ASSIGMENT -1

OSI MODE:

The OSI model (Open Systems Interconnection model) is a conceptual framework that describes how data is transmitted and received over a network. It consists of seven layers, each of which serves a specific function in the process of data communication.

Here's an in-depth explanation of each layer of the OSI model

1.Physical Layer: This layer deals with the transmission of raw data over a physical medium such as copper cables, fiber optics, or radio waves. It provides a physical interface between the device and the network.

2.Data Link Layer: This layer is responsible for ensuring that data is transmitted reliably and efficiently between two devices on the same physical network. It breaks data into frames, adds error checking information, and manages access to the physical network.

3.Network Layer: This layer is responsible for addressing, routing, and delivering data between different networks. It adds logical addresses to data packets and uses routing protocols to determine the most efficient path for data to travel.

4.Transport Layer: This layer is responsible for ensuring that data is transmitted reliably and efficiently between applications on different devices. It breaks data into segments, adds error checking information, and manages flow control.

5.Session Layer: This layer is responsible for managing the communication between different applications on different devices. It establishes, maintains, and terminates sessions between applications, and manages checkpoints and recovery.

6.Presentation Layer: This layer is responsible for transforming data into a format that can be understood by the application. It handles data encryption, compression, and translation between different data formats.

7.Application Layer: This layer is responsible for providing services to end-users. It includes protocols and services such as email, file transfer, and web browsing.

MODBUS:

Modbus is a widely used serial communication protocol in industrial automation systems. It defines the format of the messages that are exchanged between devices over serial communication lines.

Address field: This field specifies the address of the device that will receive the message. It can be a broadcast address or an address of a specific device.

Function code field: This field specifies the type of action that the device should perform. Modbus defines a set of function codes, each of which corresponds to a specific action, such as reading or writing data.

Data field: This field contains the data that is being transmitted. The format and size of the data depend on the function code being used.

Error checking field: This field contains a checksum or CRC value that is used to check for errors in the message.

RS-485:

1)RS-485 is a serial communication standard used in a wide variety of industrial and commercial applications. It is a balanced, differential signaling standard that is designed to provide reliable long-distance communication over twisted pair cables. It was first introduced in 1983 by the Electronics Industries Alliance (EIA).

2) RS-485 supports full-duplex communication over distances of up to 1,200 meters (4,000 feet) at data rates of up to 10 Mbps. It can also support half-duplex communication at distances of up to 1,200 meters (4,000 feet) at data rates of up to 2

Mbps. RS-485 uses differential signaling, which helps to reduce electromagnetic interference (EMI) and noise on the communication line.

3) RS-485 supports up to 32 devices on a single bus, with each device having a unique address. Devices communicate using a master-slave configuration, with the master device initiating communication and the slave devices responding to requests. The standard supports a variety of communication modes, including point-to-point, point-to-multipoint, and multipoint-to-multipoint.

MQTT:

MQTT (Message Queuing Telemetry Transport) is a lightweight messaging protocol that is designed for use in situations where network bandwidth and power consumption are limited, such as in the Internet of Things (IoT) and Machine-to-Machine (M2M) communication.

MQTT components:

message - the data carried by the MQTT protocal across the network. when an message is transported by MQTT. it contains

1. payload data :The payload data is the actual content of the message that is being transmitted, and is what is ultimately processed by the receiving device or application.

2.quality os service (qos):The payload data is the actual content of the message that is being transmitted, and is what is ultimately processed by the receiving device or application.