



**MODEL ANSWER**

**WINTER - 2017 EXAMINATION**

**Subject: Data Communication & Networking**

**Subject Code: 17430**

**Important Instructions to examiners:**

- 1) The answers should be examined by key words and not as word-to-word as given in the model answer scheme.
- 2) The model answer and the answer written by candidate may vary but the examiner may try to assess the understanding level of the candidate.
- 3) The language errors such as grammatical, spelling errors should not be given more Importance (Not applicable for subject English and Communication Skills).
- 4) While assessing figures, examiner may give credit for principal components indicated in the figure. The figures drawn by candidate and model answer may vary. The examiner may give credit for any equivalent figure drawn.
- 5) Credits may be given step wise for numerical problems. In some cases, the assumed constant values may vary and there may be some difference in the candidate's answers and model answer.
- 6) In case of some questions credit may be given by judgement on part of examiner of relevant answer based on candidate's understanding.
- 7) For programming language papers, credit may be given to any other program based on equivalent concept.

Q. No	Sub Q.N.	Answer	Marking Scheme
1.	A) a) Ans.	<b>Attempt any six of the following:</b> <b>Define the term bandwidth with an example.</b> Bandwidth: it is a measure of the width of a range of frequencies over which the signal can pass. <b>OR</b> The range of frequencies contained in a composite signal is its bandwidth. <i>For example</i> , if a composite signal contains frequencies between 1000Hz and 5000Hz, its bandwidth is 5000 - 1000, or 4000. <b>OR</b> Bandwidth is defined as the amount of data that can be transmitted in a fixed amount of time. <b>For digital devices, the bandwidth is usually expressed in bits per second (bps) or bytes per second.</b> Example. An Internet connection via cable modem may provide 25 Mbps of bandwidth.	<b>12</b> <b>2M</b> <i>Definition 1M</i> <i>Any example 1M</i>
	b) Ans.	<b>Draw diagram of hybrid topology.</b> <b>Hybrid topology:</b>	<b>2M</b>

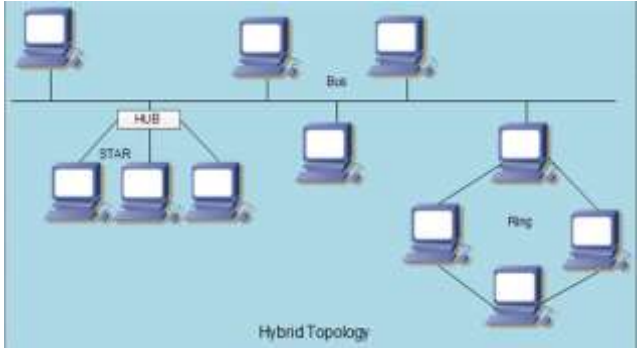
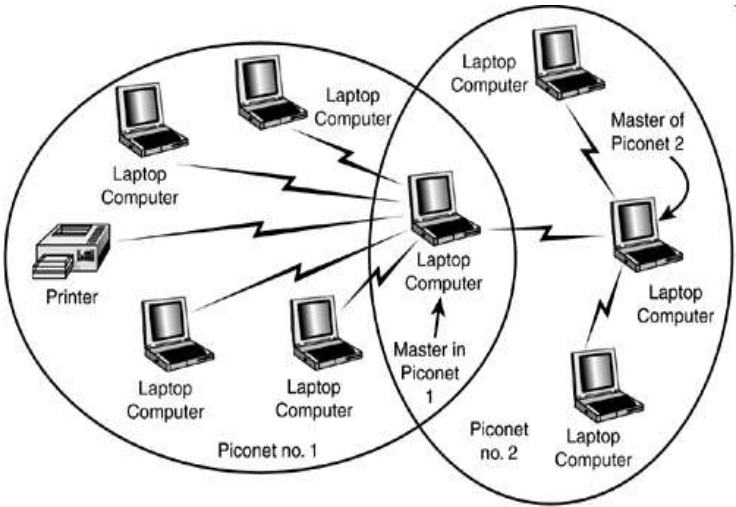


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		 <p>The diagram illustrates a Hybrid Topology network. At the top, three desktop computers are connected to a horizontal line labeled 'Bus'. Below this, a 'HUB' is connected to three desktop computers in a 'STAR' configuration. To the right, four desktop computers are connected in a 'Ring' configuration. The entire setup is labeled 'Hybrid Topology' at the bottom.</p>	<p>Star, bus, ring topology including 2M</p>
c) Ans.	<p><b>What is SMDS?</b> SMDS (Switched Multimegabit Data Service) is a public, packet-switched service aimed at enterprises that need to exchange large amounts of data with other enterprises over the wide-area network on a non constant or "bursty" basis. The SMDS is designed to connect the multiple LANs together.</p>	<p>2M <i>Explanation</i> 2M</p>	
d) Ans.	<p><b>Draw diagram of piconet.</b></p>  <p>The diagram shows two overlapping Piconets. Piconet no. 1 is on the left and contains a central 'Master in Piconet 1' laptop computer connected to four other devices: two 'Laptop Computer's and a 'Printer'. Piconet no. 2 is on the right and contains a central 'Master of Piconet 2' laptop computer connected to three other devices: two 'Laptop Computer's and one 'Laptop Computer'. The two Piconets overlap in the center, where the Master of Piconet 1 and the Master of Piconet 2 are connected to each other.</p>	<p>2M <i>Diagram</i> 2M</p>	
e) Ans.	<p><b>List different network connecting devices (any 4).</b> 1) Repeater 2) Hub 3) Bridge 4) Switch 5) Routers</p>	<p>2M <i>Any 4 devices</i> 2M</p>	



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	<p>f) <b>Ans.</b></p>	<p><b>Define IP address. Why it is require?</b> IP address is a logical address, 32 bit address having network_id&amp;host_id that uniquely &amp; universally identified over network or local network or to internet. Messages are routed in a network based on destination IP address. It has five classes: Class A, B,C,D,E.</p> <p style="text-align: center;"><b>OR</b></p> <p>IP Address: IP Address is used in the source &amp; destination address fields of the IP header it is 32 bit long. Each device has a unique IP Address.</p> <p><b>Need:</b></p> <ol style="list-style-type: none"><li>1. In an internetwork each device/computer should have unique address for identification and communication. IP addressing provides that facility.</li><li>2. In order to communicate with other devices in the network, there needs a global addressing scheme. IP addresses are used for logically addressing the computers.</li><li>3. It provides a network address and host address so routing becomes easy task.</li><li>4. It gives facility of subnetting and supernetting.</li></ol>	<p>2M</p> <p><i>Definitio n 1M</i></p> <p><i>Reason 1M</i></p>
	<p>g) <b>Ans.</b></p>	<p><b>What is ethernet?</b> A system for connecting a number of computer systems to form a local area network, with protocols to control the passing of information and to avoid simultaneous transmission by two or more systems.</p> <p style="text-align: center;"><b>OR</b></p> <p>Ethernet is a network protocol that controls how data is transmitted over a LAN. Technically it is referred to as the IEEE 802.3 protocol.</p>	<p>2M</p> <p><i>Explana tion 2M</i></p>
	<p>h) <b>Ans.</b></p>	<p><b>What is error? Enlist different types of errors.</b> Due to outside influences like sound waves or electrical signals can disrupt the flow of data in a computer system is called error.</p> <p style="text-align: center;"><b>OR</b></p> <p>In Communication Systems, any distortion of transmitted signal before reaching its destination is called error.</p> <p><b>Types of Errors:</b></p> <ol style="list-style-type: none"><li>1)Single Bit Error</li><li>2) Burst Error</li><li>3) Cross Talk and Echo</li><li>4) Attenuation</li></ol>	<p>2M</p> <p><i>Explana tion 1M</i></p> <p><i>Any 2 types 1M</i></p>



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		5) Distortion 6) Noise	
1.	<b>B)</b> <b>a)</b> <b>Ans.</b>	<b>Attempt any two of the following:</b> <b>Define protocol. What are the key elements of protocol?</b> A protocol is a set of rules that govern data communications. A protocol defines what is communicated, how it is communicated, and when it is communicated. The key elements of a protocol are syntax, semantics, and timing. <b>1. Syntax:</b> The term syntax refers to the structure or format of the data, meaning the order in which they are presented. For example, a simple protocol might expect the first 8 bits of data to be the address of the sender, the second 8 bits to be the address of the receiver and the rest of the stream to be the message itself. <b>2. Semantics:</b> The word semantics refers to the meaning of each section of bits. How a particular pattern to be interpreted, and what action is to be taken based on that interpretation? For example, does an address identify the route to be taken or the final destination of the message? <b>3. Timing:</b> The term timing refers to two characteristics. First when data should be sent and second, how fast they can be sent. For example, if a sender produces data at 100 Mbps but the receiver can process data at only 1 Mbps, the transmission will overload the receiver and some data will be lost.	<b>8</b> <b>4M</b> <i>Definition 1M</i>  <i>3 key point with explanation 3M</i>
	<b>b)</b> <b>Ans.</b>	<b>Describe working of token ring. Give its advantages and disadvantages over conventional ring topology.</b> Token Ring uses a ring topology whereby the data is sent from one machine to the next and so on around the ring until it ends up back where it started. It also uses a token passing protocol which means that a machine can only use the network when it has control of the token; this ensures that there are no collisions because only one machine can use the network at any given time.	<b>4M</b> <i>Working 1M</i>

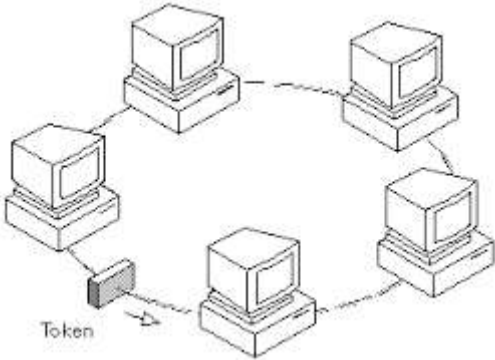


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		<p><i>Diagram 1M</i></p>
	<p><b>Advantages of Ring Topology:</b></p> <ol style="list-style-type: none"> <li>1) This type of network topology is very organized. Each node gets to send the data when it receives an empty token. This helps to reduce chances of collision. Also in ring topology all the traffic flows in only one direction at very high speed.</li> <li>2) Even when the load on the network increases, its performance is better than that of Bus topology.</li> <li>3) There is no need for network server to control the connectivity between workstations.</li> <li>4) Additional components do not affect the performance of network.</li> <li>5) Each computer has equal access to resources.</li> </ol> <p><b>Disadvantages of Ring Topology:</b></p> <ol style="list-style-type: none"> <li>1) Each packet of data must pass through all the computers between source and destination. This makes it slower than Star topology.</li> <li>2) If one workstation or port goes down, the entire network gets affected.</li> <li>3) Network is highly dependent on the wire which connects different components.</li> <li>4) MAU's and network cards are expensive as compared to Ethernet cards and hubs.</li> </ol>	<p><i>Any two advantages 1M</i></p> <p><i>Any two disadvantages 1M</i></p>
<p><b>c) Ans.</b></p>	<p><b>Explain persistent TCP connection. Give its importance.</b></p> <p>A persistent connection is a TCP connection kept open for some time and used for multiple http requests. This improves performance as it takes time to set up anew TCP connections and it takes time for TCP to figure out how fast it can safely send data. Pipelining (I know you didn't mention this but I feel it's important to the overall picture) is</p>	<p><b>4M</b></p> <p><i>Explanation with diagram 2M</i></p>



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		<p>sending multiple requests on the same connection at the same time to be processed in-order. This avoids waiting for a round trip for each request but creates its own problem; later requests can get blocked behind earlier requests.</p> <div style="text-align: center;"> </div> <p><b>Importance of persistent TCP connection:</b></p> <ol style="list-style-type: none"> <li>1. Lower CPU and memory usage (because fewer connections are open simultaneously).</li> <li>2. Enables HTTP pipelining of requests and responses.</li> <li>3. Reduced network congestion (fewer TCP connections).</li> <li>4. Reduced latency in subsequent requests (no handshaking).</li> <li>5. Errors can be reported without the penalty of closing the TCP connection.</li> </ol>	<p><i>Any 2 importance 2M</i></p>
<b>2.</b>	<b>a) Ans.</b>	<p><b>Attempt any four of the following:</b></p> <p><b>Define standards. List various standard organizations.</b></p> <ol style="list-style-type: none"> <li>1) Standards are essential in creating and maintaining an open and competitive market for equipment Manufacturers and in guaranteeing national and international interoperability of data and telecommunication technology and processes.</li> <li>2) They provide guidelines to manufacturers, Vendors, govt. agencies and other service providers to ensure the kind of interconnectivity necessary in today's market place and in international communication.</li> </ol> <p><b>Standard organizations:</b></p> <ol style="list-style-type: none"> <li>1. International standard organization (ISO)</li> <li>2. American National Standard institute (ANSI)</li> <li>3. Institute of electrical &amp; electronics engineers (IEEE)</li> <li>4. The Electronics Industries Association. (EIA)</li> </ol>	<p><b>16 4M</b></p> <p><i>Definitio n 2M</i></p> <p><i>List any two standard s 2M</i></p>

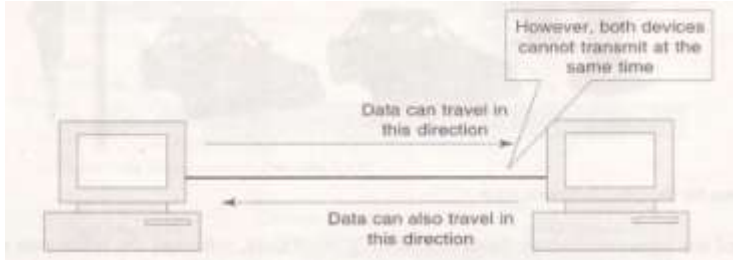
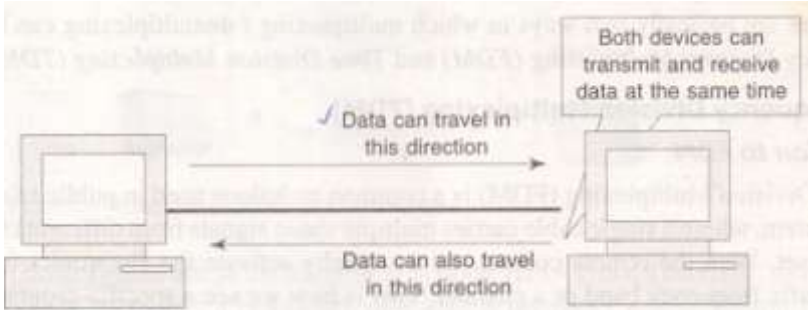


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		5.The International Telecommunications Union – Telecommunications Standard Sector(ITU-T)	
b) Ans.	<p><b>Explain half duplex system and full duplex system with diagram.</b></p> <p><b>Half duplex:</b> In the half-duplex mode, both devices can transmit data, though not at the same time. When one device is sending data, the other must only receive it, and vice versa.</p> <p>Thus, both sides take turns to send data as shown in diagram. This requires a definite turn around time during which the device changes from the receiving mode to the transmitting mode. Due to this delay, half-duplex communication is slower than simplex communication. However, it is more convenient than simplex communication, as both the devices can send and receive the data.</p>  <p>Examples of half-duplex communication are conversations over walkie-talkie.</p> <p><b>Full duplex:</b> In full duplex (or simply duplex) communication mode, both the devices can transmit data at the same time. It means that both devices are capable of sending as well as receiving data at the same time. It is also similar to a telephone conversation, where both parties can talk to each other simultaneously.</p> 	4M  <i>Each explanation 1M &amp; Each diagram 1M</i>	

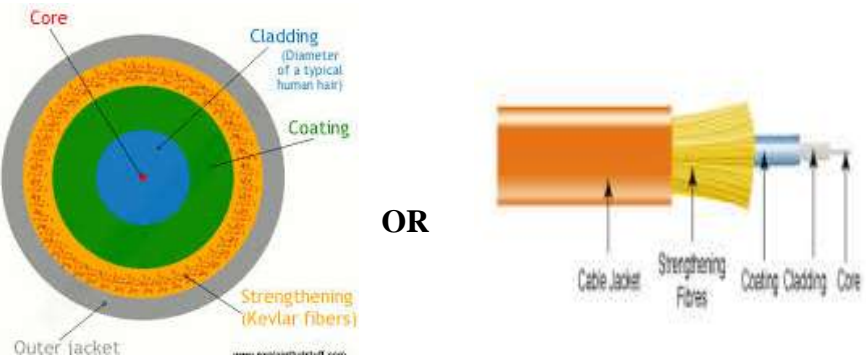


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<p><b>c)</b>  <b>Ans.</b></p>	<p><b>Describe the construction of fiber optic cable with a neat diagram.</b></p> <div style="text-align: center;">  <p style="margin: 0;"><b>OR</b></p> </div> <p><b>Core</b>        This is the physical medium that transports optical data signals from an attached light source to a receiving device. The core is a single continuous strand of glass or plastic that's measured in microns (<math>\mu</math>) by the size of its outer diameter.</p> <p><b>Cladding</b>        This is the thin layer that surrounds the fibre core and serves as a boundary that contains the light waves and causes the refraction, enabling data to travel throughout the length of the fibre segment.</p> <p><b>Coating</b>        This is a layer of plastic that surrounds the core and cladding to reinforce and protect the fibre core. Coatings are measured in microns and can range from 250 to 900 microns.</p> <p><b>Strengthening fibres</b>        These components help protect the core against crushing forces and excessive tension during installation. The materials can range from Kevlar® to wire strands to gel-filled sleeves.</p> <p><b>Cable jacket</b>        This is the outer layer of any cable. Most fibre optic cables have an orange jacket, although some types can have black or yellow jackets.</p>	<p><b>4M</b></p> <p><i>Any one diagram 2M</i></p> <p><i>Description 2M</i></p>
<p><b>d)</b>  <b>Ans.</b></p>	<p><b>Describe characteristics of data communication system.</b></p> <p>Data communications are the exchange of data between two devices via some form of transmission medium such as a wire cable. For data communications to occur, the communicating devices must be part of a communication system made up of a combination of hardware (physical equipment) and software (programs). The effectiveness of a</p>	<p><b>4M</b></p>





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		<p>data communications system depends on four fundamental characteristics: delivery, accuracy, timeliness, and jitter.</p> <p><b>1. Delivery.</b> The system must deliver data to the correct destination. Data must be received by the intended device or user and only by that device or user.</p> <p><b>2. Accuracy.</b> The system must deliver the data accurately. Data that have been altered in transmission and left uncorrected are unusable.</p> <p><b>3. Timeliness.</b> The system must deliver data in a timely manner. Data delivered late are useless. In the case of video and audio, timely delivery means delivering data as they are produced, in the same order that they are produced, and without significant delay. This kind of delivery is called real-time transmission.</p> <p><b>4. Jitter.</b> Jitter refers to the variation in the packet arrival time. It is the uneven delay in the delivery of audio or video packets. For example, let us assume that video packets are sent every 30ms. If some of the packets arrive with 30-ms delay and others with 40-ms delay, an uneven quality in the video is the result.</p>	<p><b>4</b> <i>characteristics</i> <i>1M each</i></p>
e) Ans.	<p><b>Enlist and explain functions of application layer.</b></p> <p>1. <b>Mail Services:</b> This layer provides the basis for E-mail forwarding and storage.</p> <p>2. <b>Network Virtual Terminal:</b> It allows a user to log on to a remote host. The application creates software emulation of a terminal at the remote host. User's computer talks to the software terminal which in turn talks to the host and vice versa. Then the remote host believes it is communicating with one of its own terminals and allows user to log on.</p> <p>3. <b>Directory Services:</b> This layer provides access for global information about various services.</p> <p>4. <b>File Transfer, Access and Management (FTAM):</b> It is a standard mechanism to access files and manages it. Users can access files in a remote computer and manage it. They can also retrieve files from a remote computer.</p> <p>5. <b>Remote Login:</b> this layer allows logging into a host which is remote.</p>	<p><b>4M</b></p> <p><i>Any 4 functions</i> <i>1M each</i></p>	
f) Ans.	<p><b>Describe virtual LAN with neat diagram.</b></p> <p>A virtual LAN (VLAN) abstracts the idea of the LAN; A VLAN might comprise a subset of the ports on a single switch or subsets of ports on multiple switches. By default, systems on one VLAN don't see the traffic associated with systems on other VLANs on the same</p>	<p><b>4M</b></p>	





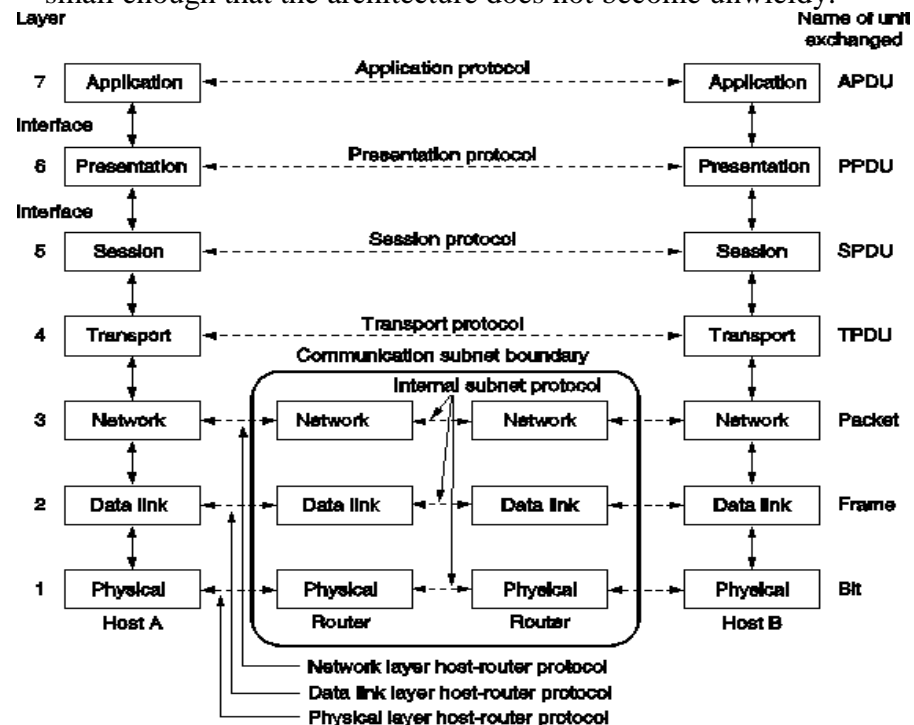
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1. A layer should be created where a different level of abstraction is needed.
2. Each layer should perform a well-defined function.
3. The function of each layer should be chosen with an eye toward defining internationally standardized protocols.
4. The layer boundaries should be chosen to minimize the information flow across the interfaces.
5. The number of layers should be large enough that distinct functions need not be thrown together in the same layer out of necessity, and small enough that the architecture does not become unwieldy.



*Diagram  
2M*

<p><b>b) Ans.</b></p>	<p><b>Describe internet topology.</b></p> <p><b>Internet topology:-</b>  <b>Internet topology</b> is the structure by which hosts, routers or autonomous systems (ASes) are connected to each other. It is representation of interconnection of between directly connected peers or nodes in network .It describes how host routers etc connects to each other</p> <p>It is organized in hierarchical manner as shown in figure.</p>	<p><b>4M</b></p> <p style="text-align: right;"><i>Explana tion 3M</i></p>
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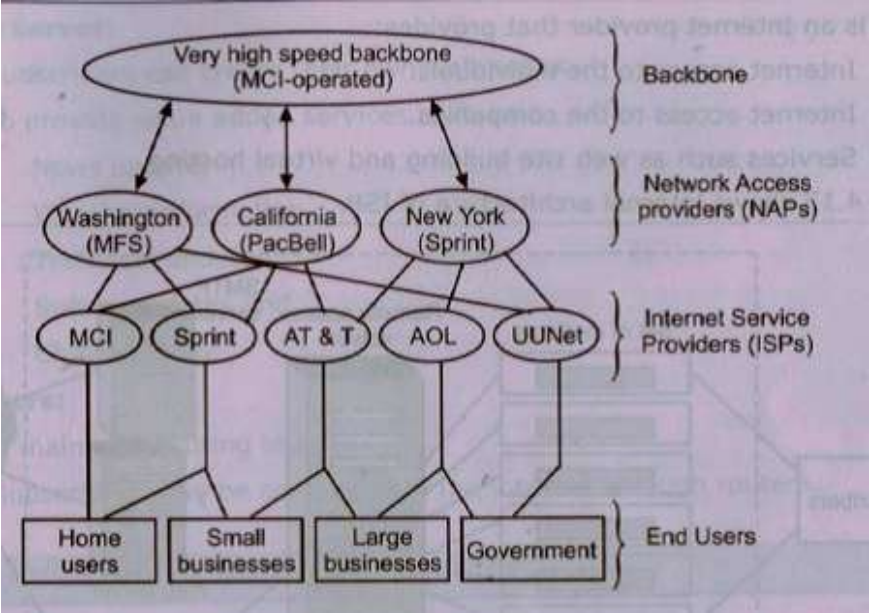


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		<p>At very top high speed backbone operated by MCI &amp; at bottom end users are present. There are intermediate layers of network access providers (NAP) &amp; Internet service providers (ISP). ISP is connected to end user &amp; it is responsible for passing call to NAP.</p>  <p>The diagram illustrates the Internet network architecture. At the top is the 'Very high speed backbone (MCI-operated)'. Below it are three 'Network Access providers (NAPs)': Washington (MFS), California (PacBell), and New York (Sprint). These NAPs are connected to five 'Internet Service Providers (ISPs)': MCI, Sprint, AT &amp; T, AOL, and UUNet. At the bottom are 'End Users', categorized into Home users, Small businesses, Large businesses, and Government. Arrows indicate the flow of data from the backbone through the NAPs and ISPs to the end users.</p>	<p>Diagram 1M</p>
	<p>c) Ans.</p>	<p><b>Explain following IEEE standards:</b> i) 802.4    ii) 802.5 <b>i) IEEE 802.4:</b> The IEEE 802.4 standard covers Token Bus. Token Bus is nothing but an implementation of Token Ring protocol, over a virtual ring over a coaxial cable. A token keeps getting circulated over the network. Only the host that processes the token has a right to transmit. Of course, if a host possessing the token does not have anything to transmit, it simply forwards the token, i.e. the right to transmit, to the next host. For this to be possible, each host needs to know the address of its immediate neighbors. Protocols are designed to handle this, a new addition of hosts, as well as disconnections. All of this comes under IEEE 802.4 standard.</p>	<p>4M  802.4 explanation 1M</p>



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			<p><b>802.4</b> <i>diagram</i> <b>1M</b></p>
	<p><b>ii) IEEE 802.5:</b>          The <b>IEEE 802.5</b> standard is nothing but the Token Ring mechanism. The Token Ring standard is based on the idea of a circulating token. A host that processes the token can transmit, others cannot. This avoids contentions and collisions in the network. A host that does not possess the token must wait even if it has data to be sent out. A host that gets the token either can send a frame and forward the token to the next host. If it has nothing to send, it simply forwards the token to the next host.</p>		<p><b>802.5</b> <i>explanation</i> <b>1M</b></p>
<p><b>d) Ans.</b></p>	<p><b>Explain RARP with neat diagram.</b>  <b>RARP (Reverse Address Resolution Protocol):</b>          1) Reverse address resolution protocol is a network protocol used to resolve a data link layer address to the corresponding network layer address.          2) It is the RARP which designed for diskless workstations that have no means of permanently storing their TCP/IP configuration</p>	<p><b>4M</b></p> <p><i>Explanation</i> <b>3M</b></p>	



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		<p>information or TCP/ IP settings.</p> <p>3) RARP does the opposite of ARP. While ARP broadcasts an IP address in an effort to discover its equivalent hardware address, RARP broadcasts the systems hardware address.</p> <p>4) RARP server responds by transmitting the IP address assigned to that client computer. RARP can supply IP address to all the systems on a network segment.</p> <div style="text-align: center;"> <p style="text-align: center;">a. RARP request is broadcast</p> <p style="text-align: center;">b. RARP reply is unicast</p> </div>	<p><i>Diagram 1M</i></p>
	<p><b>e)</b> <b>Ans.</b></p>	<p><b>State the advantages and disadvantages of Star topology.</b></p> <p><b>Advantages star topology:</b></p> <ol style="list-style-type: none"> <li>1. Highly reliable</li> <li>2. Adding new node is very easy</li> <li>3. Failure of any node does not affect the network</li> <li>4. Troubleshooting is very easy</li> </ol> <p><b>Disadvantages of star topology:</b></p> <ol style="list-style-type: none"> <li>1. Cost is very high</li> <li>2. Central hub/switch fails entire network collapse</li> <li>3. Speed of network completely dependent on capacity of networking device i.e. it may become bottle neck</li> <li>4. Maximum no. of nodes depends completely on capacity of networking device</li> </ol>	<p style="text-align: center;"><b>4M</b></p> <p style="text-align: center;"><i>Any 2 advanta ges &amp; disadvan tages 1M each</i></p>
	<p><b>f)</b> <b>Ans.</b></p>	<p><b>Describe the leased line connection. Give its need.</b></p> <p>Many medium and large organizations generally need a high</p>	<p style="text-align: center;"><b>4M</b></p>



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	<p>bandwidth for connecting to the Internet, because the number of users is very high. For this, an ISP provides an option of leasing lines to these kinds of organizations. A leased line can be thought of as a very thick pipe connecting the office of an organization with the internet via the ISP. A medium-to-big organization obtains a digital line from an ISP for a fixed charge per month, regardless of its actual use. That is organization may or may not use the complete bandwidth of the leased line, but it would still pay a fixed charge. In return, the organization gets larger bandwidth from the ISP, shared by multiple users mostly through a LAN.</p> <p><b>Need of leased line (Any TWO points):</b></p> <ol style="list-style-type: none"> <li>1. To provide high speed/ band width dedicated internet line.</li> <li>2. It provides bandwidth on demand for a specified duration of time.</li> <li>3. More nodes can be added to the network without much modification.</li> </ol>	<p align="center"><i>Leased line explanation 2M</i></p> <p align="center"><i>Any 2 needs 1M each</i></p>
<p><b>4.</b></p>	<p><b>a)</b> <b>Ans.</b></p> <p><b>WAN Addressing:</b> -WAN addressing is hierarchical addressing system .The address of a host on WAN is composed of two parts as follow</p> <ol style="list-style-type: none"> <li>1. Switch no:-It identifies switch to which host is connected</li> <li>2. Host no.:- It identifies Host which is attached to that switch Overall address is made up of combination of switch no. &amp; host no. as shown in following fig.</li> </ol> <div data-bbox="418 1436 1256 1810" data-label="Diagram"> </div> <p align="center"><b>Fig:-WAN Addressing scheme</b></p>	<p align="center"><b>16 4M</b></p> <p align="center"><i>2M explanation</i></p> <p align="center"><i>2M WAN addressing with diagram</i></p>

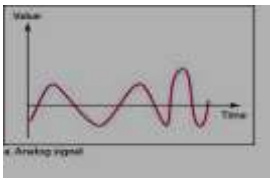
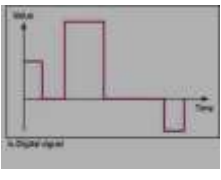
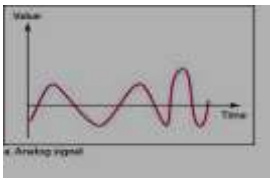
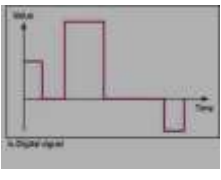
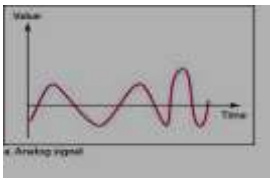
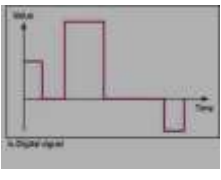


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		<p>In given Example hosts are connected to WAN switches 1,2 The host in this example will be identified bits switch ID &amp; its own ID relevant to that switch that means different host on different switch can have same Host id like host(2,1) &amp; host (3,1) having same host id.</p>																									
<b>b) Ans.</b>	<p><b>Compare analog signal and digital signal.</b></p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 10%;">Sr. NO.</th> <th style="width: 20%;">Parameter</th> <th style="width: 30%;">Analog Signals</th> <th style="width: 40%;">Digital Signals</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">1</td> <td>Number of value</td> <td>Infinite</td> <td>Finite(2,8,16 etc)</td> </tr> <tr> <td style="text-align: center;">2</td> <td>Nature</td> <td>Continuous</td> <td>Discrete</td> </tr> <tr> <td style="text-align: center;">3</td> <td>Source</td> <td>Signal generators, transducers etc.</td> <td>Computers, A to D converters</td> </tr> <tr> <td style="text-align: center;">4</td> <td>Examples</td> <td>Sine wave, triangular wave</td> <td>Binary signal</td> </tr> <tr> <td style="text-align: center;">5</td> <td></td> <td style="text-align: center;">  </td> <td style="text-align: center;">  </td> </tr> </tbody> </table>		Sr. NO.	Parameter	Analog Signals	Digital Signals	1	Number of value	Infinite	Finite(2,8,16 etc)	2	Nature	Continuous	Discrete	3	Source	Signal generators, transducers etc.	Computers, A to D converters	4	Examples	Sine wave, triangular wave	Binary signal	5				<p><b>4M</b></p> <p><i>Any four points 1M each</i></p>
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<b>c) Ans.</b>	<p><b>Explain distributed queue dual bus.</b></p> <p><b>Basics of DQDB</b> The Distributed Queue Dual Bus (DQDB) protocol is a dual bus configuration. This means that each host in the network connects to two backbone network lines. The hosts get an access to the transmission medium with an approach that is different from LANs.</p> <p>Distributed Queue Dual Bus (DQDB) is a Data-link layer communication protocol for Metropolitan Area Networks (MANs), specified in the IEEE 802.6 standard and designed for use in MANs.</p>		<p><b>4M</b></p> <p><i>Explanation 3M</i></p>																								



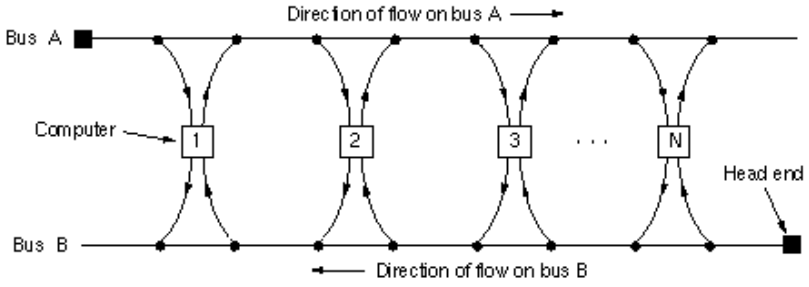


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		 <p>In case of DQDB, a mechanism called distributed queue is used and hence the name Distributed queue Dual Bus (DQDB). Figure shows sample DQDB architecture with two unidirectional buses, called bus A and B. In the fig. hosts numbered 1 to N connect to these buses. Each bus connects to the hosts on their input and output ports.</p> <p>Distributed Queue Dual Bus (DQDB) is an example of MAN. IT uses the mechanism of a dual queue. There are two buses connecting all the computers on a DQDB network. Each bus allows traffic in a single direction only. To transmit data, the sending host must select one of the two buses. A host reserves the slot before transmitting its data. At any point of time, every host knows how many reservations are pending to be served.</p>	<p><i>Diagram 1M</i></p>
	<p><b>d)</b> <b>Ans.</b></p>	<p><b>Describe functions of Data Link Layer.</b></p> <p><b>Data link layer:</b> It is responsible for transmitting group of bits between the adjacent nodes. The group of bits is called as frame. The network layer passes a data unit to the data link layer. Header and trailer is added to the data unit by data link layer. This data unit is passed to the physical layer. Data link layer is responsible for moving frames from one node to the next.</p> <p><b>Functions of data link layer are:</b></p> <ol style="list-style-type: none"><li>1) Framing</li><li>2) Physical addressing</li><li>3) Flow control</li><li>4) Error control</li><li>5) Media access control</li><li>6) Node to node delivery</li></ol>	<p><b>4M</b></p> <p><i>Any four function 1M each</i></p>



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<b>e)</b>	<p><b>Describe ICMP datagram.</b>  <i>(Note: If diagram drawn, marks shall be awarded)</i></p> <p><b>Ans.</b></p> <ol style="list-style-type: none"> <li>1. One of the main responsibilities of ICMP is to report errors. Five types of errors are handled: destination unreachable, packet too big, time exceeded parameter problems, and redirection.</li> <li>2. The checksum for ICMP is calculated by using both the header and the data fields of the ICMP message.</li> <li>3. Packet InterNet Groper (ping) is an application program that uses the services of ICMP to test the reachability of a host.</li> <li>4. ICMP messages are divided into two broad categories: error reporting messages and query messages</li> <li>5. The error reporting messages report problems that router or a host may encounter when it processes an IP packet.</li> <li>6. The query messages, which occur in pairs, help a host or a network manager get specific information from a router or another host.</li> <li>7. Host can discover and learn about routers on their network.</li> <li>8. The message format of ICMP is as given below.</li> </ol> <div style="text-align: center; margin-top: 10px;"> <p>The diagram shows the structure of an ICMP message. It consists of a header and a data section. The header is divided into four 8-bit fields: Type, Code, Checksum, and Rest of the header. The data section follows the header.</p> </div>	<p><b>4M</b></p> <p style="text-align: right; margin-top: 100px;"><i>4M for explanation</i></p>									
<b>f)</b>	<p><b>Give difference between FDM and TDM (Any 4 points).</b></p> <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 5px;"> <thead> <tr> <th style="width: 10%; text-align: center;">Sr. No.</th> <th style="width: 45%; text-align: center;">FDM</th> <th style="width: 45%; text-align: center;">TDM</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">1</td> <td>The signals which are to be multiplexed are added in the time domain. But they occupy different slots in the frequency domain.</td> <td>The signals which are to be multiplexed can occupy the entire bandwidth in the time domain.</td> </tr> <tr> <td style="text-align: center;">2</td> <td>FDM is usually preferred for the analog signals.</td> <td>TDM is preferred for the digital signals.</td> </tr> </tbody> </table>	Sr. No.	FDM	TDM	1	The signals which are to be multiplexed are added in the time domain. But they occupy different slots in the frequency domain.	The signals which are to be multiplexed can occupy the entire bandwidth in the time domain.	2	FDM is usually preferred for the analog signals.	TDM is preferred for the digital signals.	<p><b>4M</b></p> <p style="text-align: right; margin-top: 100px;"><i>Any four points 1M each</i></p>
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		<p style="text-align: center; font-size: small;">Interactions between Hosts and a DNS Server</p>	<p><b>Diagram</b> <b>1M</b></p>																								
		<p>It can contact another DSN server and try to locate the IP address for the name requested. It may have to do this more than once. It can return an error message because the requested domain name is invalid or does not exist.</p>																									
<b>b)</b>	<b>Ans.</b>	<p><b>Give difference between SLIP and PPP (any 4 points).</b>  <b>The Difference between SLIP and PPP are the following:</b></p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 10%;">Sr. No.</th> <th style="width: 45%;">SLIP (Serial Line Internet Protocol)</th> <th style="width: 45%;">PPP (Point-to-Point Protocol)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>SLIP does not perform error detection &amp; correction.</td> <td>PPP performs error detection &amp; correction.</td> </tr> <tr> <td>2</td> <td>SLIP supports only IP</td> <td>PPP supports multiple protocols.</td> </tr> <tr> <td>3</td> <td>IP address is assigned statically.</td> <td>IP address is assigned dynamically</td> </tr> <tr> <td>4</td> <td>SLIP does not provide any authentication.</td> <td>PPP provides authentication.</td> </tr> <tr> <td>5</td> <td>SLIP is not approved Internet standard.</td> <td>PPP is approved Internet standard.</td> </tr> <tr> <td>6</td> <td>SLIP is a connectionless protocol</td> <td>PPP is a connection-oriented protocol</td> </tr> <tr> <td>7</td> <td>SLIP is not a group of protocols</td> <td>PPP is a group of protocols</td> </tr> </tbody> </table>	Sr. No.	SLIP (Serial Line Internet Protocol)	PPP (Point-to-Point Protocol)	1	SLIP does not perform error detection & correction.	PPP performs error detection & correction.	2	SLIP supports only IP	PPP supports multiple protocols.	3	IP address is assigned statically.	IP address is assigned dynamically	4	SLIP does not provide any authentication.	PPP provides authentication.	5	SLIP is not approved Internet standard.	PPP is approved Internet standard.	6	SLIP is a connectionless protocol	PPP is a connection-oriented protocol	7	SLIP is not a group of protocols	PPP is a group of protocols	<p><b>4M</b></p> <p style="font-size: small;"><i>Any 4 differences 1M each</i></p>
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<b>c)</b>	<b>Ans.</b>	<p><b>Give the name of layer where following protocols are related to</b></p> <p><b>i) SMTP            ii) TCP-UDP</b>  <b>iii) IP              iv) ARPANET</b></p>	<p><b>4M</b></p>																								

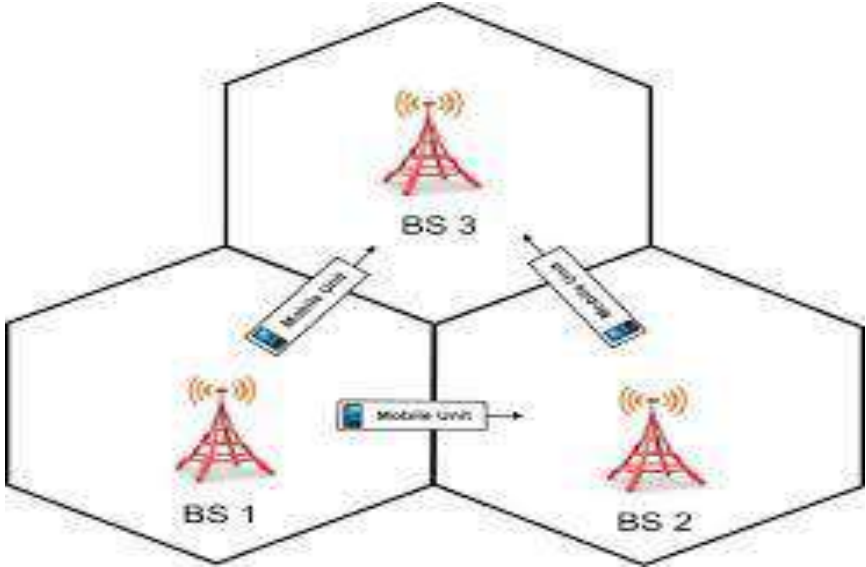


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	<p>i) SMTP – APPLICATION LAYER ii) TCP-UDP – TRANSPORT LAYER iii) IP – NETWORK LAYER / INTERNET LAYER iv) ARPANET – DATA LINK LAYER/ LINK LAYER</p>	<p>Correct layer 1M each</p>
<p>d) Ans.</p>	<p><b>Explain Hand-off operation in mobile phone.</b></p> <ol style="list-style-type: none"><li>1. While call in progress it may happen that user may move from one cell to another cell or in area where signal of current cell becomes too weak.</li><li>2. During the conversation, if the mobile phone crosses the cell, the signal can become weak.</li><li>3. The MTSO constantly checks the signal level, and if it finds it low, it immediately seeks a new cell that can look after the communication better.</li><li>4. The MTSO changes the cell carrying channel so smoothly that the user hardly notices.</li><li>5. The process of handling the signal off from the old channel to the new channel is called handoff operation</li></ol> <p>Following are various types of handoffs. Supported by a Mobile Station (MS): 1. Hard Hand Off 2. Soft Hand off</p> 	<p>4M</p> <p>Description 3M</p> <p>Diagram 1M</p>





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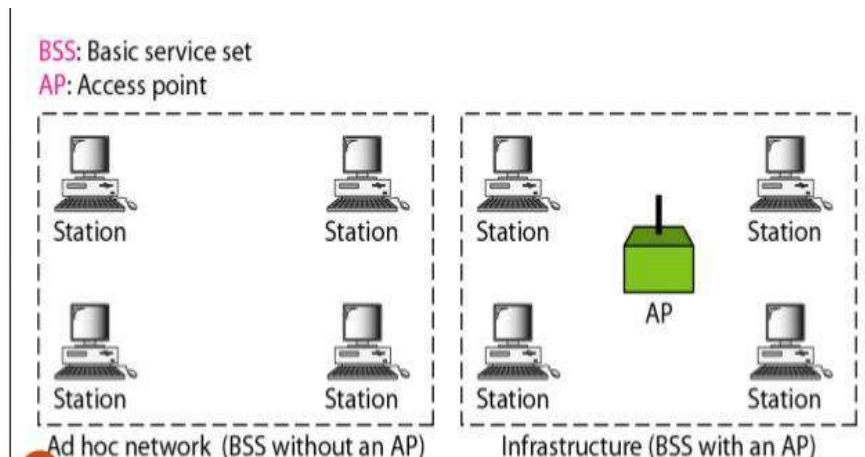
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**802.11 services:** The two types of services are

- 1) Basic services set (BSS)
- 2) Extended services set (ESS)

**Basic services set (BSS)**

- 1) The basic services set contain stationary or mobile wireless station and central base station called access point (AP)
- 2) The use of access point is optimal
- 3) If the access point is not present, it is known as standalone network. Such a BSS cannot such data to other BSSs. These types of architecture are known as adhoc architecture.
- 4) The BSS in which an access point is present is known as infrastructure network.



**Extended services set (ESS):**

- 1) An extended service set is created by initializing two or more basic services set (BSS) having access points (APS)
- 2) These extended networks are created by joining the access points of basic station set through a wired LAN known as distribution system.
- 3) The distribution system can be any IEEE LAN.
- 4) There are two types of station in ESS.

Mobile Station: These are normal station inside a BSS

Stationary Station: these are AP station that are part of a wired LAN

Communication between two stations in two different BSS usually

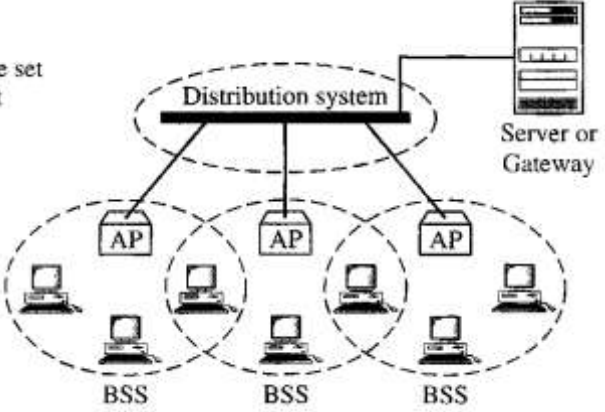


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		<p>Occurs via two APS. A mobile Station can belong to more than one BSS at the same time.</p> <p>ESS: Extended service set BSS: Basic service set AP: Access point</p>  <p><b>ii) Wi-Max:</b> <b>Define:</b> Wi- Max is worldwide interoperability for Microwave Access. It is a wireless communication standard which can provide data rates up to 1 Gbps. It is refers to interoperable implementation of IEEE 802.16 family of standards.</p> <p><b>Uses and Application:</b></p> <ol style="list-style-type: none"> <li>1) To provides portable mobile broadband connectivity.</li> <li>2) It can be used as an alternative to cable, digital subscriber line (DSL) for providing a broad band access.</li> <li>3) To provide services such as voice on IP(VOIP)</li> <li>4) For providing a source of internet connectivity.</li> </ol> <p><b>Internet Access:</b></p> <ol style="list-style-type: none"> <li>1) Wi-Max is capable of providing at home or mobile internet access across the whole city or country.</li> <li>2) It is cheap to use Wi-Max to provide Internet Access to the remote locator.</li> </ol>	
6.	a) Ans	<p><b>Attempt any four of the following:</b> <b>Draw architecture of ISP.</b></p>	16 4M



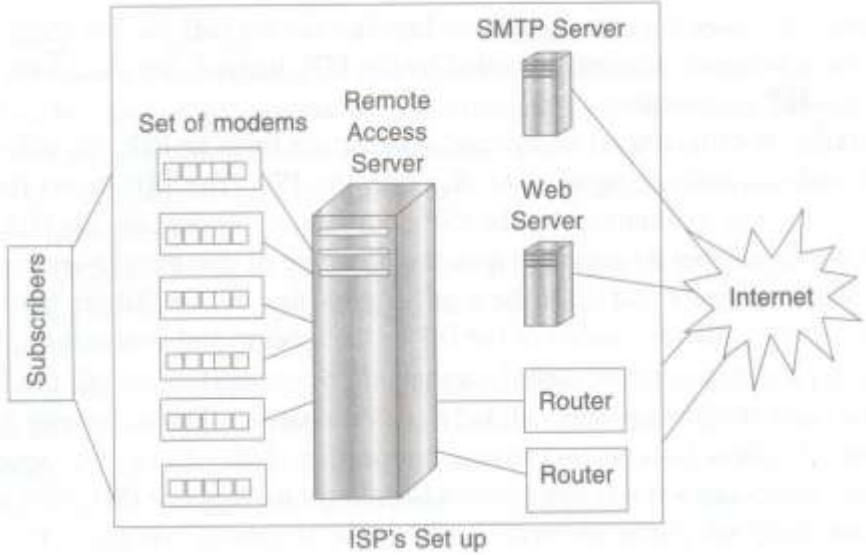
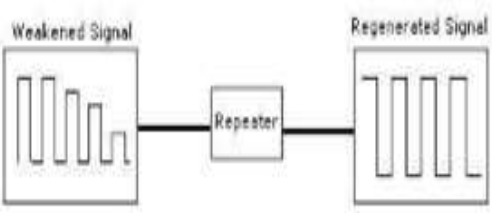


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		 <p><b>Figure: Internal Architecture of ISP.</b></p>	<p><i>Correct diagram</i> <b>4M</b></p>
<p><b>b) Ans.</b></p>		<p><b>Describe the following with diagram: (i) Repeaters (ii) Gateways.</b></p> <p><b>(i) Repeaters:</b></p> <ul style="list-style-type: none"><li>• Repeater is an electronic device that operates on physical layer of OSI model.</li><li>• A repeater is used to regenerate the signal.</li><li>• A repeater allows us to extend the physical length of a network.</li><li>• A repeater is used to boost the weak signal when the signal loses the strength as it passes along the cable.</li><li>• A repeater does not amplify the signal.</li></ul> 	<p><b>4M</b></p> <p><i>Explanation 1M each</i></p> <p><i>Diagram 1M each</i></p>

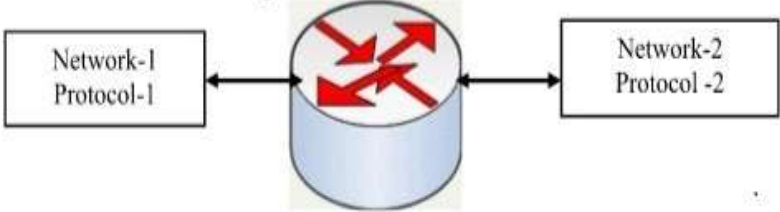
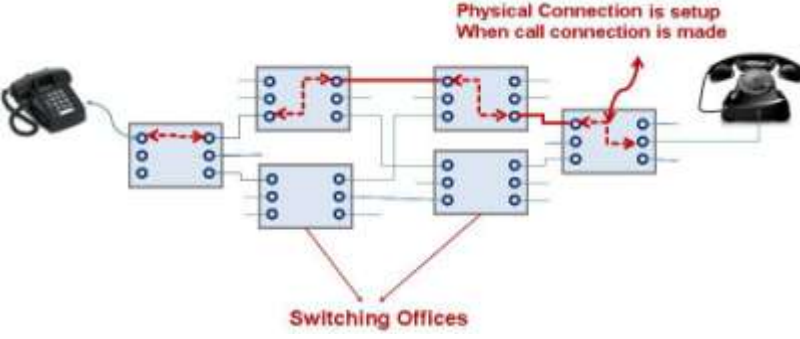


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		<p><b>(ii) Gateways:</b></p> <ul style="list-style-type: none"> <li><b>Gateways</b> are devices which operate on all layers of OSI model &amp; TCP/IP Gateway is protocol converter.</li> <li>Gateways enable communication between different network architecture and environments.</li> <li>Gateways connect two systems that do not use the same protocol, data format, language and architecture.</li> <li>They also convert commonly used protocols (e.g. TCP/IP) to a specialized protocol (for example, an SNA: System Network Architecture).</li> <li>Gateways convert message formats from one format to another.</li> <li>Gateways translate different addressing schemes</li> </ul> <div style="text-align: center;">  </div>	
<p><b>c) Ans.</b></p>	<p><b>Draw the neat diagram of circuit switching. Explain in brief.</b></p> <p>Circuit switching is primarily used in Telephone networks and not in Computer networks. In circuit switching,</p> <ol style="list-style-type: none"> <li>1. An End to end circuit (path) is first reserved using a separate signaling protocol</li> <li>2. Data transfer proceeds only after the circuit establishment phase</li> <li>3. All data of that session passes through the same circuit</li> <li>4. No other user can use this circuit till this session is completed</li> <li>5. No signaling information is sent along with the data</li> </ol> <p>Circuit is released after data transfer using the</p> <div style="text-align: center;">  </div>	<p style="text-align: right;"><b>4M</b></p> <p style="text-align: right;"><i>Explanation 3M</i></p> <p style="text-align: right;"><i>Diagram 1M</i></p>	

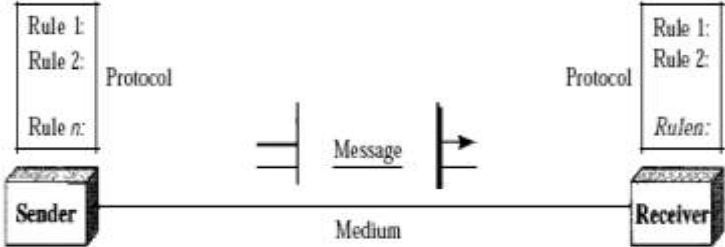


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<p>d) Ans.</p>	<p><b>Draw the components of data communication system and state the function of each component.</b> <b>Data Communication System:</b></p>  <p><b>Fig. Data Communication</b></p> <p><b>Components of data communication:</b> A data communications system has five components:</p> <ol style="list-style-type: none"><li><b>1. Message:</b> The message is the information (data) to be communicated. Popular forms of information include text, numbers, pictures, audio, and video.</li><li><b>2. Sender:</b> The sender is the device that sends the data message. It can be a computer, Workstation, telephone handset, video camera, and so on.</li><li><b>3. Receiver:</b> The receiver is the device that receives the message. It can be a computer, Workstation, telephone handset, television, and so on.</li><li><b>4. Transmission medium:</b> The transmission medium is the physical path by which a message travels from sender to receiver. Some examples of transmission media include twisted-pair wire, coaxial cable, fiber-optic cable, and radio waves.</li><li><b>5. Protocol:</b> A protocol is a set of rules that govern data communications. It represents an agreement between the communicating devices. Without a protocol, two devices may be connected but not communicating.</li></ol>	<p>4M</p> <p><i>Diagram 2M</i></p> <p><i>Functions 2M</i></p>
<p>e) Ans.</p>	<p><b>Describe cable modem with neat diagram.</b> Cable modems means CATV modems i.e. cable TV or network adapter modem. To install a cable modem, usually a power splitter and a new cable is required. The splitter divides the signal for “old” installations and the new segment connecting a cable modem.</p>	<p>4M</p> <p><i>Description 2M</i></p>



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The transmitted signal from the cable modem is sometimes 80 dB stronger than the TV set may get disturbed for while the isolation of splitter, a high pass filter is used. The HF allows only the TV Channel frequency to pass, at the same time blocks the upstream frequency band as well as low frequency of in house wiring.

The term cable refers to a modem operates over the ordinary cable TV network. The cable modem is connected to TV outlet the cable TV and cable TV operator connects a cable modem termination system (CMTs) in the end (Head end).

Again it works basically like a local area network interface. Thus CMTs device is used for connecting the cable TV network to a data network like the internet

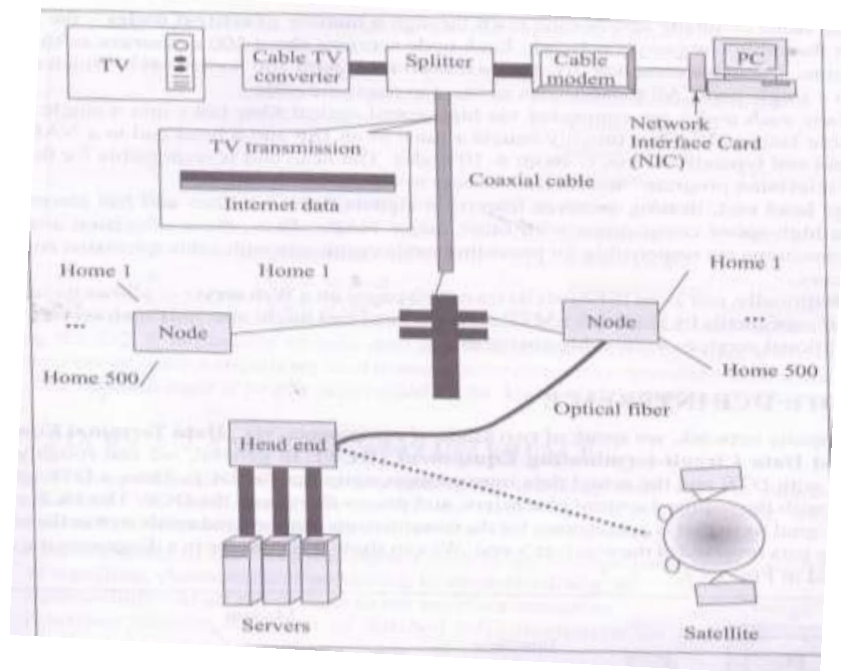


Diagram  
2M

f) Ans.	<b>Define FTP. Describe working of FTP.</b> <b>FTP:</b> <b>Definition: FTP (File Transfer Protocol)</b> is a high-level (application layer) protocol is an interface for any user of the internet to transfer files. The user requests the FTP to either retrieve from or upload a file	4M
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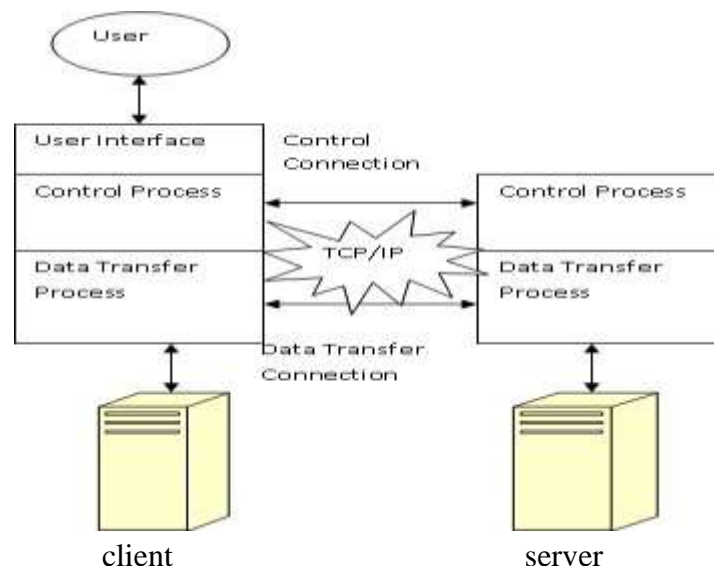
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to a remote server.

**Working:** FTP presents the user with a prompt and allows entering of various commands for accessing and downloading files that are physically exist on a remote computer. After invoking an FTP application, the user identifies a remote computer and instructs FTP to establish a connection with it. FTP contacts the remote computer using TCP/IP software. Once the connection is established, the user can choose to download a file from the remote computer, or can send file to be stored on the remote computer.

FTP uses two connections between a client and a server. One connection is used for the actual file's **data** transfer and the other is used for **control** information (commands and responses).

These two connections and components of FTP are as shown in the diagram



The client has three components namely, User interface, Client control process and client data transfer process. The server has two components namely, the server control process and server data transfer process.

*Definition and Explanation 3M*

*Diagram 1M*



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		<p>The TCP control connection is made between the control processes of the client and the server. While the data is sent (IP packets) from the server to the client, the server keeps track of the progress of the file: how much data has been sent, the number of bytes sent, the percentage of total file size in bytes and how much remains to be sent. It sends this information simultaneously on the second connection, i.e., control connection. This is used for the successful upload and download of the files. If multiple files are to be transferred, control connection will remain active throughout the entire FTP session, whereas data transfer connection is opened and closed for each file that is to be transferred.</p> <p>FTP uses two well-known TCP ports: port 21 is used for the control connection and port 20 is used for the data connection.</p>	
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