Part 1: Theoretical Analysis

1. Essay Questions

- **Q1**: Explain how **Edge AI** reduces latency and enhances privacy compared to cloud-based AI. Provide a real-world example (e.g., autonomous drones).

Edge AI runs artificial intelligence directly on local devices instead of sending data to the cloud. This reduces latency because decisions are made instantly without waiting for internet connections or remote servers. It also improves privacy since sensitive data stays on the device.

For example, autonomous drones in agriculture or disaster response can detect obstacles and adjust flight paths in real time. By processing video and sensor data locally, drones respond faster and keep information secure. Edge AI is especially useful in safety-critical applications where immediate action and data protection are both essential.

- **Q2**: Compare **Quantum AI** and classical AI in solving optimization problems. What industries could benefit most from Quantum AI?

Quantum AI combines artificial intelligence with quantum computing to solve complex problems much faster than classical methods. In agriculture and food technology, it could transform how we handle optimization challenges.

For example, quantum algorithms can analyse huge datasets of soil conditions, weather forecasts, and crop genetics to identify the best planting strategies or predict yields more accurately. Food supply chains could also benefit, with quantum AI optimizing storage, transport, and distribution to reduce waste and improve food security. By tackling these large-scale, data-heavy problems, Quantum AI offers breakthroughs that classical AI struggles to achieve efficiently.