B2.4-R4: DATA COMMUNICATION & NETWORKING TECHNOLOGIES

NOTE:

1. There are **TWO PARTS** in this Module/Paper. **PART ONE** contains **FOUR** questions and **PART TWO** contains **FIVE** questions.

2. **PART ONE** is to be answered in the **TEAR-OFF ANSWER SHEET** only, attached to the question paper, as per the instructions contained therein. **PART ONE** is **NOT** to be answered in the answer book.

3. Maximum time allotted for **PART ONE** is **ONE HOUR**. Answer book for **PART TWO** will be supplied at the table when the answer sheet for **PART ONE** is returned. However, candidates, who complete **PART ONE** earlier than one hour, can collect the answer book for **PART TWO** immediately after handing over the answer sheet for **PART ONE**.

TOTAL TIME: 3 HOURS **TOTAL MARKS: 100**

(PART ONE – 40; PART TWO – 60)

PART ONE
(Answer all the questions)

1. Each question below gives a multiple choice of answers. Choose the most appropriate one and enter in the "tear-off" answer sheet attached to the question paper, following instructions therein. (1x10)

1.1 Which of the following technique uses four twisted-pair cables that connect each station to a common hub?

A) 10Base-2
B) 10Base-5
C) 10Base-T
D) 10Base-F

1.2 Sliding window is a technique for _____.

A) line discipline
B) error control
C) flow control
D) session management

1.3 What is a second-generation cellular phone system that is a digital version of AMPS?

A) GSM
B) CDMA
C) DSSA
D) D-AMPS

1.4 In TCP, the path _____.

A) upto destination is allocated before the transmission of message begins
B) upto next intermediate node is allocated before the transmission of message begins
C) to be followed depends on the length of message
D) none of the above

1.5 Which of the following is an analog technique that can be applied when the bandwidth of a link (in hertz) is greater than the combined bandwidths of the signals to be transmitted?
A) FDM
B) TDM
C) CDM
D) WDM

1.6 Which of the following was designed as an alternative to the T-1 line (1.544 Mbps)?
A) ADSL lite
B) HDSL
C) DSL
D) VDSL

1.7 Mapping from MAC address to IP address is done by _____.
A) SNMP
B) ARP
C) SMTP
D) RARP

1.8 To deliver a message to the correct application program running on a host, which of the following address must be consulted?
A) internet protocol
B) physical
C) port
D) memory

1.9 A multistage switch with micro switches at each stage that route the packets based on the output port represented as a binary string is _____.
A) a Space-Division switch
B) a Crossbar switch
C) a Router
D) a Banyan switch

1.10 Which of the following signal can be used for short-range communication in a closed area using line-of-sight propagation?
A) Infrared
B) Bluetooth
C) Radio
D) Microwave

2. Each statement below is either TRUE or FALSE. Choose the most appropriate one and ENTER in the "tear-off" sheet attached to the question paper, following instructions therein. (1x10)

2.1 The physical layer in the traditional telephone network uses the packet-switching approach.

2.2 Synchronous Data Link Control (SDLC) protocol has more control overhead than Asynchronous Data Link Control (ADLC) protocol.

2.3 ADSL is a symmetric communication technology designed for residential users; it is not suitable for businesses.

2.4 Forward error correction is the process in which the receiver tries to guess the message by using redundant bits.

2.5 In IEEE 802.11b LAN, wireless technology is used.

2.6 IP is a best effort connectionless protocol.

2.7 A bridge can use the spanning tree algorithm to create a loopless topology.

2.8 Gigabit Ethernet access methods include half-duplex mode using traditional CSMA/CD (not common) and full-duplex mode (most popular method).

2.9 There are three types of addresses in IPv6: unicast, anycast, and multicast.

2.10 Mail services are available to network users through the application layer.

3. Match words and phrases in column X with the closest related meaning/ word(s)/phrase(s) in column Y. Enter your selection in the "tear-off" answer sheet attached to the question paper, following instructions therein. (1x10)

X		Y	
3.1	Although coaxial cable has a much higher bandwidth, the signal weakens rapidly and requires the frequent use of	**A.**	query messages
3.2	Flow control refers to a set of procedures used to restrict the amount of data that the sender can send before waiting for	**B.**	cryptography
3.3	HDLC handle data transparency by adding a 0 whenever there are five consecutive 1s following a 0. This is called	**C.**	redundancy
3.4	Converting plain text to cipher text and vice-versa	**D.**	Sampling
3.5	The first step in digitizing an analog signal	**E.**	Network
3.6	The SIP is an application protocol that establishes, manages, and terminates	**F.**	bit stuffing
3.7	Secure wireless multiplexing	**G.**	a noisy channel
3.8	The Shannon capacity determines the theoretical maximum data rate for	**H.**	CDMA
3.9	The central concept in detecting or correcting errors is	**I.**	bridge
3.10	ICMP messages are divided into two broad categories: error-reporting messages and	**J.**	repeaters
		K.	error correction
		L.	a multimedia session
		M.	acknowledgment

4. Each statement below has a blank space to fit one of the word(s) or phrase(s) in the list below. Enter your choice in the "tear-off" answer sheet attached to the question paper, following instructions therein. (1x10)

A.	broadcast	**B.**	telnet	**C.**	IP address
D.	UDP	**E.**	block coding	**F.**	the teardown phase
G.	RARP	**H.**	VPN	**I.**	HTTP
J.	Aloha	**K.**	resistance	**L.**	The class
M.	segmentation				

4.1 To implement _____ over the Internet, tunneling is used.

4.2 VLANs create _____ domains.

4.3 _____ of an IP address is easily determined by examination of the first byte.

4.4 The main advantage of PCM system is its _____ to system noise offered by digital signals.

4.5 In circuit switching, the resources need to be reserved during the setup phase; the resources remain dedicated for the entire duration of data transfer until _____.

4.6 In _____, the message is divided into blocks, each of k bits, called datawords.

4.7 The protocol used to transfer HTML pages is called _____.

4.8 In remote login, _____ is used to access distant servers.

4.9 In the Internet, _____ is used to forward data packets in intermediate routers.

4.10 _____ works on transport layer of OSI reference model.

PART TWO

(Answer any **FOUR** questions)

5.

a) What are the advantages and disadvantages of using a twisted pair? What are its two forms?

b) Explain in short the 'OSI Model'. List at least four functions performed by network layer.

c) Explain the term modulation. How is it different from encoding? Why is frequency modulation superior to amplitude modulation?

(5+5+5)

6.

a) What is VLAN? Discuss how VLAN enables logical topologies on top of the physical network infrastructure.

b) Compare virtual circuit with datagram subnet.

c) What is a subnet mask and why is it required?

(5+5+5)

7.

a) Explain briefly the roles of repeaters, bridges, routers and gateways in internetworking. Also mention the layers on which they function.

b) When is an ARP request packet generated? Describe the various steps that take place when a host receives an ARP request packet.

c) Discuss the advantages and disadvantages of packet switching over circuit switching.

(5+5+5)

8.

a) What is a network firewall? How are they different from application firewall?

b) Explain frequency reuse principal. What is handoff in wireless communication?

c) How does a peer-to-peer network differ from client/server network?

(5+5+5)

9.

a) The next-generation IP, or IPv6, has some advantages over IPv4. Write down the advantages of IPv6 over IPv4.

b) Explain with the help of an example the difference between Bellman-Ford algorithm and Dijkstra's algorithm for routing.

c) List and briefly define the key elements of SNMP.

(5+5+5)