Scoring Indicators - B

COURSE NAME : COMPUTER COMMUNICATION AND NETWORKS

COURSE CODE : 4132 QID :2103230212

Q No	Scoring Indicators	Split score	Sub Total	Total score
	PART A			**9**
I. 1	Sender, Receiver, Medium, Message, Protocol.		1	
I. 2	n(n-1) channels.		1	
I. 3	framing, flow control, error control and connection control.		1	
I. 4	Change in the shape of a signal.		1	
I. 5	True.		1	
I. 6	network part and host part.		1	
I. 7	service point addressing or port addressing.		1	
I. 8	Simple Mail Transfer Protocol.		1	
I. 9	port 20.		1	
	PART B			24
II. 1	a) Simplex: One-side communication. Ex: Radio b) Half Duplex: Two-way communication, but not at the same time. Ex: Walkie-talkie. c) Full Duplex: Simultaneous two-way. Ex: Mobile.	1 1 1	3	3
II. 2	i) Complex systems can be broken down into understandable subsystems. ii) Any facility implemented in one layer can be made visible to all other layers. iii) Services offered at a particular level may share the services of	3	3	3

	the lower/upper levels. iv) Each layer may be analyzed and tested independently. v) Layers can be simplified, extended, or deleted at any time. vi) Increase the interoperability and compatibility of various components built by different vendors. **(Any three points)**			
II. 3	1. Attenuation: Attenuation means loss of energy. 2. Distortion: Distortion means that the signal changes its form or shape. 3. Thermal noise is the random motion of electrons in a wire which creates an extra signal. 4. Induced noise comes from sources such as motors and appliances through induction. 5. Crosstalk is the effect of one wire on the other. 6. Impulse noise is a spike (a signal with high energy in a very short time) that comes from power lines, lightning, and so on. **(Any three points)**	3	3	3
II. 4	Analog data are continuous and take continuous values. Digital data have discrete states and take discrete values. In the case of a binary-level digital signal, It is two levels, 1 and 0.	3	3	
II. 5	Data-link layer takes the packets from the Network Layer and encapsulates them into frames. Also, it packs bits received from the physical layer into frames. The process is called framing. **Parts of a Frame:** A frame has the following parts – a) Frame Header – It contains the source and the destination addresses of the frame. b) Payload field – It contains the message to be delivered. c) Trailer – It contains the error detection and error correction bits. d) Flag – It marks the beginning and end of the frame.	1 2	3	
II. 6	Network layer services: 1) Packetization 2) IP Addressing 3) Routing and forwarding (One mark each, with definition)	3	3	
II. 7	IPv6 provides a large address space with 128 bits hexadecimal address made up of 8 sets of 16 bits each, and these 8 sets are			

<table>
<tr><td></td><td>separated by a colon. IPv6 is capable of producing over 340 undecillion (3.4*1038) addresses.
 
</td><td>3</td><td>3</td><td>3</td></tr>
<tr><td>II. 8</td><td>a) http: hyper text transfer protocol
b) ftp: file transfer protocol
c) SMTP: Simple Mail Transfer Protocol, etc.
(Any three)</td><td>3</td><td>3</td><td></td></tr>
<tr><td>II.9</td><td>a) SSH Transport Layer Protocols.
b) SSH Connection Protocols.
c) SSH Authentication Protocols.</td><td></td><td>3</td><td></td></tr>
<tr><td>II.10</td><td>URL means Uniform Resource Locator, used to uniquely identify various web resources.
Components:
a) Protocol
b) Domain name or address
c) path to the resource within the domain.</td><td>1

2</td><td>3</td><td></td></tr>
<tr><td></td><td>PART C</td><td></td><td></td><td>42</td></tr>
<tr><td>III. 1</td><td><table>
<tr><th>ISO-OSI</th><th>TCP/IP</th></tr>
<tr><td>7 Layers</td><td>4 Layers</td></tr>
<tr><td>5 bytes header</td><td>20 bytes header</td></tr>
<tr><td>Open Systems Interconnection</td><td>Transmission Control Protocol</td></tr>
<tr><td>Vertical Approach</td><td>Horizontal Approach</td></tr>
<tr><td>Transport layer is Connection-oriented</td><td>It is both connection-oriented and connection less.</td></tr>
<tr><td>Developed by ISO</td><td>Developed by ARPANET</td></tr>
<tr><td>defines the services, protocols, and interfaces as well as provides a proper distinction between them. It is protocol independent.</td><td>services, protocols, and interfaces are not properly separated. It is protocol dependent.</td></tr>
</table>(Any relevant seven points)</td><td>7</td><td>7</td><td>7</td></tr>
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III. 2	Any two network topologies (Star, Bus, Ring, Mesh, Hybrid) (diagram -1 Mark, features - 2.5 Marks) x 2	7	7	7
III. 3	**Features of Synchronous Transmission** o The bit stream is combined into longer "frames," which may contain multiple bytes. o Bits are send one after the other without any gaps. The receiver separates the bytes. o Synchronous means 'at the same time', used for data transfer between same devices. o Synchronization between the sender and receiver is necessary to identify the start and end. o The frame structure Starts with one or more bytes of data that have a unique bit pattern, or flag (preamble), Preamble tells the receiver a block of data will follow. o The preamble is followed by various control fields, a variable-length data field, more control fields, and finally a postamble. o The control information within the frame will include a length field, which specifies the amount of data to be read. o Postamble identifies the end of the data frame.		7	7
III. 4	**The algorithm of CSMA/CD is:** 1) When a frame is ready, the transmitting station checks whether the channel is idle or busy. 2) If the channel is busy, the station waits until the channel becomes idle. 3) If the channel is idle, the station starts transmitting and continually monitors the channel to detect collision. 4) If a collision is detected, the station starts the collision resolution algorithm. 5) The station resets the retransmission counters and completes frame transmission. **The algorithm of Collision Resolution is:** 1) The station continues transmission of the current frame for a specified time along with a jam signal, to ensure that all the other stations detect collision. 2) The station increments the retransmission counter. 3) If the maximum number of retransmission attempts is reached, then the station aborts transmission. 4) Otherwise, the station waits for a backoff period which is generally a function of the number of collisions and restarts the main algorithm.	4 3	7	7

<table>
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<td>III. 5</td>
<td>ALOHA is a multiple-access protocol for the transmission of data via a shared network channel.
Aloha Rules
A. Any station can transmit data to a channel at any time.
B. It does not require any carrier sensing.
C. Collision and data frames may be lost during the transmission of data through multiple stations.
D. Acknowledgment of the frames exists in Aloha. Hence, there is no collision detection.
E. It requires the retransmission of data after some random amount of time.
There are two variations of Aloha i) Pure Aloha and ii) Slotted Aloha.
i) Pure Aloha: Whenever a station hasan available frame, it sends the frame. If there is collision and the frame is destroyed, the sender waits for a random amount of time before retransmitting it.

ii Slotted Aloha: Slotted ALOHA reduces the number of collisions and doubles the capacity of pure ALOHA. The shared channel is divided into a number of discrete time intervals called slots. A station can transmit only at the beginning of each slot.</td>
<td>4

1.5

1.5</td>
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<td>III. 6</td>
<td>
<table>
<tr><th>Guided</th><th>Unguided</th></tr>
<tr><td>Wired or bounded transmission media</td><td>Wireless or unbounded transmission media</td></tr>
<tr><td>Point to point communication</td><td>Broadcasting mostly</td></tr>
<tr><td>Signal propagates through cables.</td><td>Signal propagation through air.</td></tr>
<tr><td>Cost effective</td><td>expensive</td></tr>
<tr><td>Signals in the form of light, voltage, etc</td><td>Signals in the form of electro-magnetic radiations.</td></tr>
<tr><td>Suitable for short distances.</td><td>Preferred in wide coverage.</td></tr>
<tr><td>Eg: Co-axial, Twisted Pair, Fiber Optic cables, etc.</td><td>Microwave, infrared, Bluetooth, wifi, Wimax, etc</td></tr>
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(One Mark each)
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<td>III. 7</td>
<td>Transport Layer Services:
1. Process-to-Process Service: Application-to-application message delivery.
2. Service Point Addressing: Port addressing to identify the</td>
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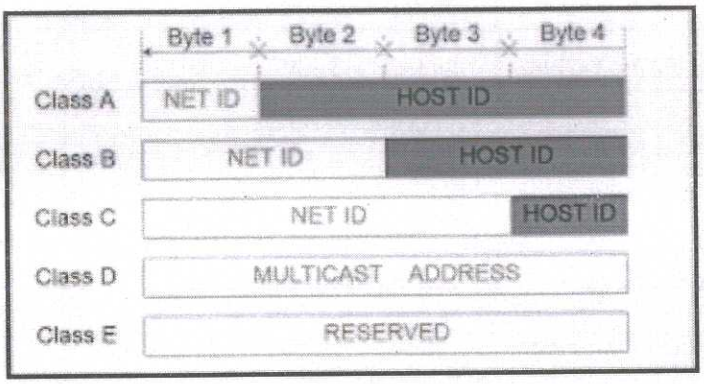
	application within the end systems. 3. Encapsulation and decapsulation: Data Segmentation. 4. Multiplexing and DeMultiplexing. 5. Congestion Control. 6. Flow Control. 7. Data integrity and error correction. (One mark each for every point with an explanation)			
III. 8	**IP Addressing:** An IP (Internet Protocol) address is a numerical label assigned to the devices connected to a computer network that uses the IP for communication. An IP address is assigned to each device so that the device on a network can be identified uniquely. There are two versions of IP addresses:- IPv4 and IPv6. **i) IPv4 Addressing:** It is a 32-bit address written in four octets separated by 'dot' (dotted-decimal notation). Each number in an octet is in the range from 0-255. An e.g., IPv4 address: 192.168.17.43. This addressing scheme can produce 4,294,967,296 possible unique addresses. IPv4 addresses are composed of two parts. The first numbers specify network, while latter numbers specify specific host. A subnet mask specifies which part of an address is n/w part, and which part addresses specific host. A packet with a destination address that is not on same n/w as source address will be routed, to appropriate n/w. Once on correct n/w, host part of address determines which interface packet gets delivered to. IPv4 has 5 types of classes, Class A, Class B, Class C, Class D, and Class E.  	4 3	7	7

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<td>III. 9</td>
<td>Comparison of the features of transport layer protocols.
TCP vs UDP
<table>
<tr><th>Basis</th><th>TCP</th><th>UDP</th></tr>
<tr><td>Definition</td><td>Establishes a virtual circuit before transmitting the data.</td><td>transmits the data directly the destination without verifying whether the rece is ready to receive.</td></tr>
<tr><td>Connection Type</td><td>Connection Oriented</td><td>Connection Less</td></tr>
<tr><td>Speed</td><td>Slow</td><td>High</td></tr>
<tr><td>Reliability</td><td>Reliable</td><td>Un-reliable</td></tr>
<tr><td>Header size</td><td>20 bytes</td><td>8 bytes</td></tr>
<tr><td>Ack</td><td>Yes</td><td>No</td></tr>
<tr><td>Retransmission</td><td>Yes</td><td>No</td></tr>
</table>
(One mark each for relevant points)</td>
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<td>III. 10</td>
<td>Link state routing is a technique in which each router shares the knowledge of its neighborhood with every other router in the internetwork.

Advantages:
Fast Network Convergence:
Topological Map:
Hierarchical Design:
Event-driven Updates:
Disadvantages:
Memory Requirements
Processing Requirements
Bandwidth Requirements.</td>
<td>2

3

2</td>
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<td>III. 11</td>
<td>SMTP (Simple Mail Transfer Protocol): A set of communication guidelines that allow software to transmit an electronic mail over the internet. The main components of SMTP are i) User Agent and ii) Mail Transfer Agent. The user agent (UA) prepares the message, creates the</td>
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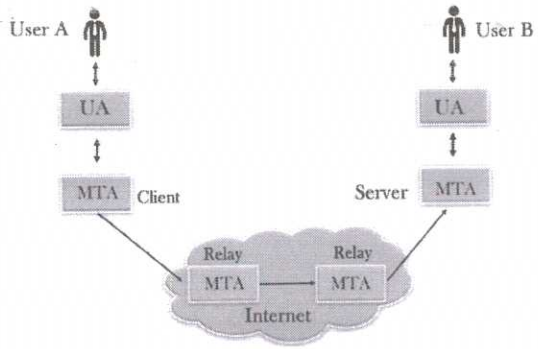
	envelope and then puts the message in the envelope. The mail transfer agent (MTA) transfers this mail across the internet. **Working** a) **Composition**: User prepares the mail through Mail User Agent(MUA). bi) **Submission**: MUA submits the email to SMTP server using SMTP on TCP port 25. c) **Delivery**: The MTA transfers the email to the appropriate server. d) **Storage**: The server stores the received mail in Mail Delivery Agent(MDA). e) **Retrieval**: The stored email in MDA can be retrieved by MUA.  **SMTP - Advantages** a) Low cost and wide coverage b) Reliable and prompt delivery. c) Bulk mailing facility d) Choices for tracking and autoresponse. **SMTP - Disadvantages** 1. SMTP's common port can be blocked by firewalls. 2. Security issues 3. Size Restrictions			
III. 12	**Working of DNS** Suppose a user, for example, wants to use a file transfer client to access the file transfer server running on a remote host. To establish the connection, the TCP/IP suite needs the IP address of the file transfer server. The given figure illustrates the working of the DNS step by step. 1. The hostname is passed to the file transfer client by the user. 2. The file transfer client transmits the hostname to the DNS client. 3. The DNS client sends the query to the DNS server which gives file transfer server name by utilizing known IP address of the DNS			

server.

4. DNS server sends the response with the IP address of the required file transfer server.

5. The DNS client passes the IP address to the file transfer server.

6. The received IP address is used by file transfer clients to access the file transfer server.

Sample Diagram