

Question 1

Neural Networks in AI: Neural networks are a subset of machine learning algorithms modeled after the human brain. They consist of interconnected layers of nodes, or neurons, which process data by passing information through these layers. Each connection has a weight that adjusts during training, allowing the network to learn patterns and make decisions. This structure mimics the brain's neural connections, enabling neural networks to recognize complex patterns and relationships within data.

Traditional machine learning algorithms often rely on predefined rules and simpler models like decision trees or linear regression. Neural networks, especially deep neural networks with many layers (deep learning), can handle vast amounts of data and learn intricate features without explicit programming. This gives them an edge in pattern recognition tasks, such as image and speech recognition, where they can outperform traditional methods by discovering hierarchical patterns in data.

Question 2

Weak AI vs. Strong AI: Weak AI, or narrow AI, refers to systems designed for specific tasks, such as virtual assistants (e.g., Siri, Alexa) or image recognition systems. These applications perform well within their domains but lack general intelligence and the ability to transfer knowledge across tasks.

Strong AI, or general AI, aims to achieve human-level intelligence, capable of understanding, learning, and applying knowledge across a wide range of tasks. While strong AI remains theoretical, its pursuit raises significant concerns. Potential risks include job displacement, ethical dilemmas around decision-making autonomy, and the challenge of ensuring AI systems align with human values.

Strong AI's societal impact could be profound, revolutionizing industries and daily life but also posing ethical considerations like ensuring transparency, accountability, and preventing misuse. Balancing innovation with ethical guidelines is crucial for developing advanced AI responsibly.

Question 3

Natural Language Processing (NLP) in AI: NLP enables machines to comprehend, generate, and respond to human language. By leveraging algorithms and models, machines can perform tasks like language translation, sentiment analysis, and text summarization. Training NLP models involves processing vast datasets to understand syntax, semantics, and contextual nuances.

Challenges in NLP include handling language ambiguity, understanding context, and interpreting idiomatic expressions. These complexities require sophisticated models to achieve accurate and meaningful language processing.

Successful NLP applications include chatbots providing customer support, sentiment analysis tools gauging public opinion, and translation services like Google Translate. Advanced NLP can

transform areas like customer service by offering more personalized interactions, enhance language translation accuracy, and automate content creation, streamlining workflows and improving efficiency.