

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 A signal with a power of 10 mw is transmitted through a co-axial cable. Signal level measured at the other end of the cable is 5 mw. What is the loss of the signal strength?
 - A) -3 dB
 - B) 3 dB
 - C) 2 dB
 - D) -2 dB
 - 1.2 The size of ATM cell in octets is
 - A) 48
 - B) 5
 - C) 64
 - D) 53
 - 1.3 The range of first octet of class B IP addresses is
 - A) 0 to 127
 - B) 128 to 191
 - C) 192 to 223
 - D) 224 to 239
 - 1.4 The speed of Ethernet is
 - A) 64 Kbps
 - B) 64 Mbps
 - C) 10 Kbps
 - D) 10 Mbps
 - 1.5 Which of the following technology is based on virtual circuits?
 - A) Frame relay
 - B) Token bus
 - C) Token ring

D) Ethernet

- 1.6 Sending an e-mail requires
- A) Connection-oriented approach with timing relationship between sender and receiver
 - B) Connection-less approach with timing relationship between sender and receiver
 - C) Connection-oriented approach with no timing relationship between sender and receiver
 - D) Connection-less approach with no timing relationship between sender and receiver
- 1.7 Optical transmission mainly uses
- A) WDM
 - B) FDM
 - C) TDM
 - D) CDM
- 1.8 A GSM system has
- A) 124 pairs of simplex channels with each simplex channel of 200 KHz width
 - B) 124 pairs of duplex channels with each simplex channel of 200 KHz width
 - C) 992 channels with each simplex channel of 10 KHz width
 - D) 992 channels centered at 890 MHz
- 1.9 The physical layer most popularly used in wired LANs nowadays uses
- A) UTP cables
 - B) STP cables
 - C) Coaxial cables
 - D) Radio Frequency
- 1.10 An application generates a traffic stream that requires ATM cells to be transmitted at almost uniform time spacing and expects that the receiver will receive the stream with a small delay jitter. This application requires
- A) CBR
 - B) CBR
 - C) UBR
 - D) ABR

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 If modems are used for relaying electrical signals, the physical layer protocol is between the end system and the modem.
- 2.2 The physical layer converts bits into electrical signals and vice versa. Clock and signal encoding are data layer functions.
- 2.3 RSA is a secret key encryption algorithm.
- 2.4 IPv6 uses 32 bit addresses.
- 2.5 The ATM physical layer is divided into two sublayers namely physical media dependent sublayer and transmission convergence sublayer.
- 2.6 TCP header can vary from 20 bytes to 60 bytes.
- 2.7 Ethernet uses variable sized packets to transmit data.
- 2.8 TCP/IP is the protocol suite for Internet.
- 2.9 Encryption and decryption are the functions of the presentation layer.
- 2.10 E-mail security can be achieved by compressing the messages using PGP and then encrypting them using IDEA.

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	Data rates at the source and destination must be same	A.	Message switching
3.2	Routing	B.	Application Layer
3.3	Media access Control	C.	NNI
3.4	DES	D.	Circuit switching
3.5	The interface between ATM end system and ATM switch	E.	Ethernet
3.6	CSMA/CD protocol	F.	secret key encryption algorithm
3.7	Web security	G.	IEEE 802.11
3.8	Token ring technology	H.	Data link layer
3.9	WWW	I.	ATM
3.10	Wireless protocol	J.	UNI
		K.	public key encryption algorithm
		L.	IEEE 802.5
		M.	Network layer
		N.	SSL

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.	RS232	B.	ISDN	C.	SMDS
D.	Connection less	E.	Ring	F.	Asynchronous
G.	QPSK	H.	ATM	I.	36%
J.	Synchronous	K.	telnet	L.	Frame relay
M.	18%	N.	Connection oriented	O.	24%
P.	QAM	Q.	Bus	R.	X.25

- 4.1 _____ is used for serial communication.
- 4.2 Start and stop bits are used in _____ transmission.
- 4.3 _____ is a remote login protocol.
- 4.4 Bearer channel (B), Data channel (D) and Hybrid channel (H) are defined in _____.
- 4.5 A combination of ASK and PSK is employed at high bit rates is called _____.
- 4.6 The terms DTE and DCE terms are normally used in _____.
- 4.7 _____ topology is normally used in Ethernet.
- 4.8 TCP is _____ reliable protocol.
- 4.9 The technology that can be used to transfer data, audio and video over LANs and WANs is _____.
- 4.10 Throughput of simple ALOHA is _____.

PART TWO
(Answer any **FOUR** questions)

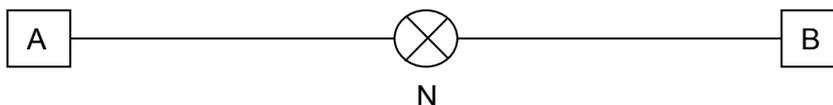
5.

- a) If the transmitted code word is 10001001 and the received code word is 11000101. What is the error word? Express transmitted word, received word and error word as polynomials.
- b) The Physical layer service is a non-confirmed service. If some data bits are lost during transmission over the interconnecting media which layer will detect their loss and take recovery action? Explain any one method which depicts how this operation is performed.
- c) What is the average number of transmissions required to send a frame of length 1200 bytes correctly, if the bit error rate is 1×10^{-6} .
- d) Discuss any routing algorithm of your choice.

(4+4+3+4)

6.

- a) Two end systems A and B are connected through a store and forward node N as shown below.



The propagation delay of the interconnecting links is 100 ms. The links are operating at 1 Mbps. The store and forward node has negligible processing delay. Calculate the delivery time of 100 K bits long message from node A to node B when

- i) the node N is a message switch,
- ii) the node N is a packet switch. Assume packet size of 1K bits.

Neglect the overhead of addressing bits.

- b) Write down the basic features of HDLC protocol.
- c) 'The basic security requirements are confidentiality, integrity, authentication and non-repudiation.' Discuss this statement by clearly explaining the meaning of each of these four terms.

(4+3+8)

7.

- a) IP is described as a best effort service. Why? Does it support any error handling mechanisms?
- b) Discuss the basic differences between a LAN and a WAN. Name at least one LAN technology and one WAN technology. Explain the steps required to deliver a packet from a source host to a destination host in
 - i) a LAN
 - ii) a WAN
- c) What are the benefits of cell switching that is used in ATM?

(4+6+5)

8.

- a) Why are transport layer protocols like TCP or UDP called end-to-end protocols? Bring out the difference between them.
- b) Draw a TCP/IP internet that consists of two networks connected by a router. If a computer is attached to each network, show the protocol attack used on the computers and the stack used on the router.
- c) Compare the following:
 - i) Optical fibre and Co-axial cable
 - ii) Firewall and Proxy

(4+3+8)

9.

- a) What are the two basic GSM channel types? Explain them.
- b) What is the use of VPN?
- c) Compare static and dynamic routing. What are the various dynamic routing protocols?

(5+5+5)