**QUESTION 1 [24 MARKS]**

1. What do you understand about Artificial Intelligence?

**[ 3 Marks]**

The development of computer systems that can perform tasks that typically require human intelligence, such as perception, reasoning, learning, decision-making, and natural language processing. In other words, AI involves creating intelligent machines that can simulate human cognitive processes, including understanding, problem-solving, and adaptation.

1. What is the difference between Strong and Weak AI, and how does their level of intelligence and capabilities differ?

**[6 Marks]**

**Weak AI** - designed to perform a specific task or set of tasks within a limited domain. It is not capable of performing tasks outside of its designated domain and lacks true consciousness or self-awareness. - **2 Marks**

**Strong AI**, is designed to have human-level intelligence and consciousness. It is capable of performing tasks across multiple domains, and has the ability to reason, learn, and adapt to new situations. Strong AI is still a theoretical concept and has not yet been fully achieved. – **2 Marks**

Overall, the key **difference between strong and weak AI** lies in their level of intelligence and capabilities. While weak AI can perform specific tasks within a limited domain, strong AI has the potential to revolutionize the way we interact with technology and the world around us. – **2 Marks**

1. Provide an explanation of whether ChatGPT falls under the category of strong or weak artificial intelligence?

**[3 Marks]**

**Weak AI** – **1 Marks**

Because its designed to perform a specific task, such as answering questions or generating text, but does not have general intelligence or self-awareness like a human. ChatGPT's abilities are limited to the specific domain it has been trained on, and it cannot learn or adapt to new tasks without additional training. – **2 Marks**

1. Offsetting your carbon footprint while travelling can be difficult to manage, but this is achievable with the advancement of AI technology. How can this problem be achieved? Discuss your idea.

**[4 Marks]**

This could be accomplished through a **smartphone app** or other device that utilizes **GPS data**, information about the mode of transportation, and other relevant factors to estimate the amount of carbon dioxide and other greenhouse gases produced during travel. **– 2 Marks**

AI could also be used to **optimize travel routes** and **transportation modes** to reduce carbon emissions. **For example, machine learning algorithms could analyze traffic patterns and identify the most efficient route to reduce travel time and carbon emissions. – 2 Marks**

1. Give one real word example of **Turing Test application**. Explain your answer

**[4 Marks]**

**Chatbots in customer service** **– 1 Marks**

If the chatbot is able to engage in a natural language conversation with the customer (human) that is indistinguishable from that of a human customer service representative, then it can be said to have passed a kind of Turing Test. **– 3 Marks**

Other example: ChatGPT or any application that fall into the Turing Test theory

1. In your opinion, what do you foresee Artificial Intelligence will be in the future. Your answer must be based on the current trend and issues in Artificial Intelligence.

**[4 Marks]**

**Increased Automation**. **– 1 Marks**

We are already witnessing the impact of automation powered by AI in various industries, including manufacturing, logistics, and healthcare. In the future, we can expect AI to take over more routine and repetitive tasks, leading to increased efficiency and productivity. **– 3 Marks**

**Personalization.** **– 1 Marks**

AI-powered personalization is already present in our lives, from personalized recommendations on social media to personalized healthcare. In the future, we can expect AI to become even more tailored to individual needs, preferences, and behaviors. **– 3 Marks**

**Ethical Concerns**. **– 1 Marks**

As AI becomes more advanced and widespread, we can expect ethical concerns to become even more critical. Issues such as bias in algorithms, privacy concerns, and the potential misuse of AI are likely to become even more pressing, and it will be crucial to address them adequately. **– 3 Marks**

**Breakthroughs in AI Research**. **– 1 Marks**

With the rapid advancements in AI research, we can expect to see breakthroughs in areas such as natural language processing, computer vision, and reinforcement learning. These advancements will lead to more sophisticated and intelligent AI systems. **– 3 Marks**

**QUESTION 2 [26 MARKS]**

Your task is to simulate the simple air-purifier agent (AP) that control the indoor air quality. Purposed of the agent is to make sure current air quality (indoor) is good. The agent will turn on the AP when the air quality is poor and turn off the AP when the air quality is good. Table 1 show the Air Quality Index (AQI) measurement.

**Table 1:** AQI and Air Pollution Information

|  |  |
| --- | --- |
| **AQI** | **Air Pollution Level** |
| 0 – 50 | Good |
| 51 – 100 | Moderate |
| 101 – Higher | Poor |

1. Suggest what the best **Agent Program** to accomplish the task. Explain your answer.

**[4 Marks]**

**Simple reflex agent**. - **1 Marks**

This type of agent is reactive, which means that it responds to the current state of the environment without considering any past or future states – current AQI. And applies a set of rules or conditions to either ON/OFF the AP - **3 Marks**

1. Write a Pseudo Code or Code Snipped (in any programming language) for condition action rule for the AP problem above.

**[3 Marks]**

**If (AQI == Poor) OR (AQI == Moderate) then**

**Turn ON AP**

**Else (AQI == Good)**

**Turn OFF AP**

1. Explain the nature of the air-purifier agent environment as listed below.
2. Fully or Partially Observable

***Fully observable****: The agent received AQI as the input source as the sole input source for the agent*

1. Single or Multi Agent

***Single Agent****: only one AP agent*

1. Deterministic or Stochastic

***Deterministic****: fully observable environment, agent received input from sensors do not predict the behaviour from the environment*

1. Episodic or Sequential

***Episodic environment****, there is a series of one-shot actions, and only the current percept is required for the action.*

1. Static or Dynamic

***Static environments****: idle environment with no change in its state*

1. Discrete or Continuous

***Discrete:*** *only two action ON of OFF – finite number of action*

1. Known or Unknown

**Known:** agent know all the outcomes for the actions.

**[14 Marks]**

1. Suggest **TWO (2)** improvement/features to the agent, so that it can be a better agent program compared to the agent in **Question 2 (a)**.

**[5 Marks]**

1. Use percept history as for the other input
2. Keep track of the internal state which is adjusted by each percept and that depends on the percept history.
3. Integrated learning capability