Chapter-10 : Introduction to Contemporary Technologies

1) What do you mean by IOT? Explain some applications of IOT.

⇒ Internet of Things (IoT) is network of interconnected computing devices which are ~~enabled~~ embedded in everyday objects, enablim them to send and receive data. These interconnected devices can range from everyday objects like home appliances and wearable devices to industrial machines and vehicles.

Some applications of IoT are listed below:

1) Agriculture: IoT devices are deployed in agriculture to monitor soil conditions, weather patterns, crop health, and livestock activity. By analyzing real-time data collected from ~~these~~ IoT, farmers can optimize irrigation, fertilization, and pest control strategies, leading to higher crop yields and resource efficiency.

2) Smart Cities: IoT technologies are used in urban environments for various purposes, including traffic management, waste management, public safety, and environmental monitoring. For instance, IoT in traffic lights can optimize traffic flow, smart waste bins can signal when they need emptying, and air quality sensors can provide real-time pollution data for city planning and health initiatives.

3) Healthcare: wearable IoT devices provide a range of benefits to patients and healthcare providers alike. By extension, IoT enables healthcare professionals to monitor patients remotely. The devices can automatically collect patient's health vitals like blood pressure, heart rate, temperature, and more.

4) Smart Education: IoT is revolutionizing traditional educationat methods by introducing smart classrooms, personalized learning experiences, and efficient campus management systems. Smart classrooms are equipped with IoT de enabled devices such as interactive whiteboards, tablets and sensors that enhance student engagement and learning outcomes.

5) Defense: IoT is utilized in defense applications to enhance situational awareness, improve decision-making and optimize resource allocation. Military forces deploy IoT enabled sensors, drones and survelli surveillance systems for real time monitoring of battlefield conditions, enemy movement and potential threats.

2) Why do we need data security?

⇒ Data Security refers to the protection of digital data from unauthorized access, corruption, or theft throughout its lifecycle. It encompasses various strategies, technologies, and practices aimed at ensuring the confidentiality, integrity and availability of data.

We need data security because of the following:

1) ~~Confe~~ Confidentiality: Data security ensures that sensitive information is only accessible to authorized individuals or entities. This involves encryption, ~~unauther~~ access controls, and authentication mechanisms to prevent unauthorized access or disclosure of data.

2) Integrity: Data integrity ensures that data remains accurate, consistent, and unaltered during storage, processing or transmission. Techniques such as checksums, digital signatures, and data validation mechanisms are employed to detect and prevent unauthorized modifications or tampering of data.

3) Availability: Data security ensures that data is accessible and usable when needed by authorized users. This involves implementing measures such as redundancy, backups, and disaster recovery plans to mitigate the risk of data loss or unavailability due to system failures, cyberattacks, or natural disasters.

3) Explain the various features of big data.

⇒ Big Data is the collection of large data sets that cannot be adequately processed using traditional processing techniques. Big data is not only data it has become a complete subject, which involves various tools, techniques and frameworks.

Some features of big data are explained below :

1) Volume : Big data involves handling extremely large volume of data. Traditional data storage and processing systems may struggle to manage such vast quantities of information. The volume of data can be range from terabytes to petabytes and beyond, generated from various sources such as social media, transactions and more.

2) Velocity : Big data is generated at a high velocity, often in real-time or near-real-time. This rapid influx of data requires systems capable of processing and analyzing data streams as they are generated. Examples include social media updates, sensor data from IoT devices, financial transactions, and website clickstreams.

3) Variety : Big data comes in diverse formats and types, including structured, semi-structured, and unstructured data. structured data is organized in a predefined format, such as databases and

spreadsheets. Semi-structured data lacks a strict schema but has some organizational properties like XML or JSON files. Unstructured data has no predefined structure and includes text documents, images, videos, social media posts and more. Managing and analyzing such varied data types require flexible data processing techniques and tools.

4) veracity: veracity refers to the quality and reliability of the data. Big data sources may include data with varying degrees of accuracy, consistency, and trustworthiness. Data quality issues can arise due to errors, inconsistencies, biases, or noise in the data. Addressing veracity challenges involving implementing data quality measures, data cleansing cleaning techniques, and data validation processes to ensure the accuracy and reliability of the data used for analysis.

4) Define GIS. Explain some advantages of GIS.

⇒ Geographical Information System (GIS) is a computer based tool for mapping and analyzing things that exist and events that happens earth. It is an information system that integrates so stores, edits, analyzes, shares, and displays geographic information. GIS is a computer based information system used to digitally represent and analyze the geographic features present on Earth's surface and the events taking place on it.

Some advantages of GIS are:

· Cost Savings from Greater Efficiency: GIS is widely used to optimize maintenance schedules and daily fleet movements. Typical implementations can result in a savings of 10 to 30 percent in operational expenses through reduction in fuel use and staff time, improved customer service and more efficient scheduling.

· Better Record Keeping: Many organizations have a primary responsibility of maintaining authoritative records about the status and change of geography. GIS provides a strong framework for managing these types of records with full transaction support and reporting tools.

· Improved Communication: GIS-based maps and visualizations greatly assist in understanding situations and in storytelling. They are a type of language that improves communication between different teams, departments, disciplines, professional fields, organization, and the public.

· Efficient Resource Management: GIS supports efficient resource management by optimizing the allocation and utilization of resources based on geographic data. For example, in agriculture, GIS can help optimize crop selection, irrigation scheduling, and soil management by considering factors like soil typ soil type, climate etc.