B2.4-R3: DATA COMMUNICATION AND COMPUTER NETWORKS

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. (1 x 10)

1.1 Not a function of a data link protocol.
A) Media access control
B) Amplitude shift keying
C) Message delineation
D) Error control

1.2 A brute force attack against an encryption system:
A) is known as RC4
B) is also known as 3DES
C) tries to gain access by trying every possible key
D) always uses the Rijndael algorithm

1.3 The highest data rate is provided by the transmission medium.
A) Coaxial cable
B) Microwave
C) Optical fiber
D) Twisted pairs

1.4 In FDDI, data normally travels on
A) Primary ring
B) Secondary ring
C) Both rings
D) Neither ring

1.5 The layer responsible for end to end delivery of the entire message is
A) Network layer
B) Transport Layer
C) Session layer
D) Data link layer

1.6 In ARQ, a NAK
A) is sent by the recipient if the message contains an error
B) means that the sender should continue with sending the next message
C) is sent by the recipient if the message was received without error
D) is sent by the sender at the same time as it sends a data packet

1.7 AAL2 is useful for
A) Constant bit rate
B) Variable bit rate
C) Connectionless packet data
D) Connection-oriented packet data

1.8 An effective way to prevent attenuation is
A) Adding repeaters or amplifiers to a circuit
B) Shorting a circuit
C) Adding repeaters or amplifiers to a circuit
D) Shielding wires

1.9 The loss of power a signal suffers as it travels from the transmitting computer to a receiving computer is:
A) Echo
B) Jitter
C) Spiking
D) Attenuation

1.10 In cellular mobile communication handoff means
A) to disturb the signal
B) to disturb the antenna
C) to switch to a new cell when call is in progress
D) to switch off the MTSO

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. (1 x 10)

2.1 Message delineation refers to the control that is needed when computers transmit.
2.2 Ethernet is a character-oriented data link protocol.
2.3 It is possible to have x variations in phase and y variations in amplitude using QAM (Quadrature Amplitude Modulation).
2.4 Each ATM cell contains 48 bytes of data and 8 bytes of header information.
2.5 HDLC is very similar to the SDLC synchronous data link protocol.
2.6 The denial-of-service attack disrupts the network by flooding the network with messages so that regular messages cannot be processed.
2.7 X.25 offers faster data rates than frame relay.
2.8 Nyquist theorem suggests that to transmit an analog signal into its digital equivalent, it must be sampled 1000 times a second.
2.9 Cryptography is used only for encoding the messages.
2.10 Noise that is introduced into a data transmission can show up as extra bits.

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. (1 x 10)

X		Y	
3.1	Using parity checking the probability of detecting an error, given that one has occurred, is about:	**A.**	flooding
3.2	Capability for data transmission in only one direction at a time	**B.**	start-stop transmission
3.3	A way to prevent unauthorized access by disguising information through algorithms is	**C.**	virtual circuits
3.4	Continuous ARQ	**D.**	50%
3.5	UDP	**E.**	full duplex
3.6	Asynchronous transmission	**F.**	encryption
3.7	ATM	**G.**	DTE
3.8	Link state routing	**H.**	99%
3.9	X.25	**I.**	Sliding window
3.10	To fool the target computer into believing that messages from the intruder's computer are actually coming from an authorized user inside the organization's network	**J.**	reliable
		K.	half duplex
		L.	broadcasting
		M.	unreliable
		N.	spoofing

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. (1 x 10)

A.	Data link	**B.**	Algorithm	**C.**	Character Oriented
D.	Lock	**E.**	48	**F.**	Synchronous TDM
G.	Statistical TDM	**H.**	Network	**I.**	WAN
J.	Bit oriented	**K.**	SONET	**L.**	Authenticity
M.	Integrity	**N.**	Transport	**O.**	FDDI
P.	Circuit loading	**Q.**	LAN	**R.**	64

4.1 A symmetric encryption system has two parts: the key and the _____.

4.2 _____ refers to the amount of data transmitted on a circuit.

4.3 HDLC is a _____ protocol.

4.4 The _____ layer can use the trailer of the frame for the error detection.

4.5 For sending telephone conversations across using PCM we need a bandwidth of _____ Kbps with 8-bit samples.

4.6 _____ is an intelligent multiplexing scheme.

4.7 In _____ the transmission media is shared between all computers on the network.

4.8 TCP and UDP are the part of _____layer.

4.9 _____ of a message is compromised when it is changed during transmission.

4.10 _____ is the dominant standard for long distance transmission of data over optical networks.

PART TWO

(Answer any **FOUR** questions)

5.

a) What is meant by simplex, half duplex and full duplex communication system? Give representative examples of each.

b) What is circuit switching? Discuss how packet switching is better than circuit switching for computer to computer communication.

c) Briefly describe the various classes of IP addresses.

(5+5+5)

6.

a) Describe the structure of an optical fiber and explain the mechanism of light propagation along the fiber.

b) Explain, how the private key symmetric encryption works.

c) How does the transport layer ensure that the complete message arrives at the destination and in the proper order?

(7+4+4)

7.

a) What basic function does a communication satellite perform? Give a good reason why up-link and down-link frequencies are not same. Why earth dish antenna generally is parabolic in shape?

b) Consider a PCM system in which 30 channels are to be time division multiplexed. The bandwidth of each channel is 3 kHz. The sampling rate is 33.33% higher than the theoretical minimum and 8 bits are used for each sample. Determine the required bit rate and find the minimum required transmission bandwidth.

c) What is latency buffer and why is it 30 bits long in case of a token ring LAN?

(6+6+3)

8.

a) Compare and contrast three key long distance communication technologies, namely X. 25, frame relay and ATM.

b) Why is it important for protocols configured on the top of Ethernet to have a length field in their header, indicating how long the message is? Discuss what kinds of problems arise when two computers on the same Ethernet share the same MAC (hardware) address.

c) List at least three techniques used for error detection and correction. Discuss any one of them in detail.

(6+5+4)

9. Write Short notes on (any three):

a) Mobile telephony and the concept of handoff

b) ISDN

c) FDM and TDM

d) Data modems

(5+5+5)