#### Module 01

**1.How many layers are present in the Internet protocol stack (TCP/IP model)?**  
a) 5  
b) 7  
c) 6  
d) 10  
Answer: a  
Explanation: There are five layers in the Internet Protocol stack. The five layers in Internet Protocol stack is Application, Transport, Network, Data link and Physical layer. The internet protocol stack model is also called the TCP/IP model and it’s used in modern Internet Communication.

**2.The number of layers in ISO OSI reference model is \_\_\_\_\_\_\_\_\_\_**  
a) 5  
b) 7  
c) 6  
d) 10  
Answer: b  
Explanation: The seven layers in ISO OSI reference model is Application, Presentation, Session, Transport, Network, Data link and Physical layer. OSI stands for Open System Interconnect and it is a generalized model.

**3.Which of the following layers is an addition to OSI model when compared with TCP IP model?**  
a) Application layer  
b) Presentation layer  
c) Session layer  
d) Session and Presentation layer  
Answer: d  
Explanation: The only difference between OSI model and TCP/IP model is that the functions of Presentation and Session layer in the OSI model are handled by the transport layer itself in TCP/IP. OSI is a generalized model and TCP/IP is an application specific model.

**3.Application layer is implemented in \_\_\_\_\_\_\_\_\_\_\_\_**  
a) End system  
b) NIC  
c) Ethernet  
d) Packet transport  
Answer: a  
Explanation: Not only application layer, but presentation layer, session layer and transport layer are also implemented in the end system. The layers below are implemented outside the end system, for example, the network layer is implemented on the routers and the physical layer is implemented for the medium.

**4.Transport layer is implemented in \_\_\_\_\_\_\_\_\_\_\_\_\_\_**  
a) End system  
b) NIC  
c) Ethernet  
d) Signal transmission  
Answer: a  
Explanation: Application, Presentation, Session and Transport layer are implemented in the end system. The transport layer handles the process to process delivery of the packet through ports.

**5.The functionalities of the presentation layer include \_\_\_\_\_\_\_\_\_\_\_\_**  
a) Data compression  
b) Data encryption  
c) Data description  
d) All of the mentioned  
Answer: d  
Explanation: Some functions of the presentation layer include character-code translation, data conversion, data encryption and decryption, and data translation. It connects the application layer with the layers below converting the human readable text and media to machine readable format and vice-versa.

**6.Delimiting and synchronization of data exchange is provided by \_\_\_\_\_\_\_\_\_\_**  
a) Application layer  
b) Session layer  
c) Transport layer  
d) Link layer  
Answer: b  
Explanation: The session layer provides the mechanism for opening, closing and managing a session between end-user application processes. The session layer 5 is responsible for establishing managing synchronizing and terminating sessions. In TCP/IP protocol stack, the functions of the session layer are handled by the transport layer itself and thus the session layer is missing from the TCP/IP model.

**7.In OSI model, when data is sent from device A to device B, the 5th layer to receive data at B is \_\_\_\_\_\_\_\_\_**  
a) Application layer  
b) Transport layer  
c) Link layer  
d) Session layer  
Answer: d  
Explanation: In OSI reference model, the fifth layer is Session layer. Session layer provides the mechanism for opening, closing and managing a session between end-user application processes. In TCP/IP protocol stack, the functions of the session layer are handled by the transport layer itself and thus the session layer is missing from the TCP/IP model.

**8.In TCP IP Model, when data is sent from device A to device B, the 5th layer to receive data at B is \_\_\_\_\_\_\_\_\_\_\_\_**  
a) Application layer  
b) Transport layer  
c) Link layer  
d) Session layer  
Answer: a  
Explanation: In TCP/IP model, the fifth layer is application layer. When data is sent from device A to device B, the 5th layer to receive data at B is application layer. Application layer provides the interface between applications and the network. The user interacts with only this layer.

**8.In the OSI model, as a data packet moves from the lower to the upper layers, headers are \_\_\_\_\_\_\_**  
a) Added  
b) Removed  
c) Rearranged  
d) Randomized  
Answer: b  
Explanation: In OSI reference model, when data packet moves from lower layers to higher layer, headers get removed. Whereas when the data packet moves from higher layer to lower layers, headers are added. These headers contain the essential control information for the protocols used on the specific layer.

**9.Which of the following statements can be associated with OSI model?**  
a) A structured way to discuss and easier update system components  
b) One layer may duplicate lower layer functionality  
c) Functionality at one layer no way requires information from another layer  
d) It is an application-specific network model  
Answer: c  
Explanation: One layer may use the information from another layer, for example timestamp value. The information is contained in the header inserted by the previous layer. The headers are added as the packet moves from higher layers to the lower layers.

**10.OSI stands for \_\_\_\_\_\_\_\_\_\_**  
a) open system interconnection  
b) operating system interface  
c) optical service implementation  
d) open service Internet  
Answer: a  
Explanation: OSI is the abbreviation for Open System Interconnection. OSI model provides a structured plan on how applications communicate over a network, which also helps us to have a structured plan for troubleshooting. It is recognized by the ISO as the generalized model for computer network i.e. it can be modified to design any kind of computer network.

**11.The number of layers in ISO OSI reference model is \_\_\_\_\_\_\_\_\_\_**  
a) 4  
b) 5  
c) 6  
d) 7  
Answer: d  
Explanation: In OSI reference model, there are 7 layers namely Application, Presentation, Session, Transport, Network, Data Link and Physical layer. Each layer uses a protocol to perform its designated function, for example, the data link layer uses error detection protocols for error control functions.

**12.TCP/IP model does not have \_\_\_\_\_\_ layer but OSI model have this layer.**  
a) session layer  
b) transport layer  
c) application layer  
d) network layer  
Answer: a  
Explanation: In OSI reference model, there are two layers which are not present in TCP/IP model. They are Presentation and Session layer. The functions of Presentation and Session layer in the OSI model are handled by the transport layer itself in TCP/IP.

**13.Which layer is used to link the network support layers and user support layers?**  
a) session layer  
b) data link layer  
c) transport layer  
d) network layer  
Answer: c  
Explanation: Physical, data link and network layers are network support layers and session, presentation and application layers are user support layers. The transport layer links these layers by segmenting and rearranging the data. It uses protocols like TCP and UDP.

**14.Which address is used on the internet for employing the TCP/IP protocols?**  
a) physical address and logical address  
b) port address  
c) specific address  
d) all of the mentioned  
Answer: d  
Explanation: The physical, logical, port and specific addresses are used in TCP/IP protocol. All the addressing schemes, that is physical (MAC) and logical address, port address and specific address are employed in both TCP/IP model and OSI model. In TCP/IP, the addresses are more focused on the internet implementation of these addresses.

**15.TCP/IP model was developed \_\_\_\_\_ the OSI model.**  
a) prior to  
b) after  
c) simultaneous to  
d) with no link to  
Answer: a  
Explanation: Several TCP/IP prototypes were developed at multiple research centers between 1978 and 1983, whereas OSI reference model was developed in the year 1984. TCP/IP was developed with the intention to create a model for the Internet while OSI was intended to be a general network model.

**16.Which layer is responsible for process to process delivery in a general network model?**  
a) network layer  
b) transport layer  
c) session layer  
d) data link layer  
Answer: b  
Explanation: The role of Transport layer (Layer 4) is to establish a logical end to end connection between two systems in a network. The protocols used in Transport layer is TCP and UDP. The transport layer is responsible for segmentation of the data. It uses ports for the implementation of process-to-process delivery.

**17.Which address is used to identify a process on a host by the transport layer?**  
a) physical address  
b) logical address  
c) port address  
d) specific address  
Answer: c  
Explanation: A port number is a way to identify a specific process to which an Internet or other network message is to be forwarded when it arrives at a server. Some examples of port numbers are port 20 which is used for FTP data, port 22 which is used for SSH remote login ,and port 23 which is used for TELNET.

**18.Which layer provides the services to user?**  
a) application layer  
b) session layer  
c) presentation layer  
d) the physical layer  
Answer: a  
Explanation: In networking, a user mainly interacts with application layer to create and send information to other computer or network. Application layer provides the interface between applications and the network. It is the top-most layer in both the TCP/IP and the OSI model.

**19.Transmission data rate is decided by \_\_\_\_\_\_\_\_\_\_\_\_**  
a) network layer  
b) physical layer  
c) data link layer  
d) transport layer  
Answer: b  
Explanation: Physical layer is a layer 1 device which deals with network cables or the standards in use like connectors, pins, electric current used etc. Basically the transmission speed is determined by the cables and connectors used. Hence it is physical layer that determines the transmission speed in network. Some of the cables used for high speed data transmission are optical fiber cables and twisted pair cables.

**20.Physical or logical arrangement of network is \_\_\_\_\_\_\_\_\_\_**  
a) Topology  
b) Routing  
c) Networking  
d) Control  
Answer: a  
Explanation: Topology in networks is the structure or pattern in which each and every node in the network is connected. There are many topologies in networking like bus, tree, ring, star, mesh, and hybrid topology. There is no particular best topology and a suitable topology can be chosen based on the kind of application of the network .

**21.Which network topology requires a central controller or hub?**  
a) Star  
b) Mesh  
c) Ring  
d) Bus  
Answer: a  
Explanation: In star topology, no computer is connected to another computer directly but all the computers are connected to a central hub. Every message sent from a source computer goes through the hub and the hub then forwards the message only to the intended destination computer.

**22.\_\_\_\_\_\_\_ topology requires a multipoint connection.**  
a) Star  
b) Mesh  
c) Ring  
d) Bus  
Answer: d  
Explanation: In bus topology, there is a single cable to which all the network nodes are connected. So whenever a node tries to send a message or data to other nodes, this data passes through all other nodes in the network through the cable. It is really simple to install but it’s not secure enough to be used in most of the computer network applications.

**23.Data communication system spanning states, countries, or the whole world is \_\_\_\_\_\_\_\_**  
a) LAN  
b) WAN  
c) MAN  
d) PAN  
Answer: b  
Explanation: WAN is the abbreviation for Wide Area Network. This network extends over a large geographical area. WANs are used to connect cities, states or even countries. A wireless connection is required to build a WAN. The best example of WAN is the Internet.

**24.Data communication system within a building or campus is\_\_\_\_\_\_\_\_**  
a) LAN  
b) WAN  
c) MAN  
d) PAN  
Answer: a  
Explanation: LAN is an abbreviation for Local Area Network. This network interconnects computers in a small area such as schools, offices, residence etc. It is the most versatile kind of data communication system where most of the computer network concepts can be visibly used.

**25.WAN stands for \_\_\_\_\_\_\_\_\_\_**  
a) World area network  
b) Wide area network  
c) Web area network  
d) Web access network  
Answer: b  
Explanation: WAN is the abbreviation for Wide Area Network. This network extends over a large geographical area. These are used to connect cities, states or even countries. They can be connected through leased lines or satellites.

**26.In TDM, slots are further divided into \_\_\_\_\_\_\_\_\_\_**  
a) Seconds  
b) Frames  
c) Packets  
d) Bits  
Answer: b  
Explanation: TDM is the abbreviation for Time division multiplexing. It is technique for combining several low rate channels to a single high rate channel. For a certain time slot, the several channels could use the maximum bandwidth. Each channel is inactive for a period of time too. Some other multiplexing techniques are Frequency division multiplexing and Phase division multiplexing.

**27.\_\_\_\_\_ is the multiplexing technique that shifts each signal to a different carrier frequency.**  
a) FDM  
b) TDM  
c) Both FDM & TDM  
d) PDM  
Answer: a  
Explanation: FDM is an abbreviation for Frequency Division Multiplexing. This technique is used when the bandwidth of the channel is greater than the combined bandwidth of all the signals which are to be transmitted. The channel is active at all times unless a collision occurs with another channel trying to use the same frequency. Some other multiplexing techniques are Time division multiplexing and Phase division multiplexing.

**28.The sharing of a medium and its link by two or more devices is called \_\_\_\_\_\_\_\_\_**  
a) Fully duplexing  
b) Multiplexing  
c) Micropleixng  
d) Duplexing  
Answer: b  
Explanation: Multiplexing is a method using which one can send multiples signals through a shared medium at the same time. This helps in using less resources and thus saving the cost of sending messages.

**29.Multiplexing is used in \_\_\_\_\_\_\_**  
a) Packet switching  
b) Circuit switching  
c) Data switching  
d) Packet & Circuit switching  
 Answer: b  
Explanation: Circuit switching is a switching method by which one can obtain a physical path between end points. Circuit switching method is also called a connection oriented network. Two nodes must be physically and logically connected to each other to create a circuit switching network.

**30.Which multiplexing technique used to transmit digital signals?**  
a) FDM  
b) TDM  
c) WDM  
d) FDM & WDM  
Answer: b  
Explanation: TDM abbreviation for Time Division Multiplexing is a method used for digital signals. Whereas FDM and WDM abbreviation for Frequency Division Multiplexing, and Wavelength Division Multiplexing, are used for analog signals. TDM is used in applications like ISDN (Integrated Services Digital Network) and PSTN (Public Switched Telephone Network).

**31.If there are n signal sources of same data rate, then the TDM link has \_\_\_\_\_\_\_ slots.**  
a) n  
b) n/2  
c) n\*2  
d) 2n  
Answer: a  
Explanation: In TDM, the total unit of time is divided equally among all the signal sources and each and every source has access to the complete channel bandwidth during its allotted time slot. When the time slot of the source is not active, it remains idle and waits for its slot to begin.

**32.If link transmits 4000frames per second, and each slot has 8 bits, the transmission rate of circuit this TDM is \_\_\_\_\_\_\_\_\_**  
a) 32kbps  
b) 500bps  
c) 500kbps  
d) 32bps  
Answer: a  
Explanation: Transmission rate= frame rate \* number of bits in a slot.  
Given: Frame rate = 4000/sec and number of bits in slot = 8  
Thus, Transmission rate = (4000 \* 8) bps  
= 32000bps  
= 32kbps

**33.The state when dedicated signals are idle are called \_\_\_\_\_\_\_\_\_\_**  
a) Death period  
b) Poison period  
c) Silent period  
d) Stop period  
Answer: c  
Explanation: There are instances when connection between two endpoints has been established, but no communication or transfer of messages occurs. This period of time is called silent period. The silent period ends when either of the two endpoints starts the communication.

**34.Multiplexing provides \_\_\_\_\_\_\_\_\_**  
a) Efficiency  
b) Privacy  
c) Anti jamming  
d) Both Efficiency & Privacy  
Answer: d  
Explanation: Multiplexing helps us to transfer our messages over a shared channel. This brings up the issue of privacy and efficiency. Fortunately, Multiplexing has high efficiency and high privacy when implemented because in the implementation, the transport layer of the OSI network model handles the function of multiplexing through interfaces called ports which provide the required efficiency and privacy.

**35.In TDM, the transmission rate of a multiplexed path is always \_\_\_\_\_\_\_ the sum of the transmission rates of the signal sources.**  
a) Greater than  
b) Lesser than  
c) Equal to  
d) Equal to or greater than  
Answer: a  
Explanation: In TDM the transmission rate provided by the path that is multiplexed will always be greater than the sum of transmission rates of the single sources. This happens because the transmission rate is provided to each source only for a small period of time.

**36.In TDM, slots are further divided into \_\_\_\_\_\_\_\_\_**  
a) Seconds  
b) Frames  
c) Packets  
d) Bits  
Answer: b  
Explanation: TDM is the abbreviation for Time division multiplexing. It is technique for combining several low rate channels to a single high rate channel. For a certain time slot, the several channels could use the maximum bandwidth. Each channel is inactive for a period of time too. Some other multiplexing techniques are Frequency division multiplexing and Phase division multiplexing.

**Module 02**

**1.The physical layer is concerned with \_\_\_\_\_\_\_\_\_\_\_**  
a) bit-by-bit delivery  
p) process to process delivery  
c) application to application delivery  
d) port to port delivery  
Answer: a  
Explanation: Physical layer deals with bit to bit delivery in networking. The data unit in the physical layer is bits. Process to process delivery or the port to port delivery is dealt in the transport layer. The various transmission mediums aid the physical layer in performing its functions.

**2.Which transmission media provides the highest transmission speed in a network?**  
a) coaxial cable  
b) twisted pair cable  
c) optical fiber  
d) electrical cable  
Answer: c  
Explanation: Fiber optics is considered to have the highest transmission speed among the all mentioned above. The fiber optics transmission runs at 1000Mb/s. It is called as 1000Base-Lx whereas IEEE standard for it is 802.3z. It is popularly used for modern day network connections due to its high transmission rate.

**3.Bits can be sent over guided and unguided media as analog signal by \_\_\_\_\_\_\_\_\_\_\_**  
a) digital modulation  
b) amplitude modulation  
c) frequency modulation  
d) phase modulation  
Answer: a  
Explanation: In analog modulation, digital low frequency baseband signal (digital bit stream) is transmitted over a higher frequency. Whereas in digital modulation the only difference is that the base band signal is of discrete amplitude level. The bits are represented by only two frequency levels, one for high and one for low.

**4.The portion of physical layer that interfaces with the media access control sublayer is called \_\_\_\_\_\_\_\_\_\_\_**  
a) physical signalling sublayer  
b) physical data sublayer  
c) physical address sublayer  
d) physical transport sublayer  
Answer: a  
Explanation: The portion of physical layer that interfaces with the medium access control sublayer is Physical Signaling Sublayer. The main function of this layer is character encoding, reception, decoding and performs optional isolation functions. It handles which media connection the signal should be forwarded to physically.

**5.The physical layer provides \_\_\_\_\_\_\_\_\_\_**  
a) mechanical specifications of electrical connectors and cables  
b) electrical specification of transmission line signal level  
c) specification for IR over optical fiber  
d) all of the mentioned  
Answer: d  
Explanation: Anything dealing with a network cable or the standards in use – including pins, connectors and the electric current used is dealt in the physical layer (Layer 1). Physical layer deals with bit to bit delivery of the data aided by the various transmission mediums.

**6.In asynchronous serial communication the physical layer provides \_\_\_\_\_\_\_\_\_\_\_**  
a) start and stop signalling  
b) flow control  
c) both start & stop signalling and flow control  
d) only start signalling  
Answer: c  
Explanation: In asynchronous serial communication, the communication is not synchronized by clock signal. Instead of a start and stop signaling and flow control method is followed. Unlike asynchronous serial communication, in synchronous serial communication a clock signal is used for communication, so the start and stop method is not really required.

**7.The physical layer is responsible for \_\_\_\_\_\_\_\_\_\_**  
a) line coding  
b) channel coding  
c) modulation  
d) all of the mentioned  
 Answer: d  
Explanation: The physical layer is responsible for line coding, channel coding and modulation that is needed for the transmission of the information. The physical configuration including pins, connectors and the electric current used is dealt in the physical layer based on the requirement of the network application.

**8.The physical layer translates logical communication requests from the \_\_\_\_\_\_ into hardware specific operations.**  
a) data link layer  
b) network layer  
c) trasnport layer  
d) application layer  
Answer: a  
Explanation: Physical layer accepts data or information from the data link layer and converts it into hardware specific operations so as to transfer the message through physical cables. Some examples of the cables used are optical fiber cables, twisted pair cables and co-axial cables.

**9.A single channel is shared by multiple signals by \_\_\_\_\_\_\_\_\_\_\_\_**  
a) analog modulation  
b) digital modulation  
c) multiplexing  
d) phase modulation  
Answer: c  
Explanation: In communication and computer networks, the main goal is to share a scarce resource. This is done by multiplexing, where multiple analog or digital signals are combined into one signal over a shared medium. The multiple kinds of signals are designated by the transport layer which is the layer present on a higher level than the physical layer.

**10.Wireless transmission of signals can be done via \_\_\_\_\_\_\_\_\_\_\_=**  
a) radio waves  
b) microwaves  
c) infrared  
d) all of the mentioned  
Answer: d  
Explanation: Wireless transmission is carried out by radio waves, microwaves and IR waves. These waves range from 3 Khz to above 300 Ghz and are more suitable for wireless transmission. Radio waves can penetrate through walls and are used in radio communications, microwaves and infrared (IR) waves cannot penetrate through walls and are used for satellite communications and device communications respectively.

**11.Which of this is not a guided media?**  
a) Fiber optical cable  
b) Coaxial cable  
c) Wireless LAN  
d) Copper wire  
Answer: c  
Explanation: Wireless LAN is unguided media.

**12.UTP is commonly used in \_\_\_\_\_\_\_\_\_\_**  
a) DSL  
b) FTTP  
c) HTTP  
d) None of the mentioned  
Answer: a  
Explanation: Unshielded twisted pair(UTP) is commonly used in home access.

**13.Coaxial cable consists of \_\_\_\_\_\_\_ concentric copper conductors.**  
a) 1  
b) 2  
c) 3  
d) 4  
Answer: b  
Explanation: Coaxial cable has an inner conductor surrounded by a insulating layer, which is surrounded by a conducting shield. Coaxial cable is used to carry high frequency signals with low losses.

**14.Fiber optics posses following properties \_\_\_\_\_\_\_\_\_\_**  
a) Immune electromagnetic interference  
b) Very less signal attenuation  
c) Very hard to tap  
d) All of the mentioned  
Answer: d  
Explanation: In fibre optics the transmission of information is in the form of light or photons. Due to all above properties mentioned in options fibre optics can be submerged in water and are used at more risk environments.

**15.If an Optical Carrier is represented as OC-n, generally the link speed equals(in Mbps) \_\_\_\_\_\_\_\_\_\_**  
a) n\*39.8  
b) n\*51.8  
c) 2n\*51.8  
d) None of the mentioned  
Answer: b  
Explanation: The base unit of transmission rates in optical fibre is 51.8 Mbits/s. So an optical carrier represented as OC-n has n\*51.8 Mbits/s transmission speed. For eg. OC-3 has 3\*51.8 Mbits/s speed.

**16.Terrestrial radio channels are broadly classifed into \_\_\_\_\_ groups.**  
a) 2  
b) 3  
c) 4  
d) 1  
Answer: b  
Explanation: The three types are those that operate over very short distance, those that operate in local areas, those that operate in the wide area.

**17.Radio channels are attractive medium because \_\_\_\_\_\_\_\_\_\_**  
a) Can penetrate walls  
b) Connectivity can be given to mobile user  
c) Can carry signals for long distance  
d) All of the mentioned  
Answer: d  
Explanation: Radio channels can penetrate walls, can be used to provide connectivity to mobile users and can also carry signals for long distances.

**18.Geostationary satellites \_\_\_\_\_\_\_\_\_\_\_**  
a) Are placed at a fixed point above the earth  
b) Rotate the earth about a fixed axis  
c) Rotate the earth about a varying axis  
d) All of the mentioned  
Answer: a  
Explanation: They are placed in orbit at 36,000km above Earth’s surface.

**17.A local telephone network is an example of a \_\_\_\_\_\_\_ network.**  
a) Packet switched  
b) Circuit switched  
c) Bit switched  
d) Line switched  
Answer: b  
Explanation: Circuit switching is connection oriented switching technique, whereas in the case of packet switching, it is connectionless. Circuit switching is implemented in the Physical layer, whereas packet switching is implemented in the Network layer. Internet too is based on the concept of circuit switching.

**18.Most packet switches use this principle \_\_\_\_\_\_\_\_\_\_\_\_**  
a) Stop and wait  
b) Store and forward  
c) Store and wait  
d) Stop and forward  
Answer: b  
Explanation: The packet switch will not transmit the first bit to outbound link until it receives the entire packet. If the entire packet is not received and the time-out period expires, the packet switch will inform the sender to resend the part of packet or the entire packet based on the algorithm being used.

**19.If there are N routers from source to destination, the total end to end delay in sending packet P(L-> number of bits in the packet R-> transmission rate) is equal to \_\_\_\_\_\_\_\_\_\_\_\_\_\_**  
a) N  
b) (N\*L)/R  
c) (2N\*L)/R  
d) L/R  
Answer: b  
Explanation: The equation to find the end to end delay when no. of bits, transmission rate and no. of routers is given by (N\*L)/R. The total end to end delay, that is, nodal delay is the sum of all, the processing delay, queuing delay, transmission delay and propagation delay.

**20.What are the Methods to move data through a network of links and switches?**  
a) Packet switching and Line switching  
b) Circuit switching and Line switching  
c) Line switching and bit switching  
d) Packet switching and Circuit switching  
Answer: d  
Explanation: Packet switching and Circuit switching are two different types of switching methods used to connect the multiple communicating devices with one another. Packet switching is used in conventional LAN systems and circuit switching is used in telephonic systems.

**21.The required resources for communication between end systems are reserved for the duration of the session between end systems in \_\_\_\_\_\_\_\_ method.**  
a) Packet switching  
b) Circuit switching  
c) Line switching  
d) Frequency switching  
Answer: b  
Explanation: In circuit switching, a physical path between the sender and receiver is established. This path is maintained until the connection is needed. Circuit switching is implemented in the Physical layer and is used in telephonic systems.

**22.As the resources are reserved between two communicating end systems in circuit switching, \_\_\_\_\_\_\_\_\_\_\_ is achieved.**  
a) authentication  
b) guaranteed constant rate  
c) reliability  
d) store and forward  
Answer: b  
Explanation: Circuit switching is connection oriented and is always implemented in the physical layer. Once a path is set, all transmission occurs through the same path. It is used since the early times in telephonic systems.

**23.In \_\_\_\_\_\_\_\_\_ systems, resources are allocated on demand.**  
a) packet switching  
b) circuit switching  
c) line switching  
d) frequency switching  
Answer: a  
Explanation: In packet switching, the bits are received in out of order and need to be assembled at the receiver end, whereas in the case of Circuit switching, all the bits are received in order. All transmissions may not occur through the same path in case of packet switching.

**24Which of the following is not an application layer service?**  
a) Network virtual terminal  
b) File transfer, access, and management  
c) Mail service  
d) Error control  
Answer: d  
Explanation: Application layer is the topmost layer in the OSI model. Network virtual terminal, mail service, file transfer, access and management are all services of the application layer. It uses protocols like HTTP, FTP, and DNS etc. to provide these services.

**Module 03**

**1.The data link layer takes the packets from \_\_\_\_\_\_\_\_\_ and encapsulates them into frames for transmission.**  
a) network layer  
b) physical layer  
c) transport layer  
d) application layer  
Answer: a  
Explanation: In computer networks, the data from application layer is sent to transport layer and is converted to segments. These segments are then transferred to the network layer and these are called packets. These packets are then sent to data link layer where they are encapsulated into frames. These frames are then transferred to physical layer where the frames are converted to bits. Error control and flow control data is inserted in the frames at the data link layer.

**2.Which of the following tasks is not done by data link layer?**  
a) framing  
b) error control  
c) flow control  
d) channel coding  
Answer: d  
Explanation: Channel coding is the function of physical layer. Data link layer mainly deals with framing, error control and flow control. Data link layer is the layer where the packets are encapsulated into frames.

**3.Which sublayer of the data link layer performs data link functions that depend upon the type of medium?**  
a) logical link control sublayer   
b) media access control sublayer  
c) network interface control sublayer  
d) error control sublayer  
Answer: b  
Explanation: Media access control (MAC) deals with transmission of data packets to and from the network-interface card, and also to and from another remotely shared channel. The MAC sublayer also prevents collision using protocols like CSMA/CD.

**4.Header of a frame generally contains \_\_\_\_\_\_\_\_\_\_\_\_\_\_**  
a) synchronization bytes  
b) addresses  
c) frame identifier  
d) all of the mentioned  
Answer: d  
Explanation: In a frame, the header is a part of the data that contains all the required information about the transmission of the file. It contains information like synchronization bytes, addresses, frame identifier etc. It also contains error control information for reducing the errors in the transmitted frames.

**5.Automatic repeat request error management mechanism is provided by \_\_\_\_\_\_\_\_**  
a) logical link control sublayer  
b) media access control sublayer  
c) network interface control sublayer  
d) application access control sublayer  
Answer: a  
Explanation: The logical link control is a sublayer of data link layer whose main function is to manage traffic, flow and error control. The automatic repeat request error management mechanism is provided by the LLC when an error is found in the received frame at the receiver’s end to inform the sender to re-send the frame.

**6.When 2 or more bits in a data unit has been changed during the transmission, the error is called \_\_\_\_\_\_\_\_\_\_\_\_**  
a) random error  
b) burst error  
c) inverted error  
d) double error  
Answer: b  
Explanation: When a single bit error occurs in a data, it is called single bit error. When more than a single bit of data is corrupted or has error, it is called burst error. If a single bit error occurs, the bit can be simply repaired by inverting it, but in case of a burst error, the sender has to send the frame again.

**7.CRC stands for \_\_\_\_\_\_\_\_\_\_**  
a) cyclic redundancy check  
b) code repeat check  
c) code redundancy check  
d) cyclic repeat check  
Answer: a  
Explanation: Cyclic redundancy check is a code that is added to a data which helps us to identify any error that occurred during the transmission of the data. CRC is only able to detect errors, not correct them. CRC is inserted in the frame trailer.

**8.Which of the following is a data link protocol?**  
a) ethernet  
b) point to point protocol  
c) hdlc  
d) all of the mentioned  
Answer: d  
Explanation: There are many data link layer protocols. Some of them are SDLC (synchronous data link protocol), HDLC (High level data link control), SLIP (serial line interface protocol), PPP (Point to point protocol) etc. These protocols are used to provide the logical link control function of the Data Link Layer.

**9.Which of the following is the multiple access protocol for channel access control?**  
a) CSMA/CD  
b) CSMA/CA  
c) Both CSMA/CD & CSMA/CA  
d) HDLC  
Answer: c  
Explanation: In CSMA/CD, it deals with detection of collision after collision has occurred, whereas CSMA/CA deals with preventing collision. CSMA/CD is abbreviation for Carrier Sensing Multiple Access/Collision detection. CSMA/CA is abbreviation for Carrier Sensing Multiple Access/Collision Avoidance. These protocols are used for efficient multiple channel access.

**10.The technique of temporarily delaying outgoing acknowledgements so that they can be hooked onto the next outgoing data frame is called \_\_\_\_\_\_\_\_\_\_\_\_**  
a) piggybacking  
b) cyclic redundancy check  
c) fletcher’s checksum  
d) parity check  
Answer: a  
Explanation: Piggybacking is a technique in which the acknowledgment is temporarily delayed so as to be hooked with the next outgoing data frame. It saves a lot of channel bandwidth as in non-piggybacking system, some bandwidth is reserved for acknowledgement.

**11.Multiple access schemes are used to allow \_\_\_\_\_\_\_\_ mobile users to share simultaneously a finite amount of radio spectrum.**  
a) Many  
b) One  
c) Two  
d) Ten-Fifteen  
Answer: a  
Explanation: Multiple access schemes are used to allow many mobile users to share simultaneously a finite amount of radio spectrum. The sharing of spectrum is required to achieve high capacity by simultaneously allocating the available bandwidth to multiple users.  
**12.The technique that makes possible the task of listening and talking in communication system is called \_\_\_\_\_\_\_\_**  
a) Simplex  
b) Duplexing  
c) Modulating  
d) Multiple access technique  
Answer: b  
Explanation: In conventional telephone systems, it is possible to talk and listen simultaneously. This effect is called duplexing and is generally required in wireless telephone systems.  
**13.Frequency division duplexing provides \_\_\_\_\_\_\_\_ distinct bands of frequencies for \_\_\_\_\_\_\_\_\_ user.**  
a) Two, two  
b) One, two  
c) Two, one  
d) Two, many  
Answer: c  
Explanation: Frequency division duplexing (FDD) provides two distinct bands of frequencies for every user. In FDD, any duplex channel actually consists of two simplex channels.

**14.The forward band in FDD provides traffic from the mobile to base station.**  
a) True  
b) False  
Answer: b  
Explanation: The forward band in FDD provides traffic from the base station to the mobile. The reverse band provides traffic from the mobile to the base station.

**15.The frequency separation between each forward and reverse channel changes throughout the system.**  
a) True  
b) False  
Answer: b  
Explanation:The frequency separation between each forward and reverse channel is constant throughout the system. It is regardless of the particular channel being used. A device called a duplexer is used inside each subscriber unit and base station to allow simultaneous bidirectional radio transmission.

**16.Time division duplexing uses \_\_\_\_\_\_\_\_ to provide both a forward and reverse link.**  
a) Frequency  
b) Time  
c) Time and frequency  
d) Cell spacing  
Answer: b  
Explanation: Time division duplexing (TDD) uses time instead of frequency to provide both a forward and reverse link. In TDD, multiple users share a single radio channel by taking turns in the time domain.

**17.TDD is effective for \_\_\_\_\_\_\_\_\_**  
a) Fixed wireless access and users are stationary  
b) Dynamic wireless access and users are stationary  
c) Fixed wireless access and users are moving  
d) Dynamic wireless access and users are moving  
Answer: a  
Explanation: TDD is effective for fixed wireless access when all users are stationary. This makes the propagation delay does not vary in time among the users. Because of rigid timing required for time slotting, TDD generally is limited to cordless phone or short range potable access.

**18.In wideband systems, the transmission bandwidth of a single channel \_\_\_\_\_\_\_\_\_ coherence bandwidth of the channel.**  
a) Equal to  
b) Not related to  
c) Larger than  
d) Smaller than  
Answer: c  
Explanation: In wideband systems, the transmission bandwidth of a single channel is much larger than the coherence bandwidth of the channel. Thus, multipath fading does not greatly vary the received signal power within a wideband channel.

**19.In narrowband system, the channels are usually operated using TDD.**  
a) True  
b) False  
Answer: b  
Explanation: In narrowband system, channels are usually operated using FDD. To minimize interference between forward and reverse links on each channel, the frequency separation is made as great as possible within the frequency spectrum.

**20.Narrowband FDMA allows users to share the same radio channel allocating a unique time slot to each user.**  
a) True  
b) False  
Answer: b  
Explanation: In narrowband FDMA, a user is assigned a particular channel which is not shared by other users in the vicinity. However narrowband TDMA allows the users to share the same radio channel allocating a unique time slot to each user.

**Module 04**

**1.The network layer is concerned with \_\_\_\_\_\_\_\_\_\_ of data.**  
a) bits  
b) frames  
c) packets  
d) bytes  
Answer: c  
Explanation: In computer networks, the data from the application layer is sent to the transport layer and is converted to segments. These segments are then transferred to the network layer and these are called packets. These packets are then sent to data link layer where they are encapsulated into frames. These frames are then transferred to physical layer where the frames are converted to bits.

**2Which one of the following is not a function of the network layer?**  
a) routing  
b) inter-networking  
c) congestion control  
d) error control  
Answer: d  
Explanation: In the OSI model, network layer is the third layer and it provides data routing paths for network communications. Error control is a function of the data link layer and the transport layer.

**3.A 4 byte IP address consists of \_\_\_\_\_\_\_\_\_\_**  
a) only network address  
b) only host address  
c) network address & host address  
d) network address & MAC address  
Answer: c  
Explanation: An ip address which is 32 bits long, that means it is of 4 bytes and is composed of a network and host portion and it depends on address class. The size of the host address and network address depends upon the class of the address in classful IP addressing.

**4.In virtual circuit network each packet contains \_\_\_\_\_\_\_\_\_\_\_**  
a) full source and destination address  
b) a short VC number  
c) only source address  
d) only destination address  
Answer: b  
Explanation: A short VC number also called as VCID (virtual circuit identifier) is a type of identifier which is used to distinguish between several virtual circuits in a connection oriented circuit switched network. Each virtual circuit is used to transfer data over a larger packet switched network.

**5.Which of the following routing algorithms can be used for network layer design?**  
a) shortest path algorithm  
b) distance vector routing  
c) link state routing  
d) all of the mentioned  
Answer: d  
Explanation: The routing algorithm is what decides where a packet should go next. There are several routing techniques like shortest path algorithm, static and dynamic routing, decentralized routing, distance vector routing, link state routing, Hierarchical routing etc. The routing algorithms go hand in hand with the operations of all the routers in the networks. The routers are the main participants in these algorithms.

**6.Which of the following is not correct in relation to multi-destination routing?**  
a) is same as broadcast routing  
b) contains the list of all destinations  
c) data is not sent by packets  
d) there are multiple receivers  
Answer: c  
Explanation: In multi-destination routing, there is more than one receiver and the route for each destination which is contained in a list of destinations is to be found by the routing algorithm. Multi-destination routing is also used in broadcasting.

**7.A subset of a network that includes all the routers but contains no loops is called \_\_\_\_\_\_\_\_**  
a) spanning tree  
b) spider structure  
c) spider tree  
d) special tree  
Answer: a  
Explanation: Spanning tree protocol (STP) is a network protocol that creates a loop free logical topology for ethernet networks. It is a layer 2 protocol that runs on bridges and switches. The main purpose of STP is to ensure that you do not create loops when you have redundant paths in your network.

**8Which one of the following algorithm is not used for congestion control?**  
a) traffic aware routing  
b) admission control  
c) load shedding  
d) routing information protocol  
Answer: d  
Explanation: The Routing Information Protocol (RIP) is used by the network layer for the function of dynamic routing. Congestion control focuses on the flow of the traffic in the network and uses algorithms like traffic aware routing, admission control and load shedding to deal with congestion.

**9The network layer protocol for internet is \_\_\_\_\_\_\_\_\_\_**  
a) ethernet  
b) internet protocol  
c) hypertext transfer protocol  
d) file transfer protocol  
Answer: b  
Explanation: There are several protocols used in Network layer. Some of them are IP, ICMP, CLNP, ARP, IPX, HRSP etc. Hypertext transfer protocol is for application layer and ethernet protocol is for data link layer.

**10.ICMP is primarily used for \_\_\_\_\_\_\_\_\_\_**  
a) error and diagnostic functions  
b) addressing  
c) forwarding  
d) routing  
Answer: a  
Explanation: ICMP abbreviation for Internet Control Message Protocol is used by networking devices to send error messages and operational information indicating a host or router cannot be reached. ICMP operates over the IP packet to provide error reporting functionality as IP by itself cannot report errors.

**11.Which of these is not applicable for IP protocol?**  
a) Connectionless  
b) Offer reliable service  
c) Offer unreliable service  
d) Does not offer error reporting  
Answer: b  
Explanation: IP does not provide reliable delivery service for the data. It’s dependent upon the transport layer protocols like TCP to offer reliability.

**12.Which of the following demerits does Fragmentation have?**  
a) Complicates routers  
b) Open to DOS attack  
c) Overlapping of fragments  
d) All of the mentioned  
Answer: d  
Explanation: Fragmentation makes the implementation of the IP protocol complex and can also be exploited by attackers to create a DOS attack such as a teardrop attack. Fragmentation won’t be required if the transport layer protocols perform wise segmentation.

**13.Which field helps to check rearrangement of the fragments?**  
a) Offset  
b) Flag  
c) TTL  
d) Identifier  
Answer: a  
Explanation: The Fragment Offset field specifies where the fragment fits in the original datagram. The offset of the first fragment will always be 0. The size of the field (13 bits) is 3-bits shorter than the size of the total length field (16 bits).

**14.In classless addressing, there are no classes but addresses are still granted in \_\_\_\_\_\_**  
a) IPs  
b) Blocks  
c) Codes  
d) Sizes  
Answer: b  
Explanation: In classless addressing, there are no classes but addresses are still granted in blocks. The total number of addresses in a block of classless IP addresses = 2(32 – CIDR\_value).

**15.In IPv4 Addresses, classful addressing is replaced with \_\_\_\_\_\_\_\_**  
a) Classless Addressing  
b) Classful Addressing  
c) Classful Advertising  
d) Classless Advertising  
Answer: a  
Explanation: Classful addressing is replaced with classless addressing as a large ratio of the available addresses in a class in calssful addressing is wasted. In classless addressing, one can reserve the number of IP addresses required by modifying the CIDR value and make sure that not many addresses are wasted.

**16.The first address in a block is used as network address that represents the \_\_\_\_\_\_\_\_**  
a) Class Network  
b) Entity  
c) Organization  
d) Codes  
Answer: c  
Explanation: First address in a block is used as network address that represents the organization. The network address can be found by AND’ing any address in the block by the default mask. The last address in a block represents the broadcast address.

**17.In classful addressing, a large part of available addresses are \_\_\_\_\_\_\_\_**  
a) Organized  
b) Blocked  
c) Wasted  
d) Communicated  
Answer: c  
Explanation: In classful addressing, a large part of available addresses are wasted. Thus to solve this classful addressing is replaced with classless addressing where one can reserve the number of IP addresses required by modifying the CIDR value and make sure that not many addresses are wasted.

**18.Network addresses are a very important concept of \_\_\_\_\_\_\_\_**  
a) Routing  
b) Mask  
c) IP Addressing  
d) Classless Addressing  
Answer: c  
Explanation: Network addresses are a very important concept of IP addressing. The first address in a block is used as network address that represents the organization. The network address can be found by AND’ing any address in the block or class by the default mask.

**19.Which of this is not a class of IP address?**  
a) Class E  
b) Class C  
c) Class D  
d) Class F  
Answer: d  
Explanation: Class F is not a class of IP addressing. There are only five classes of IP addresses: Class A (0.0.0.0 to 127.255.255.255), Class B (128.0.0.0 to 191.255.255.255), Class C (192.0.0.0 to 223.255.255.255), Class D (224.0.0.0 to 239.255.255.255), and Class E (240.0.0.0 to 255.255.255.255).

**20.Which of the following is not applicable for IP?**  
a) Error reporting  
b) Handle addressing conventions  
c) Datagram format  
d) Packet handling conventions  
Answer: a  
Explanation: The Internet Protocol is the networking protocol which establishes the internet by relaying datagrams across network boundaries. ICMP is a supporting protocol for IP which handles the Error Reporting functionality.

**21.Which of the following field in IPv4 datagram is not related to fragmentation?**  
a) Flags  
b) Offset  
c) TOS  
d) Identifier  
Answer: c  
Explanation: TOS-type of service identifies the type of packets. It is not related to fragmentation but is used to request specific treatment such as high throughput, high reliability or low latency for the IP packet depending upon the type of service it belongs to.

**22.The TTL field has value 10. How many routers (max) can process this datagram?**  
a) 11  
b) 5  
c) 10  
d) 1  
Answer: c  
Explanation: TTL stands for Time to Live. This field specifies the life of the IP packet based on the number of hops it makes (Number of routers it goes through). TTL field is decremented by one each time the datagram is processed by a router. When the value is 0, the packet is automatically destroyed.

**23.If the value in protocol field is 17, the transport layer protocol used is \_\_\_\_\_\_\_\_\_\_\_\_\_**  
a) TCP  
b) UDP  
c) ICMP  
d) IGMP  
Answer: b  
Explanation: The protocol field enables the demultiplexing feature so that the IP protocol can be used to carry payloads of more than one protocol type. Its most used values are 17 and 6 for UDP and TCP respectively. ICMP and IGMP are network layer protocols.

**24.The data field cannot carry which of the following?**  
a) TCP segment  
b) UDP segment  
c) ICMP messages  
d) SMTP messages  
Answer: c  
Explanation: Data field usually has transport layer segments, but it can also carry ICMP messages. SMTP is an application layer protocol. First it must go through the transport layer to be converted into TCP segments and then it can be inserted into IP packets.

**25.What should be the flag value to indicate the last fragment?**  
a) 0  
b) 1  
c) TTl value  
d) Protocol field value  
Answer: a  
Explanation: The Flag field in the IP header is used to control and identify the fragments. It contains three bits: reserved, don’t fragment and more fragments. If the more fragments bit is 0, it means that the fragment is the last fragment.

**26.Which of these is not applicable for IP protocol?**  
a) is connectionless  
b) offer reliable service  
c) offer unreliable service  
d) does not offer error reporting  
Answer: b  
Explanation: IP does not provide reliable delivery service for the data. It’s dependent upon the transport layer protocols like TCP to offer reliability.

**27.Which of the following demerits does Fragmentation have?**  
a) complicates routers  
b) open to DOS attack  
c) overlapping of fragments.  
d) all of the mentioned  
Answer: d  
Explanation: Fragmentation makes the implementation of the IP protocol complex and can also be exploited by attackers to create a DOS attack such as a teardrop attack. Fragmentation won’t be required if the transport layer protocols perform wise segmentation.

**28.Which field helps to check rearrangement of the fragments?**  
a) offset  
b) flag  
c) ttl  
d) identifer  
Answer: a  
Explanation: The Fragment Offset field specifies where the fragment fits in the original datagram. The offset of the first fragment will always be 0. The size of the field (13 bits) is 3-bits shorter than the size of the total length field (16 bits).

**29.Dijkstra’s Algorithm is used to solve \_\_\_\_\_\_\_\_\_\_\_\_\_ problems.**  
a) All pair shortest path  
b) Single source shortest path  
c) Network flow  
d) Sorting  
Answer: b  
Explanation: Dijkstra’s Algorithm is used for solving single source shortest path problems. In this algorithm, a single node is fixed as a source node and shortest paths from this node to all other nodes in graph is found.

**30.Which of the following is the most commonly used data structure for implementing Dijkstra’s Algorithm?**  
a) Max priority queue  
b) Stack  
c) Circular queue  
d) Min priority queue  
Answer: d  
Explanation: Minimum priority queue is the most commonly used data structure for implementing Dijkstra’s Algorithm because the required operations to be performed in Dijkstra’s Algorithm match with specialty of a minimum priority queue.

**31.What is the time complexity of Dijikstra’s algorithm?**  
a) O(N)  
b) O(N3)  
c) O(N2)  
d) O(logN)  
Answer: c  
Explanation: Time complexity of Dijkstra’s algorithm is O(N2) because of the use of doubly nested for loops. It depends on how the table is manipulated.

**32.Dijkstra’s Algorithm cannot be applied on \_\_\_\_\_\_\_\_\_\_\_\_\_\_**  
a) Directed and weighted graphs  
b) Graphs having negative weight function  
c) Unweighted graphs  
d) Undirected and unweighted graphs  
Answer: b  
Explanation: Dijkstra’s Algorithm cannot be applied on graphs having negative weight function because calculation of cost to reach a destination node from the source node becomes complex.

**33.What is the pseudo code to compute the shortest path in Dijkstra’s algorithm?**  
a)

if(!T[w].Known)

  if(T[v].Dist + C(v,w) < T[w].Dist)  {

                 Decrease(T[w].Dist to T[v].Dist +C(v,w));

                T[w].path=v; }  
b)

if(T[w].Known)

  if(T[v].Dist + C(v,w) < T[w].Dist)  {

                 Increase (T[w].Dist to T[v].Dist +C(v,w));

                T[w].path=v; }  
c)

if(!T[w].Known)

  if(T[v].Dist + C(v,w) > T[w].Dist)  {

                 Decrease(T[w].Dist to T[v].Dist +C(v,w);

                  T[w].path=v; }  
d)

if(T[w].Known)

  if(T[v].Dist + C(v,w) < T[w].Dist)  {

                 Increase(T[w].Dist to T[v].Dist);

                T[w].path=v; }  
Answer: a  
Explanation: If the known value of the adjacent vertex(w) is not set then check whether the sum of distance from source vertex(v) and cost to travel from source to adjacent vertex is less than the existing distance of the adjacent node. If so, perform decrease key operation.

**34.How many priority queue operations are involved in Dijkstra’s Algorithm?**  
a) 1  
b) 3  
c) 2  
d) 4  
Answer: b  
Explanation: The number of priority queue operations involved is 3. They are insert, extract-min and decrease key.

**35.How many times the insert and extract min operations are invoked per vertex?**  
a) 1  
b) 2  
c) 3  
d) 0  
Answer: a  
Explanation: Insert and extract min operations are invoked only once per vertex because each vertex is added only once to the set and each edge in the adjacency list is examined only once during the course of algorithm.

**36.The maximum number of times the decrease key operation performed in Dijkstra’s algorithm will be equal to \_\_\_\_\_\_\_\_\_\_\_**  
a) Total number of vertices  
b) Total number of edges  
c) Number of vertices – 1  
d) Number of edges – 1  
Answer: b  
Explanation: If the total number of edges in all adjacency list is E, then there will be a total of E number of iterations, hence there will be a total of at most E decrease key operations.

**37.What is running time of Dijkstra’s algorithm using Binary min- heap method?**  
a) O(V)  
b) O(VlogV)  
c) O(E)  
d) O(ElogV)  
Answer: d  
Explanation: Time required to build a binary min heap is O(V). Each decrease key operation takes O(logV) and there are still at most E such operations. Hence total running time is O(ElogV).

**38.The running time of Bellmann Ford algorithm is lower than that of Dijkstra’s Algorithm.**  
a) True  
b) False  
Answer: b  
Explanation: The number of iterations involved in Bellmann Ford Algorithm is more than that of Dijkstra’s Algorithm.

**39.Dijkstra’s Algorithm run on a weighted, directed graph G={V,E} with non-negative weight function w and source s, terminates with d[u]=delta(s,u) for all vertices u in V.**  
a) True  
b) False  
Answer: a  
Explanation: The equality d[u]=delta(s,u) holds good when vertex u is added to set S and this equality is maintained thereafter by the upper bound property.

**40.Given pseudo code of Dijkstra’s Algorithm.**  
**1. *//Initialise single source(G,s)***  
**2. S=0**  
**3. Q=V[G]**  
**4. While Q != 0**  
**5. Do u=extract-min(Q)**  
**6. S=S union {u}**  
**7. For each vertex v in adj[u]**  
**8. Do relax(u,v,w)**  
**What happens when while loop in line 4 is changed to while Q>1?**  
a) While loop gets executed for v times  
b) While loop gets executed for v-1 times  
c) While loop gets executed only once  
d) While loop does not get executed  
Answer: b  
Explanation: In the normal execution of Dijkstra’s Algorithm, the while loop gets executed V times. The change in the while loop statement causes it to execute only V – 1 times.

**42Dijkstra’s Algorithm is the prime example for \_\_\_\_\_\_\_\_\_\_\_**  
a) Greedy algorithm  
b) Branch and bound  
c) Back tracking  
d) Dynamic programming  
Answer: a  
Explanation: Dijkstra’s Algorithm is the prime example for greedy algorithms because greedy algorithms generally solve a problem in stages by doing what appears to be the best thing at each stage.

**43.Internet Control Message Protocol (ICMP) has been designed to compensate \_\_\_\_\_\_\_\_\_**  
a) Error-reporting  
b) Error-correction  
c) Host and management queries  
d) All of the mentioned  
Answer: d  
Explanation: IP by itself does not provide the features of error reporting or error correction. So, to address these issues a network layer protocol called Internet Control Message Protocol is used. ICMP operates over the IP packet to provide error reporting functionality.

**44.Header size of the ICMP message is \_\_\_\_\_\_\_\_\_**  
a) 8-bytes  
b) 8-bits  
c) 16-bytes  
d) 16-bits  
Answer: a  
Explanation: An ICMP message has an 8-byte header and a variable size data section. Out of the 8 bytes, the first 4 bytes are of a fixed format having the type, code and checksum fields and the next 4 bytes depend upon the type of the message.

**45.During error reporting, ICMP always reports error messages to \_\_\_\_\_\_\_\_**  
a) Destination  
b) Source  
c) Next router  
d) Previous router  
Answer: b  
Explanation: ICMP notifies the source about the error when an error is detected because the datagram knows information about source and destination IP address. The source can then retransmit the data again or try to correct those errors.

**46.Which of these is not a type of error-reporting message?**  
a) Destination unreachable  
b) Source quench  
c) Router error  
d) Time exceeded  
Answer: c  
Explanation: Router error is not a type of error-reporting message in ICMP. The type of error reporting message is specified in the ICMP header. Destination unreachable is type 3 error message, source quench is type 4, and time exceeded is type 11 error message.

**47.ICMP error message will not be generated for a datagram having a special address such as \_\_\_\_\_\_\_**  
a) 127.0.0.0  
b) 12.1.2  
c) 11.1  
d) 127  
Answer: a  
Explanation: 127.0.0.0 is a special address known as the loopback address which is used for testing purpose of a machine without actually communicating with a network. Thus no error reporting message will be generated for such special addresses.

**48.When a router cannot route a datagram or host cannot deliver a datagram, the datagram is discarded and the router or the host sends a \_\_\_\_\_\_\_\_\_\_\_\_ message back to the source host that initiated the datagram.**  
a) Destination unreachable  
b) Source quench  
c) Router error  
d) Time exceeded  
Answer: a  
Explanation: Router sends destination unreachable message if the destination is not found. Destination unreachable is type 3 error reporting message. It is invoked when the router can’t find a path to the intended destination to forward the packet through.

**49.The source-quench message in ICMP was designed to add a kind of \_\_\_\_\_\_\_\_\_\_\_\_ to the IP.**  
a) error control  
b) flow control  
c) router control  
d) switch control  
Answer: b  
Explanation: Firstly, it informs the source that the datagram has been discarded. Secondly, it warns the source that there is congestion in the network. It’s type 4 error reporting message after which the source is expected to reduce the flow of packets.

**50.In case of time exceeded error, when the datagram visits a router, the value of time to live field is \_\_\_\_\_\_\_\_\_**  
a) Remains constant  
b) Decremented by 2  
c) Incremented by 1  
d) Decremented by 1  
Answer: d  
Explanation: This field will be decremented by 1 at every router, and will be zero by the time it reaches source. This error reporting message is type 11 and is used to prevent the router from travelling forever in case some unknown path anomaly occurs.

**51.Two machines can use the timestamp request and timestamp replay messages to determine the \_\_\_\_\_\_\_\_\_\_\_ needed for an IP datagram to travel between them.**  
a) Half-trip time  
b) Round-trip time  
c) Travel time for the next router  
d) Time to reach the destination/source  
Answer: b  
Explanation: The round-trip time refers to the total time taken combining the time taken for a packet sent from a source to reach a destination and the time taken the acknowledgement sent by the destination to reach the source. The Router sends destination unreachable message if the destination is not found.

**52.During debugging, we can use the \_\_\_\_\_\_\_\_\_\_\_\_ program to find if a host is alive and responding.**  
a) traceroute  
b) shell  
c) ping  
d) java  
Answer: c  
Explanation: Ping program is used to find if a host is alive and responding. It is to be entered into a command line with the syntax “ping (IP address)” to be executed. Traceroute is a program used to find the shortest route to the destination IP.

**Module 05**

**1.Transport layer aggregates data from different applications into a single stream before passing it to \_\_\_\_\_\_\_\_\_\_\_\_**  
a) network layer  
b) data link layer  
c) application layer  
d) physical layer  
Answer: a  
Explanation: The flow of data in the OSI model flows in following manner Application -> Presentation -> Session -> Transport -> Network -> Data Link -> Physical. Each and every layer has its own set of functions and protocols to ensure efficient network performance.

**2.Which of the following are transport layer protocols used in networking?**  
a) TCP and FTP  
b) UDP and HTTP  
c) TCP and UDP  
d) HTTP and FTP  
Answer: c  
Explanation: Both TCP and UDP are transport layer protocol in networking. TCP is an abbreviation for Transmission Control Protocol and UDP is an abbreviation for User Datagram Protocol. TCP is connection oriented whereas UDP is connectionless.

**2.User datagram protocol is called connectionless because \_\_\_\_\_\_\_\_\_\_\_\_\_**  
a) all UDP packets are treated independently by transport layer  
b) it sends data as a stream of related packets  
c) it is received in the same order as sent order  
d) it sends data very quickly  
Answer: a  
Explanation: UDP is an alternative for TCP and it is used for those purposes where speed matters most whereas loss of data is not a problem. UDP is connectionless whereas TCP is connection oriented.

**3.Transmission control protocol \_\_\_\_\_\_\_\_\_\_\_**  
a) is a connection-oriented protocol  
b) uses a three way handshake to establish a connection  
c) receives data from application as a single stream  
d) all of the mentioned  
Answer: d  
Explanation: TCP provides reliable and ordered delivery of a stream of bytes between hosts communicating via an IP network. Major internet applications like www, email, file transfer etc rely on TCP. TCP is connection oriented and it is optimized for accurate delivery rather than timely delivery.

**4.An endpoint of an inter-process communication flow across a computer network is called \_\_\_\_\_\_\_\_\_\_**  
a) socket  
b) pipe  
c) port  
d) machine  
Answer: a  
Explanation: Socket is one end point in a two way communication link in the network. TCP layer can identify the application that data is destined to be sent by using the port number that is bound to socket.

**5.Socket-style API for windows is called \_\_\_\_\_\_\_\_\_\_\_\_**  
a) wsock  
b) winsock  
c) wins  
d) sockwi  
Answer: b  
Explanation: Winsock is a programming interface which deals with input output requests for internet applications in windows OS. It defines how windows network software should access network services.

**6.Which one of the following is a version of UDP with congestion control?**  
a) datagram congestion control protocol  
b) stream control transmission protocol  
c) structured stream transport  
d) user congestion control protocol  
Answer: a  
Explanation: The datagram congestion control is a transport layer protocol which deals with reliable connection setup, teardown, congestion control, explicit congestion notification, and feature negotiation. It is used in modern day systems where there are really high chances of congestion. The protocol was last updated in the year 2008.

**7.A \_\_\_\_\_ is a TCP name for a transport service access point.**  
a) port  
b) pipe  
c) node  
d) protocol  
Answer: a  
Explanation: Just as the IP address identifies the computer, the network port identifies the application or service running on the computer. A port number is 16 bits. The combination of IP address preceded with the port number is called the socket address.  
**8.Transport layer protocols deals with \_\_\_\_\_\_\_\_\_\_\_\_**  
a) application to application communication  
b) process to process communication  
c) node to node communication  
d) man to man communication  
Answer: b  
Explanation: Transport layer is 4th layer in TCP/IP model and OSI reference model. It deals with logical communication between process. It is responsible for delivering a message between network host.

**9.Which of the following is a transport layer protocol?**  
a) stream control transmission protocol  
b) internet control message protocol  
c) neighbor discovery protocol  
d) dynamic host configuration protocol  
 Answer: a  
Explanation: The Stream Control Transmission Protocol (SCTP) is a transport layer protocol used in networking system where streams of data are to be continuously transmitted between two connected network nodes. Some of the other transport layer protocols are RDP, RUDP, TCP, DCCP, UDP etc.

**10.Which of the following is false with respect to UDP?**  
a) Connection-oriented  
b) Unreliable  
c) Transport layer protocol  
d) Low overhead  
Answer: a  
Explanation: UDP is an unreliable, connectionless transport layer protocol that provides message-based data transmission. TCP is an example of connection-oriented protocols.

**11.Return value of the UDP port “Chargen” is \_\_\_\_\_\_\_**  
a) String of characters  
b) String of integers  
c) Array of characters with integers  
d) Array of zero’s and one’s  
Answer: a  
Explanation: Using Chargen with UDP on port 19, the server sends a UDP datagram containing a random number of characters every time it receives a datagram from the connecting host. The number of characters is between 0 and 512.

**12.Beyond IP, UDP provides additional services such as \_\_\_\_\_\_\_**  
a) Routing and switching  
b) Sending and receiving of packets  
c) Multiplexing and demultiplexing  
d) Demultiplexing and error checking  
Answer: d  
Explanation: De-multiplexing is the delivering of received segments to the correct application layer processes at the recipients end using UDP. Error checking is done through checksum in UDP.

**13.What is the main advantage of UDP?**  
a) More overload  
b) Reliable  
c) Low overhead  
d) Fast  
Answer: c  
Explanation: As UDP does not provide assurance of delivery of packet, reliability and other services, the overhead taken to provide these services is reduced in UDP’s operation. Thus, UDP provides low overhead, and higher speed.

**14.Port number used by Network Time Protocol (NTP) with UDP is \_\_\_\_\_\_\_\_**  
a) 161  
b) 123  
c) 162  
d) 124  
Answer: b  
Explanation: The Network Time Protocol is a clock synchronization network protocol implemented by using UDP port number 123 to send and receive time stamps.

**15.What is the header size of a UDP packet?**  
a) 8 bytes  
b) 8 bits  
c) 16 bytes  
d) 124 bytes  
Answer: a  
Explanation: The fixed size of the UDP packet header is 8 bytes. It contains four two-byte fields: Source port address, Destination port address, Length of packet, and checksum.

**16.The port number is “ephemeral port number”, if the source host is \_\_\_\_\_\_\_**  
a) NTP  
b) Echo  
c) Server  
d) Client  
Answer: d  
Explanation: Port numbers from 1025 to 5000 are used as ephemeral port numbers in Windows Operating System. Ephemeral port numbers are short-lived port numbers which can be used for clients in a UDP system where there are temporary clients all the time.

**17.“Total length” field in UDP packet header is the length of \_\_\_\_\_\_\_\_\_**  
a) Only UDP header  
b) Only data  
c) Only checksum  
d) UDP header plus data  
Answer: d  
Explanation: Total length is the 16 bit field which contains the length of UDP header and the data. The maximum value of the Total length field and the maximum size of a UDP datagram is 65,535 bytes (8 byte header + 65,527 bytes of data).

**18.Which is the correct expression for the length of UDP datagram?**  
a) UDP length = IP length – IP header’s length  
b) UDP length = UDP length – UDP header’s length  
c) UDP length = IP length + IP header’s length  
d) UDP length = UDP length + UDP header’s length  
Answer: a  
Explanation: A user datagram is encapsulated in an IP datagram. There is a field in the IP header that defines the total length of the IP packet. There is another field in the IP header that defines the length of the header. So if we subtract the length of the IP header that is encapsulated in the IP packet, we get the length of UDP datagram.

**19.The \_\_\_\_\_\_ field is used to detect errors over the entire user datagram.**  
a) udp header  
b) checksum  
c) source port  
d) destination port  
Answer: b  
Explanation: Checksum field is used to detect errors over the entire user datagram. Though it is not as efficient as CRC which is used in TCP, it gets the job done for the UDP datagram as UDP doesn’t have to ensure the delivery of the packet.

**20.Which of the following is false with respect to TCP?**  
a) Connection-oriented  
b) Process-to-process  
c) Transport layer protocol  
d) Unreliable  
Answer: d  
Explanation: TCP is a transport layer protocol that provides reliable and ordered delivery of a stream of bytes between hosts communicating via an IP network.

**21.In TCP, sending and receiving data is done as \_\_\_\_\_\_\_**  
a) Stream of bytes  
b) Sequence of characters  
c) Lines of data  
d) Packets  
Answer: a  
Explanation: TCP provides stream oriented delivery between hosts communicating via an IP network and there are no message boundaries. TCP can concatenate data from a number of send () commands into one stream of data and still transmit it reliably.

**22.TCP process may not write and read data at the same speed. So we need \_\_\_\_\_\_\_\_\_\_ for storage.**  
a) Packets  
b) Buffers  
c) Segments  
d) Stacks  
Answer: b  
Explanation: A TCP receiver has a receive buffer that is used to store the unprocessed incoming packets in case the sender is sending packets faster than the processing rate of the received packets.

**23.TCP groups a number of bytes together into a packet called \_\_\_\_\_\_\_**  
a) Packet  
b) Buffer  
c) Segment  
d) Stack  
Answer: c  
Explanation: A segment may be collection of data from many send () statements. TCP transmits each segment as a stream of bytes

**24.Communication offered by TCP is \_\_\_\_\_\_\_\_**  
a) Full-duplex  
b) Half-duplex  
c) Semi-duplex  
d) Byte by byte  
Answer: a  
Explanation: Data can flow both the directions at the same time during a TCP communication hence, it is full-duplex. This is the reason why TCP is used in systems that require full-duplex operation such as e-mail systems.

**25.To achieve reliable transport in TCP, \_\_\_\_\_\_\_\_\_\_\_ is used to check the safe and sound arrival of data.**  
a) Packet  
b) Buffer  
c) Segment  
d) Acknowledgment  
Answer: d  
Explanation: Acknowledgment mechanism is used to check the safe and sound arrival of data. The sender actively checks for acknowledgement from the receiver and once a specific time period has passed, it retransmits the data.

**26.In segment header, sequence number and acknowledgement number fields refer to \_\_\_\_\_\_\_**  
a) Byte number  
b) Buffer number  
c) Segment number  
d) Acknowledgment  
Answer: a  
Explanation: As TCP has to ensure ordered delivery of packets, sequence number and acknowledgement number are used to identify the byte number of the packet in the stream of bytes being transmitted.

**27.Suppose a TCP connection is transferring a file of 1000 bytes. The first byte is numbered 10001. What is the sequence number of the segment if all data is sent in only one segment?**  
a) 10000  
b) 10001  
c) 12001  
d) 11001  
Answer: b  
Explanation: The sequence number given to first byte of a segment, with respect to its order among the previous segments, is the sequence number of that segment.

**28.Bytes of data being transferred in each connection are numbered by TCP. These numbers start with a \_\_\_\_\_\_\_\_\_**  
a) Fixed number  
b) Random sequence of 0’s and 1’s  
c) One  
d) Sequence of zero’s and one’s

Answer: d  
Explanation: One might expect the sequence number of the first byte in the stream to be 0, or 1. But that does not happen in TCP, Instead, the sender has to choose an Initial Sequence Number (ISN), which is basically a random 32 bit sequence of 0’s and 1’s, during the connection handshake.

**29.The value of acknowledgement field in a segment defines \_\_\_\_\_\_\_**  
a) sequence number of the byte received previously  
b) total number of bytes to receive  
c) sequence number of the next byte to be received  
d) sequence of zeros and ones  
Answer: c  
Explanation: The acknowledgement field in a segment defines the sequence number of the byte which is to be received next i.e. sequence number of byte that the sender should transmit next.

**Module 06**

**1. Which is not an application layer protocol?**

a) HTTP  
b) SMTP  
c) FTP  
d) TCP  
Answer: d  
Explanation: TCP is transport layer protocol.

**2.The packet of information at the application layer is called \_\_\_\_\_\_\_\_\_\_**  
a) Packet  
b) Message  
c) Segment  
d) Frame  
Answer: b  
Explanation: For Application, Presentation and Session layers there is no data format for message. Message is message as such in these three layers. But when it comes to Transport, Network, Data and Physical layer they have data in format of segments, packets, frames and bits respectively.

**3.Which one of the following is an architecture paradigms?**  
a) Peer to peer  
b) Client-server  
c) HTTP  
d) Both Peer-to-Peer & Client-Server  
Answer: d  
Explanation: HTTP is a protocol.

**4.Application developer has permission to decide the following on transport layer side**  
a) Transport layer protocol  
b) Maximum buffer size  
c) Both Transport layer protocol and Maximum buffer size  
d) None of the mentioned  
Answer: c  
Explanation: Application layer provides the interface between applications and the network. So application developer can decide what transport layer to use and what should be its maximum buffer size.

**5.Application layer offers \_\_\_\_\_\_\_ service.**  
a) End to end  
b) Process to process  
c) Both End to end and Process to process  
d) None of the mentioned  
Answer: a  
Explanation: End to End service is provided in the application layer. Whereas process to process service is provided at the transport layer.

**6.E-mail is \_\_\_\_\_\_\_\_\_**  
a) Loss-tolerant application  
b) Bandwidth-sensitive application  
c) Elastic application  
d) None of the mentioned  
Answer: c  
Explanation: Because it can work with available throughput.

**7. Pick the odd one out.**  
a) File transfer  
b) File download  
c) E-mail  
d) Interactive games  
Answer: d  
Explanation: File transfer, File download and Email are services provided by the application layer and there are message and data oriented.

**8. Which of the following is an application layer service?**  
a) Network virtual terminal  
b) File transfer, access, and management  
c) Mail service  
d) All of the mentioned  
 Answer: d  
Explanation: The services provided by the application layer are network virtual terminal, file transfer, access and management, mail services, directory services, various file and data operations.

**9. To deliver a message to the correct application program running on a host, the \_\_\_\_\_\_\_ address must be consulted.**  
a) IP  
b) MAC  
c) Port  
d) None of the mentioned  
Answer: c  
Explanation: IP address lets you know where the network is located. Whereas MAC address is a unique address for every device. Port address identifies a process or service you want to carry on.

**10. Which is a time-sensitive service?**  
a) File transfer  
b) File download  
c) E-mail  
d) Internet telephony  
Answer: d  
Explanation: Internet telephony is Loss-tolerant other applications are not.

**11. Transport services available to applications in one or another form \_\_\_\_\_\_\_\_\_**  
a) Reliable data transfer  
b) Timing  
c) Security  
d) All of the mentioned  
Answer: d  
Explanation: The transport services that are provided to application are reliable data transfer, security and timing. These are very important for proper end to end services.

**12. Electronic mail uses which Application layer protocol?**  
a) SMTP  
b) HTTP  
c) FTP  
d) SIP  
Answer: a  
Explanation: Email uses various protocols like SMTP, IMAP and POP. The most prominent one used in application layer is SMTP.  
This set of Computer Networks Multiple Choice Questions & Answers (MCQs) focuses on “Application Layer – 2”.

**13. The \_\_\_\_\_\_\_\_\_\_\_\_ translates internet domain and host names to IP address.**  
a) domain name system  
b) routing information protocol  
c) network time protocol  
d) internet relay chat  
Answer: a  
Explanation: Domain name system is the way the internet domain names are stored and translated to IP addresses. The domain names systems matches the name of website to ip addresses of the website.

**14. Which one of the following allows a user at one site to establish a connection to another site and then pass keystrokes from local host to remote host?**  
a) HTTP  
b) FTP  
c) Telnet  
d) TCP  
Answer: c  
Explanation: Telnet is used for accessing remote computers. Using telnet a user can access computer remotely. With Telnet, you can log on as a regular user with whatever privileges you may have been granted to the specific application and data on the computer.

**15. Application layer protocol defines \_\_\_\_\_\_\_\_\_\_\_\_**  
a) types of messages exchanged  
b) message format, syntax and semantics  
c) rules for when and how processes send and respond to messages  
d) all of the mentioned  
Answer: d  
Explanation: Application layer deals with the user interface, what message is to be sent or the message format, syntax and semantics. A user has access to application layer for sending and receiving messages.

**16. Which one of the following protocol delivers/stores mail to reciever server?**  
a) simple mail transfer protocol  
b) post office protocol  
c) internet mail access protocol  
d) hypertext transfer protocol  
Answer: a  
Explanation: SMTP, abbreviation for Simple Mail Transfer Protocol is an application layer protocol. A client who wishes to send a mail creates a TCP connection to the SMTP server and then sends the mail across the connection.

**17. The ASCII encoding of binary data is called**  
a) base 64 encoding  
b) base 32 encoding  
c) base 16 encoding  
d) base 8 encoding  
Answer: a  
Explanation: Base64 is used commonly in a number of applications including email via MIME, and storing complex data in XML. Problem with sending normal binary data to a network is that bits can be misinterpreted by underlying protocols, produce incorrect data at receiving node and that is why we use this code.

**18. Which one of the following is an internet standard protocol for managing devices on IP network?**  
a) dynamic host configuration protocol  
b) simple network management protocol  
c) internet message access protocol  
d) media gateway protocol  
Answer: b  
Explanation: SNMP is a set of protocols for network management and monitoring. This protocol is included in the application layer. SNMP uses 7 protocol data units.

**19. Which one of the following is not an application layer protocol?**  
a) media gateway protocol  
b) dynamic host configuration protocol  
c) resource reservation protocol  
d) session initiation protocol  
Answer: c  
Explanation: Resource reservation protocol is used in transport layer. It is designed to reserve resources across a network for quality of service using the integrated services model.

**20. Which protocol is a signaling communication protocol used for controlling multimedia communication sessions?**  
a) session initiation protocol  
b) session modelling protocol  
c) session maintenance protocol  
d) resource reservation protocol  
Answer: a  
Explanation: SIP is a signaling protocol in which its function includes initiating, maintaining and terminating real time sessions. SIP is used for signaling and controlling multimedia sessions.

**21. Which one of the following is not correct?**  
a) Application layer protocols are used by both source and destination devices during a communication session  
b) HTTP is a session layer protocol  
c) TCP is an application layer protocol  
d) All of the mentioned  
Answer: d  
Explanation: HTTP is an application layer protocol. Whereas TCP is a transport layer protocol.

**22. When displaying a web page, the application layer uses the \_\_\_\_\_\_\_\_\_\_\_\_\_**  
a) HTTP protocol  
b) FTP protocol  
c) SMTP protocol  
d) TCP protocol  
Answer: a  
Explanation: HTTP is abbreviation for hypertext transfer protocol. It is the foundation of data communication for world wide web. This protocol decides how the message is formatted and transmitted etc.