Answer Key: JSQ

Section 1 (5 marks per question)

Q1. Describe the role of cloud computing in IoT environments.

Keywords:

Cloud computing, IoT, Big Data

Main Points:

• Cloud computing provides a scalable computing platform for Big Data processing in IoT environments.
• It enables on-demand configuration and pay-per-use pricing to meet changing application requirements.

Detailed Explanation:

Cloud computing offers a flexible and cost-effective infrastructure for processing and analyzing large volumes of data generated by IoT devices.

Q2. Explain the challenges faced by centralized cloud processing in real-time IoT applications.

Keywords:

Latency, Data velocity, Real-time applications

Main Points:

• Latency issues due to data transmission and processing in distant cloud servers.
• Inability to handle high-velocity data flows in real-time.

Detailed Explanation:

Centralized cloud processing may not be suitable for real-time IoT applications due to its inherent latency and limitations in handling large volumes of data in a timely manner.

Q3. Discuss the motivations for considering an alternative paradigm to cloud computing in IoT.

Keywords:

Privacy, Data proximity, Computation offloading

Main Points:

• Privacy concerns among users regarding the transfer and storage of personal data in the cloud.
• Need for a paradigm that allows computation closer to data sources for faster response times.

Detailed Explanation:

Alternative paradigms, such as fog computing, can address these concerns by enabling data processing and computation at the edge of the network, providing greater privacy and lower latency.

Q4. Compare and contrast the characteristics of Little Data and Big Data in IoT environments.

Keywords:

Little Data, Big Data, IoT, Data characteristics

Main Points:

• Little Data: Transient data captured continuously from IoT devices, characterized by its small size and high velocity.
• Big Data: Persistent data and knowledge stored in centralized cloud storage, characterized by its large volume and complexity.

Detailed Explanation:

Little Data and Big Data represent distinct categories of data in IoT environments, with different attributes and requirements for processing and storage.

Q5. Analyze the importance of both Big Stream and Big Data in smart cities and infrastructures.

Keywords:

Smart cities, Infrastructures, Big Stream, Big Data

Main Points:

• Big Stream: Enables real-time analytics and city infrastructure monitoring.
• Big Data: Provides historical data and knowledge for predictive analysis and informed decision-making.

Detailed Explanation:

Both Big Stream and Big Data are essential for effective decision-making in smart cities and infrastructures, as they provide timely insights and knowledge from different perspectives.

Q6. Evaluate the strengths and limitations of cloud computing in supporting Big Data processing in IoT environments.

Keywords:

Cloud computing, Big Data, IoT, Strengths, Limitations

Main Points:

• Strengths: Scalability, on-demand configuration, pay-per-use pricing.
• Limitations: Latency, data privacy concerns, inability to handle high-velocity data flows in real-time.

Detailed Explanation:

Cloud computing offers advantages for Big Data processing, but its limitations can be significant in certain IoT applications.

Q7. Discuss the privacy concerns related to the transfer and storage of activity-track-data in the cloud.

Keywords:

Privacy, Activity-track-data, Cloud

Main Points:

• Users may be uncomfortable with sharing personal data with third-party cloud providers.
• Concerns about data security and potential unauthorized access.

Detailed Explanation:

Privacy is a key concern for users considering transferring and storing their activity-track-data to the cloud.

Q8. Analyze the impact of data velocity on the processing capabilities of cloud servers in IoT environments.

Keywords:

Data velocity, Cloud servers, IoT, Latency, Real-time applications

Main Points:

• High-velocity data flows can overwhelm cloud servers, leading to latency and performance issues.
• Real-time applications require immediate processing of data, which may not be feasible with centralized cloud processing.

Detailed Explanation:

The high velocity of data in IoT environments poses challenges for cloud servers, potentially affecting the reliability and effectiveness of data processing.

Q9. Explain the concept of bringing the computation to the edge in IoT environments.

Keywords:

Computation at the edge, IoT, Latency reduction

Main Points:

• Involves moving computation closer to data sources, such as end-user devices or network gateways.
• Reduces latency and enables faster response times, particularly in real-time applications

Detailed Explanation:

Computation at the edge is a strategy that brings processing capabilities closer to the data sources, aiming to improve performance and reduce latency.

Q10. Provide an example of a real-time IoT application where centralized cloud processing may be insufficient.

Keywords:

Real-time IoT applications, Centralized cloud processing, Limitations

Main Points:

• A self-driving car that requires real-time analysis of sensor data for navigation and collision avoidance.
• A smart home system that needs to respond immediately to user requests or environmental changes.

Detailed Explanation:

Real-time applications with strict latency requirements may not be well-suited for centralized cloud processing due to the potential for delays and unreliability.