Question 1

a) Explain the concept of Fog Computing. Give one use case related to your explanation.

Fog Computing: Fog Computing is a distributed computing paradigm that extends cloud computing to the edge of the network, closer to the source of data generation. In fog computing, computing resources are placed at various points between the data source and the cloud, enabling processing and analysis of data to occur closer to where it is generated. This helps in reducing latency, bandwidth usage, and ensures real-time processing for applications.

Use Case: Consider a smart city application where sensors are deployed throughout the city to monitor and manage various aspects like traffic, pollution, and energy consumption. Fog Computing can be employed to process this data locally, at the edge of the network, rather than sending all the raw data to a centralized cloud. This allows for quicker decision-making and local response, such as adjusting traffic signals in real-time based on local conditions.

b) Clarify why you consider the use case mentioned in part (a) is to be stronger in using Fog Computing than Cloud Computing.

Strength of Fog Computing over Cloud Computing: In the smart city use case, Fog Computing is stronger than Cloud Computing due to the need for low latency and real-time responsiveness. Cloud Computing typically involves sending data to a centralized server for processing, which can introduce delays. In contrast, Fog Computing processes data locally, reducing the latency and enabling quick, decentralized decision-making. This is crucial for applications like smart traffic management, where immediate responses are essential.

c) What is the role of Cloud Computing and Big Data in Internet of Things?

- **Cloud Computing:** Provides the necessary infrastructure and resources for storing and processing large volumes of IoT data. It allows for centralized management, analysis, and storage of data, providing scalability and accessibility.
- **Big Data:** IoT devices generate massive amounts of data. Big Data technologies enable the storage, processing, and analysis of this data to extract valuable insights. It involves techniques like data mining, machine learning, and analytics to make sense of the vast and diverse datasets generated by IoT devices.

c) Outline the importance of Fog Computing in IoT.

- **Reduced Latency:** Fog Computing brings processing closer to IoT devices, reducing latency and enabling real-time decision-making.
- **Bandwidth Efficiency:** By processing data locally, Fog Computing reduces the need to transmit large amounts of raw data to the cloud, optimizing bandwidth usage.
- **Privacy and Security:** Local processing in the fog can enhance privacy and security by keeping sensitive data closer to its source, reducing the exposure to potential threats.

d) State the difference between Web of Things and IoT.

- **Internet of Things (IoT):** Refers to the network of physical objects (devices, vehicles, buildings, etc.) embedded with sensors, software, and network connectivity to collect and exchange data. IoT focuses on the interconnection of devices for data sharing and automation.
- **Web of Things (WoT):** Extends the capabilities of IoT by providing a standard way to describe and expose the functionalities of IoT devices on the web. WoT enables a more seamless integration of devices by providing a common framework for describing device properties and interactions, making it easier for applications to interact with diverse IoT devices over the web.