based (1marks for justification).

6. Explain how AI works in the following areas (any two):

a. Google Search Engine b. Voice Assistants c. E-commerce websites

a. 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.

b. Voice assistant:

AI is being used in voice assistants to recognize words spoken by the user. NLP has capabilities like “Speech-to-Text” convert the natural language of the user into text for further processing. As the digital assistant answers more and more queries, it “learns” using ML algorithms. The more tasks it performs, its ML algorithms help it “learn” from the tasks and the preferences of the user. As a result, the digital assistant improves its performance over time.

c. 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: Higher number of returning customers.

7. How has AI changed the gaming world?

AI has changed the world of gaming by making the game more intelligent by providing them the ability to learn using machine learning algorithms. Games these days try to understand human patterns and give responses on the basis of it and also give new difficulty levels.

OR

AI has changed the gaming world in terms of feel and emotions. Some video games react to player skill level. Depending on how well you do, adaptive AI ratchets the game’s difficulty level up and down to give you a greater challenge when you need it or to prevent you from rage-quitting in frustration. AI can also adapt to your playing style by making the game more exciting.

8. Why training with information/Data is important in Artificial Intelligent devices?

Similar to human beings, AI devices need experience to give better results and improve in every next iteration. For giving better results, the machine should be trained with some real data. The more the amount of accurate data, the better predictions will be made by the machine. Hence, data is very important in AI devices.

OR

The AI devices need to be trained with information / Big data to produce the best possible accurate results. All of AI’s learning happens only through this data. So, it makes sense to have as big a dataset as is required to include variety, subtlety, and nuance that makes the model viable for practical use. Before training, the model is just a theorist.

4 Mark Questions

1. What is Intelligence? Explain in brief any three types of intelligence that are mainly perceived by human beings?

Intelligence is the *'ability to perceive or infer information, and to retain it as knowledge to be applied towards adaptive behavior within an environment or context.'*

OR

Intelligence is the ability to interact with the world (speech, vision, motion, manipulation), ability to model the world and to reason about it, ability to learn, ability to make decisions and to adapt.

OR

Intelligence has been defined in many ways: It involves abstract reasoning, mental representation, problem solving, and decision making, the ability to learn, emotional knowledge, creativity, and adaptation to meet the demands of the environment effectively.

As per major researches, there are mainly 9 types of Intelligence;

- (i) **Mathematical Logical Intelligence:** A person's ability to regulate, measure, and understand numerical symbols, abstraction and logic
- (ii) **Linguistic Intelligence:** Language processing skills both in terms of understanding or implementation in writing or speech.
- (iii) **Spatial Visual Intelligence:** It is defined as the ability to perceive the visual world and the relationship of one object to another.
- (iv) **Kinesthetic Intelligence:** Ability that is related to how a person uses his limbs in a skilled manner.
- (v) **Musical Intelligence:** As the name suggests, this intelligence is about a person's ability to recognize and create sounds, rhythms, and sound patterns
- (vi) **Intrapersonal Intelligence:** Describes the level of self-awareness someone has starting from realizing weakness, strength, to recognizing his own feelings
- (vii) **Existential Intelligence:** An additional category of intelligence relating to religious and spiritual awareness.
- (viii) **Naturalist Intelligence:** An additional category of intelligence relating to the ability to process information on the environment around us.
- (ix) **Interpersonal Intelligence:** Interpersonal intelligence is the ability to communicate with others by understanding other people's feelings and the influence of the person.

2. Differentiate between what is AI and what is not AI with the help of an example?

AI Machine	Not AI machine
1. AI machines are trained with data and algorithm.	1. Smart machines which are not AI, do not require training data, they work on algorithms only.
2. AI machines learn from mistakes and experience. They try to improvise on their next iterations.	2. Smart machines work on fixed algorithms and they always work with the same level of efficiency, which is programmed into them.
3. AI machines can analyse the situation and can take decisions	

AI Machine	Not AI machine
<p>accordingly.</p> <p>4. AI based drones capture the real-time data during the flight, processes it in real-time, and makes a human-independent decision based on the processed data.</p>	<p>3. Machines which are not AI cannot take decisions on their own.</p> <p>4. An automatic door in a shopping mall, seems to be AI-enabled, but it is built with only sensor technology.</p>

(Any other valid examples of AI and Non-AI machine can be considered.)

While we see a lot of AI applications around us, there still exist a lot of them which are smart but not intelligent.

An AI enabled machine should not only recognize, but should also do something with its gathered information. Artificial intelligence” must mean a human-made interface with the power to reason and integrate knowledge. AI must demonstrate at least some of the following behaviors associated with human intelligence: planning, learning, reasoning, problem solving, knowledge representation, perception, motion, manipulation and, to a lesser extent, social intelligence, and creativity.

Most IOT items are ordinary things outfitted with sensors and connected to the Internet. For example, sensors in your office can recognize shadows or movements, but that doesn't make them an example of artificial intelligence. A fully automatic washing machine can work on its own, but it requires human intervention to select the parameters of washing and to do the necessary preparation for it to function correctly before each wash, which makes it an example of automation, not AI.

3. How can AI be integrated with non-AI technologies? Explain with the help of an example.

Today's world is changing with the adoption of IOT (Internet of Things). IOT is helping in prominently capturing a tremendous amount of data from multiple sources. The convergence of AI (Artificial Intelligence) and IOT can redefine the way industries, business, and economies function. AI enabled IoT creates intelligent machines that simulate smart behavior and supports decision making with little or no human interference.

While IOT provides data, artificial intelligence acquires the power to unlock responses, offering both creativity and context to drive smart actions. Here are some examples:

Ex. 1: Self-driving Cars: Tesla's self-driving cars are the best example of IoT and AI working together. With the power of AI, self-driving cars predict the behavior of pedestrians and cars in various circumstances. For example, they can determine road conditions, optimal speed, weather and getting smarter with each trip.

Ex. 2: Robots in Manufacturing: Manufacturing is one of the industries that already embraced new technologies like IoT, artificial intelligence, facial recognition, deep learning, Robots and many more. Robots employed in factories are turning smarter with the support of implanted sensors, which facilitates data transmission. Moreover, as the robots are provisioned with artificial intelligence algorithms, they can learn from newer data. This approach not only saves time and cost but also makes the manufacturing process better over time.

Ex.3: Weather forecasting System: In a weather forecasting system, where IOT temperature sensor and humidity sensors collect data from the physical world, AI tries to figure out patterns from previous data collected and tries to interpret and give accurate predictions of upcoming day weather.

Ex.4: Smart Drones: Initially drones were only able to capture photographs, these were not AI drones. As the scientist used to analyze the data captured through drones. Now the drones are incorporated with AI, which helps them to make decisions also on the basis of the picture they capture.

*Any one example from above or any other matching example can be given

4. Read the given scenario and answer the questions that follow:

A farmer keeps rabbits in three large hutches that stand in a row in his backyard. Each of the hutches is painted different colours – red, yellow and green. Until recently, the number of rabbits in the green hutch was twice as large as the number of rabbits in the yellow hutch. Then, one day, the farmer took five rabbits out of the left-side hutch and gave them away to the local school’s pet corner. He also took half of the rabbits that remained in the left-side hutch and moved them to the red hutch.

a. What was the colour of the left-side hutch? Justify your answer with explanation.

The answer is yellow.

Explanation: As we already know at the outset the number of rabbits in the green hutch was twice as large as the number of rabbits in the yellow hutch. This means that the number of rabbits in the green hutch was an even number. After the farmer removed five rabbits from the left side hutch, then the number of rabbits that remained there also became an even number. This is proven by the fact that it was divisible by 2. Therefore, before those five were removed, the left side hutch contained an uneven number of rabbits hence the left side hutch cannot be the green one, but based on the given information, it cannot be the red one. Hence it is yellow.

5. A scenario is given to you below. Read it and answer the questions that follow:

Late one night, a car ran over a pedestrian in a narrow by street and drove away without stopping. A policeman who saw the vehicle leave the scene of the accident reported it moving at very high speed. The accident itself was witnessed by six bystanders. They provided the following conflicting accounts of what had happened:

- *It was a blue car driven by a man;*
- *The car was moving at high speed and its headlights were turned off;*
- *The car did have license plates; it wasn’t going very fast;*
- *It was a Toyota and its headlights were turned off;*
- *The car didn’t have license plates; the driver was a woman;*
- *It was a grey Ford.*

When the car and its driver were finally apprehended, it turned out that only one of the six eyewitnesses gave a fully correct description. Each of the other five provided one true and one false piece of information. Keeping that in mind, can you determine the following:

- | | |
|-------------------------------------|------------|
| a. What was the car's brand? | Ans: FORD |
| b. What was the colour of the car? | Ans: BLUE |
| c. Was the car going fast or slow? | Ans: FAST |
| d. Did it have license plates? | Ans: NO |
| e. Were its headlights turned on? | Ans: NO |
| f. Was the driver a man or a woman? | Ans: WOMAN |

Explanation: Out of the statements of 6 bystanders, the third statement becomes false as the policeman who saw the vehicle leave the scene of the accident reported it moving at very high speed. Then eliminating all false statements of bystanders, the above results can be extracted.

6. ***A firefighter has to get to a burning building as quickly as he can. There are three paths that he can take. He can take his fire engine over a large hill (5 miles) at 8 miles per hour. He can take his fire engine through a windy road (7 miles) at 9 miles per hour. Or he can drive his fire engine along a dirt road which is 8 miles at 12 miles per hour. Which way should he choose? (speed=distance/time)***

To reach the destination quickly, the fire fighter has to calculate the time required on the basis of given data. Driving his fire engine 5 miles at 8 miles per hour takes 37.5 minutes. Driving his fire engine 7 miles at 9 miles per hour takes about 47 minutes. Driving his fire engine 8 miles at 12 miles per hour takes 40 minutes So he should choose to drive his fire engine over the hill.)

7. ***A thief has just found a pair of ancient treasure caves. One of the caves is filled with unbelievable treasure and the other has a fire breathing monster that will eat anyone who opens that cave. One cave has a black door decorated with diamonds and the other cave has a brown door decorated with sapphires. Each of the doors has an engraved description on top. The descriptions say:***

- a. Black Door: Monster is here.***
b. Brown Door: Only One Door speaks the truth.

Which door should the thief open?

The treasure is in the Black door.

Explanation: Let us look at the description on the Brown door. It can be correct or wrong.

Scenario 1: The description on the Brown door is true. Then the description on the Black door has to be false. That means that the inscription on the Black door is false and the cave with black door contains the treasure!

Scenario 2: The description on the Brown door is false. Then either both the descriptions are false or both are true. Both cannot be true as that is impossible and not consistent. That means that both descriptions are false.

8. *How intelligent robots are helping us in accomplishing dangerous jobs?*

Robots let humans avoid some hurtful work:

- (i) Lifting up heavy material at the construction site.
- (ii) Stirring and mixing metals or liquids at a high temperature.
- (iii) Collecting and packaging of radioactive waste.
- (iv) Working in contaminated and dusty environments.

9. *How AI helps in giving you personalized experience online?*

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.