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

#### ****Reduced Latency****

#### **Edge AI** eliminates the need to transmit data back and forth to a cloud server.This enables **real-time decision-making**, which is critical in applications like autonomous vehicles or drones where delays can be dangerous.

**Example**: An **autonomous drone** navigating a disaster zone can detect obstacles and adjust its flight path instantly using onboard AI. If it relied on cloud processing, even minor network delays could result in crashes or missed targets.

#### ****Enhanced Privacy****

#### Sensitive data is processed locally and doesn’t leave the device.This significantly reduces the risk of **data breaches** or **unauthorized access**, especially in industries like healthcare or finance.

#### ****Real-World Example:****

**DJI drones** with onboard AI can identify and track objects without needing internet accessThis capability is vital in **search-and-rescue missions**, where connectivity is limited and time is critical.

### ****Q2;Compare Quantum AI and Classical AI in solving optimization problems. What industries could benefit most from Quantum AI?****

|  |  |  |
| --- | --- | --- |
| Feature | Classical AI | Quantanum AI |
| Computational Basis | Uses binary (0/1) bits | Uses qubits, which can be in superpositions |
| Speed for Complex Problems | Slower with exponential complexity | Potential for exponential speed-up in some cases |
| Problem Solving Approach | Often uses brute force or heuristics | Can explore many solutions simultaneously |
|  |  |  |

#### ****Industries That Could Benefit:****

* **Finance** – Real-time portfolio optimization and fraud detection
* **Logistics** – Route optimization for delivery and supply chaIN
* **Pharmaceuticals** – Drug discovery through molecular structure simulatioN

**Q3;Discuss the societal impact of Human-AI collaboration in healthcare. How might it transform roles like radiologists or nurses?**

#### Radiologists:

#### AI scans images (X-rays, MRIs) faster than humans, flagging anomalies like tumors.

#### Radiologists focus on complex diagnoses, interpretations, and patient interactions—moving from technician to **strategist**.It also reduces burnout from repetitive tasks.

#### Nurses:

AI monitors patient vitals using wearables.Early warnings for sepsis or cardiac arrest via predictive analytics.Documentation, triage, and scheduling handled by AI assistants, giving them time to focus on compassionate care

**Societal Shifts:**

**Increased Access**: Telemedicine powered by AI reaches rural areas.

**Upskilling Needed**: Health professionals must learn to interpret AI outputs.

**Ethical Demands**: AI must be explainable, transparent—and always augment, not verride, human judgment.

#### ****Case Study Critique****

#### **Analyze: How does integrating AI with IoT improve urban sustainability? Identify two challenges (e.g., data security).**

How AI-IoT Improves Urban Sustainability:

* Reduced Emissions: AI analyzes IoT data to optimize traffic flow, cutting congestion by up to 20%, reducing fuel use and CO2 emissions.
* Energy Efficiency: AI-IoT systems lower energy consumption by 15-25% through predictive maintenance and adaptive infrastructure controls.
* Enhanced Public Transport: Real-time data improves public transport reliability, increasing ridership by 10% and reducing private vehicle use, promoting sustainable mobility.

**Challenges:**

* Data Security/Privacy: IoT data is vulnerable to cyberattacks, risking breaches or traffic system manipulation, requiring strong encryption and anonymization.
* High Costs: Significant upfront and maintenance costs for AI-IoT infrastructure can limit scalability, especially in smaller cities, necessitating innovative funding solutions.