| Sub:	IoT&WSN					Sub Code:	
Date:	1/02/2021	Duration:	90 Minutes	Max Marks:	50	Sem / Sec:	

<u>Answer any FIVE FULL Questions</u>

1 With a neat diagram explain the TCP/IP reference model, giving a brief description of the protocols in each layer. [10]

TCP/IP Reference Model is a four-layered suite of communication protocols. It was developed by the DoD (Department of Defence) in the 1960s. It is named after the two main protocols that are used in the model, namely, TCP and IP. TCP stands for Transmission Control Protocol and IP stands for Internet Protocol.

The four layers in the TCP/IP protocol suite are −

- **Host-to- Network Layer −**It is the lowest layer that is concerned with the physical transmission of data. TCP/IP does not specifically define any protocol here but supports all the standard protocols.
- **Internet Layer −**It defines the protocols for logical transmission of data over the network. The main protocol in this layer is Internet Protocol (IP) and it is supported by the protocols ICMP, IGMP, RARP, and ARP.
- **Transport Layer −** It is responsible for error-free end-to-end delivery of data. The protocols defined here are Transmission Control Protocol (TCP) and User Datagram Protocol (UDP).
- **Application Layer −** This is the topmost layer and defines the interface of host programs with the transport layer services. This layer includes all high-level protocols like Telnet, DNS, HTTP, FTP, SMTP, etc.
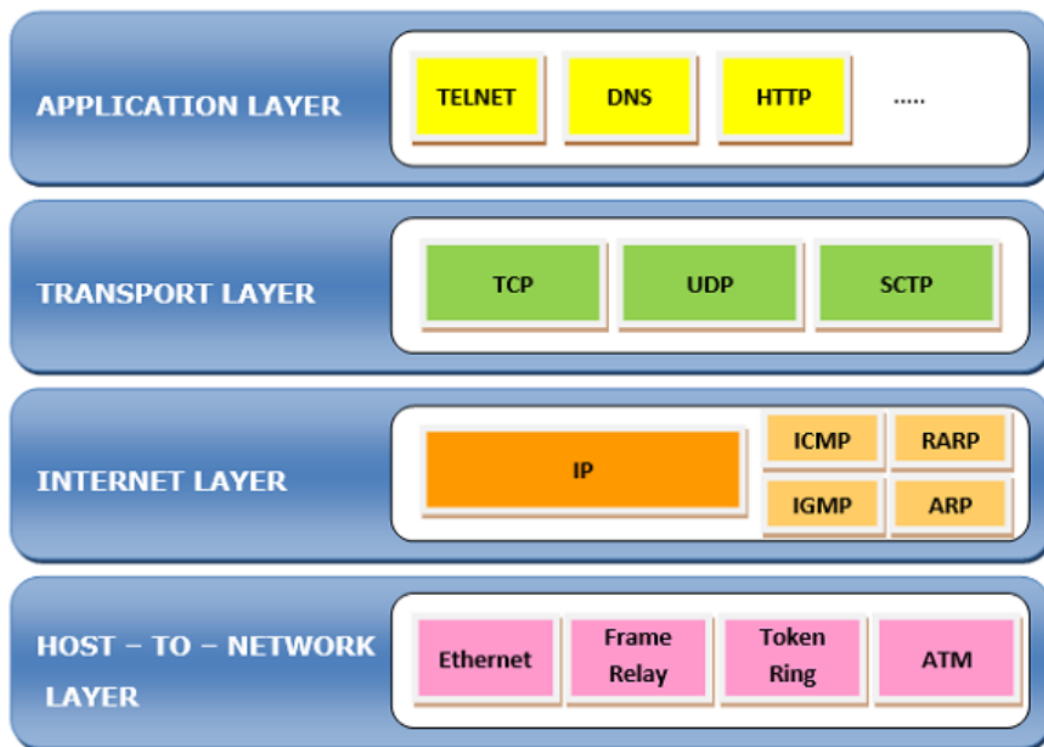
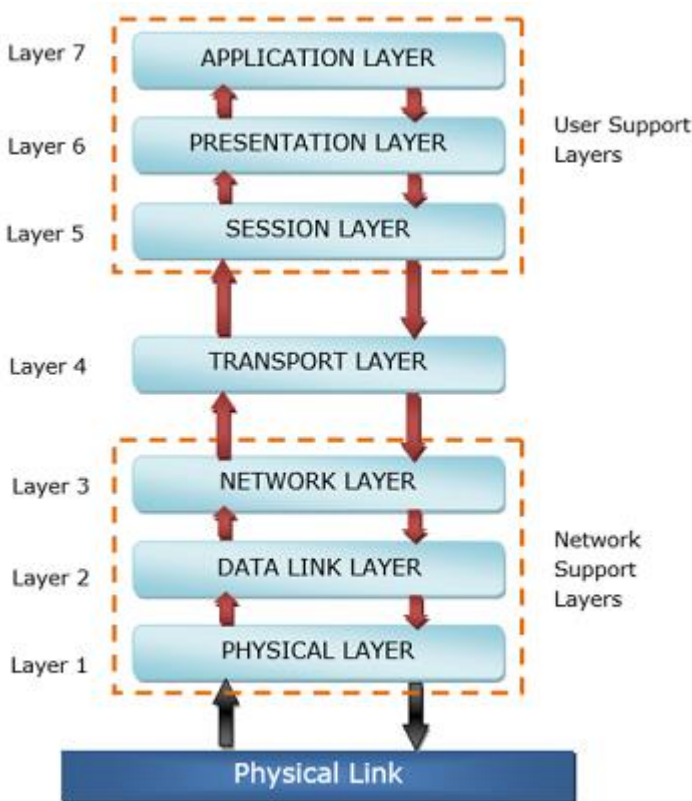| 2	A pure ALOHA network transmits 200-bit frames on a shared channel of 200 Kbps. Find the vulnerable time and throughput if the system produces: a) 1000 frames/sec b) 500 frames/sec c) 250 frames/sec. [10]
	Solution This situation is similar to the previous exercise except that the network is using slotted ALOHA instead of pure ALOHA. The frame transmission time is 200/200 kbps or 1 ms. a. In this case G is 1. So $S = G \times e^{-G} = 0.368$ (36.8 percent). This means that the throughput is $1000 \times 0.0368 = 368$ frames. Only 368 out of 1000 frames will probably survive. Note that this is the maximum throughput case, percentagewise. b. Here G is 1/2. In this case $S = G \times e^{-G} = 0.303$ (30.3 percent). This means that the throughput is $500 \times 0.0303 = 151$. Only 151 frames out of 500 will probably survive. c. Now G is 1/4. In this case $S = G \times e^{-G} = 0.195$ (19.5 percent). This means that the throughput is $250 \times 0.195 = 49$. Only 49 frames out of 250 will probably survive.
3	**Describe ISO-OSI reference model of computer network. Discuss the function of each layer [10]** OSI or Open System Interconnection model was developed by International Standards Organization (ISO). It gives a layered networking framework that conceptualizes how communications should be done between heterogeneous systems. It has seven interconnected layers. The seven layers of the OSI Model are a physical layer, data link layer, network layer, transport layer, session layer, presentation layer, and application layer, as shown in the following diagram – The main functions of each of the layers are as follows − • **Physical Layer −** Its function is to transmit individual bits from one node to another over

|	
	a physical medium.
	• **Data Link Layer −** It is responsible for the reliable transfer of data frames from one node to another connected by the physical layer.
	• **Network Layer −** It manages the delivery of individual data packets from source to destination through appropriate addressing and routing.
	• **Transport Layer −**It is responsible for delivery of the entire message from the source host to destination host.
	• **Session Layer −** It establishes sessions between users and offers services like dialog control and synchronization.
	• **Presentation Layer −** It monitors syntax and semantics of transmitted information through translation, compression, and encryption.
	• **Application Layer −** It provides high-level APIs (application program interface) to the users.
4	Write short note on a) 10Base5 Ethernet b) 10Base2 Ethernet. [10] ## 10BaseT One of the most common types of Ethernet in use today is **10BaseT.** This particular implementation uses four-pair UTP wiring (Cat3 or higher, but most commonly you will see Cat5) using RJ-45 connectors. Each cable is connected from each network device to a central hub in a physical star topology. Within the hub, the signals are repeated and forwarded to all other nodes on the network because it is a logical bus topology. Older network interface cards are configured with jumpers to set addresses and interrupts. Today's network interface cards can be managed through a diagnostic program, or automatically configure themselves through plug and play technology. There is a limit of 1024 devices on an Ethernet segment, plus you can have a maximum of 1024 network segments. A UTP cable has a maximum distance of 100 meters, which is equivalent to 328 feet. ## 10Base2 The minimum distance for cables between workstations must be at least a half-meter. Drop cables should not be used to connect a BNC connector to the network interface card (NIC) because this will cause signaling problems unless the NIC is terminated. 10Base2 ThinNet segments cannot be longer than 185 meters, although it is often exaggerated to 200 meters, and you can't put more than 30 devices on each populated segment. The entire cabling scheme, including all five segments, can't be longer than 925 meters.
5	Explain hidden station problem and exposed station problem with figures [10]

Hidden Station Problem (HSP) :
When two stations hidden from each other i.e., not in range of each other send signals to third station at the same considering third station is free. It causes collision at third station and is known as Hidden Station Problem. It reduces capacity of network due to possibility of collision. Following is diagrammatically representation of Hidden Station Problem (HSP) in wireless LAN.


Hidden Station Problem
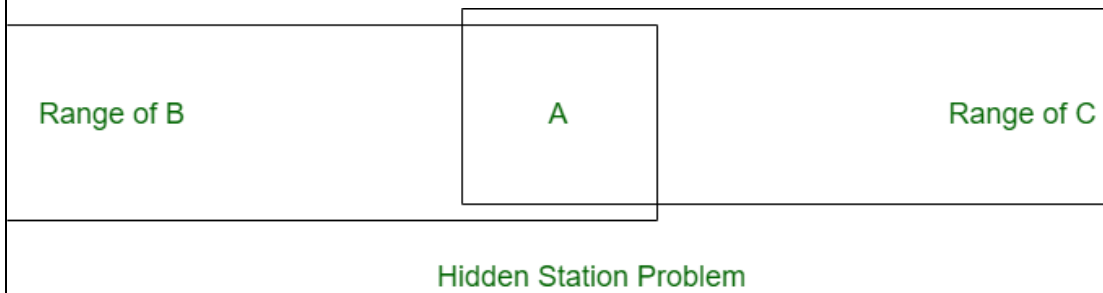
The Exposed Terminal Problem

In wireless LANs (wireless local area networks), the exposed terminal problem is a transmission problem that arises when a transmitting station is prevented from sending frames due to interference with another transmitting station. This is prevalent in decentralised systems where there aren't any entity for controlling transmissions. This occurs when a station is visible from a wireless access point (AP), but not from other stations that communicate with the AP.
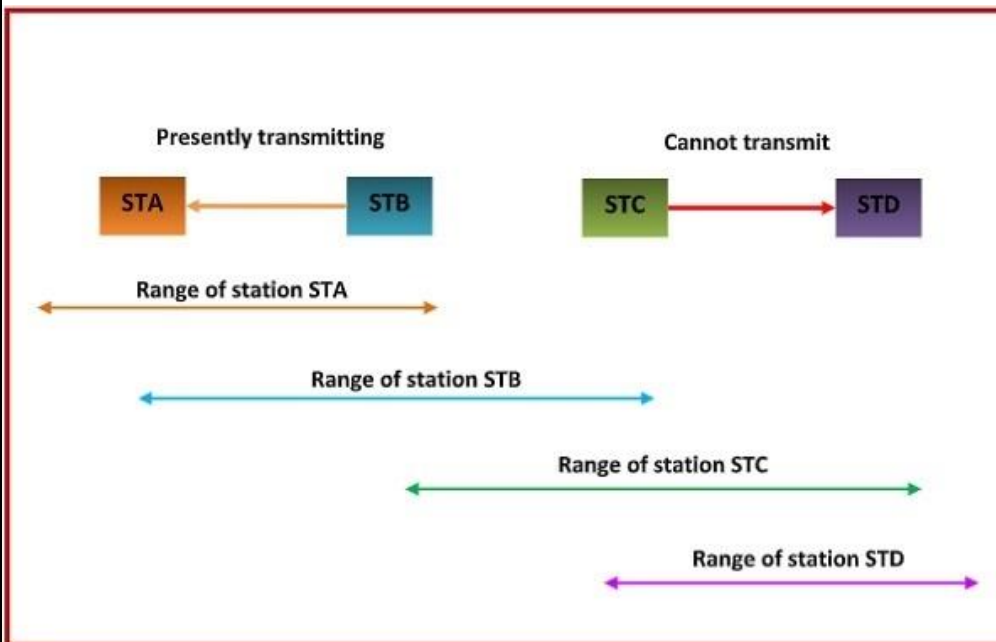
| 6 | With time line diagram, explain CSMA/CA.[10] |
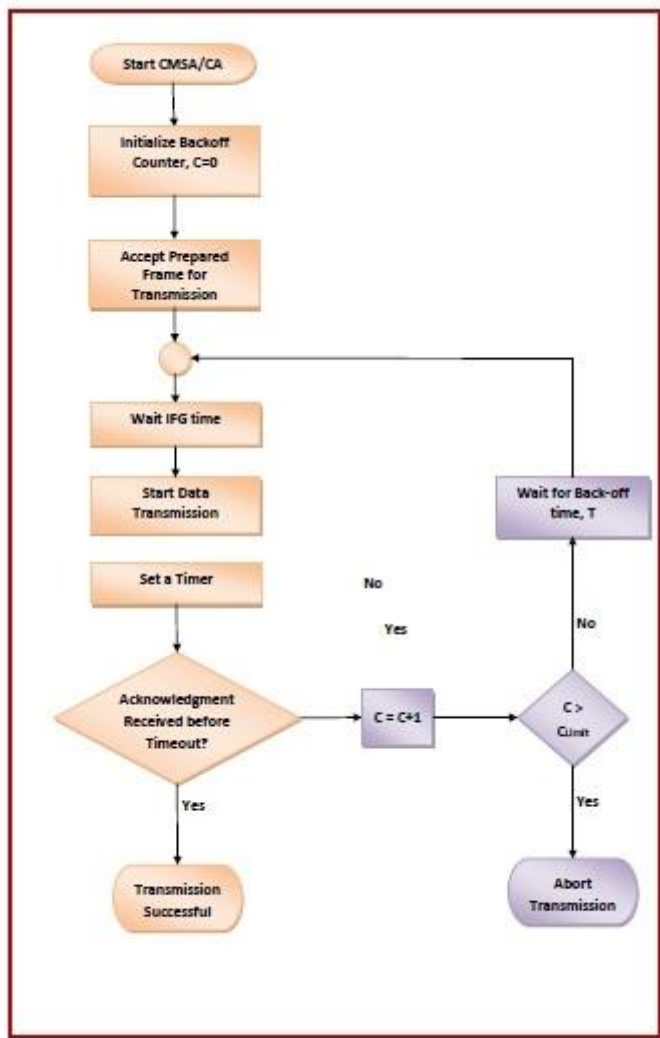
Algorithm

The algorithm of CSMA/CA is:

- When a frame is ready, the transmitting station checks whether the channel is idle or busy.
- If the channel is busy, the station waits until the channel becomes idle.
- If the channel is idle, the station waits for an Inter-frame gap (IFG) amount of time and then sends the frame.
- After sending the frame, it sets a timer.
- The station then waits for acknowledgement from the receiver. If it receives the acknowledgement before expiry of timer, it marks a successful transmission.
- Otherwise, it waits for a back-off time period and restarts the algorithm.

| 7 | Explain FTP protocol with figure. [10] |
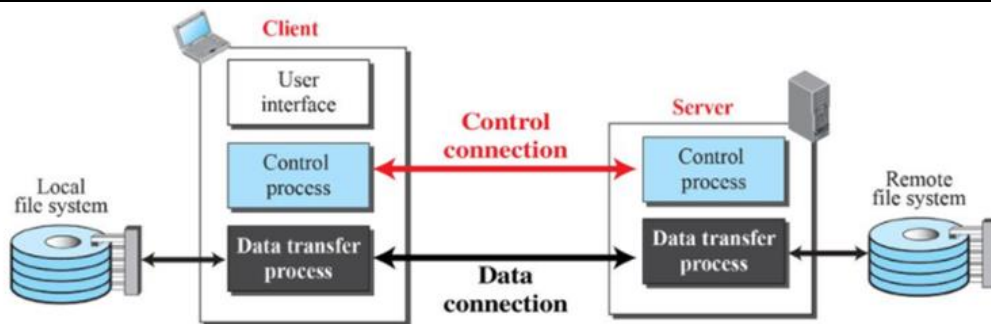
The Figure shows a….

✓ basic model of FTP. The client has three components: the user interface, the client control process, and the client data transfer process.

✓ The server has two components: the server control process and the server data transfer process.

✓ The control connection is made between the control processes.
The data connection is made between the data transfer processes.

- *Communication is achieved through commands and responses.*

- *commands are sent from the client to the server and responses are sent from the server to the client.*

- *This simple method is adequate for the control connection because we send one command (or response) at a time.*

- *Each line is terminated with a two-character (carriage return and line feed) end-of-line token.*