THEORETICAL ANALYSIS

1. **Essay Questions**
    - **Q1:** Edge AI reduces latency and compared to cloud-based AI since it doesn't need to transmit data to the cloud for processing, devices can analyze and respond in real time for example an autonomous drone needs to quickly make decisions to avoid obstacles or track targets. It enhances privacy by ensuring data stays local to the device, reducing risk of interception or misuse during transmission. In the real-world context, Edge AI enables drones to navigate, map environments or detect objects without constant connectivity.
    - **Q2: Processing power;** Classical AI is sequential using bits while for Quantum AI is exponential speed using qubits.
      Computation style; In Classical AI is deterministic while in Quantum AI is probabilistic and parallel in nature.
      Scalability; In Classical AI is limited for complex problems while in Quantum AI is highly scalable for high-dimensional problems.
      Industries that benefit the most from quantum AI are: Logistics where the quantum AI can streamline complex supply chain optimizations. **Pharmaceuticals** where it accelerates drug discovery and protein folding analysis. **Finance** where it enhances portfolio optimization and fraud detection. **Energy** where it optimizes grid operations and resource distribution.
    - **Q3:** AI can pre-screen imaging data to identify abnormalities and can help monitor vitals, predict patient deterioration and manage workloads allowing nurses to spend more time on direct patient care.
      The societal impact Human-AI collaboration include; improved access to underserved regions with fewer specialists, higher efficiency hence reduces burnout and improves quality of care and personalized medicine that is based on individual health data and predictions.

2. **Case Study Critique**

   AI in Smart Cities

   By integrating AI with IoT, it improves urban sustainability by forming the backbone of smart traffic systems in urban spaces. This fusion enables cities to become more adaptive, efficient and environmentally friendly.
   It improves urban sustainability by: **Optimized traffic flow** where sensors collect real-time traffic data and AI algorithms analyze patterns and adjust traffic lights or reroute vehicles to reduce bottlenecks. **Smart public transport** where GPS and IoT devices track buses and AI predicts delays or demand spikes enabling systems to adjust routes or increase vehicle frequency proactively. **Emergency response and accident prevention**

where cameras and IoT detectors monitor traffic violations or accidents and AI identifies risks such as reckless driving and triggers alerts or dispatches help quickly.

Challenges: IoT devices gather vast information of sensitive data such as locations and if poorly protected can be vulnerable to hacking or misuse, threatening data security and privacy.
Also, integrating new AI-IoT tools with systems already in place across cities can be technically complex and costly and poor integration may lead to inaccurate data or limited coverage.