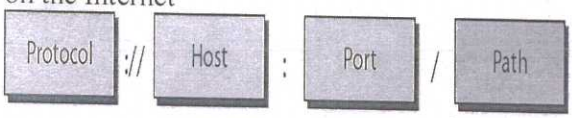
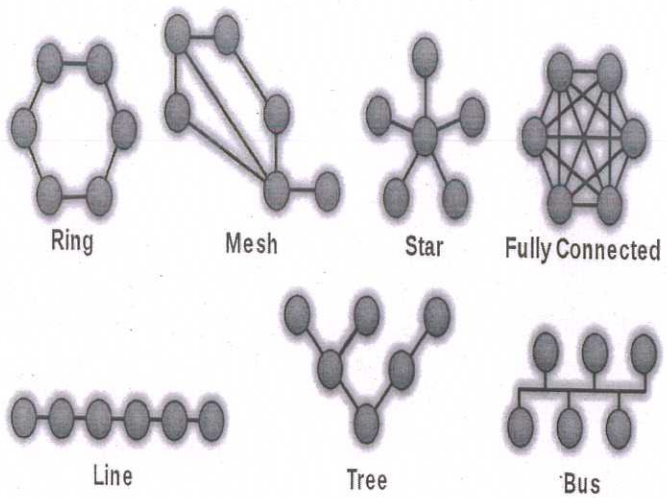
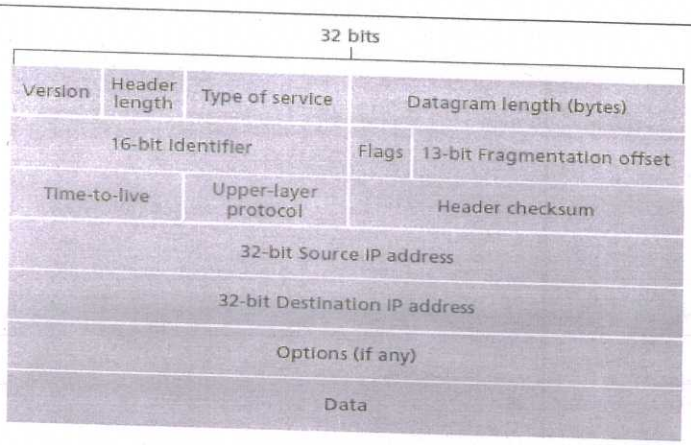
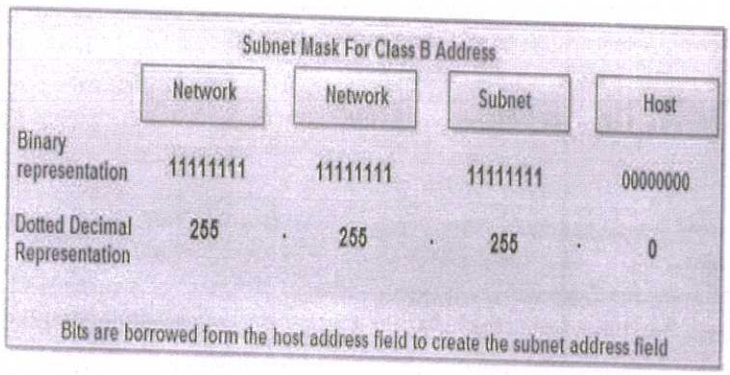
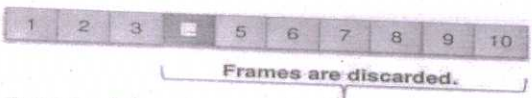
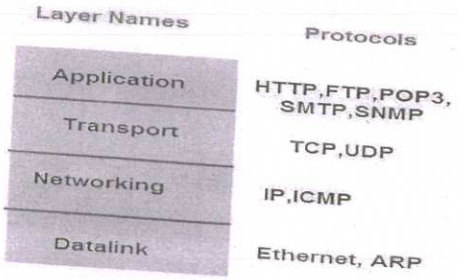
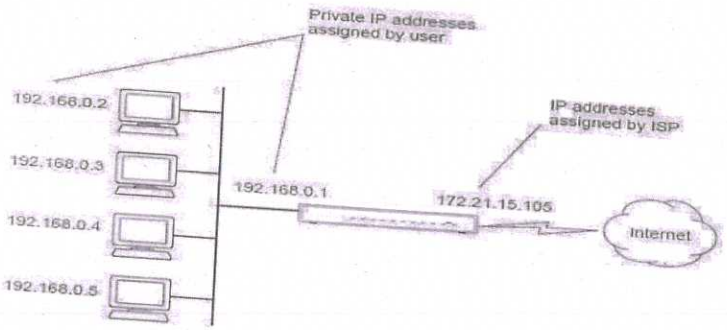
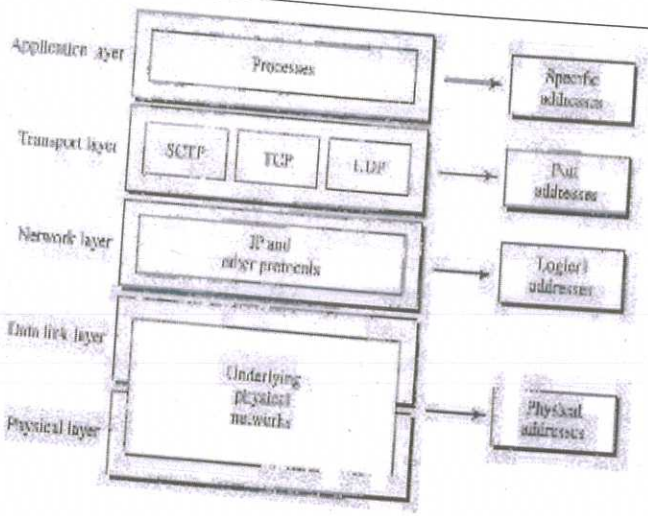
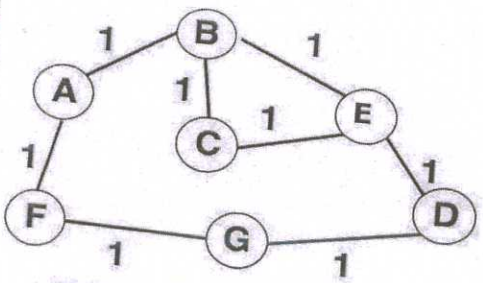
Revision 2015 Course Title COMPUTER NETWORKS				Course Code 6131
Q.No	Scoring Indicator	Split up score	Sub Total	Total
	PART A			
1	A computer network is a group of computer systems &other computing hardware devices that are linked together through communication channels to facilitate communication and resource-sharing among a wide range of users.			2
2	The **Internet Protocol (IP)** is the principal communications protocol in the TCP/IP protocol suite. IP has the task of delivering packets from the source host to the destination host solely based on the IP addresses in the packet headers.			2
3	A *socket* is one endpoint of a two-way communication link between two programs running on the network. A socket is bound to a port number so that the TCP layer can identify the application that data is destined to be sent to.			2
4.	A uniform resource locator (URL) is the address of a resource on the Internet 			2
5	FTP,TFTP,SMTP,DNS,TELNET (any two)	2*1		2
	PART B			

1						
		Hub	**Switch**	6*1		6
	Layer	Physical layer. Hubs are classified as Layer 1 devices per the OSI model.	Data Link Layer. Network switches operate at Layer 2 of the OSI model.			
	Ports	4/12 ports	Switch is multi port Bridge. 24/48 ports			
	Device Type	Passive Device (Without Software)	Active Device (With Software) & Networking device			
	Transmission Type	Hubs always perform frame flooding; may be unicast, multicast or broadcast	First broadcast; then unicast & multicast as needed.			
	Table	A network hub cannot learn or store MAC address.	A network switch stores MAC addresses in a lookup table.			
	Data Transmission form	Electrical signal or bits	Frame (L2 Switch) Frame & Packet (L3 switch)			
	Transmission Mode	Half duplex	Full duplex			
	Function	To connect a network of personal computers together, they can be joined through a central hub.	Allow to connect multiple device and port can be manage, Vlan can create security also can apply			
	Used in (LAN, MAN, WAN)	LAN	LAN			
	Broadcast Domain	Hub has one Broadcast Domain.	Swich has one broadcast domain [unless VLAN implemented]			
	Definition	An electronic device that connects many network device together so that devices can exchange data	A network switch is a computer networking device that is used to connect many devices together on a computer network. A switch is considered more advanced than a hub because a switch will on send msg to device that needs or request it.			
	Collisions	Collisions occur commonly in setups using hubs.	No collisions occur in a full-duplex switch.			
	Spanning-Tree	No Spanning-Tree	Many Spanning-tree Possible			
	Manufacturers	Sun Systems, Oracle and Cisco	Cisco and D-link Juniper			
	Any 6					
2				2*3		6
	Any 2 and their explantion					

3				6
4	The process of subnetting involves dividing a network up into smaller networks called subnets or sub networks. Each of these subnets has its own specific address. To create these additional networks we use a subnet mask. The subnet mask simply determines which portion of the IP address belongs to the host. The subnet address is created by dividing the host address into network address and host address. Eg. 	4 2		6

5	Introduce a window size of n Can inject n packets on net without hearing ACK Each packet is labeled with a sequence number. IN GO BACK N PROTOCOL.... Sending window  Receiving window  	3 3		6
6	• UDP is suitable for a process that requires simple request-response communication with little concern for flow and error control. It is not usually used for a process such as FTP that needs to send bulk data. • UDP is suitable for a process with internal flow and error-control mechanisms. For example, the Trivial File Transfer Protocol (TFTP) process includes flow and error control. • UDP is used for management processes such as SNMP. UDP is a suitable transport protocol for multicasting. Multicasting capability is embedded in the UDP software but not in the TCP software. • UDP is normally used for real-time applications that cannot tolerate uneven delay between sections of a received message. • UDP is used for some route updating protocols such as Routing Information Protocol (RIP).			6
7	-*File Transfer Protocol* (**FTP**) is the commonly used protocol for exchanging files over the Internet. -FTP uses the Internet's TCP/IPprotocols to enable data transfer -FTP uses a client-server architecture, often secured with SSL/TLS. **How to transfer file using FTP** Files can be transferred between two computers using FTP software. The user's computer is called the local host machine and is connected to the Internet. The second machine, called the remote host, is also running FTP software and connected to the Internet.	3 3		6

	The local host machine connects to the remote host's IP address. The user would enter a username/password (or use anonymous). FTP software may have a GUI, allowing users to drag and drop files between the remote and local host. If not, a series of FTP commands are used to log in to the remote host and transfer files between the machines.			
III a)	 TCP/IP Networking Model Explanation	3 6		9
III (b)	 **Components** Access point Clients Bridge Also the architecture constitutes of Basic Service Set (BSS) Extended Service Set (ESS	2 4		6
IV a)	• HUB • SWITCH • ROUTER	3*2		6

IV b)	 Explanation	4*2 1		9
V a)	Distance Vector Routing Distance vector routing is the dynamic routing algorithm and also known as **Bellman-Ford** routing algorithm and **Ford-Fulkerson** algorithm. In this algorithm, node router constructs a table containing the distance (total cost of path) to all other nodes and distributes that vector to its immediate neighbors. For distance vector routing, it is assumed that each node knows the cost of the link to each of its directly connected neighbors. A link, which is 'down' (which is not working) is assigned as an infinite cost.  **Distance Vector Routing**	4	8	

The shortest path can be computed as:

Information at Node	Cost to Reach Node						
	A	B	C	D	E	F	G
A	0	1	2	3	2	1	2
B	1	0	1	2	1	2	3
C	2	1	0	2	1	3	3
D	3	2	2	0	1	2	2
E	2	1	1	1	0	3	2
F	1	2	3	2	3	0	1
G	2	3	3	1	2	1	0

Every node sends a message to its directly connected neighbors **For example:** A sends its information to B and F. After communicating to each directly connected node the shortest path can be easy to compute (as shown in above table).

4

V b) DHCP (Dynamic Host Configuration Protocol) is a network management protocol used to dynamically assign an Internet Protocol (IP) address to any device, or node, on a network so they can communicate using IP. DHCP automates and centrally manages these configurations rather than requiring network administrators to manually assign IP addresses to all network devices.

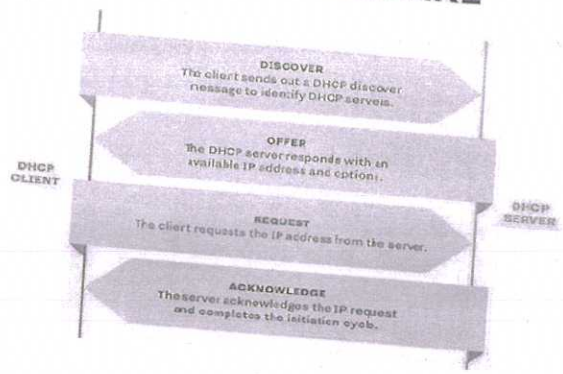
2

How DHCP works

DHCP runs at the application layer of the Transmission Control Protocol/IP (TCP/IP) protocol stack to dynamically assign IP addresses to DHCP clients and to allocate TCP/IP configuration information to DHCP clients. This includes subnet mask information, default gateway IP addresses and domain name system (DNS) addresses.

2

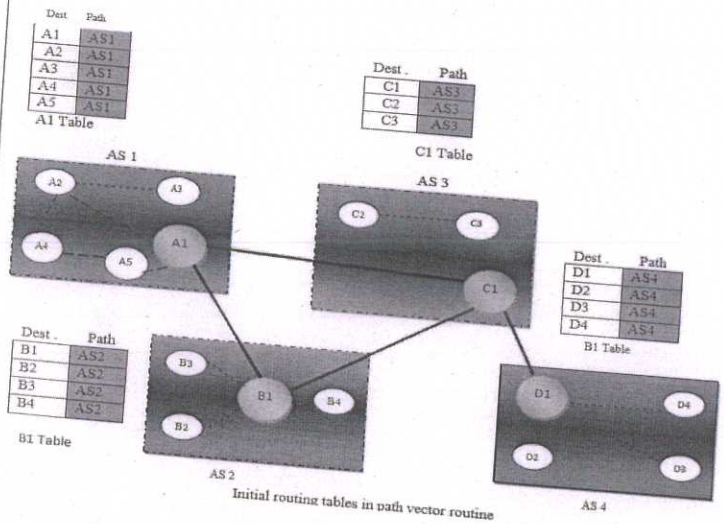
7



3

VI a) Path Vector Routing is a routing algorithm in unicast routing protocol of network layer, and it is useful for interdomain routing. The principle of path vector routing is similar to that of distance vector routing. It assumes that there is one node in each autonomous system that acts on behalf of the entire autonomous system is called Speaker node .The speaker node in an AS creates a routing cable and advertises to the speaker node in the neighbouring ASs .A speaker node advertises the path, not the metrics of the nodes, in its autonomous system or other autonomous systems

4



Initial routing tables in path vector routine

5

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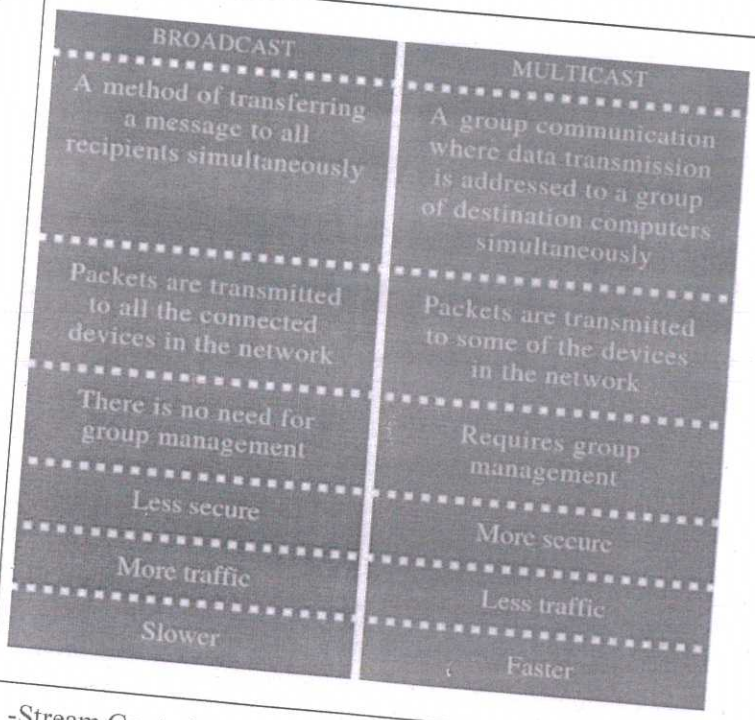
VI b)		6*1		6
VII	-Stream Control Transmission Protocol (SCTP) is a reliable, message-oriented transport layer protocol. -SCTP has mixed features of TCP and UDP. -maintains the message boundaries and detects the lost data, duplicate data as well as out-of-order data. - provides the Congestion control as well as Flow control. -SCTP is especially designed for internet applications. SCTP Services 1. Process-to- Process communication 2. Multi- Stream Facility 3.Full- Duplex Communication 4. Connection- Oriented Service -a connection oriented protocol, just like TCP with the only difference that, it is called association in SCTP. 5. Reliability	5 5*2		15

VIII a)

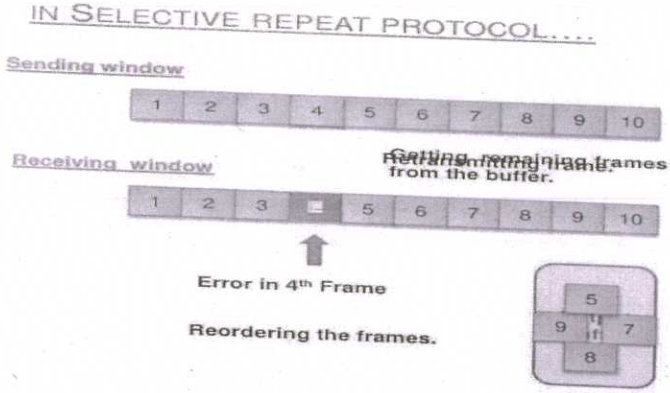
Characteristics/ Description	UDP	TCP
General Description	Simple High speed low functionality "wrapper" that interface applications to the network layer and does little else	Full-featured protocol that allows applications to send data reliably without worrying about network layer issues.
Protocol connection Setup	Connection less data is sent without setup	Connection-oriented; Connection must be Established prior to transmission.
Data interface to application	Message base-based is sent in discrete packages by the application.	Stream-based; data is sent by the application with no particular structure
Reliability and Acknowledgements	Unreliable best-effort delivery without acknowledgements	Reliable delivery of message all data is acknowledged.
Retransmissions	Not performed. Application must detect lost data and retransmit if needed.	Delivery of all data is managed, and lost data is retransmitted automatically.
Features Provided to Manage flow of Data	None	Flow control using sliding windows; window size adjustment heuristics; congestion avoidance algorithms
Overhead	Very Low	Low, but higher than UDP
Transmission speed	Very High	High but not as high as UDP
Data Quantity Suitability	Small to moderate amounts of data.	Small to very large amounts of data.

9*1 | | 9

VIII b)

-Go-Back –N is inefficient because multiple frames are resent when errors or losses occur.
-SR retransmits only an individual frame containing the error.
-Buffer is provided in this case

2



4

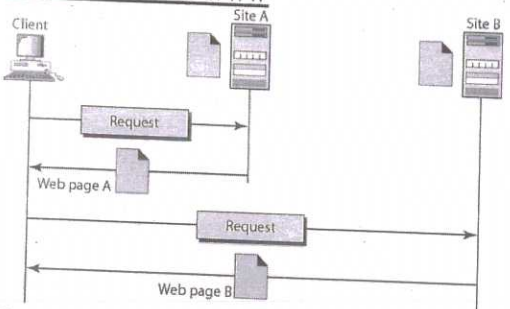
6

IX

The WWW today is a distributed client/server service, in which a client using a browser can access a service using a server. However, the service provided is distributed over many locations called sites.

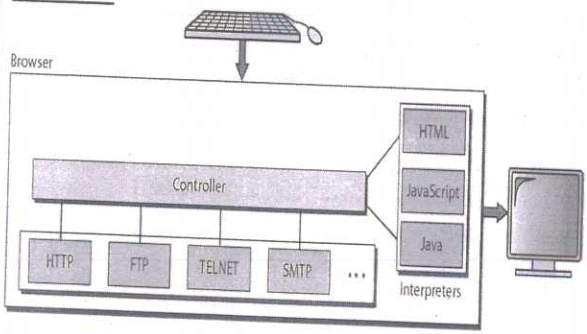
2

Architecture of www



5

Browser



2

15

Web Documents

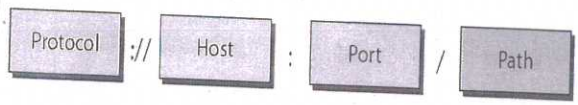
The documents in the WWW can be grouped into three broad categories:

static,
dynamic,
active.

The category is based on the time at which the contents of the document are determined.

4

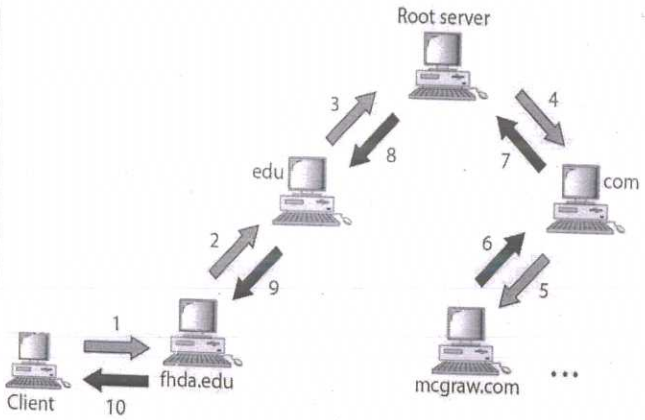
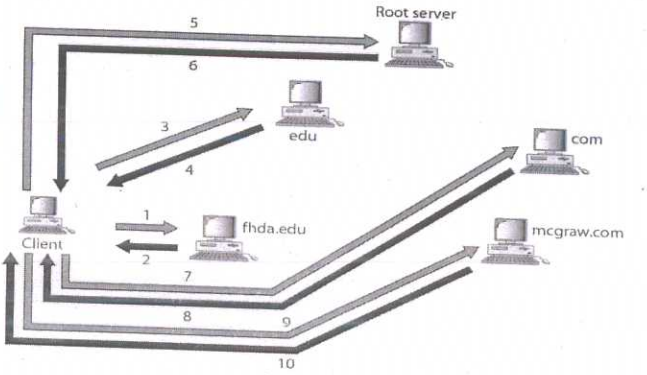
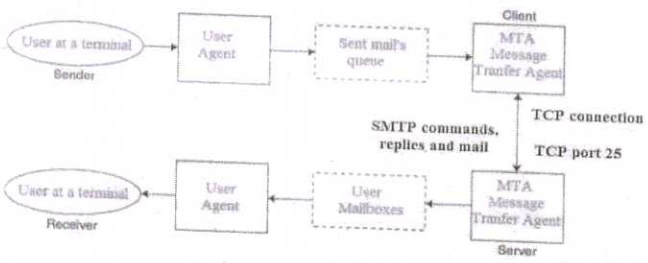
URL



2

X a) Mapping a name to an address or an address to a name is called name-address resolution.

2

	Recursive Resolution  Iterative resolution  **explanation**	2 2 3		9
X b)	SMTP is an application layer protocol. The client who wants to send the mail opens a TCP connection to the SMTP server and then sends the mail across the connection. The SMTP server is always on listening mode. As soon as it listens for a TCP connection from any client, the SMTP process initiates a connection on that port (25). After successfully establishing the TCP connection the client process sends the mail instantly.  	2 4		6