ROBOTICS AND ARTIFICIAL INTELLIGENCE

NAME - AKSHAT SINGH KUSHWAHA

CLASS - X

SECTION - I

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Question 1: Discuss the benefits and limitations of using `autonomous warehouse robots`.

Answer: Benefits: `Autonomous warehouse robots` increase efficiency by automating repetitive tasks, reduce labor costs, and improve accuracy in inventory management. Limitations: They have high initial costs, require regular maintenance, and may lack flexibility in handling unexpected tasks.

Question 2: Define `autonomous Drone`.

Answer: An `autonomous drone` is an unmanned aerial vehicle (`UAV`) that operates without human intervention, using onboard sensors, `GPS`, and software algorithms to navigate and perform tasks.

Question 3: Differentiate between `Robots` and `Cobots`.

Answer: `Robots` are designed to operate independently, often in isolated environments, performing tasks without human interaction. `Cobots`, or collaborative robots, are designed to work alongside humans, sharing workspaces and assisting with tasks.

Question 4: Define a `machine`. Give few characteristics of a `machines`.

Answer: A `machine` is a device that uses energy to perform a specific task. Characteristics of `machines` include efficiency, precision, consistency, and the ability to automate repetitive tasks.

Question 5: Define `Gear` and also explain its types.

Answer: A `gear` is a rotating machine part with cut teeth that mesh with another toothed part to transmit torque. Types of `gears` include `spur gears` (straight teeth), `helical gears` (angled teeth), `bevel gears` (conical shape), and `worm gears` (screw-like shape).

Question 6: Describe `Gear efficiency`.

Answer: `Gear efficiency` is the ratio of the output power to the input power, indicating how effectively a `gear` transmits power without losses due to friction, heat, or other factors.

Question 7: Explain emerging `sensor technologies` and their potential applications in `robotics`.

Answer: Emerging `sensor technologies` include `LIDAR` (Light Detection and Ranging), `ultrasonic sensors`, and `infrared sensors`. These sensors are used in `robotics` for navigation, obstacle detection, environmental mapping, and enhancing the robot's interaction with its surroundings.

Question 8: Explain difference between `supervised` and `unsupervised learning`.

Answer: `Supervised learning` involves training a model on labeled data, where the input-output pairs are known. `Unsupervised learning` involves training a model on unlabeled data, where the algorithm identifies patterns and relationships within the data without predefined labels.

Question 9: Differentiate between `learning` and `Artificial Intelligence`.

Answer: `Learning` refers to the process of acquiring knowledge or skills through experience, study, or teaching. `Artificial Intelligence` (`AI`) is the simulation of human intelligence in machines, enabling them to perform tasks that typically require human intelligence, such as problem-solving and decision-making.

Question 10: What is `Cyber-crime`? Explain it.

Answer: `Cyber-crime` refers to illegal activities conducted via the internet or other digital means. Examples include hijacking, phishing, identity theft, and distributing malware, all of which exploit vulnerabilities in digital systems for malicious purposes.

Question 11: Give the advantages and disadvantages of `Artificial Intelligence`.

Answer: Advantages of `AI` include automation of repetitive tasks, increased efficiency, and enhanced data analysis capabilities. Disadvantages include potential job displacement, ethical concerns, high development costs, and the risk of biased decision-making.

Question 12: What are `Underwater Robots`? Give some applications of `Underwater Robots`.

Answer: `Underwater robots` are machines designed to operate underwater, often equipped with sensors and cameras. Applications include ocean exploration, pipeline inspection, marine biology research, and underwater construction.

Question 13: Explain limitations of `Human Intelligence`.

Answer: Limitations of `human intelligence` include cognitive biases, limited processing speed, susceptibility to fatigue, and emotional influence, which can affect decision-making and problem-solving abilities.

Question 14: What are `NARs`. Illustrate with 2 examples.

Answer: `NARs` (Non-Anthropomorphic Robots) are robots that do not resemble humans in appearance. Examples include the `Roomba` vacuum cleaner and robotic arms used in manufacturing.

Question 15: Explain `Reinforcement learning`. Key components of `RL` with examples.

Answer: `Reinforcement learning` is a type of machine learning where an agent learns to make decisions by performing actions and receiving rewards or penalties. Key components include the agent, environment, actions, and rewards. An example is `AlphaGo`, a program that learned to play the game Go through `reinforcement learning`.

Question 16: Explain `Human` Vs `machine decision making` (Subjective Vs Objective)? Describe differences.

Answer: `Human decision-making` is often subjective, influenced by emotions, biases, and personal experiences. `Machine decision-making` is objective, based on data and algorithms, and free from emotional influence, leading to consistent and unbiased outcomes.

Question 17: Explain `Deterministic` Vs `Probabilistic system`.

Answer: A `deterministic system` produces predictable outcomes with no randomness involved, given the same initial conditions. A `probabilistic system` involves randomness and uncertainty, producing outcomes based on probabilities rather than certainty.

Question 18: What is `Intelligence`? Explain its importance and types.

Answer: `Intelligence` is the ability to learn, understand, and apply knowledge to solve problems and adapt to new situations. It is important for effective decision-making and problem-solving. Types of `intelligence` include `interpersonal intelligence`, `linguistic intelligence`, and `kinesthetic intelligence`.

Question 19: How `Human Drones` are being used in India? Explain with examples.

Answer: In India, `human drones` are used in agriculture for crop monitoring, in disaster management for rescue operations, and in surveillance for border security. Examples include drones spraying pesticides and drones surveying flood-affected areas.

Question 20: Explain `Gear ratio`.

Answer: `Gear ratio` is the ratio of the number of teeth on two meshing gears, determining the relationship between the rotational speeds and torques of the gears. It is calculated by dividing the number of teeth on the driven gear by the number of teeth on the driving gear.

Question 21: What is difference between `Human Intelligence`, `Machine Intelligence`, `Artificial Intelligence`.

Answer: `Human Intelligence` refers to natural cognitive abilities possessed by humans. `Machine Intelligence` refers to the computational capabilities of machines. `Artificial Intelligence` is the simulation of human-like intelligence in machines, enabling them to perform tasks that typically require human intelligence.

Question 22: Differentiate between `Machines` and `Robots`.

Answer: `Machines` are devices that perform specific tasks, often requiring human operation. `Robots` are machines equipped with sensors and control systems, capable of autonomous or semi-autonomous operation, and can perform complex tasks without human intervention.