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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. 1. a) Attempt any THREE of the following: 12 Marks

i) List various standard organizations for Data Communications.   (Any 4, 1 Mark for each)

Standard Organizations: Standards are developed through the cooperation of standards creation committees, forums, and government regulatory agencies.

- International Organization for Standardization (ISO).

- International Telecommunication Union – Telecommunication Standards Sector (ITU-T)

- American National Standards Institute (ANSI)

- Institute of Electrical and Electronics Engineers(IEEE).

- Electronic Industries Association(EIA)

ii) Fiber Optic cable construction: (Diag. with labeling 1 Mark, Exp. 3 Mark)

A highly refined quartz tube that is filled with combination of gases (silica tetra chloride germanium tetra chloride etc) is selected to start the process. This tube about 4 ft long 1 inch diameter is placed in a lathe and these gases are injected into the hollow tube. The tube is rotated over a flame and subjected to temp of about $1600°$ F. The burning of the gases produces a deposit on the inside of the tube. The quartz tube is said to have undergone modified chemical vapor deposition MCVD. This performed quartz is then heated to about 2100°F melting and collapsing the tube to about 13 mm. This preformed quartz is now ready to be placed in vertical drawing tower where it is further heated to 2200°F and

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drawn downward by means of a computer controlled melting and drawing process which produces fine, high quality fiber thread having 125 micrometer diameter and about 6.25 km in length. The optically pure center called core is surrounded by leas optically pure quartz called cladding.

Diag.
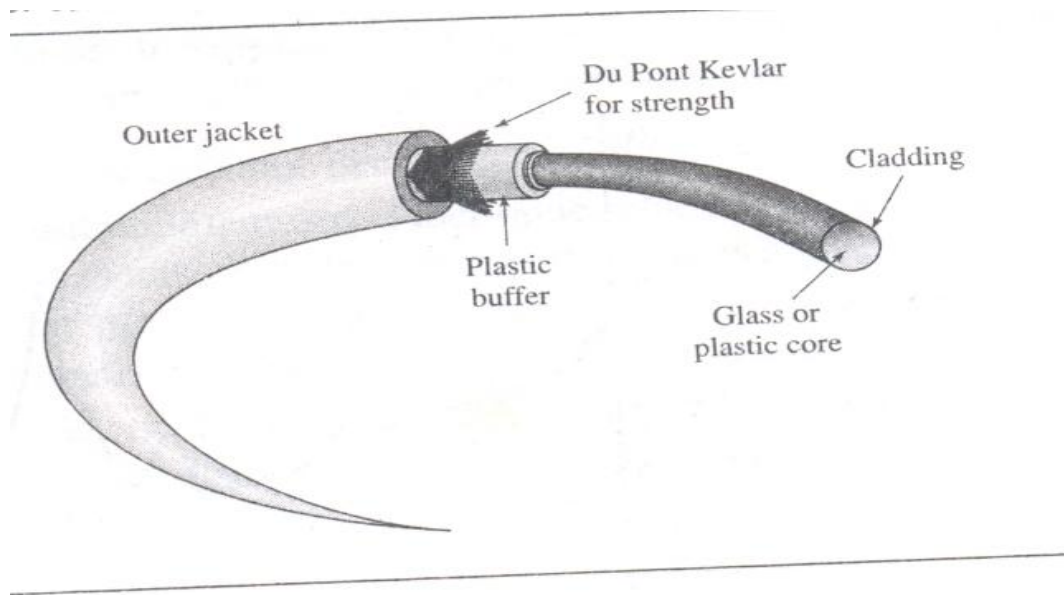
iii) Propagation Modes: (Type of modes- 1 Mark, Type of index- 1 Mark, Diag. 2 Marks)

Current technology supports two modes (multimode and single mode) for propagating light along optical channels, each requiring fiber with different physical characteristics. Multi mode can be implemented in two forms: step index or graded-index.

Multimode : Multimode is so named because multiple beams from a light source move through the core in different paths.

Multimode step index fiber, the density of the core remains constant from the center to the edges. A beam of light moves through this constant density in a straight line until it reaches the interface of the core and the cladding. At the interface, there is an abrupt change due to a lower density; this alters the angle of the beam's motion. The term step index refers to the suddenness of this change, which contributes to the distortion of the signal as it passes through the fiber.

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A graded index fiber therefore is one with varying densities. Density is highest at the center of the core and decreases gradually to its lowest at the edge.
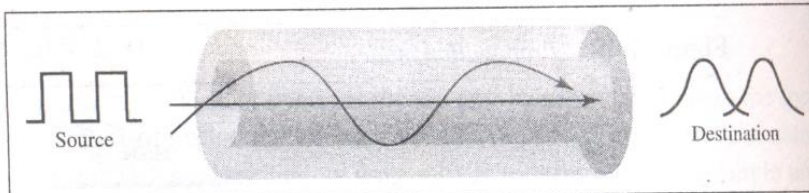
Single Mode: single mode uses step index fiber and a highly focused source of light that limits beams to a small range of angles, all close to the horizontal.

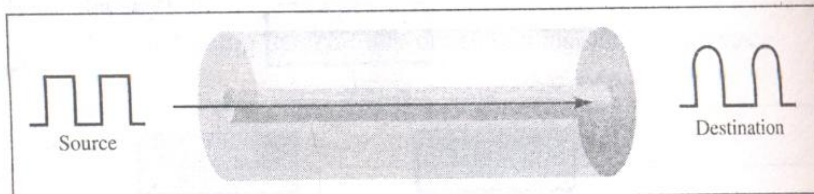All the beams arrive at the destination "together" and can be recombined with little distortion to the signal.

Diag.
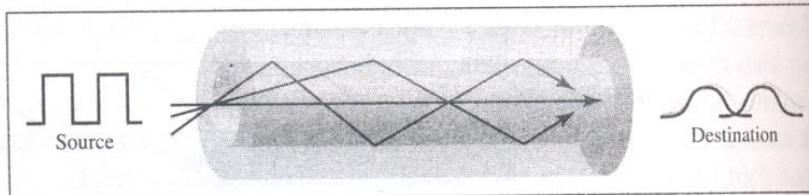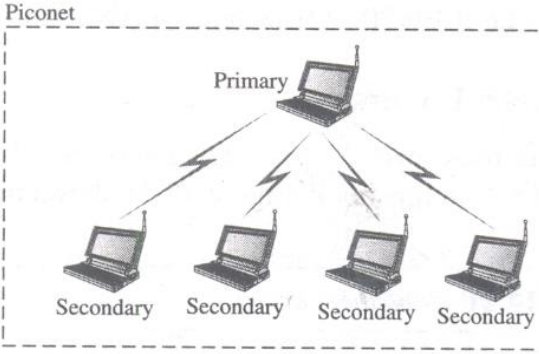

a. Multimode, step index

b. Multimode, graded index
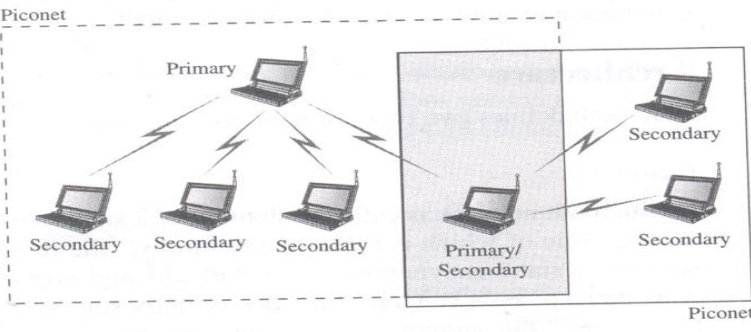
c. Single mode

iv) Comparison between piconet and a scatternet   (1 Mark for Each Point)

Piconet	Scatternet
One network of eight station	Many Piconets can be combined to form scatternet
Piconet can have up to 8 stations, one station is	A secondary station in one piconet can be a primary in another

_____

the primary station	piconet
Dia.	Dia.
A station is a member of only one network	A station can be member of more than one piconetwork.

Q. 1. b) Attempt any one of the following: 6 Marks

i) Cyclic Redundancy Check (CRC) works: (Procedure – 3 Marks, Example- 3 Marks)

A CRC code word of length l with n-bit data word is referred to as (l, n) cyclic code and contains (l-n) check bits. These check bits are generated by module – 2 division. The dividend is the data word followed by r=l – n Zeroes and the divisor is a special binary word of length r ×l. The CRC code word is formed by mod -2 addition of dividend and the reminder.

Step by step procedure:

1. Append a string of r zeros to the data word where r is less than the number of bits pre decided divisor by 1 bit i.e. if divisor = 5 bits then r = 4 zeros.

2. Divide the newly generated data unit in step 1 by the divisor . It is binary division

3. The remainder obtained after division is the r bit CRC.

4. This CRC will replace the r zeros appended to the data unit to get the codeword to be transmitted.

Eg. To Generate CRC for the data word 110101010 using the divisor 10101

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Data Word – 110101010

Divisor – 10101

$L - r = 4$

4 zeros added

Dia.

Thus the data word sent is 1101010101100

ii) L2CAP :   (Diag. with explanation- 2 Marks, Each Specific duty- 1 Mark)

The Logical Link Control and Adaptation Protocol : It is used for data exchange on an ACL link. SCO channels do not use L2CAP.

The 16 bit length field defines the size of the data, in bytes, coming from the upper layers. Data can be up to 65,535 bytes. The channel ID (CID) defines a unique identifier for the virtual channel created at this level.

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The L2CAP has specific duties: multiplexing, segmentation and reassembly, quality of service (QoS) and group management..

This Fig. shows format of data packet :

Dia.

Multiplexing:

The L2CAP can do multiplexing. At the sender site. It accepts data from one of the upper-layer protocols, frames them, and delivers them to the baseband layer. At the receiver site, it accepts a frame from the baseband layer, extracts the data, and delivers them to the appropriate protocol layer. It creates a kind of virtual channel on higher – level protocols.

Segmentation and Reassembly:

The maximum size of the payload field in the baseband layer is 2774 bits, or 343 bytes. This includes 4 bytes to define the packet and packet length. Therefore the size of the packet that can arrive from an upper layer can only be 339 bytes. However, application layers sometimes need to send a data packet that can be up to 65,535 bytes (an Internet packet, for example). The L2CAP divides these large packets into segments and adds extra information to define the location of the segments in the original packet. The L2CAP segments the packet at the source and reassembles them at the destination

QoS

Bluetooth allows the stations to define a quality-of-service level. It is sufficient to know that if no quality-of –service level is defined, Bluetooth defaults to what is called best-effort service; it will do its best under the circumstances.

Group Management

Another functionality of L2CAP is to allow devices to create a type of logical addressing between themselves. This is similar to multicasting. For example, two or three secondary devices can be part of a multicast group to receive data from the primary.

Q. 2. Attempt any two of the following: 16 Marks

a) Describe the following terms under ATM.   (Diag.- 2 Marks TP- 2 Marks, VP- 2 Marks, VC- 2 Marks)

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i)ATM is a cell-switched network. The user access devices, called the endpoints, are connected through a user-to-network interface (UNI) to the switches inside the network. The switches are connected through network-to-network interfaces (NNIs).

Connection between two endpoints is accomplished through transmission paths (TPs), virtual paths (VPs), and virtual circuits (VCs).

TP: A transmission path (TP) is the physical connection (wire, cable, satellite, and so on) between an endpoint and a switch or between two switches.

VP: A transmission path is divided into several virtual paths. A virtual path (VP) provides a connection or a set of connections between two switches.

VC: Cell networks are based on virtual circuits (VCs). All cells belonging to a single message follow the same virtual circuit and remain in their original order until they reach their destination.

Diag.
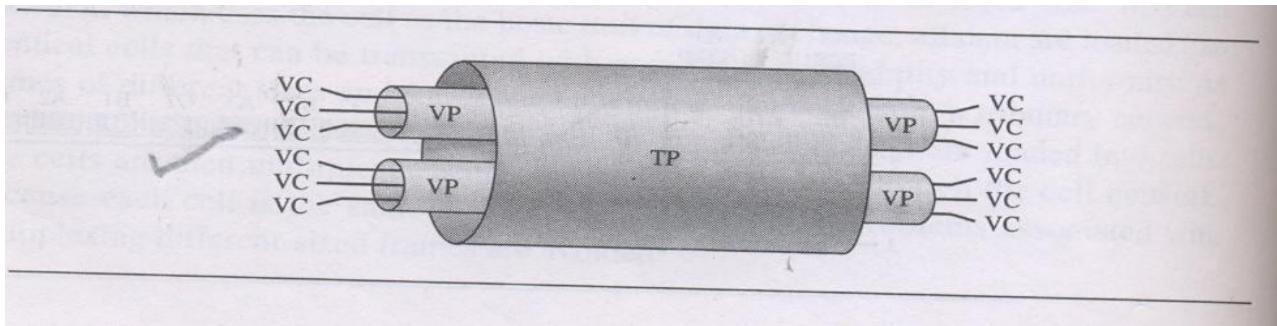
Q. 2. b) Packet switching:

Packet switching: (2 Marks)

In packet switching the data are transmitted i.e. small blocks called packets. Each packet contains some portion of the user data plus control into for proper functioning of the network. The control info includes the info that the network requires to be able to route the packet through the network and delivery it to the intended destination. All packet switching nodes always know the state of the entire network. At each node in the network the packet is received stored briefly and then passed on to the next node.

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Packet Switching

Datagram approach   Virtual circuit approach

Switched virtual circuit   Permanent virtual circuit
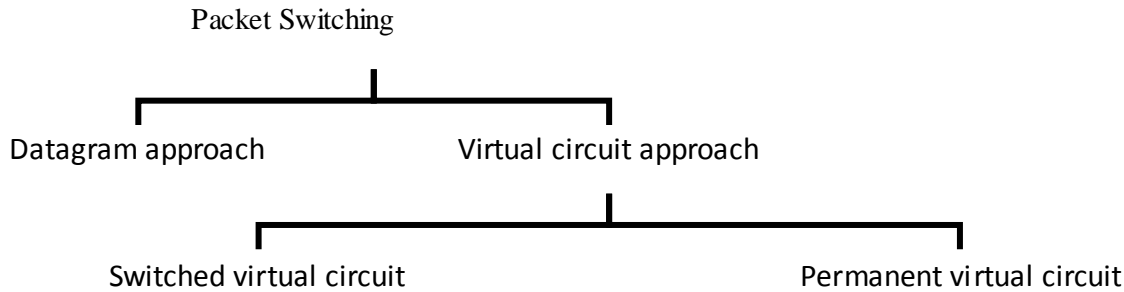
Packet switching- Datagram approach :   (2 Marks)

Diag.

Fig A
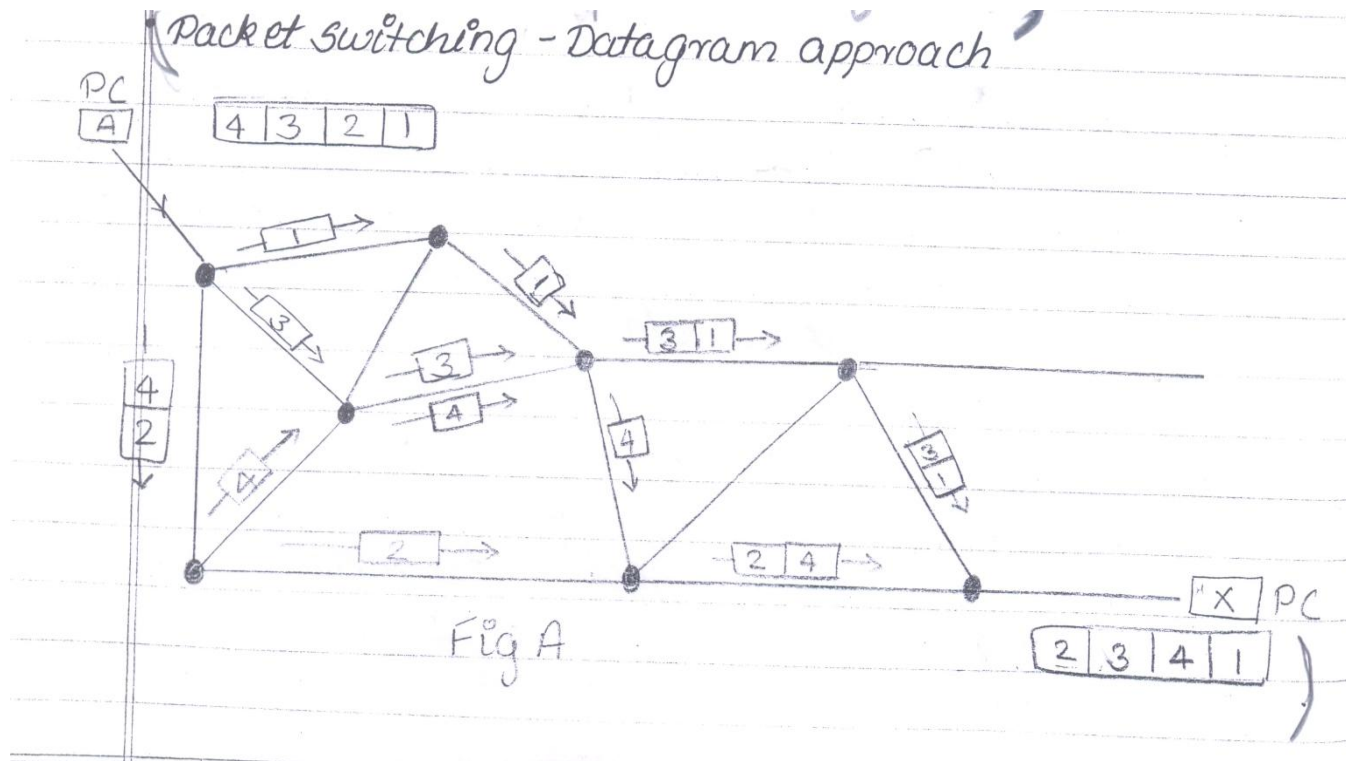
In data gram approach through packet switching each packet is treated independently from all others even when one packet represents just a piece of multipacket transmission the network treats it as through it existed alone. Packets in this technology all referred as 'datagram'

Fig. A shows how datagram approach can be used to delivery 4 packets from station A to station X. All the 4 data grams belong to the same message, but may go by different path to reach their destination. This can cause the datagram of a transmission to arrive at the destination out of order. It is the responsibility of the transport layer of the protocol to reorder the datagram before passing them to the destination port.

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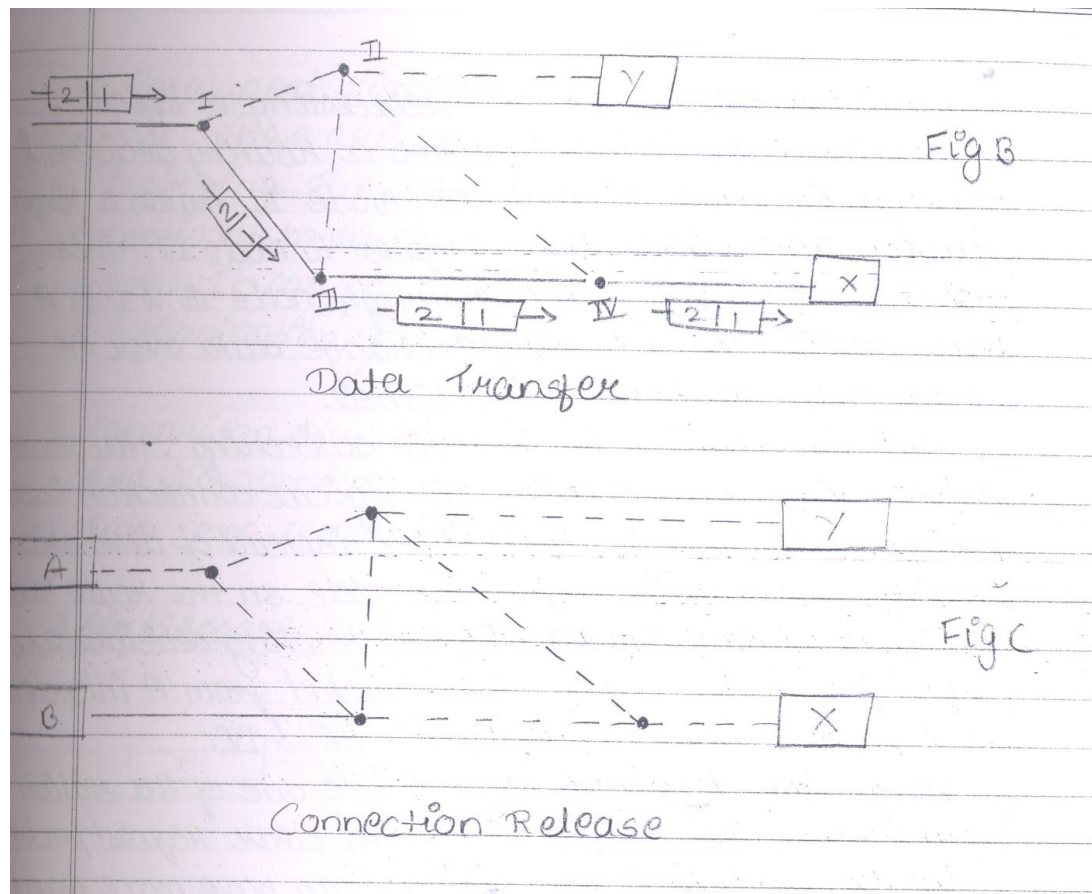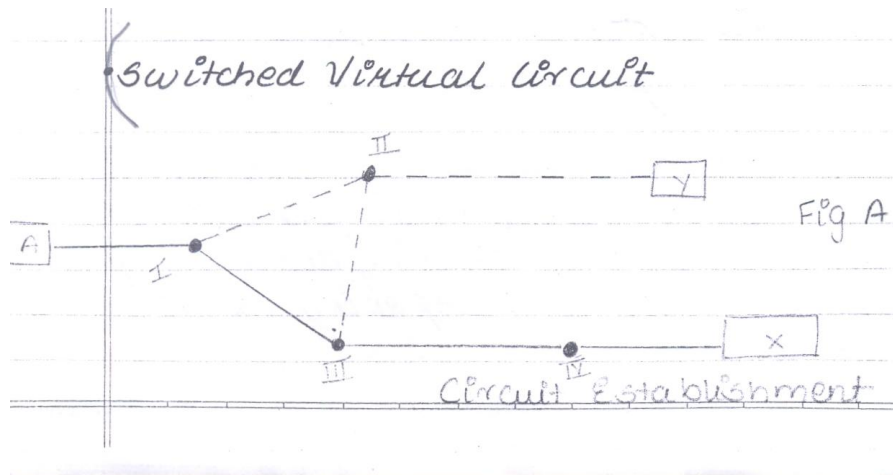Virtual Circuit Approach:

A single route is chosen path way sender and receiver at the beginning of the session when data is sent, all the packets of the transmission travel one after other along the same route.

1. Switched Virtual Circuit(SVC)   (2 Marks)

   Diag.

Fig A — Circuit Establishment

Fig B — Data Transfer


Fig C — Connection Release

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SVC format is comparable to dial up lines in circuit switching. A. VC is created when it is needed and exist only for the duration of specific exchange. Consider A has 1 or more messages to be sent to X it sends a special control packet called as call request packet to s/w I requesting a logical connection to X. Node I makes a routing decision and request is send to node III. Node III makes a routing decision and sends the request to Node IV. This packets is passed back through Node III and I to A . Now station A & X can exchange data over the route that has been established.

It is similar to circuit switching. So the route is fixed for the duration of logical connection. Each packet contains a VC identifier instead of destination address along with data. Each node on the route know where to direct the packet, no routing decisions are required. Thus every data packet from A intended to X passes through nodes I,III & IV. When data transfer is complete one of the station terminates the connection with clear request packet. At the same time each station can have more than one VC to another station.

2. Permanent Virtual Circuit: (2Marks)

Diag.

Fig B

Data Transfer
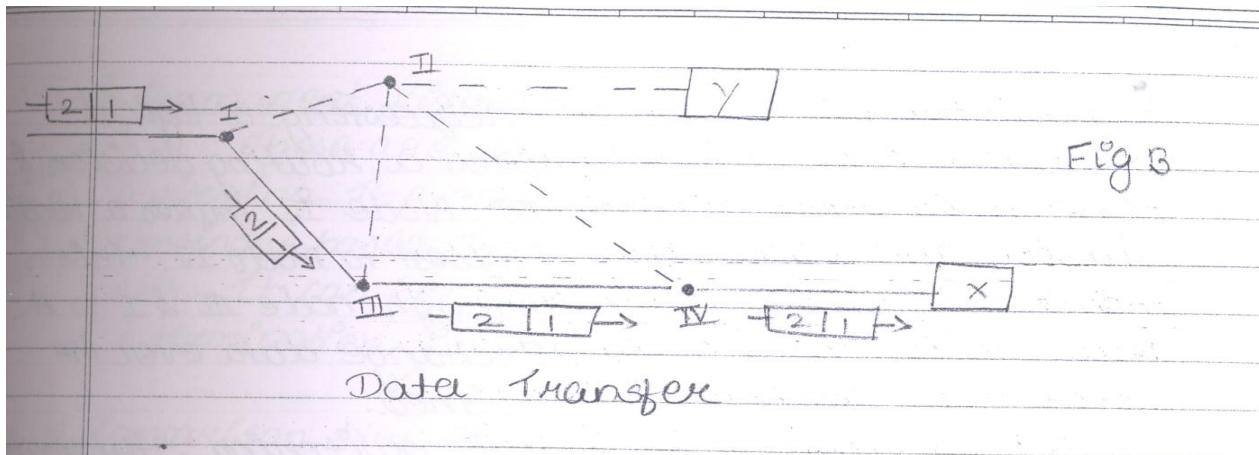
These are comparable to leased line in circuit switching. The same VC is provided between two users on a continuous basis. This circuit is dedicated to the specific users. It can be used without connection establishment and termination.
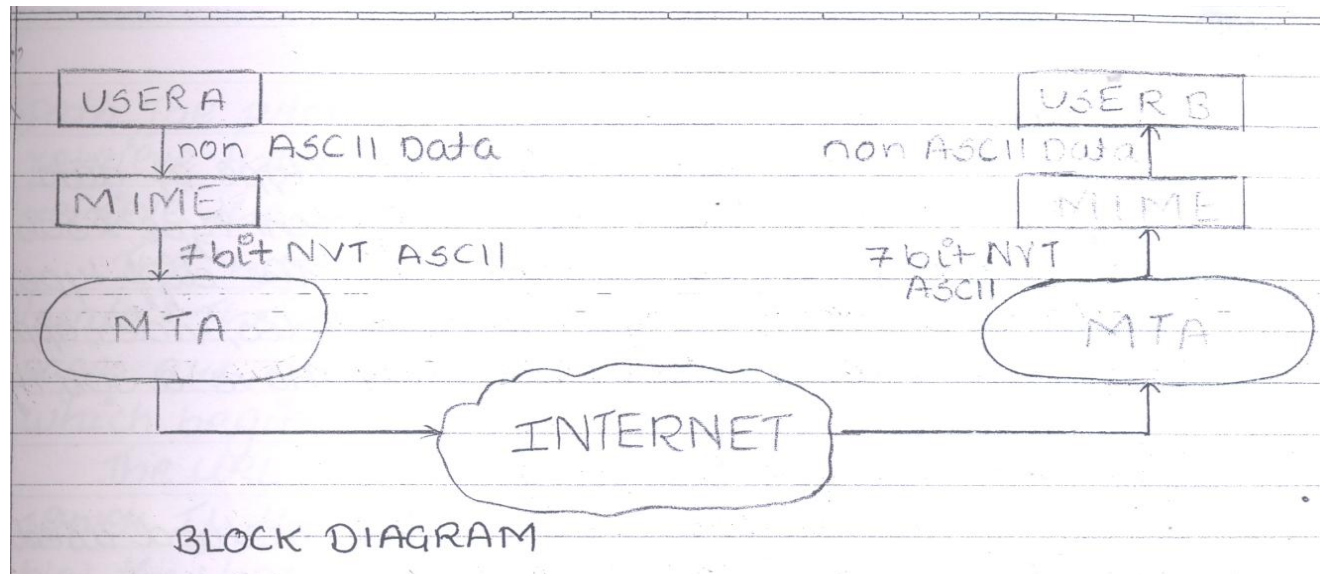
Q. 2 C Describe the following:

i. MIME (Multipurpose Internet Mail Extension)   (Diag.- 1Mark, Explanation- 3 Marks)

_____

Diag.

BLOCK DIAGRAM

MIMI is a supplementary protocol that allows non_ ASCII data at the sender side to NVT ASCII data and delivers them to the client MTA to be send through internet. The messages at the receiving end is transformed back to the original data.

It is set of software functions that transform non ASCII data to seven bit ASCII data.

MIME defines 5 headers that can be added to the original email header to define the transformation parameter. They are: MIME version, content type; content transfer encoding, content –Id, content description.

ii) URL: (Explanation- 4 Marks)

URL(Uniform resource Locator): A client that wants to access a webpage needs the address to facilitate the access of documents throughout the world http uses locaters. URL is a standard for specifying any kind of info on internet. URL defines protocols host comp, port and path. The protocol is a client server program used to retrieve the documents. Many different protocols can retrieve the document like FTP, HTTP etc.

The host is the computer on which information is located. The name of the comp can be alias. Web pages are usually stored in computer and are given name which begins with characters 'www'

The URL can optionally contain port no of the server. If the port no is included it I inserted between the host and the path . it is separated from the host by ':'

Path is the pathname of the file where the info is located. The path can itself have numbers of slashes to separate directories, subdirectories and files. The format of URL is :

_____

Protocol://host:port/path.

3. Attempt Any <u>Four</u> of the following: (4 each)

a) What is the need of frame relay?

(With appropriate diagram 4 or more than 4 points-04 marks)

Solution:

Need of Frame Relay:

1) Frame relay is a virtual-circuit wide-area network that was designed in response to demands for a new type of WAN.

2) X.25 has a low 64-kbps data rate. There was a need for higher data-rate WANs.

3) Flow and error control at data link and network layers create a large overhead and slow down transmissions. And require acknowledgments for both data link layers frames and network layer packets that are sent between nodes and between source and destination.

4) X.25 was designed for private use, not for the Internet. X.25 has its own network layer. This means that the user's data are encapsulated in the network layer packets of X.25. This doubles the overhead. Frame relay has lower overhead.

5) The services provided by T-1 and T-3 lines assume that the user has fixed-rate data all the time .This type of service is not suitable for the many users today that need to send bursty data.

6) Leasing T-1 or T-3 lines send the constant data rate and its costly as compare to Frame relay.

b) Compare an SVC with PVC.

(With appropriate diagram 8 or more than 8 points-04 marks)

Solution:

NO	SVC(Switched Virtual Circuit)	PVC(Permanent Virtual Circuit)
1	A source and a destination connect when data are being transferred.	A source and a destination may choose to have a PVC
2	SVC creates a temporary, short	PVC create a permanent and continuous connection.

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	connection.	
3	An SVC require establishing and terminating phases.	PVC connection setup is simple.
4	SVC is cheap cost as compare with PVC	PVC is costly.
5	SVC is on-demand circuit established by user signal.	This Virtual circuit values are manual.
6.	A SVC is established by UNI signaling methods.	A PVC in the usual meaning is a VC that is not signaled by the end points
7.	A switch in the path fails, the SVC is broken and would have to be reconnected	Failure of a link causes a Soft PVC to route around the outage and remain available.
8.	E.g. ATM, X.25 etc.	E.g.: Frame Relay, ATM, X.25 etc.

c) Describe various characteristics of optical detectors.

(With appropriate diagram 6 or more than 6 points-04 marks

Characteristics with Description- 04 marks)

Solution:

Characteristics of Optical detectors:

1) **Receiver sensitivity**

   The receiver sensitivity is the minimum amount of optical power level that can be received by the detector. If the sensitivity is high that detector can receive signals of having low strength and it reduces the bit error rate. The sensitivity is decided by the material used to manufacture the detector.

2) **High fidelity**

_____

The detector must have the characteristic of receiving optical signal as it is. And detector should have the capability of generate the optical signal into electrical signal without destroying characteristic of the signal. Example - signal wave lengths frequency and phase.

3) Short response time

Short response time means the time taken by detector to receive optical signal generate the electrical signal. Better optical detector must have Short response time because the bandwidth is depending on the time of conversion. If the conversion time is high, we can get high bandwidth.

4) Small size

Detector must be compacted in size, in order to reduce the spare space it takes during the installation. But small size detectors are required high cost of manufacturing.

5) Minimum noise

Noise in the detector is caused due to photon to electrical conversion and the thermal noise in the detector. To detect the weakest signal, detector should maintain a high SNR. In order to do those detectors should have high quantum efficiency and low noises.

6) Linearity

Linearity is another important characteristic of optical detectors .Detectors are characterized by a response in which the output is linear with incident intensity. The response may be linear over a broad range, perhaps many orders of magnitude. If the output of the detector is plotted versus the input power, there should be no change in the slope of the curve.

7) Low cost

This is the most important factor when we selecting optical detector of our link. Most of detectors are highly cost because the technology and materials are very much expensive. If we can choose low cost detector our whole project will be successfully with low cost.

8) Impulse Response

The width of the photo-detector's output in response to a fast optical pulse, measured as a full width at half maximum (FWHM).

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d) State any four application of LASER.

(With appropriate diagram 4 or more than 4 points-04 marks

Four Application – 04 marks)

Solution:

Four application of Laser:

1) **Medical use of Laser:**

    The highly collimated beam of a laser can be further focused to a microscopic dot of extremely high energy density. This makes it useful as a cutting and cauterizing instrument. Lasers are used for photocoagulation of the retina to halt retinal hemorrhaging and for the tacking of retinal tears.

2) **Lasers in Communication**

    Fiber optic cables are a major mode of communication partly because multiple signals can be sent with high quality and low loss by light propagating along the fibers. The light signals can be modulated with the information to be sent by either light emitting diodes or lasers.

3) **Welding and Cutting**

    The highly collimated beam of a laser can be further focused to a microscopic dot of extremely high energy density for welding and cutting. The automobile industry makes extensive use of carbon dioxide lasers with powers up to several kilowatts for computer controlled welding on auto assembly lines.

4) **Heat Treatment**

    Heat treatments for hardening or annealing have been long practiced in metallurgy. But lasers offer some new possibilities for selective heat treatments of metal parts. For example, lasers can provide localized heat treatments such as the hardening of the surfaces of automobile camshafts.

5) **Barcode Scanners**

    Supermarket scanners typically use helium-neon lasers to scan the universal barcodes to identify products. The laser beam bounces off a rotating mirror and scans the code, sending a modulated beam to a light detector and then to a computer which has the product information stored. Semiconductor lasers can also be used for this purpose.

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6) **Lasers in the Garment Industry**

The usefulness of the laser for such cutting operations comes from the fact that the beam is highly collimated and can be further focused to a microscopic dot of extremely high energy density for cutting.

7) **Laser Printers**

The laser printer has in a few years become the dominant mode of printing in offices. It employs a semiconductor laser and the xerography principle. The laser is focused and scanned across a photoactive selenium coated drum where it produces a charge pattern which mirrors the material to be printed.

e) List and describe various fiber optic cable connectors.

(With appropriate diagram 6 or more than 6 points-04 marks

Listing of Connectors – 02 marks

Description- 02 marks)

Solution:

There are many types of fiber optic cable connectors:

1) **ST Connectors:** The ST connector utilizes a bayonet twist-lock connection with 2.5mm ferrule. Available in single mode and multimode, the ST connector features reliable and durable field installation. Common connector for multimode fibers.

2) **FC Connectors:** FC connectors are specifically designed for telecommunication applications and provide non-optical disconnect performance. Designed with a threaded coupling for durable connections. The ferrule is PC finished to a pre-radius, which ensures low back reflection. Popular with single mode fibers.

3) **SC Connectors:** The SC is a non-optical disconnects connector with a 2.5mm pre-radiuses zirconium ferrule. Available in simplex and duplex styles, this connector features a push-pull connection design for quick patching of cables into rack or wall mounts.

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4) **LC Connectors:** The LC connector provides a pull-proof design and small size perfect for high-density applications. Available in simplex or duplex versions. The LC connector is provided with a 1.25mm zirconium ferrule.

5) **MT-RJ Connectors:** The MT-RJ multimode duplex connector provides increased port density two times that of a duplex SC. The single plastic ferrule houses two fibers utilizing a user-friendly RJ-45 connection system. The same size as a simplex SC connector, the MT-RJ is designed for backbone and horizontal cabling systems, local area networks and telecommunication systems.

6) **MU Connectors:** The MU connector is designed for high-density connections. This small single-fiber connector has a high level of performance, providing more than double the packaging density of the SC connector

4. A) Attempt any three: (4 marks each for 12 marks)
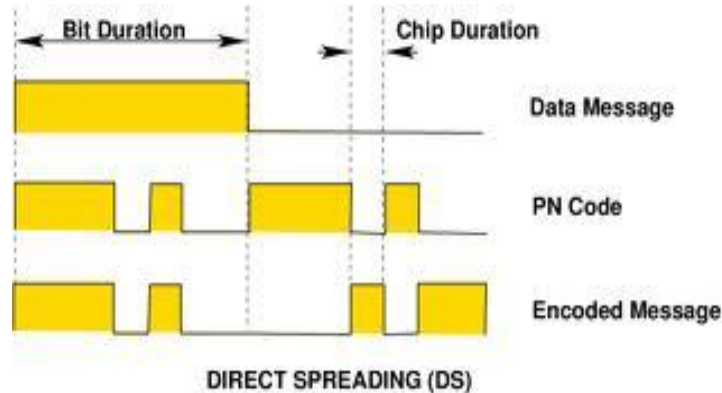
i) Describe DSSS.

(With appropriate diagram 8 or more than 8 points-04marks)

Solution:

1) Direct sequence spread spectrum, also known as direct sequence code division multiple access (DS-CDMA), is one of two approaches to <u>spread spectrum</u> <u>modulation</u> for digital signal transmission over the airwaves.

2) In direct sequence spread spectrum, the stream of information to be transmitted is divided into small pieces, each of which is allocated across to a frequency channel across the spectrum.

3) DSSS multiplies the data bits by a very fast pseudo-random bit pattern (PN sequence) that "spreads" the data into a large coded stream that takes the full bandwidth of the channel.

4) In Direct Sequence-Spread Spectrum the baseband waveform is XOR by the PN sequence in order to spread the signal. After spreading, the signal is modulated and transmitted. The most widely modulation scheme is BPSK (Binary Phase Shift Keying).

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5) A data signal at the point of transmission is combined with a higher data-rate bit sequence (also known as a *chipping code*) that divides the data according to a spreading ratio.

6) The redundant chipping code helps the signal resist interference and also enables the original data to be recovered if data bits are damaged during transmission.
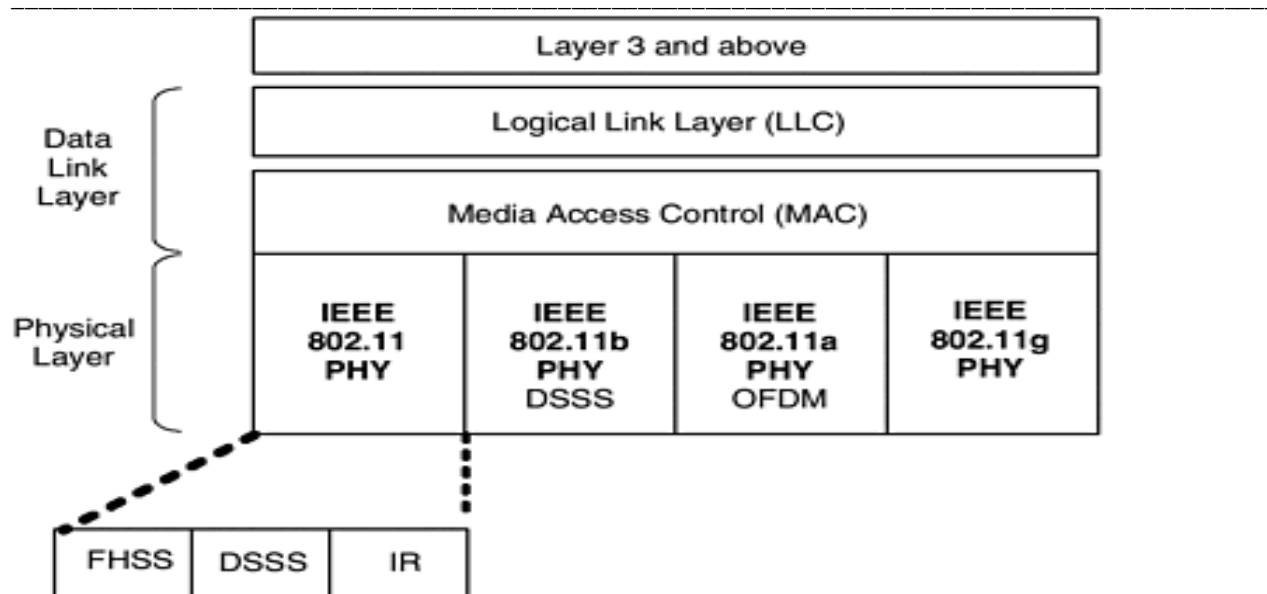

DIRECT SPREADING (DS)

7) Direct sequence contrasts with the other spread spectrum process, known as frequency hopping spread spectrum, or frequency hopping code division multiple access (FH-CDMA), in which a broad slice of the bandwidth spectrum is divided into many possible broadcast frequencies.

8) In general, frequency-hopping devices use less power and are cheaper, but the performance of DS-CDMA systems is usually better and more reliable.

ii) Draw MAC layers in IEEE 802.11 standards.

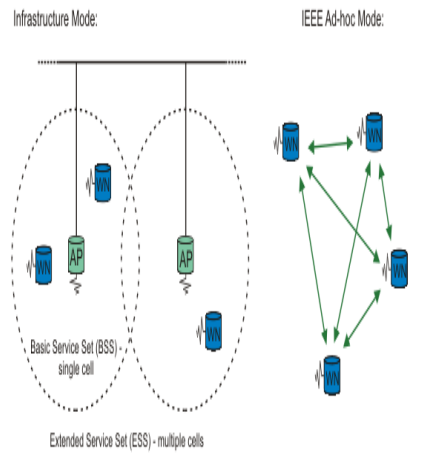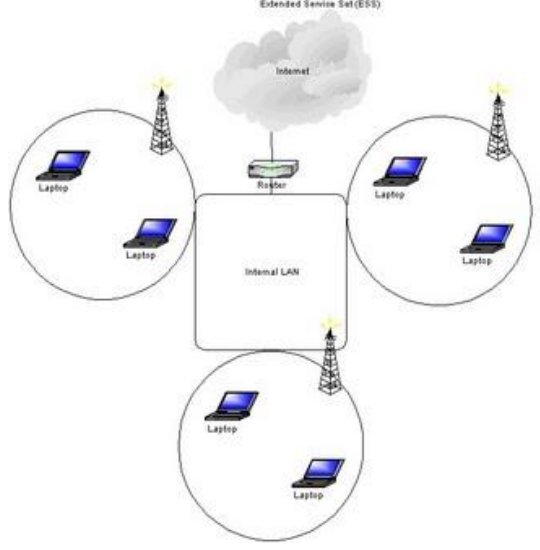**(With appropriate diagram 8 or more than 8 points-04 marks)**

Solution:

MAC layers in IEEE 802.11 standards:

MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION
(Autonomous)
(ISO/IEC - 27001 - 2005 Certified)
SUMMER – 13 EXAMINATION

Subject Code: 12267   <u>**Model Answer**</u>   Page No: _19_/ 31
_____

Similar diagram and above 3 layers with correct naming.

iii) What is difference between: BSS and ESS?

NO	BSS	ESS
1	BSS is Building Blocks of wireless LAN	ESS is made up of two or more BSSs with APs.
2	BSS is made of stationary or mobile wireless stations and an optional central base station	In ESS the BSSs are connected through a distribution system.
3	BSS without an AP is an ad hoc architecture and with an AP is an infrastructure.	The distribution system connects the APs in the BSSs.

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4	Infrastructure Mode: IEEE Ad-hoc Mode: Basic Service Set (BSS) - single cell, Extended Service Set (ESS) - multiple cells	Extended Service Set (ESS)
5	Types of BSS: 1) BSS without AP 2) BSS with AP	Types of stations in ESS 1) Mobile stations 2) Stationary of non-moving stations
6.	ESS has 2 or more access point .and Support mobility (roaming) between AP's by using mobile IP .	BSS has only one access point to connect wireless node so not Support mobility (roaming).

iv) Describe various advantages of fiber optic cable.

(With appropriate diagram 4 or more than 4 points-04 marks

Application with Description- 02 marks)

Solution:

Advantages: Fiber- optic cable has several advantages over twisted-pair or coaxial

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1) **Higher Bandwidth:** Data rates and bandwidth utilization is limited not by medium but by the signal generation and reception technology available.

2) **Less signal attenuation:** Fiber-optic transmission distance is significantly greater.

3) **Immunity to electromagnetic interference:** Electromagnetic noise cannot affect fiber-optic cables.

4) **Resistance to corrosive materials:** Glass is more resistant to corrosive materials than other.

5) **Light weight:** Fiber-optic cables are much lighter than other cables.

6) **Greater immunity to tapping:** Fiber-optic cables are more immune to tapping.

B) Attempt any one :(6 marks for 1)

i) Describe sliding window technique for the recovery from error.

(With appropriate diagram 6 to 10 points-04 marks

Only diagram – 02 marks

Description- 04 marks)

Solution:

In this method the sender can transmit several frames before needing an acknowledgement. Frames can be sending one after another.

The acknowledgement (ACK or NAK) should be used after every frame. That means the sender sends frame, waits for the acknowledgement and sends the next frame or retransmits the original one, only after receiving some acknowledgement6 from the receiver.

In order to improve the efficiency, the sender sends multiple frames at time, the receiver check the CRC of all the frames one by one and sends the acknowledgement for all. This is the principle of operation of sliding window technique.

In this technique, an imaginary window consisting of n number of data frame is defined. This means that up to number of frames be sent before receiving an acknowledgment.

For example:

From Sender's slide window:

_____

1) If the sender window size is 4 and frames 1 and 2 are sent but acknowledgement has not been received so far, then the sender's windows will only contains two frames i.e. 3 and 4.

2) Now if the sender receives acknowledgement bearing number 3 then it understands that the receiver has correctly received frames 1 and 2.

3) The senders window now expands and includes the next two frames as figure (b).

4) In this way the left edge of sender's window will shift right when the data frames are sent and the right edge of the senders window will shift right when the acknowledgment is received.

From Receiver 's slide window:

1) Its left edge shift right on receiving each data frame, where as its right edge shift right when an acknowledgment is sent.

2) If we take the same example that we discussed for the senders window then the position of receivers windows are as show in figure (c).

_____
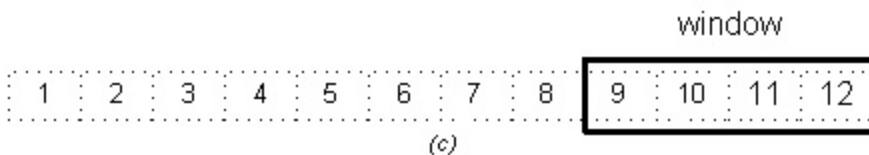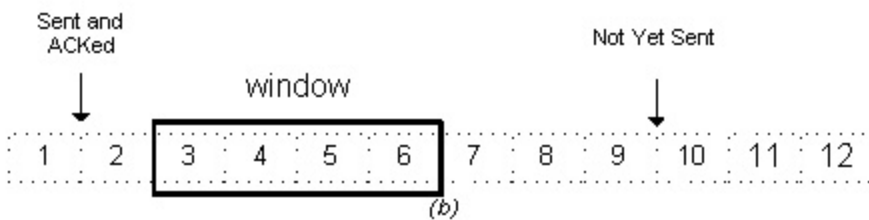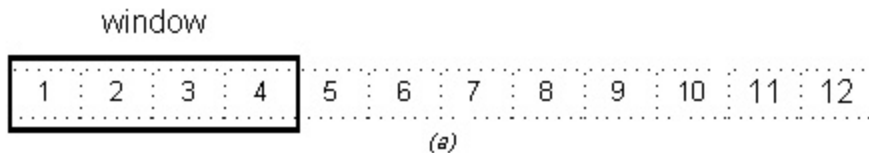
ii) Describe the following terms

1. **SMTP**
2. **SNMP**
3. **HTTP**

(With appropriate diagram 8 to 12 points-05 marks

And Full Name of protocol -01 mark)

Solution:

1) SMTP: Simple Mail Transfer Protocol

The formal protocol that defines the MTA client and server in the Internet is called the Simple Mail Transfer Protocol.

SMTP simply defines how commands and responses must be sent back and forth.

SMTP works in following 3 stages

   1) Connection Establishment:
   2) Message Transfer(Mail Transfer)
   3) Connection Termination

SMTP importance in distributed applications:

   o SMTP is relatively simple text based protocol in which one or more recipient of a message are specified along with the message text and possibly other encoded objects.
   o Easy to implement and higher speed.

2) SNMP: Simple Network Management Protocol

The Simple Network Management Protocol (SNMP) is a framework for managing devices in an internet using the TCP/IP protocol suite.

It provides a set of fundamental operations for monitoring and maintaining an internet.

Management with SNMP is based on three basic ideas:

1) A manager checks an agent by requesting information that reflects the behavior of the agent.

_____

2) A manager forces an agent to perform a task by resetting values in the agent database.

3) An agent contributes to the management process by warning the manager of an unusual situation.

Role of SNMP:

- It defines the format of the packet to be sent from a manager to an agent and vice versa.

- It also interprets the results and creates statistics.

- The packets exchanged contain the object names and their status.

- SNMP responsible for reading and changing these values.

3) HTTP: Hypertext Transfer Protocol

The HTTP is a protocol used mainly to access data on the World Wide Web.

HTTP function as a combination of FTP and SMTP.

FTP transfers files and uses the services of TCP. FTP uses only one TCP connection.

HTTP is like SMTP because the data transferred between the client and server look like SMTP messages.

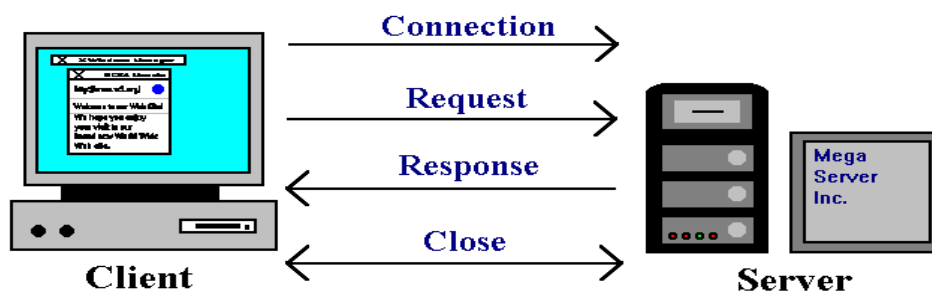HTTP uses the services of TCP on well-known port 80.

HTTP Transaction:

HTTP transaction between the client and server. The client initializes the transaction by sending a request message. The server replies by sending a response.
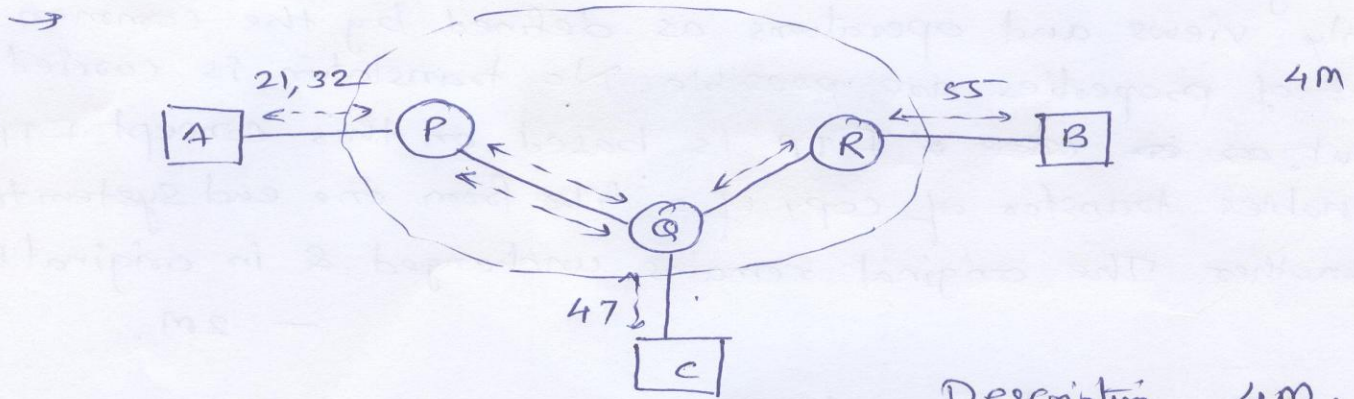
Diagram:

Hypertext Transport Protocol
(HTTP)

Connection →
Request →
Response ←
Close ←

Client   Server

Stages in an HTTP Transaction

_____

Q5)   Attempt any Two   (16)

a) Describe how frame relay works.

Description   4m.

FR provides switched virtual connection services similar to those provided by X.25 N/w. The virtual connection is identified by connection identifier called DLCI.

Virtual connection in frame relay is established through frame relay nodes; P, Q, R as in fig above. Each DTE is provided with DLCIs equal to no of connections to be established. These DLCIs are alloted by the frame relay s/w. There can be multiple simultaneous connections on each link. Frames belonging to different connections are distinguished by the DLCI values & are statistically multiplexed. The n/w maps these two DLCIs to one another.

The process of data transfer is typically as

i) Establish the connection

ii) Transfer the data

iii) Disconnect the data link.

b) Describe the purpose of FTP.

→ The way files containing info. are stored in a system depends on the architecture of the System. ie hardware, operating system, data type, coding styles, file organization. To exchange these files between two different systems

_____

requires a common protocol that is acceptable to two systems.

To reduce all the files systems to a file system having a common minimal set of fundamental properties. Only views and operations as defined by the common set of properties are possible. No translation is carried out. FTP is based on this concept. FTP enables transfer of copy of a file from one end system to another. The original remains unchanged & in original location.

— 2M.

FTP connection mechanism

Diagram (optional as not mentioned in Q)   2M. Description – 2M.
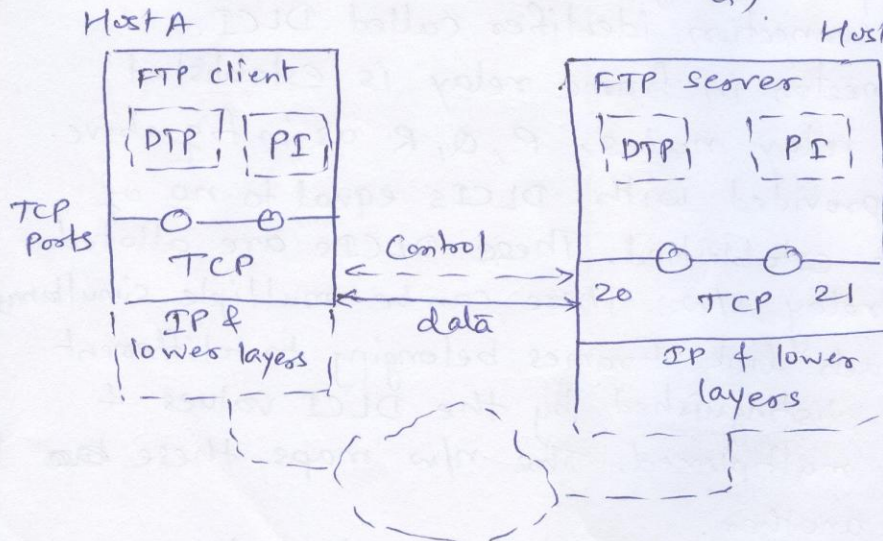
Two TCP connections — one for control signals (commands & responses) used by control process Protocol Interpreter (PI) client PI & server PI are responsible for translating local syntax. in to NVT & viceversa (port 21)

The other connection is for file transfer. Data Transfer Process (DTP) is used for this. (Port 20)

The DTP connection is terminated when the data transfer is complete. Port 20 is active mode FTP port. Passive ports can be used specified by server.

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2points – 2M.

TFTP	FTP
1) Code size is very small suitable for small machines, or n/w devices like bridges, routers.	1) Code size is very large.
2) Unsecured protocol & do not support authentication	2) Secure protocol & authenticatn is supported.
3) port used is UDP port no 69	3) Port no active mode 20, Passive mode > 1023
4) Error recovery is stop & wait	4) No error recovery required as TCP is used.

c) What is URL? Describe how HTTP protocol helps to web server to work.

→ URL – Uniform Resource Locator :-   2m
 WWW users URL as identifier of a given information resource on the Internet.
     It consists of two parts
     < scheme >: < scheme specific part (path to the info. source)>

6M {
HTTP is used for transporting WWW documents between the client and server. The basic operation (describe in detail)
1) The client opens TCP connection & sends request for a document.
2) The server responds with the document.
3) The server closes the connection

HTTP messages from the client to the server are called HTTP request messages. From server to client are called HTTP responses. These messages consists of header & body.
}

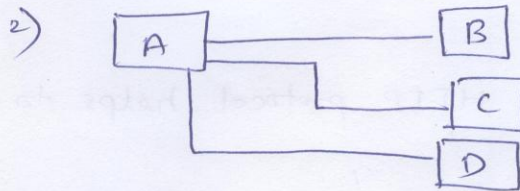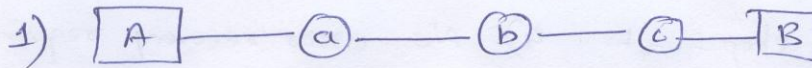If diagram is drawn   2m for diagram (optional as

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Q 6) Attempt four.

a) Two types of physical links are
   1) point to point link
   2) multipoint links.

   Diagrams — **1m** each
   Description — 1m each.

   1)   [A] —— (a) —— (b) —— (c) —— [B]

   2)

b) Types of errors.

   A) content error — Single bit and burst errors.

   B) Flow integrity errors — Data blocks lost during transmission.

   Description of content error with example - 3m
   describe flow integrity error -   1M.

c) What are protocols and standards

   A) Protocol - A set of rules or steps that
      governs the said operation. Key elements are
      i) Syntax
      ii) Semantics
      iii) Timing.   2M
         Examples : —

   B) Standards — There are two standards in Data h/w
      i) De facto   ii) De jure
   Description & eg of each.   2M

(4)

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Q 6)

d) What is meaning of signal propagation.

Movement of signal through the channel wired or wireless is called signal propagation. The signal used in data communication is in the form of pulse, the presence indicate bit =1 and absence indicates 0.

Data can be texts, numbers, Images, Audio, Video.

The transmission modes can be
Parallel, serial, Synchronous or asynchronous.

It can be baseband or passband transmission depending upon whether the channel is wired or wireless respectively.
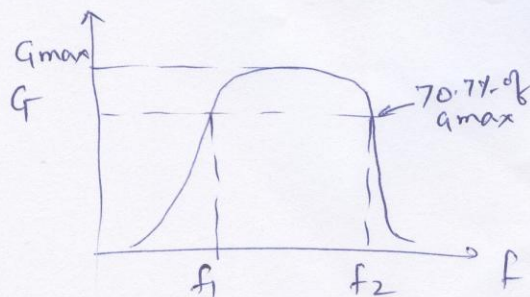
The Signal whether analog or digital will have freqn. So as to occupy a bandwidth over the channel.

The signal is electrical if propagating on wired channel and electromagnetic if propagating on wireless channel.

e) Describe the term BW? Why it is useful?

→ Bandwidth is a range of frequency in which the gain of the System or output signal is 70.7% of the maximum value.

$BW = f_2 - f_1$

— 2M

The bandwidth is useful factor to determine the requirement of the signal over the channel.

⑤

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If the required BW is less than the provided one, the signal will propagate with minimum noise, whereas if the alloted BW is less, the signal will detoriate

The BW depends upon the pulse width of data. If pulse width decreases, the corresponding BW required increases.

If the required BW is known and is less than the channel BW, more no of users can be accomodated in the given channel, called multiplexing.

For digital signal, the BW is specified in terms of bits/sec where as for analog signals it is in Hz.

— 2M.

⑥

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