SCHEME OF VALUATION

(Scoring Indicators)

Revision : 2015

Course Code : 6131

CourseTitle : COMPUTER NETWORKS

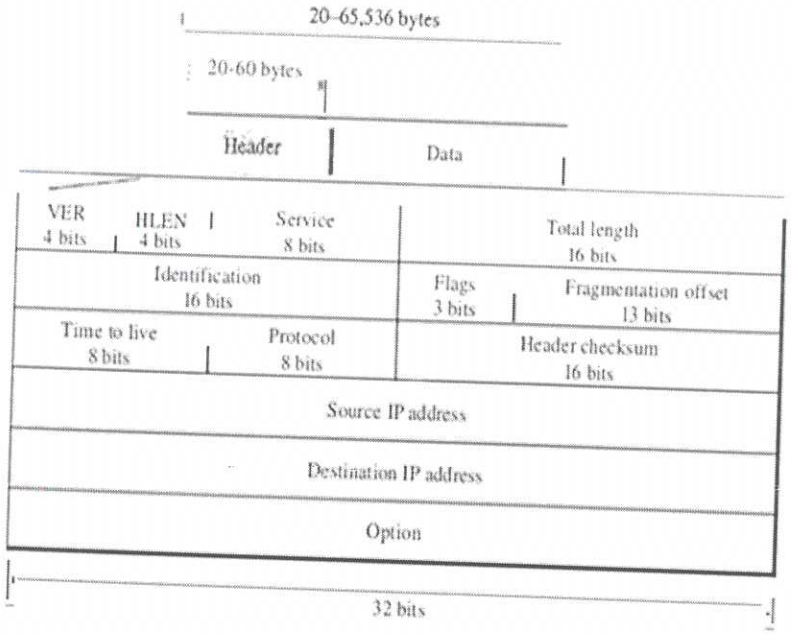
Qst. No	Scoring Indicator	Split up score	Sub Total	Total
	PART A			
I (1)	Performance, Reliability, and Security (List ant two)	1 Mark for each	2	10
I (2)	A repeater is a device that operates only in the physical layer. A repeater receives a signal and, before it becomes too weak or corrupted, regenerates the original bit pattern.	2	2	
I (3)	This is 4-bit field and defines the total length of the datagram header in 4-byte words. This field is needed because the length of the header is variable (between 20 and 60 bytes). When there are no options, the header length is 20 bytes, and the value of this field is 5 (5 x 4 = 20). When the option field is at its maximum size, the value of this field is 15 (15 x 4 = 60).	2	2	
I (4)	Process-to-process delivery needs two identifiers, IP address and the port number, at each end to make a connection. The combination of an IP address and a port number is called a socket address.	2	2	
I (5)	SMTP and POP3	1 Mark for each	2	
	PART B			
II (1)	There are four basic topologies possible: mesh, star, bus, and ring. In a mesh topology, every device has a dedicated point-to-point link to every other device. In a star topology, each device has a dedicated point-to-point link only to a central controller, usually called a hub. A bus topology is multipoint. One long cable acts as a backbone to link all the devices in a network. In a ring topology, each device has a dedicated point-to-point connection with only the two devices on either side of it. (Explain any three with Figure)	2 Marks each	6	

II (2)	In unicast communication, there is one source and one destination. The relationship between the source and the destination is one-to-one. In this type of communication, both the source and destination addresses, in the IP datagram, are the unicast addresses assigned to the hosts	2		
	In multicast communication, there is one source and a group of destinations. The relationship is one-to-many. In this type of communication, the source address is a unicast address, but the destination address is a group address, which defines one or more destinations. The group address identifies the members of the group.	2	6	
	In broadcast communication, the relationship between the source and the destination is one-to-all. There is only one source, but all the other hosts are the destinations.	2		
II (3)	DELIVERY The network layer supervises the handling of the packets by the underlying physical networks.We define this handling as the delivery of a packet.	2		
	Direct Delivery In a direct delivery, the final destination of the packet is a host connected to the same physical network as the deliverer. (Explain with figure)	2	6	
	Indirect Delivery If the destination host is not on the same network as the deliverer, the packet is delivered indirectly. (Explain with figure)	2		
II (4)	Multiplexing At the sender site, there may be several processes that need to send packets. However,there is only one transport layer protocol at any time. This is a many-to-one relationship and requires multiplexing. The protocol accepts messages from different processes, differentiated by their assigned port numbers. After adding the header, the transport layer passes the packet to the network layer.(Explain with figure)	3	6	30

	Demultiplexing At the receiver site, the relationship is one-to-many and requires demultiplexing. The transport layer receives datagrams from the network layer. After error checking and dropping of the header, the transport layer delivers each message to the appropriate process based on the port number.(Explain with figure)	3	
II (5)	Explanation : There is no need for flow control in this scheme. The data link layer at the sender site gets data from its network layer, makes a frame out of the data, and sends it. The data link layer at the receiver site receives a frame from its physical layer, extracts data from the frame, and delivers the data to its network layer.	3	6
	Figure	3	
II (6)	Explanation :The World Wide Web (WWW) is a repository of information linked together from points all over the world. The WWW 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.	3	6
	Figure	3	
II (7)	DNS has two types of messages: query and response. Both types have the same format. The query message consists of a header and question records; the response message consists of a header, question records, answer records, authoritative records, and additional records.	1	6
	Explain each field	5 (1 mark for each)	

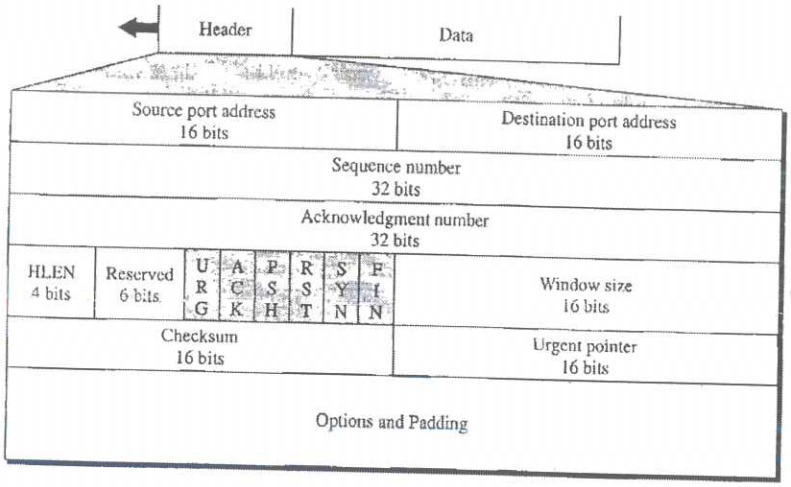
PART C

III (a)	Four Layers: Physical & Datalink, Network, Transport and Application layer	2	10
	Figure	2	

	Explanation of each Layer	6 (1.5 Marks for each)		15
III (b)	Different characteristics are : port numbers, MAC addresses, IP addresses, IP multicast addresses, or a combination of two or more of these.	5 (1 Mark for each)	5	
IV (a)	Four levels of addresses are used in an internet employing the TCP/IP protocols: physical (link) addresses, logical (IP) addresses, port addresses, and specific addresses	3	9	15
	Explanation	6 (1.5 Marks each)		
IV (b)	(i) unicast address because A in binary is 1010 (even). (ii) multicast address because 7 in binary is 0111 (odd). (iii) broadcast address because all digits are F's.	2 Marks each	6	
V (a)	Figure	2	8	15
				
	Explanation of any six fields	6 (1 Mark for each)		

V (b)	Definition : To make the IPv4 protocol independent of the physical network, the designers decided to make the maximum length of the IPv4 datagram equal to 65,535 bytes. This makes transmission more efficient if we use a protocol with an MTU of this size. However, for other physical networks, we must divide the datagram to make it possible to pass through these networks. This is called fragmentation.	2	7	
	The fields that are related to fragmentation and reassembly of an IPv4 datagram are the identification, flags, and fragmentation offset fields. Explanation of each field	3 (1 Mark for each		
	Example	2		
VI (a)	In distance vector routing, the least-cost route between any two nodes is the route with minimum distance. In this protocol, as the name implies, each node maintains a vector (table) of minimum distances to every node. The table at each node also guides the packets to the desired node by showing the next stop in the route (next-hop routing).	1.5	8	15
	Explain Initialization, sharing and updatting	4.5 (1.5 for each)		
	Figure	2		
VI (b)	In link state routing, if each node in the domain has the entire topology of the domain the list of nodes and links, how they are connected including the type, cost (metric), and condition of the links (up or down)-the node can use Dijkstra's algorithm to build a routing table.	1	7	
	Four Steps are: 1. Creation of the states of the links by each node, called the link state packet (LSP).	1		
	2. Dissemination of LSPs to every other router, called flooding, in an efficient and reliable way.	1		
	3. Formation of a shortest path tree for each node using Dijkstra's Algorithm	2		
	4. Calculation of a routing table based on the shortest path tree.	2		

VII (a)	In this protocol we can send several frames before receiving acknowledgments; we keep a copy of these frames until the acknowledgments arrive. Sequence Numbers Frames from a sending station are numbered sequentially. If the header of the frame allows m bits for the sequence number,the sequence numbers are modulo-2^m. Sliding Window In this protocol, the sliding window is an abstract concept that defines the range of sequence numbers that is the concern of the sender and receiver. The range which is the concern of the sender is called the send sliding window; the range that is the concern of the receiver is called the receive sliding window.	3	9	15
	Explanation with example	3		
	Figure	3		
VII (b)	Flow Control Flow control is a set of procedures that tells the sender how much data it can transmit before it must wait for an acknowledgment from the receiver. Any receiving device has a limited speed at which it can process incoming data and a limited amount of memory in which to store incoming data. The receiving device must be able to inform the sending device before those limits are reached and to request that the transmitting device send fewer frames or stop temporarily. Incoming data must be checked and processed before they can be used. The rate of such processing is often slower than the rate of transmission. For this reason, each receiving device has a block of memory, called a buffer, reserved for storing incoming data until they are processed. If the buffer begins to fill up, the receiver must be able to tell the sender to halt transmission until it is once again able to receive.	2	6	
	Error Control Error control is both error detection and error correction. It allows the receiver to inform the sender of any frames lost or damaged in transmission and coordinates the retransmission of those frames by the sender.	2		

	Congestion Control Congestion in a network may occur if the load on the network is greater than the capacity of the network. Congestion control refers to the mechanisms and techniques to control the congestion and keep the load below the capacity.	2		
VIII (a)		3	8	15
	Explain any five fields	5 (1 mark for each)		
VIII (b)	TCP transmits data in full-duplex mode. When two TCPs in two machines are connected, they are able to send segments to each other simultaneously. This implies that each party must initialize communication and get approval from the other party before any data are transferred.The connection establishment in TCP is called **three-way handshaking.**	2	7	
	Explanation with figure	5		
IX (a)	The Hypertext Transfer Protocol (HTTP) is a protocol used mainly to access data on the World Wide Web. HTTP functions as a combination of FTP and SMTP. Unlike SMTP, the HTTP messages are not destined to be read by humans; they are read and interpreted by the HTTP server and HTTP client (browser). HTTP messages are delivered immediately (not stored and forward). The commands from the client to the server are embedded in a request message. The contents of the requested file or other information are embedded in a response message. HTTP uses the services of TCP on well-known port 80.	2	10	

	Explanation of HTTP transactions, Messages, Request and status lines, request types, URL,version, Status code, Status phrase, header and body	8 (1 for each)		
IX (b)	FTP establishes two connections between the hosts. One connection is used for data transfer, the other for control information (commands and responses)	1		15
	<u>Communication over Control Connection</u> FTP uses the the 7-bit ASCII character set to communicate across the control connection. Communication is achieved through commands and responses. This simple method is adequate for the control connection because we send one command (or response) at a time. Each command or response is only one short line.	2	5	
	<u>Communication over Data Connection</u> File transfer occurs over the data connection under the control of the commands sent over the control connection. The client must define the type of file to be transferred, the structure of the data, and the transmission mode. Before sending the file through the data connection, we prepare for transmission through the control connection. The heterogeneity problem is resolved by defining three attributes of communication: file type, data structure, and transmission mode .	2		
X (a)	TELNET (TErminaL NETwork) enables the establishment of a connection to a remote system in such a way that the local terminal appears to be a terminal at the remote system.	2	8	15
	Time sharing environment	2		
	Logging	2		
	Network Virtual Terminal	2		
X (b)	Mapping a name to an address or an address to a name is called name-address resolution.A host that needs to map an address to a name or a name to an address calls a DNS client called a resolver.	1	7	
	Mapping Names to Addresses and Mapping Addresses to Names	2		
	Recursive Resolution, Iterative Resolution and Caching	4		