## MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION
### (Autonomous)
### (ISO/IEC - 27001 - 2005 Certified)

### SUMMER-16 EXAMINATION
### Model Answer

**Subject Code: 17429**                     **Subject Name: Computer Network**

---

**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 judgment 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.

**Marks**

**1.(A)Attempt any SIX:**                                    **6 × 2 = 12**

**(a)    Define Computer Network.**
*(Definition - 2 marks)*

**Ans:**
A computer network is a group of computer systems and other computing hardware devices that are linked together through communication channels to facilitate communication and resource-sharing among a wide range of users.

**MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION**
**(Autonomous)**
**(ISO/IEC - 27001 - 2005 Certified)**

**SUMMER-16 EXAMINATION**
**Model Answer**

**Subject Code: 17429**                                   **Subject Name: Computer Network**

**(b)  List two applications of Computer Network.**
*(Any two Applications - 1 mark each)*

**Ans:**

**Applications of Computer Network**
- Banking
- Video conferencing
- Marketing
- School
- Radio
- Television
- E-mail
- Companies

**(c)  Define Network topology. List types of Network topologies**
*(Definition - 1 mark; Listing - 1 mark)*

**Ans:**

Network Topology refers to layout of a network. How different nodes in a network are connected to each other and how they communicate is determined by the network's topology.
Types of Network Topology
- Mesh Topology
- Bus Topology
- Star Topology
- Ring Topology
- Tree Topology
- Hybrid Topology

| Subject Code: 17429 | Subject Name: Computer Network |
|---|---|

**(d)**  **State two features of  (i) TELNET  (ii)  FTP.**
*(Any features - ½ marks for each Feature)*

**Ans:**

  1.  **TELNET**
     **TELNET is a protocol that allows you to connect to remote computers (called hosts) over a TCP/IP network (such as the Internet). Using telnet client software on your computer, you can make a connection to a telnet server (i.e., the remote host)**
     1.  TELNET is a specialized service that lets you use one computer to access the contents of another computer a telnet host.
     2.  A telnet program creates a "Window" into the host so you can access files, issue commands, and exchange data.
     3.  Telnet is widely used by libraries to allow visitors to look up information, find articles and so on
     4.  Telnet allows a user who login on any other computer on the network.
     5.  Telnet sends data in clear text.
  2.   **FTP.**
FTP is a stranded mechanism provided by the Internet for copying a file from one host to the other. Some of the problem in transferring files from one system to the other is as follows:
  1.  Two systems may use different file name conventions.
  2.  Two systems may represent text data in different types. The directory structure of the two systems may be different.
  3.  FTP provides a simple solution to all these problems.
  4.  FTP established two connections between the client and server. One is for data transfer and the other is for the control information.
  5.  The fact that FTP separates control and data makes it very efficient.
  6.  The control connection uses simple rules of communication. Only one line of command or a line of response is transferred at a time.
  7.  But the data connection uses more complex rules due to the variety of data types being transferred.
  8.  FTP uses port 21 for the control connection and port 20 for the data connection.

**MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION**
**(Autonomous)**
**(ISO/IEC - 27001 - 2005 Certified)**

**SUMMER-16 EXAMINATION**
**Model Answer**

**Subject Code: 17429**                                    **Subject Name: Computer Network**

**(e)    State the criteria for selection of transmission media.**
*(Any four criteria - ½ marks each)*

**Ans:**

**Criteria to be considered:**
- Type of medium.
- No of conductors/connectors.
- Flexibility.
- Durability.
- Bandwidth.
- Reliability of connection
- Required speed
- Distance (segment length )
- Ease of installation and maintenance access
- Technical expertise required to install and configure
- Resistance to internal EMI, cross talk of parallel wires
- Resistance to external EMI outside the cable.
- Attenuation
- Cost
- Bending Radius

**MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION**
**(Autonomous)**
**(ISO/IEC - 27001 - 2005 Certified)**

**SUMMER-16 EXAMINATION**
**Model Answer**

**Subject Code: 17429**                                      **Subject Name: Computer Network**

**(f)**    **Draw and label fiber optics cable.**
       *(Diagram - 1 mark; Labeling - 1 mark)*

**Ans:**
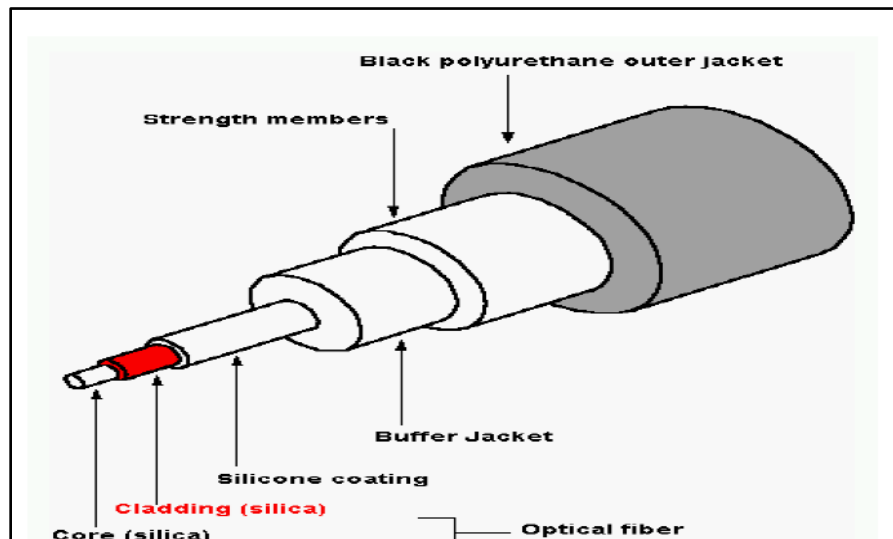


**(g)**    **Define (i) Protocol (ii)  Encapsulation**
       *(Definition - 1 mark each)*

**Ans:**

- **Protocol:** There are certain rules that must be followed to ensure proper communication & a set of such rules and regulation is known as protocol.
- **Encapsulation:** Encapsulation is the process of adding the headers and footers to the data.

**MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION**
**(Autonomous)**
**(ISO/IEC - 27001 - 2005 Certified)**

**SUMMER-16 EXAMINATION**
__Model Answer__

Subject Code: 17429                                      Subject Name: Computer Network

**(h)   Differentiate between IPV$_4$ & IPV$_6$. (two point)**
*(Any two points -1 mark each)*

**Ans:**

| IPv4 | IPv6 |
|---|---|
| 1. Source and destination addresses are 32 bits (4 bytes) in length. | 1. Source and destination addresses are 128bits (16 bytes) in length. |
| 2. Uses broadcast addresses to send traffic to all nodes on a subnet. | 2. There are no IPv6 broadcast addresses. Instead, multicast scoped addresses are used. |
| 3. Fragmentation is supported at originating hosts and intermediate routers. | 3. Fragmentation is not supported at routers. It is only supported at the originating host. |
| 4. IP header includes a checksum. | 4. .IP header does not include a checksum |
| 5. IP header includes options. | 5. All optional data is moved to IPv6 extension headers. |
| 6. IPsec support is optional | 6. IPsec support is required in a full IPv6 implementation. |

**(B) Attempt any TWO:**                                      **2 × 4=8**

**(a)   Classify Networks on the basis of their geography and define.**
*(Classification - 1 mark; Definition - 3 marks)*

**Ans:**

**Classification of network by their geography**:
   **LAN** - Local Area Network
   **MAN** - Metropolitan Area Network
   **WAN** - Wide Area Network
   **CAN** - Campus Area Network
   **PAN** - Personal Area Network

**MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION**
**(Autonomous)**
**(ISO/IEC - 27001 - 2005 Certified)**

**SUMMER-16 EXAMINATION**
Model Answer

**Subject Code: 17429**                    **Subject Name: Computer Network**

**PAN:** A PAN is personal area network is used for communication among computer devices close to one's person. Wireless networking or Bluetooth technologies are the some examples of PAN. The communication network established for the purpose of connecting computer devices of personal use is known as the PAN.

**CAN:** CAN is a Campus Area Network is used to connect buildings across campuses of colleges or Universities. A CAN is actually a type of LAN. It is larger than a LAN but smaller than MAN.CAN is a network that connects two or more LANs but that is limited to a specific and contiguous geographical area such as a college campus, industrial complex or military base.

**LAN:** LAN is local area network. LAN is privately-owned networks covering a small geographic area(less than 1 km), like a home, office, building or group of buildings. LAN transmits data with a speed of several megabits per second.

**MAN:** A Metropolitan Area Network (MAN) is a large computer network that spans a metropolitan area or campus. A MAN typically covers an area up to 10 kms (city). The best example of MAN is the cable Television network, available in many cities. For an organization, the common use of a MAN is to extend their LAN connectivity between buildings/offices that are within the same city or urban area (hence the name Metropolitan Area Network). The organization can pass their Ethernet frames to the service provider MAN; the service provider will carry their frames across the MAN; and then deliver the frames to the destination site. From the customer's point of view, the MAN looks like one big (long) Ethernet link between their offices. The different sites could belong to the same IP subnet, and from the customer's viewpoint, no routing is required between their sites.

**WAN:** WAN is wide area network. WAN is a long-distance communication network that covers a wide geographic area, such as state or country. The most common example is internet. A WAN provides long-distance transmission of data, voice, image and video information over larger geographical areas that may comprise a country or even whole world.

**(b)** **Name the topology which is combination of different topologies. Explain it with advantages.**
*(Name of topology - 1 mark; Explanation - 2 marks; advantages - 1 mark)*

**Ans:**

**Name of topology: Hybrid Topology**

**Hybrid Topology**:-A combination of two or more different topologies makes for a hybrid topology. When different topologies are connected to one another, they do not display characteristics of any one specific topology.
**Working of Hybrid Topology** The Hybrid topology scheme combines multiple topologies into one large topology. The hybrid network is common in large wide area networks. Because each topology

**MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION**
**(Autonomous)**
**(ISO/IEC - 27001 - 2005 Certified)**

**SUMMER-16 EXAMINATION**
**Model Answer**

Subject Code: 17429                                    Subject Name: Computer Network

has its own strengths and weaknesses, several different types can be combined for maximum effectiveness.
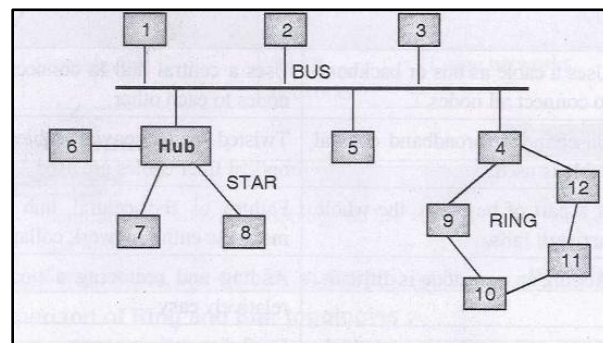


**Advantages of Hybrid Topology**

1) **Reliable:** Unlike other networks, fault detection and troubleshooting is easy in this type of topology. The part in which fault is detected can be isolated from the rest of network and required corrective measures can be taken, WITHOUT affecting the functioning of rest of the network.

2) **Scalable:** It's easy to increase the size of network by adding new components, without disturbing existing architecture.

3) **Flexible:** Hybrid Network can be designed according to the requirements of the organization and by optimizing the available resources. Special care can be given to nodes where traffic is high as well as where chances of fault are high

4) **Effective:** Hybrid topology is the combination of two or more topologies, so we can design it in such a way that strengths of constituent topologies are maximized while there weaknesses are neutralized.

**(c)  List and describe criteria for selection of Network topology.**
*(Listing criteria - 1 mark; Description of any three criteria - 3 marks)*

**Ans:**

**Selection criteria for selecting network topology:**
- Size of the network & number of devices or nodes being connected.
- Ease of configuration & installing.
- The ease of adding new device in an existing network.

**MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION**
**(Autonomous)**
**(ISO/IEC - 27001 - 2005 Certified)**

**SUMMER-16 EXAMINATION**
**Model Answer**

**Subject Code: 17429**                          **Subject Name: Computer Network**

- The ease of fault indication & reflection.
- Number of physical links required to be used for connecting the devices.
- Need of network connecting devices such as repeaters, switches, hubs etc.
- Costs involved.
- Need of security.
- Need of network administration.

**Description:**
1. **Size of network:** Size of network vary according to the company requirement and budget.
2. **Configuration & Installation:** This process should be simple & easy.
3. **Adding new devices:** Adding new nodes to the network topology should be easy & it should not affect the other nodes.
4. **Fault identification:** Fault should be easily recognizable and proper remedy should be available.

**SUMMER-16 EXAMINATION**
**Model Answer**

**Subject Code: 17429**                                        **Subject Name: Computer Network**

**2.     Attempt any FOUR:**                                                          **4 × 4 =16**

**(a)     State the difference between server based network and peer to peer network.**
*(Any Four Points - 1 mark each)*

**Ans:**

| Server based network | Peer to Peer |
|---|---|
| 1. It is much like company uses centralized management. | 1. It is much like company uses decentralized management. |
| 2. In this server has more power & client has less power. | 2.In this each machine has same power |
| 3. It is hardware intensive. | 3. Uses less expensive computer hardware. |
| 4. Complex to setup & require professional administrator. | 4. Easy to setup & administrator. |
| 5.Very secure | 5.Less secure |
| 6.Network O.S required | 6.Network O.S not required |
| 7.It support large Network | 7.It support small Network |
| 8.Better performance | 8.Might hurt user's performance |

**(b)     State the functions of  (i) Hub  (ii) Repeater (iii)  Bridge (iv) Router**
*(Two Functions of Each component - ½ marks each)*

**Ans:**

- **Hub**
  - Hub connects all nodes in star topology. Hub is broadcasting device.
  - It sends packets to all nodes in the network.
  - It works at Physical Layer Of OSI model
- **Repeater:**
  - Repeaters are used to take the distorted, weak and corrupt input signal and regenerate this signal at its output.
  - It ensures that the signals are not distorted or weak before it reaches the destination.
  - It recreates the bit pattern of the signal, and puts this regenerated signal back on to the transmission medium.

**MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION**
**(Autonomous)**
**(ISO/IEC - 27001 - 2005 Certified)**

**SUMMER-16 EXAMINATION**
**Model Answer**

Subject Code: 17429                                    Subject Name: Computer Network

- **Bridge**
  - A bridge device filters data traffic at a network boundary.
  - Bridges reduces the amount of traffic on a LAN by dividing it into two segments.
  - It inspects incoming traffic and decides whether to forward or discard it.
  - It sends packets between two networks of same type.

- **Router**
  - Router chooses the best path for packet forwarding.
  - Router read complex network address in packet.
  - It works at Network Layer of OSI model
  - Efficiently direct packets from one network to another, reducing excessive traffic.
  - Join neighbouring or distant network
  - Connect dissimilar networks.
  - Prevent network bottlenecks by isolating portions of a network.

**(c)** **List type of cable. Draw and label the constructional sketch of co-axial cable.**
*(Listing - 1 mark; Diagram - 2 marks; Labeling - 1 mark)*

**Ans:**

**Types of cables:**
1. Twisted Pair cable
2. Coaxial cable
3. Fiber optic cable

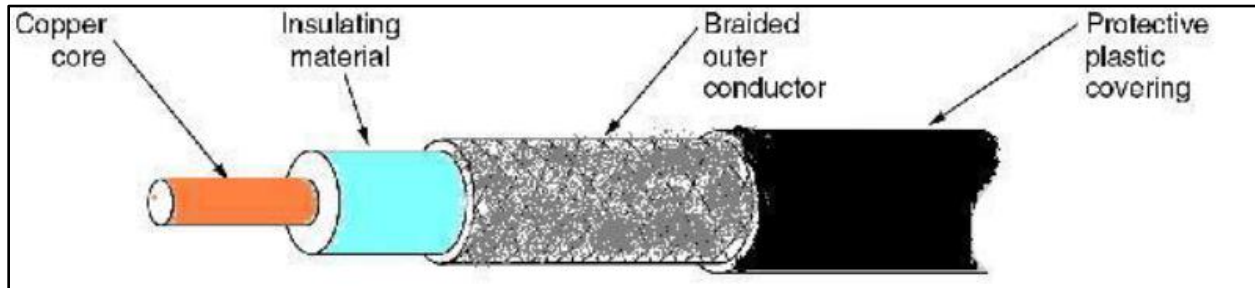**MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION**
**(Autonomous)**
**(ISO/IEC - 27001 - 2005 Certified)**

**SUMMER-16 EXAMINATION**
**Model Answer**

**Subject Code: 17429**                            **Subject Name: Computer Network**

**(d)    State the need of transmission media.**
*(Any relevant four points - 1 mark each)*

**Ans:**

1. Transmission media are needed for interacting with the devices.
2. Without transmission media communication cannot take place.
3. Communication media is the middle part of sender and receiver.
4. It is needed for faster communication.
5. It is needed for reliable delivery of data with efficient methods.
6. It is needed for secure transmission of data


**(e)    State four benefits of computer networks.**
*(Any four Points - 1 mark each)*

**Ans:**

1. File sharing
2. Printer sharing
3. Application services
4. E-mail services.
5. Remote access

MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION
(Autonomous)
(ISO/IEC - 27001 - 2005 Certified)

SUMMER-16 EXAMINATION
Model Answer

Subject Code: 17429                                Subject Name: Computer Network

**(f)    State characteristics of cables.**
*(Any Four Points - 1 mark each)*

**Ans:**
1. Bandwidth
2. Transmission impairments
3. Interference
4. Number of receivers
5. Range of communication

**3.    Attempt any FOUR :**                                                16

**(a)   Explain which resources can be shared in computer networks.**
*(Any Four Resources - 1 mark each)*

**Ans:**
1. **File sharing: -**files can be centrally stored and used by multiple users. Shared directory or disk drive is used. If many users access same file on network and make changes at same time and conflict occurs. Network operating system performs file sharing and provides security to share files.
2. **Printer sharing:** Printer connected in a network can be shared in many ways . Use printer queues on server. Here printer is connected to server. Each work station can access printer directly. Printer can be connected to server. Connect a printer to a computer in a network and run special print server software. Use built in print server. Use dedicated print server. By printer sharing reduces no. of printers needed. Share costly and high quality printers.
3. **Application services:** Share application on a network. When applications are centralized, amount of memory required on disk of work station is reduced. It is easier to administer an application. It is more secure and reliable. It is faster and convenient.
4. **E-mail services.** Two types of email systems are available:

   1) **File based system:** Files are stored in shared location on server. Server provides access to file. Gate way server connects from file based email system to internet.
   2) **Client server e-mail system:** E-mail server contains message and handles e-mail interconnections. E-mail client functions (also consider other e-mail functions): read mail, send, compose, forward, delete. E-mail protocols: SMTP, POP etc**.**

**MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION**
**(Autonomous)**
**(ISO/IEC - 27001 - 2005 Certified)**

**SUMMER-16 EXAMINATION**
**Model Answer**

**Subject Code: 17429**                               **Subject Name: Computer Network**

5. **Remote access**: Set up remote access service on network operating system. Setup VPN (virtual private network) on internet terminal services (TELNET).User can access files from remote location. User can access centralized application or share files on LAN.
6. **Disk sharing:** Disk connected in a network can be shared in many users / computers also called as mountain disk or shared volume.
7. **Scanner sharing:** Scanner connected in a network can be shared in many users/computers.

**(b)** **What is role of Modems in Networking? Explain types of Modems.**
*(Diagram -1 mark, Explanation - 2 marks; Types - 1 mark)*

**Ans:**
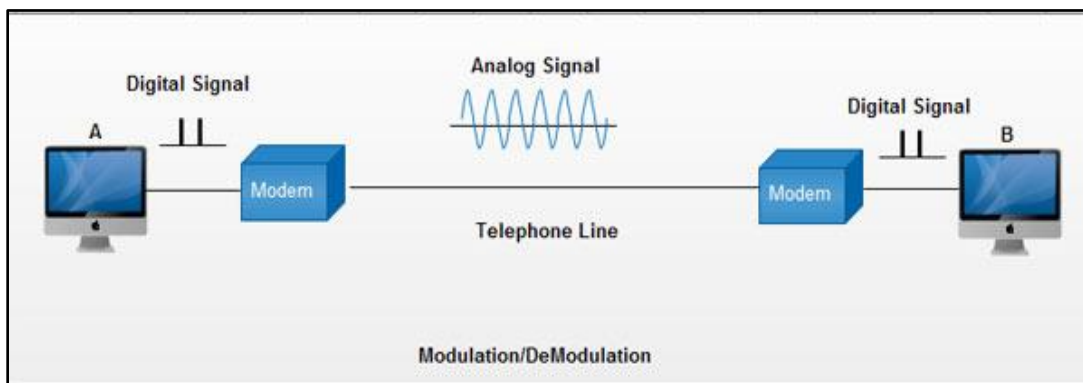


**ROLE OF MODEM:** MODEM works as modulator as well as demodulator. MODEM convers analog signal to digital signal and vice versa. In case of networking data has to be transferred from one location to another location. At present to transfer such a data whatever the infrastructure (PSTN) is available it is of analog tech. but computer sends digital data to transfer this data to another location it is needed to convert into analog format so that it can be transferred by using currently available infrastructure.
**Types of Modem:**
1. **Onboard Modem** - Modem built onto the computer motherboard. These Modems cannot be removed, but can be disabled through a Jumper or CMOS Setup.
2. **Internal Modem** - Modem that connects to a PCI slot inside a newer desktop computer or ISA slot on an older computer. The Internal Modem shown at the beginning of this document is an example of a PCI Modem.
3. **External Modem** - Modem within a box that connects to the computer externally, usually the Serial Ports or USB port.
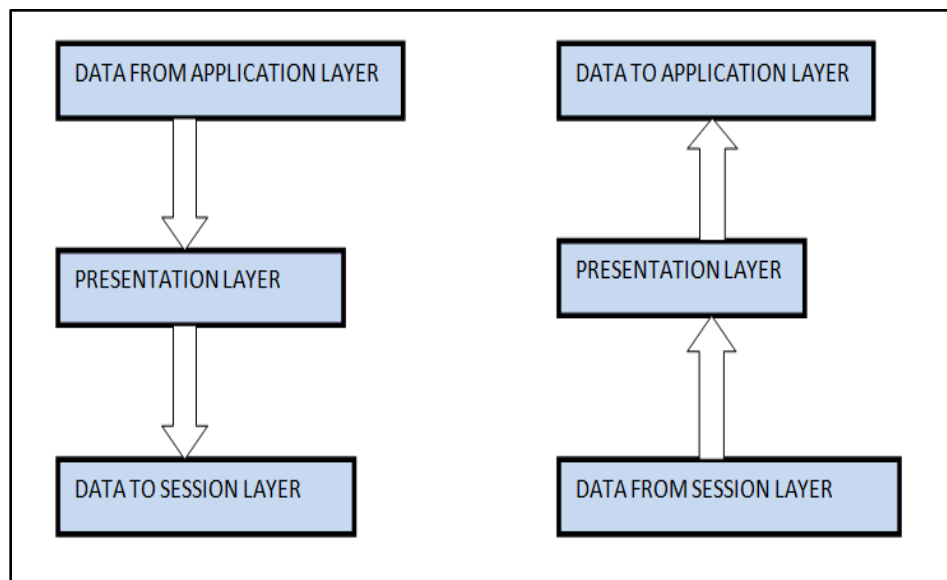
**MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION**
**(Autonomous)**
**(ISO/IEC - 27001 - 2005 Certified)**

**SUMMER-16 EXAMINATION**
**Model Answer**

Subject Code: 17429                                     Subject Name: Computer Network

**(c)**   **Describe presentation layer of OSI model.**
          *(Diagram - 2 marks; Explanation - 2 marks)*

**Ans:**

**Presentation Layer - OSI Model**

The primary goal of this layer is to take care of the syntax and semantics of the information exchanged between two communicating systems. Presentation layer takes care that the data is sent in such a way that the receiver will understand the information (data) and will be able to use the data. Languages (syntax) can be different of the two communicating systems. Under this condition presentation layer plays a role translator.



**Fig: Presentation Layer**

**MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION**
**(Autonomous)**
**(ISO/IEC - 27001 - 2005 Certified)**

**SUMMER-16 EXAMINATION**
**Model Answer**

**Subject Code: 17429**                          **Subject Name: Computer Network**

**Functions of Presentation Layer**
1. **Translation:** Before being transmitted, information in the form of characters and numbers should be changed to bit streams. The presentation layer is responsible for interoperability between encoding methods as different computers use different encoding methods. It translates data between the formats the network requires and the format the computer.
2. **Encryption**: It carries out encryption at the transmitter and decryption at the receiver.
3. **Compression:** It carries out data compression to reduce the bandwidth of the data to be transmitted. The primary role of Data compression is to reduce the number of bits to be transmitted. It is important in transmitting multimedia such as audio, video, text etc.


**(d)** **State name of protocol used at different layers of OSI model.**
*(2 - Protocols of Each Layer - ½ marks each (Any Four Layer))*

**Ans**

**The following are the OSI protocols used in the seven layers of the OSI Model:**
1. **Physical Layer:** Bluetooth, PON, OTN, DSL, IEEE.802.11, IEEE.802.3, L431 and TIA 449.
2. **Data Link Layer:** ARP, CSLIP, HDLC, IEEE.802.3, PPP, X-25, SLIP, ATM, SDLS and PLIP.
3. **Network Layer:** Internet Protocol (IPv4), Internet Protocol (IPv6), IPX, AppleTalk, ICMP, IPSec and IGMP.
4. **Transport Layer:** Transmission Control Protocol (TCP), UDP, SPX, DCCP and SCTP.
5. **Session Layer:** PPTP, SAP, L2TP and NetBIOS.
6. **Presentation Layer:** XDR, TLS, SSL and MIME.
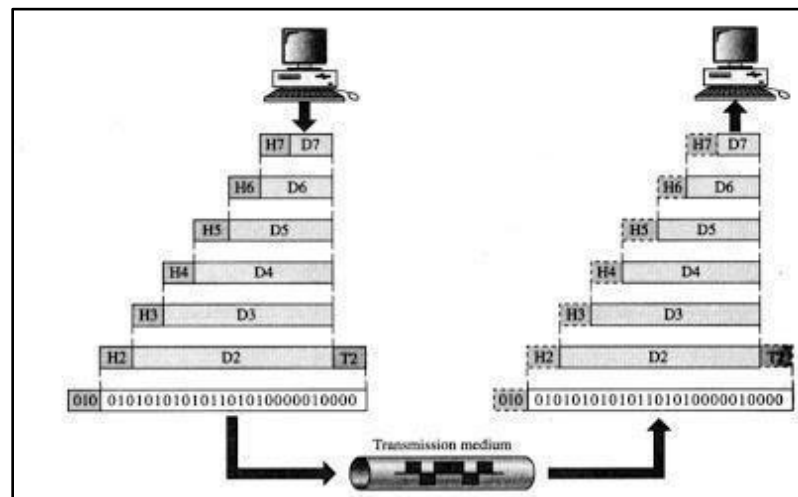7. **Application Layer:** HTTP, SMTP, DHCP, FTP, Telnet, SNMP and SMPP.

| Subject Code: 17429 | Subject Name: Computer Network |
|---|---|

**(e)** **Explain the concept of encapsulation.**
*(Diagram - 2 marks; Explanation - 2 marks)*

**Ans:**



- In computer networking, the term encapsulation is used to refer to the process of each layer at the sending computer adding its own header information, in the form of meta-data to the actual payload (data)
- Each layer's header information would be interpreted and acted upon by a peer layer in another machine.
- Encapsulation is analogous to packing a letter inside an addressed envelope by the sender. Just like postal envelopes cannot be delivered to the intended recipient without an address, similarly without the encapsulation headers, data cannot be carried across the computer networks from the sending computer to the receiving computer.
- It is the primary means of communication between peer layers of different computers. For instance, : the Network layer Header (NH) containing the destination IP address, helps a packet to be routed to the correct receiving computer : the Data link layer Header (DLH) containing the destination MAC address, helps a frame to be passed onto the correct next hop neighbor, during a packets hop by hop journey from the source computer to the receiving computer : the Transport layer Header (TH) containing the source port and the destination port helps the source and the destination computers to correctly multiplex/demultiplex data among different applications (like HTTP, FTP etc.).

MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION
(Autonomous)
(ISO/IEC - 27001 - 2005 Certified)

SUMMER-16 EXAMINATION
Model Answer

Subject Code: 17429                                    Subject Name: Computer Network

**(f)** **Write abbreviation / Acronym of following :**
**(i) SLIP   (ii) PPP    (iii) ARP  (iv)RARP**
**(v) FTP    (vi) SMTP   (vii) DNS  (viii) UDP**
*(½ - marks for each correct abbreviation)*

**Ans:**

i)    **SLIP:** Serial Line Internet Protocol
ii)   **PPP:** Point-to-Point Protocol
iii)  **ARP:** Address Resolution Protocol
iv)   **RARP:** Reverse Address Resolution Protocol
v)    **FTP:** File Transfer Protocol
vi)   **SMTP:** Simple Mail Transfer Protocol
vii)  **DNS:** Domain Name System
viii) **UDP:** User Datagram Protocol

**4.    Attempt any FOUR :**                                                          **16**

**(a)    State meaning of (i) Subnetting (ii) Supernetting with suitable examples.**

 *(Subnetting - 1 mark; Example - 1 mark; Supernetting - 1 mark; Example - 1 mark)*

**Ans:**

**Sub-netting:** Subnet mask is a net mask with the only real difference being that breaking a larger
Network into smaller parts and each smaller section will use different sets of address numbers.
The subnet mask is 32 bit value that usually express in dotted decimal notation used by IP address.
This is the combination of net-ID and host-ID.

**Example:**
Consider the subnet mask as 255.255.0.0. Convert the 255.255.0.0 subnet mask to binary.
255.255.0.0 = 11111111 11111111 00000000 00000000 (in binary) add 1s right after the last 1 on
the right (in the middle of the Mask, between the 1s and 0s) I add five 1s to make it look like this:
111111111111111
11111000 00000000 Using the subnet's formula, this would give us 25 = 32networks

**Super-netting:** To create a supernetwork, the procedure is to be reversed. The networks are
combined by creating space for a larger number of hosts. To accomplish this, we start with the
default subnet mask of 255.255.255.0 and use some of the bits reserved for the Net id to identify

MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION
(Autonomous)
(ISO/IEC - 27001 - 2005 Certified)

SUMMER-16 EXAMINATION
Model Answer

Subject Code: 17429                                          Subject Name: Computer Network

the Host id. The following example shows we would create a new supernetwork by combining four separate subnetworks.

**Example:** If a packet arrives at the router with the destination address 192.168.64.48, the supernet mask 255.255.252.0 is applied to the destination address.
11000000.10101000.01000000.00110000 (destination IP address) AND
11111111.11111111.11111100.00000000    (Supernet    mask)    Returns
11000000.10101000.01000000.00000000

**(b)**  **Draw and explain layered structure of TCP/IP model.**
  *(Diagram - 1 mark; Explanation - 3 marks)*
**Ans***:*
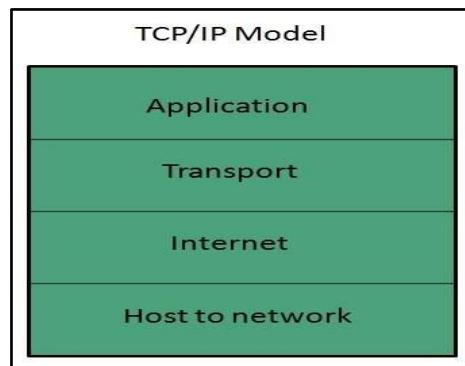


TCP/IP Reference Model: TCP/IP means transmission control protocol and internet protocol. Protocols are set of rules which govern every possible communication over the internet. These protocols describe the movement of data between the host computers or internet. These offer simple naming and addressing schemes.
Overview of TCP/IP reference model
TCP/IP that is transmission control protocol and the internet protocol was developed by Department of Defense's Project Research Agency (ARPA, later DARPA) under the project of network interconnection.
Originally it was created to connect military networks together, later it was used by government agencies and universities. It is robust to failures and flexible to diverse networks. Most widely used protocol for interconnecting computers and it is the protocol of the internet.
Description of different TCP/IP protocols
  **Layer 1: Host-to-network Layer**
  **1.** Protocol is used to connect the host, so that the packets can be sent over it.
  **2.** Varies host to host and network to network.

**MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION**
**(Autonomous)**
**(ISO/IEC - 27001 - 2005 Certified)**

**SUMMER-16 EXAMINATION**
**Model Answer**

**Subject Code: 17429**                                    **Subject Name: Computer Network**

**Layer 2: Internet layer**
1. Selection of a packet switching network which is based on a connectionless internetwork layer is called internet layer.
2. It the layer which holds the whole architecture together.
3. It allows the host to insert the packets.
4. It helps the packet to travel independently to the destination.
5. Order in which packets are received is different from the way they are sent.
6. IP (internet protocol) is used in this layer.

**Layer 3: Transport Layer**
1. It decides if data transmission should be on parallel path or single path.
2. Functions such as multiplexing, segmenting or splitting on the data done by layer four that is transport layer.
3. Transport layer breaks the message (data) into small units so that they are handled more efficiently by the network layer.
4. Functions of the transport layer are same as the OSI model.
5. Transport layer also arrange the packets sent in sequence.

**Layer 4: Application Layer**
1. Protocols used in this layer are high level protocols such as TELNET, FTP (file transfer protocol etc.

**(c)**   **Draw the Bluetooth architecture and describe its working.**
          *(Piconet - 2 marks; Scatternet - 2 marks)*

**Ans:**
**Bluetooth Architecture**
**Bluetooth architecture defines two types of networks:**
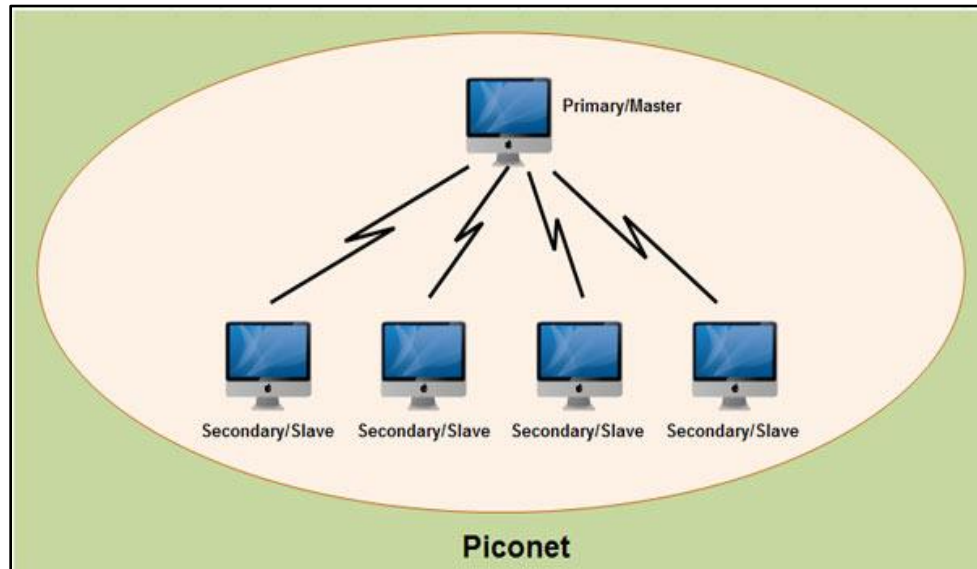   1. Piconet
   2. Scattemet

**1. Piconet**
- Piconet is a Bluetooth network that consists of one primary (master) node and seven active secondary (slave) nodes.
- Thus, piconet can have up to eight active nodes (1 master and 7 slaves) or stations within the distance of 10 meters.
- There can be only one primary or master station in each piconet.
- The communication between the primary and the secondary can be one-to-one or one-to-many.
- All communication is between master and a slave. Salve-slave communication is not possible.

**MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION**
**(Autonomous)**
**(ISO/IEC - 27001 - 2005 Certified)**

**SUMMER-16 EXAMINATION**
**Model Answer**

**Subject Code: 17429**                                 **Subject Name: Computer Network**

**Piconet**

2. **Scatternet:**

- Scattemet is formed by combining two or more piconets.
- A slave in one piconet can act as a master or primary in other piconet.
- Such a station or node can receive messages from the master in the first piconet and deliver the message to its slaves in other piconet where it is acting as master. This node is also called bridge slave.
- Thus a station can be a member of two piconets.
- A station cannot be a master in two piconets
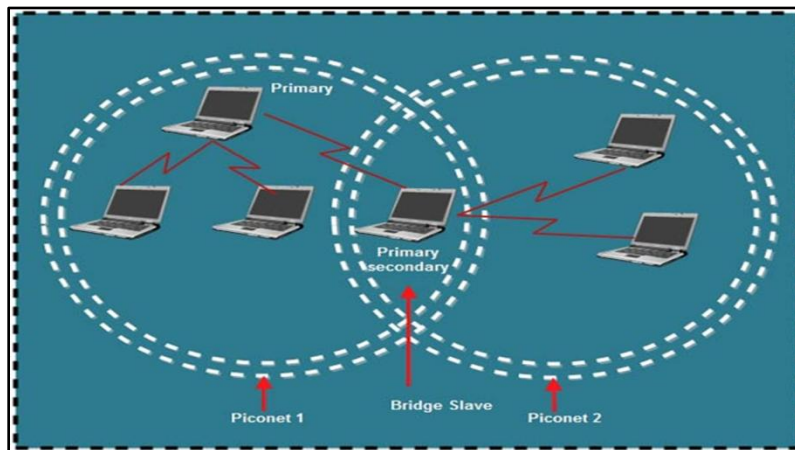
| | |
|---|---|
| **Subject Code: 17429** | **Subject Name: Computer Network** |

**(d)** **Define IP Addressing .List IP Address classes with their range of addresses.**
*(Define - 1 mark; Classes - 1 mark; range - 2 marks)*

**Ans:**

**Internet Protocol IP address** is a number (example shown right) used to indicate the location of a computer or other device on a network using TCP/IP. These addresses are similar to those of your house; they allow data to reach the appropriate destination on a network and the Internet.
There are two versions of IP addresses used today, IPv4 and IPv6

**IP address classes**: There are five classes of available IP ranges: Class A, Class B, Class C, Class D and Class E, while only A, B, and C are commonly used. Each class allows for a range of valid IP addresses, shown in the following table.

| Class | Address Range |
|---|---|
| **Class A** | 1.0.0.0 to 127.255.255.255 |
| **Class B** | 128.0.0.0 to 191.255.255.255 |
| **Class C** | 192.0.0.0 to 223.255.254.255 |
| **Class D** | 224.0.0.0 to 239.255.255.255 |
| **Class E** | 240.0.0.0 to 254.255.255.255 |

**MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION**
**(Autonomous)**
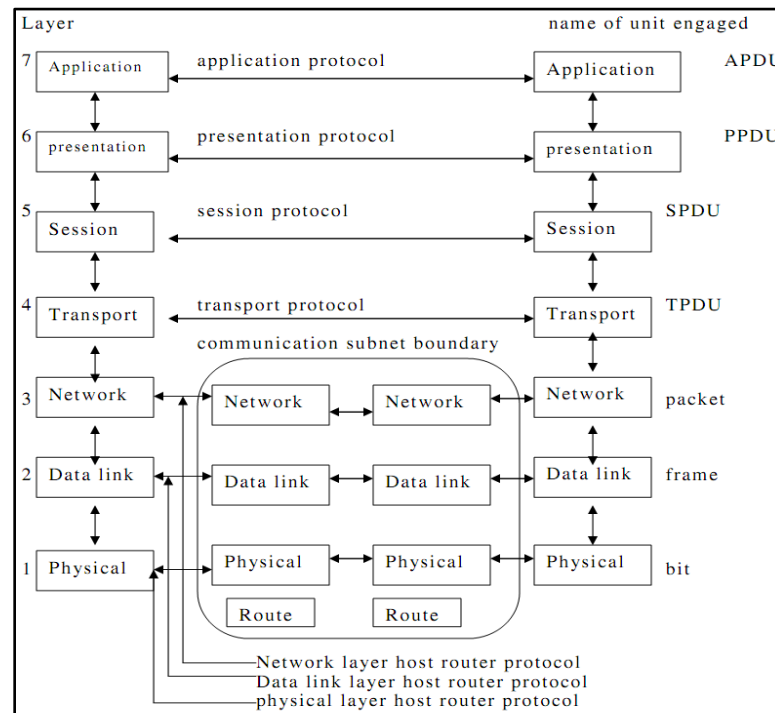**(ISO/IEC - 27001 - 2005 Certified)**

**SUMMER-16 EXAMINATION**
**Model Answer**

Subject Code: 17429                                     Subject Name: Computer Network

**(e)**     **What do you mean by Layered Architecture?**
          *(Diagram - 2 marks; Explanation - 2 marks)*

**Ans**



**Fig: Layered Architecture of OSI Reference Model**

The OSI reference model is as shown in the figure. There are seven layers in the model. Physical layer, Data link layer, Network layer, Transport layer, Session layer, Presentation layer, Application layer. Each layer performs unique and specific task and it offers services to the layer above it. Each computer on a network uses a series of protocols to perform the functions assigned to each layer. At the top of the stack is the application layer and at the bottom is the physical medium which actually connects the computers to form a network. The figure shows the OSI model with two hosts A and B, communicating with each other Interface: an interface defines the operations and services offered by lower layer to the upper layer. This is an interface between each pair of adjacent layers as shown in the figure. Peer: the entities comprising the corresponding layers on different machines are called as peers. The communication actually takes place between the peers using the protocols. Exchange of information: at the physical layer the communication is direct that is, machine a sends a stream of bits to machine B. at higher layers each layer in the sending machines adds its own information to the message it receives from the layer just above it and passes the whole package to the layer just below it. The information added by each layer is in the form of

MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION
**(Autonomous)**
**(ISO/IEC - 27001 - 2005 Certified)**

**SUMMER-16 EXAMINATION**
**Model Answer**

Subject Code: 17429                                    Subject Name: Computer Network

headers or trailers. At layer 1 the entire package is converted to a form that can be transferred to the receiving machine.

**(f)    Compare LAN & WAN.**
*(Any Four Comparison - 1 mark each)*

**Ans:**

|  | LAN | WAN |
|---|---|---|
| **Covers** | Local areas only (e.g. homes, offices, schools) | Large geographic areas(e.g. cities, states, nations) |
| **Definition** | LAN (Local Area Network) is a computer network covering a small geographic area, like a home, office, school, or group of buildings. | WAN (Wide Area Network) is a computer network that covers a broad area (e.g., any network whose communications links cross metropolitan, regional, or national boundaries over a long distance). |
| **Speed** | High speed (1000 mbps) | Less speed (150 mbps) |
| **Data transfer rates** | LANs have a high data transfer rate. | WANs have a lower data transfer rate compared to LANs. |
| **Example** | The network in an office building can be a LAN | Internet is a good example of a WAN |
| **Connection** | One LAN can be connected to other LANs over any distance via telephone lines and radio waves. | Computers connected to a wide-area network are often connected through public networks, such as the telephone system. They can also be connected through leased lines or satellites. |
| **Data Transmission Error** | Experiences fewer data transmission errors | Experiences more data transmission errors as compared to LAN |
| **Ownership** | Typically owned, controlled, and managed by a single person or organization. | WANs (like the Internet) are not owned by any one organization but rather exist under collective or distributed ownership and management over long distances. |
| **Set-up costs** | If there is a need to set-up a couple of extra devices on the network, it is not | For WANs since networks in remote areas have to be connected |

**MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION**
**(Autonomous)**
**(ISO/IEC - 27001 - 2005 Certified)**

**SUMMER-16 EXAMINATION**
**Model Answer**

**Subject Code: 17429**                                    **Subject Name: Computer Network**

| | very expensive to do that. | the set-up costs are higher. |
|---|---|---|
| **Geographical Spread** | Have a small geographical range and do not need any leased telecommunication lines | Have a large geographical range generally spreading across boundaries and need leased telecommunication lines |
| **Maintenance costs** | Because it covers a relatively small geographical area, LAN is easier to maintain at relatively low costs. | Maintaining WAN is difficult because of its wider geographical coverage and higher maintenance costs. |
| **Bandwidth** | High bandwidth is available for transmission. | Low bandwidth is available for transmission. |
| **Congestion** | Less congestion | More congestion |

**5.    Attempt any FOUR :**                                                                          **16**

**(a)    State the application of NIC device driver and client server software.**
*(NIC device driver application - 2 marks;   client server software - 2 marks; any 2 application)*

**Ans:**
**Applications of NIC device driver**
A driver (sometimes called a device driver) is software that enables a computer to work with a particular device. Although a device might be installed on a computer, the computer's operating system cannot communicate with the device until the driver for that device has been installed and configured
Network interface card (NIC) drivers are computerized instructions and information that are required for a NIC card to be operational after it is installed into or connected to a computer. It is the software driver that tells the computer how to work with the device so that the device can perform its job.

**Applications:**
There are drivers for nearly every type of computer device and peripheral.
1)  The computer's operating system works with the driver to make the device perform. Printers provide a good illustration of how drivers are used. Printers built by different manufacturers have different features and functions.
2)  It is impossible for computer and operating-system manufacturers to equip new computers with all the software required to identify and work with every type of printer.
3)  Network interface card (NIC) drivers are computerized instructions and information that are required for a NIC card to be operational after it is installed into or connected to a computer.

**MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION**
**(Autonomous)**
**(ISO/IEC - 27001 - 2005 Certified)**

**SUMMER-16 EXAMINATION**
**Model Answer**

**Subject Code: 17429**                                                    **Subject Name: Computer Network**

4) These instructions usually are written by highly proficient computer programmers who might program in a variety of programming languages such as C or C++.
5) A NIC card is a hardware device, and hardware drivers might be thought of as the computer code or machine language that "drives" hardware or makes it work.

**Applications of Client – Server software**
**1)     E-mail clients**
   A mail server (sometimes also referred to an e-mail server) is a server that handles and delivers e-mail over a network, usually over the Internet. A mail server can receive e-mails from client computers and deliver them to other mail servers. A mail server can also deliver e-mails to client computers. A client computer is normally the computer where you read your e-mails, for example your computer at home or in your office. Also an advanced mobile phone or Smartphone, with e-mail capabilities, can be regarded as a client computer in these circumstances.
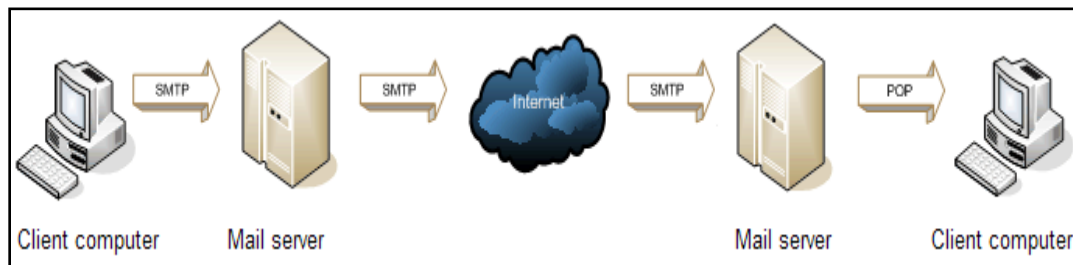


**2)     Web browsers**
   Web browser or browser is a software application used to locate, retrieve and display content on the World Wide Web, including Web pages, images, video and other files. As a client/server model, the browser is the client run on a computer that contacts the Web server and requests information. The Web server sends the information back to the Web browser which displays the results on the computer or other Internet-enabled device that supports a browser.

**3)     FTP (file transfer) clients**
   A File Transfer Protocol client (FTP client) is a software utility that establishes a connection between a host computer and a remote server, typically an FTP server. An FTP client provides the dual-direction transfer of data and files between two computers over a TCP network or an Internet connection. An FTP client works on a client/server architecture, where the host computer is the client and the remote FTP server is the central server.

MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION
(Autonomous)
(ISO/IEC - 27001 - 2005 Certified)

SUMMER-16 EXAMINATION
Model Answer

Subject Code: 17429                                    Subject Name: Computer Network

(b)   **Differentiate between TCP and UDP (four points).**
      *(Any - 4 points 1 mark for each)*

**Ans:**

| TCP | UDP |
|---|---|
| TCP is transmission control protocol. | UDP is user datagram protocol. |
| It is connection oriented protocol because connection must be establish prior to transmission of data. | It is connectionless protocol because data is sent without establishing a connection between sender and receiver before sending the data. |
| TCP is reliable protocol because data is delivered with acknowledgement | UDP is unreliable because data is delivered without acknowledgement. |
| TCP perform AutoRetransmission if the data is lost. | UDP does not perform Auto retransmission |
| TCP use flow control | UDP does not use flow control. |
| TCP has high speed of transmission | UDP has very high transmission speed. |

(c)   **Name the types of Handoffs in Mobile Communication and describe Handoff procedure with suitable diagram.**
      *(1 - mark for naming types of handoffs (any two); 3 - marks for explanation with diagram)*

**Ans:**
   **Handoffs in Mobile Communication**

   A handoff refers to the process of transferring an active call or data session from one cell in a cellular network to another or from one channel in a cell to another. A well-implemented handoff is important for delivering uninterrupted service to a caller or data session user.

   **Handoffs may be classified into two types:**

   - **Hard handoff**
   - **Soft handoff**
   - **Queued handoff**
   - **Delayed handoff**
   - **Forced handoff**

**MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION**
**(Autonomous)**
**(ISO/IEC - 27001 - 2005 Certified)**

**SUMMER-16 EXAMINATION**
**Model Answer**

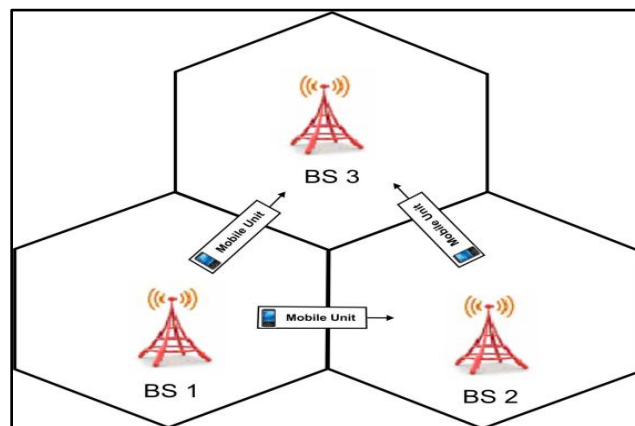**Subject Code: 17429**　　　　　　　　　　　**Subject Name: Computer Network**

1)  **Hard Handoff**: Characterized by an actual break in the connection while switching from    one cell or base station to another.

2)   **Soft Handoff**: Entails two connections to the cell phone from two different base stations. This ensures that no break ensues during the handoff. Naturally, it is more costly than a hard handoff.

## Handoff procedure with diagram
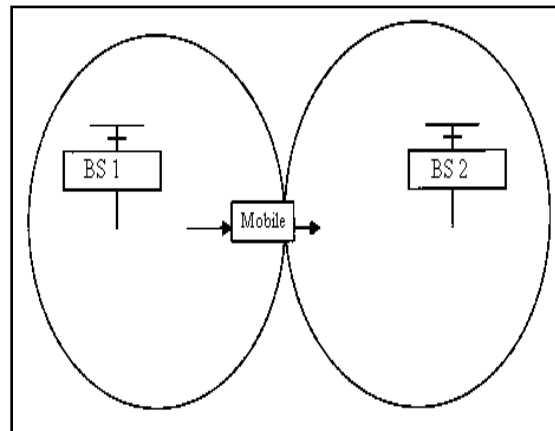


**OR**

**MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION**
**(Autonomous)**
**(ISO/IEC - 27001 - 2005 Certified)**

**SUMMER-16 EXAMINATION**
**Model Answer**

**Subject Code: 17429**                                      **Subject Name: Computer Network**

Cellular networks are composed of cells, each of which is capable of providing telecommunications services to subscribers roaming within them. Each cell can only serve up to a certain area and number of subscribers. Thus, when any of these two limits is reached, a handoff ensues. For instance, if a subscriber moves out of the coverage area of a particular cell while entering another, a handoff takes place between the two cells. The cell that served the call prior to the handoff is relieved of its duties, which are then transferred to the second cell. A handoff may also be triggered when the number of subscribers using a particular cell has already reached the cell's maximum limit (capacity). Such a handoff is possible because the reach of the cell sites serving these cells can sometimes overlap. Thus, if a subscriber is within an overlapping area, the network may opt to transfer one subscriber's call to the cell involved in the overlap. Sometimes a handoff can take place even if no limit is breached. For example, suppose that a subscriber initially inside the jurisdiction of a large cell (served by an umbrella-type cell site) enters the jurisdiction of a smaller cell (one served by a micro cell). The subscriber can be handed off to the smaller cell in order to free up capacity on the larger one.

**(d)** **A computer centre is connected in star topology with 8 computers. This set up has to be converted into Mesh topology. What are the requirements? What are the advantages and disadvantages of the two systems? Draw the sketches for both the topologies.**

*(Requirements - 1 mark; advantages and disadvantages - 2 marks; sketches of topologies - 1 mark)*

**Ans:**

In Star topology Devices are connected to Hub/Switch that we have to disconnect and remove the central device. Now, If we have to connect Eight devices in a mesh topology. How many cables are needed? How many ports are needed for each device?

Cables needed (8*7)/2 = 28 and,
Each device needs to be connected to 7 other devices. So, each device needs to have 7 ports. Eight devices times seven ports equals to 56 total ports.

Mesh is having high redundancy. Only one device would be disconnected if all the connections were to fail for that device. You can have many connections to other devices that's why it's less likely to fail. The only cause of failure at this point is really the power and if you just don't have any. Even if one of the connections between two devices fail there is no effect on network and they can still communicate through other channels.

**MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION**
**(Autonomous)**
**(ISO/IEC - 27001 - 2005 Certified)**

**SUMMER-16 EXAMINATION**
<u>**Model Answer**</u>

**Subject Code: 17429**                                      **Subject Name: Computer Network**

**Advantages of Mesh topology**

1) Data can be transmitted from different devices simultaneously. This topology can withstand high traffic.

2) Even if one of the components fails there is always an alternative present. So data transfer doesn't get affected.
3) Expansion and modification in topology can be done without disrupting other nodes.

**Disadvantages of Mesh topology**
**1)** There are high chances of redundancy in many of the network connections.
**2)** Overall cost of this network is way too high as compared to other network topologies.
**3)** Set-up and maintenance of this topology is very difficult. Even administration of the network is tough.

**Advantages of Star Topology**
1) As compared to Bus topology it gives far much better performance, signals don't necessarily get transmitted to all the workstations. A sent signal reaches the intended destination after passing through no more than 3-4 devices and 2-3 links. Performance of the network is dependent on the capacity of central hub.
2) Easy to connect new nodes or devices. In star topology new nodes can be added easily without affecting rest of the network. Similarly components can also be removed easily.
3) Centralized management. It helps in monitoring the network.
4) Failure of one node or link doesn't affect the rest of network. At the same time its easy to detect the failure and troubleshoot it.

**Disadvantages of Star Topology**
1) Too much dependency on central device has its own drawbacks. If it fails whole network goes down.
2) The use of hub, a router or a switch as central device increases the overall cost of the network.
3) Performance and as well number of nodes which can be added in such topology is depended on capacity of central device.

**MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION**
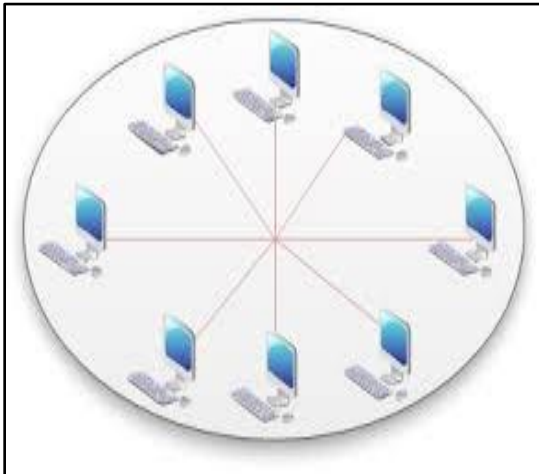**(Autonomous)**
**(ISO/IEC - 27001 - 2005 Certified)**

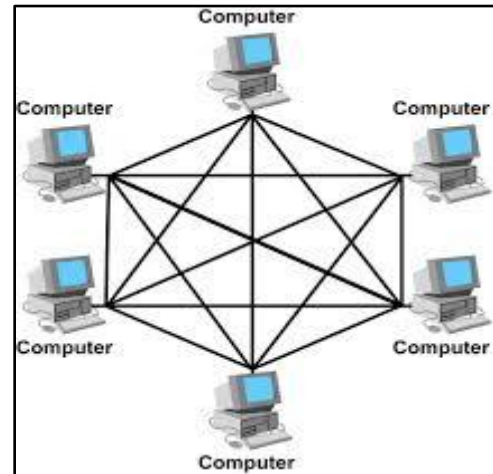**SUMMER-16 EXAMINATION**
**Model Answer**

**Subject Code: 17429**                                    **Subject Name: Computer Network**

**Fig. Star topology**



**Fig. Mesh Topology**

**(e)    Draw the frame format of TCP Header and state the function of various fields.**
*(Frame format - 2 marks; explanation of all fields - 2 marks)*

**Ans:**

**TCP/IP Header Format:** TCP segments are sent as internet datagram's. The Internet Protocol header carries several information fields, including the source and destination host addresses. A TCP header follows the internet header, supplying information specific to the TCP protocol. This division allows for the existence of host level protocols other than TCP.
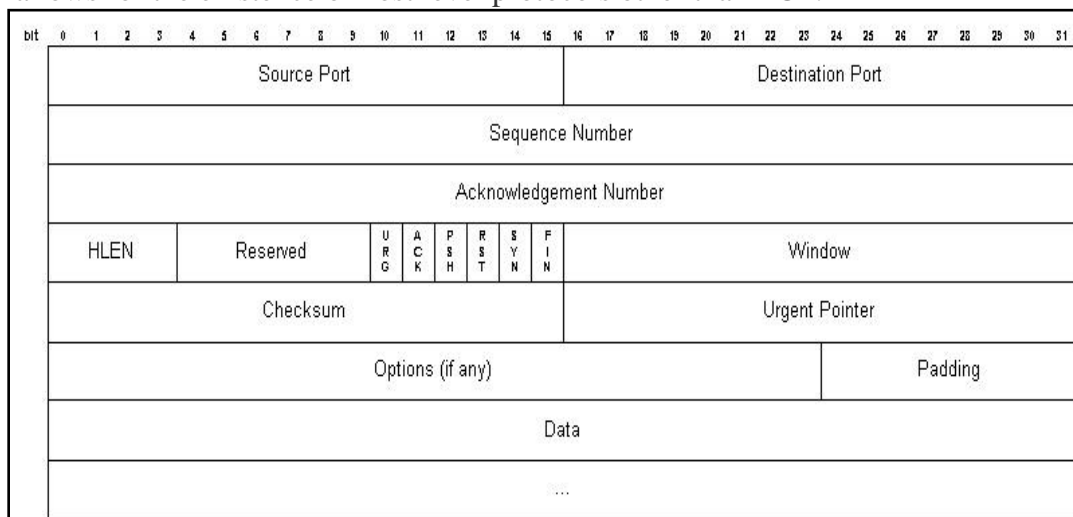
**MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION**
**(Autonomous)**
**(ISO/IEC - 27001 - 2005 Certified)**

**SUMMER-16 EXAMINATION**
**Model Answer**

**Subject Code: 17429**                          **Subject Name: Computer Network**

- **Source Port (16):** The port number of the host sending the data
- **Destination Port (16):** The port number of the application requested on the destination host.
- **Sequence Number (32):** The sequence number of the first data octet in this segment (except when SYN is present). If SYN is present the sequence number is the initial sequence number (ISN) and the first data octet is ISN+1. It puts the data back in the correct order or retransmits missing or damages data, a process called sequencing.
- **Acknowledgement Number (32):** Define which TCP octet expected next. If the ACK control bit is set this field contains the value of the next sequence number the sender of the segment is expecting to receive. Once a connection is established this is always sent.
- **Header Length (4):** Stands for header length, which defines the number of 32 bit words in the header. This indicates where the data begins. The TCP header (even one including options) is an integral number of 32 bits long.
- **Unused (6):** Reserved for future use, it always set to 0.
- **Flags (6):** Control functions used to set up and terminate a session. Flags from left to right:
  - URG:  Urgent Pointer field significant
  - ACK:  Acknowledgment field significant
  - PSH:  Push Function
  - RST:  Reset the connection
  - SYN:  Synchronize sequence numbers
  - FIN:  No more data from sender

- **Windows (16):** The window size of the sender is willing to accept, in octet. The number of data octets beginning with the one indicated in the acknowledgment field which the sender of this segment is willing to accept.
- **Checksum (16): An error detection code.** The checksum field is the 16 bit one's complement of the one's complement sum of all 16 bit words in the header and text.  If a segment contains an odd number of header and text octets to be check summed, the last octet is padded on the right with zeros to form a 16 bit word for checksum purposes.  The pad is not transmitted as part of the segment.  While computing the checksum, the checksum field itself is replaced with zeros.
- **Urgent Pointer (16):** Indicates the ends of urgent data. This field communicates the current value of the urgent pointer as a positive offset from the sequence number in this segment. The urgent pointer points to the sequence number of the octet following the urgent data.  This field is only be interpreted in segments with the URG control bit set.
- **Options (32):** Options may occupy space at the end of the TCP header and are a multiple of 8 bits in length.  All options are included in the checksum.  An option may begin on any octet boundary. There are two cases for the format of an option:
  **Case 1:**  A single octet of option-kind.
  **Case 2:**  An octet of option-kind, an octet of option-length, and the actual option-data octets.
  The   option-length counts the two octets of option-kind and option-length as well as the option data octets.
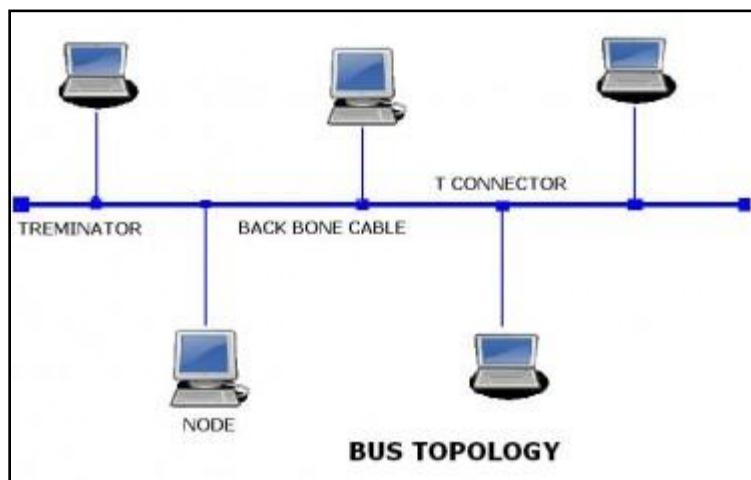
**MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION**
**(Autonomous)**
**(ISO/IEC - 27001 - 2005 Certified)**

**SUMMER-16 EXAMINATION**
**Model Answer**

**Subject Code: 17429**                                     **Subject Name: Computer Network**

**(f)** **Draw the sketch of bus topology and explain.**
*(Diagram - 2 marks; explanation - 2 marks)*

**Ans:**

**Bus Topology** is a network setup in which each computer and network device are connected to a single cable or backbone. Bus uses a common backbone to connect all devices. A single cable, the backbone functions as a shared communication medium that devices attach or tap into with an interface connector. A device wanting to communicate with another device on the network sends a broadcast message onto the wire that all other devices see, but only the intended recipient actually accepts and processes the message.



**Advantages of bus topology**
- It works well when you have a small network.
- Easiest network topology for connecting computers or peripherals in a linear fashion.
- Requires less cable length than a star topology.

**Disadvantages of bus topology**
- Difficult to identify the problems if the whole network goes down.
- It can be hard to troubleshoot individual device issues.
- Not great for large networks.
- Terminators are required for both ends of the main cable.
- Additional devices slow the network down.
- If a main cable is damaged, the network fails or splits into two.

**MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION**
**(Autonomous)**
**(ISO/IEC - 27001 - 2005 Certified)**

**SUMMER-16 EXAMINATION**
**Model Answer**

**Subject Code: 17429**                              **Subject Name: Computer Network**

**6.**   **Attempt any TWO :**                                                                    **16**

**(a)**   **Draw and explain the functions of various layer of OSI Reference model.**
         *(Layered structure 1 mark; functions of layers - 7 marks)*

         *(Diagram - 2 marks; explanation of layers functions - 6 marks)*

**Ans:**
         OSI model (open system interconnection) model was developed by ISO (international standard organization)
         Function of OSI model
         1) It provides way to understand how internet work operates.
         2) It gives guideline for creating network standard. OSI model has 7 layers as shown in the figure.

|  |
| --- |
| **Application Layer** |
| **Presentation Layer** |
| **Session Layer** |
| **Transport Layer** |
| **Network Layer** |
| **Data link Layer** |
| **Physical Layer** |

OSI model has following 7 layers as Physical layer, data link layer, Network layer, Transport layer, session layer, presentation layer, application layer.

- **Physical layer:** It co-ordinates the functions required to transmit bit stream over physical medium. It deals with mechanical and electrical specifications of interface and transmission medium. For transmission it defines procedures and functions that devices and transmission medium has to perform.

- **Data link layer:** 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. Functions of data link layer are:

MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION
**(Autonomous)**
**(ISO/IEC - 27001 - 2005 Certified)**

**SUMMER-16 EXAMINATION**
**Model Answer**

**Subject Code: 17429**                    **Subject Name: Computer Network**

   **1)** Framing
   **2)** Physical addressing
   **3)** Flow control
   **4)** Error control
   **5)** Media access control
   **6)** Node to node delivery

▪ **Network layer:** It is responsible for routing the packets with in the subnet i.e. from source to destination. It is responsible for source to destination delivery of individual packets across multiple networks. It ensures that packet is delivered from point of origin to destination.
  **Functions of network layer**
   **1)** logical addressing
   **2)** Routing.
   **3)** Congestion control
   **4)** Accounting and billing
   **5)** Address transformation
   **6)** Source host to destination host error free delivery of packet.

▪ **Transport layer:** Responsibility of process to process delivery of message Ensure that whole message arrives in order.
  **Functions of Transport Layer:**
   **1)** Service point addressing
   **2)** Segmentation and reassembly
   **3)** Connection control
   **4)** Flow control: Flow control is performed end to end
   **5)** Error control
   **6)** Quality of service

▪ **Session layer:** Establishes, maintains, synchronizes the interaction among communication systems It is responsible for dialog control and synchronization
  **Functions of Session Layer:**
   **1)** Dialog control/ Management
   **2)** Synchronization, session and sub session
   **3)** Session closure

▪ **Presentation layer:** It is concerned with syntax, semantics of information exchanged between the two systems.
  **Functions:**
  Translation, encryption, compression of the data.

▪ **Application layer: It** enables user to access the network. It provides user interfaces and support for services like email, remote file access.

**MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION**
**(Autonomous)**
**(ISO/IEC - 27001 - 2005 Certified)**

**SUMMER-16 EXAMINATION**
<u>**Model Answer**</u>

Subject Code: 17429                 Subject Name: Computer Network

**Functions:**
Network virtual terminal, file transfer access and management, mail services and directory services

**(b)**     **Explain protocol used in internet layer in TCP/IP.**
        *(Any - 4 protocols - 2 marks for each)*

**Ans:**

The *Internet layer* of TCP/IP is responsible for addressing, packaging, and routing functions. The core protocols of the Internet layer are IP, ARP, ICMP, and IGMP.

1) **The** *Internet Protocol* **(IP)** is a routable protocol responsible for IP addressing, routing, and the fragmentation and reassembly of packets. It has the task of delivering packets from the source host to the destination host solely based on the IP address in the packet headers. For this purpose, IP defines packet structures that encapsulate the data to be delivered. It also defines addressing methods that are used to label the datagram with source and destination information.

2) **The** *Address Resolution Protocol (ARP)* is responsible for the resolution of the Internet layer address to the Network Interface layer address such as a hardware address. ARP was defined by <u>RFC 826</u> in 1982. ARP is used for mapping a network address (e.g. an <u>IPv4 address</u>) to a physical address like an <u>Ethernet address</u> (also named a <u>MAC address</u>). ARP has been implemented with many combinations of network and data link layer technologies

3) **The** *Internet Control Message Protocol* **(ICMP)** is responsible for providing diagnostic functions and reporting errors due to the unsuccessful delivery of IP packets. It is used by network devices, like routers, to send error messages indicating, for example, that a requested service is not available or that a host or router could not be reached. ICMP can also be used to relay query messages.

4) **The** *Internet Group Management Protocol* **(IGMP)** is responsible for the management of IP multicast groups. It is used by <u>hosts</u> and adjacent <u>routers</u> on <u>IPv4 networks</u> to establish multicast group memberships. IGMP is an integral part of <u>IP multicast</u>. IGMP can be used for one-to-many networking applications such as online <u>streaming video</u> and <u>gaming</u>, and allows more efficient use of resources when supporting these types of applications. IGMP is used on <u>IPv4</u> networks.

**MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION**
**(Autonomous)**
**(ISO/IEC - 27001 - 2005 Certified)**

**SUMMER-16 EXAMINATION**
<u>**Model Answer**</u>

**Subject Code: 17429**                    **Subject Name: Computer Network**

**(c)**    **State eight advantages of fiber optic cable over other cables.**
*(Any 8 advantages - 1 mark for each)*

**Ans:**

Fibre optic cable is one of the fastest-growing transmission mediums for both new cabling installations and upgrades, including backbone, horizontal, and even desktop applications. Fiber offers a number of advantages over copper.

**1.  Greater bandwidth**

Fiber provides far greater bandwidth than copper and has standardized performance up to 10 Gbps. Fiber speeds are dependent on the type of cable used. Single-mode cable offers far greater distance than either 62.5- or 50-micron multimode cable. In addition, fiber optic cable can carry more information with greater fidelity than copper wire. That's why telephone and CATV companies are converting to fiber.

**2.  Low attenuation and greater distance**

Because the fiber optic signal is made of light, very little signal loss occurs during transmission, and data can move at higher speeds and greater distances. Fiber does not have the 100-meter (9328-ft.) distance limitation of unshielded twisted pair copper (without a booster). Fiber distances can range from 300 meters (984.2 ft.) to 40 kilometers (24.8 mi.), depending on the style of cable, wavelength, and network. Because fiber signals need less boosting than copper ones do, the cable performs better.

**3.  Security**

Your data is safe with fiber cable. It doesn't radiate signals and is extremely difficult to tap. If the cable is tapped, it's very easy to monitor because the cable leaks light, causing the entire system to fail. Fiber networks also enable to put all electronics and hardware in one central location, instead of having wiring closets with equipment throughout the building**.**

**4.  Immunity and reliability**

Fiber provides extremely reliable data transmission. It's completely immune to many environmental factors that affect copper cable. The core is made of glass, which is an insulator, so no electric current can flow through. It's immune to Electro Magnetic interference and radio-frequency interference (EM/RFI), crosstalk, impedance problems, and more. Fiber is also less susceptible to temperature fluctuations than copper and can be submerged in water**.**

**5.  Design**

Fiber is lightweight, thin, and more durable than copper cable. Plus, fiber optic cable has pulling specifications that are up to 10 times greater than copper cable's. Its small size makes it easier to handle, and it takes up much less space in cabling ducts. Although fiber is still more difficult to

**MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION**
**(Autonomous)**
**(ISO/IEC - 27001 - 2005 Certified)**

**SUMMER-16 EXAMINATION**
**Model Answer**

Subject Code: 17429                                    Subject Name: Computer Network

terminate than copper, advancements in connectors are making termination easier. In addition, fiber is actually easier to test than copper cable.

### 6. Migration

The proliferation and lower costs of media converters are making copper to fiber migration much easier. The converters provide seamless links and enable the use of existing hardware. Fiber can be incorporated into network in planned upgrades.

### 7. Fieldtermination.

Although fiber is still more difficult to terminate than copper, advancements in fiber tools have made terminating and using fiber in the field easier. Quick fusion splicers enables with auto-alignments enable fast splicing in the field. Auto-aligning pins ensure accuracy. And the use of pig-tails and pre-terminated cable make field connections quick and easy.

### 8. Cost

The cost for fiber cable, components, and hardware is steadily decreasing. Installation costs for fiber are higher than copper because of the skill needed for terminations. Overall, fiber is more expensive than copper in the short run, but it may actually be less expensive in the long run. Fiber typically costs less to maintain, has less much less downtime, and requires less networking hardware. And fiber eliminates the need to recable for higher network performance.

**MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION**
**(Autonomous)**
**(ISO/IEC - 27001 - 2005 Certified)**

**SUMMER-16 EXAMINATION**
**Model Answer**

**Subject Code: 17429**                    **Subject Name: Computer Network**