B2.4-R4: DATA COMMUNICATIONS AND NETWORK TECHNOLOGIES

NOTE:

IMPORTANT INSTRUCTIONS:

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 **OMR ANSWER SHEET** only, supplied with 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 "OMR" answer sheet supplied with the question paper, following instructions therein. (1x10)

1.1 The process-to-process delivery of the entire message is the responsibility of the _____ layer.

A) Network
B) Transport
C) Application
D) Physical

1.2 Which protocol is used for file transferring?

A) SMTP
B) FTP
C) Both A) and B)
C) None of the above

1.3 UDP is _____ protocol.

A) connection-less
B) connection-oriented
C) both A) and B)
C) none of the above

1.4 Which of the following is application layer service?

A) FTP
B) Remote log in
C) Mail service
D) All of the above

1.5 The 1-persistent CSMA/CD can be considered as a special case of p-persistent approach with p equal to

A) 0.5
B) 0.1
C) 1.0
D) None of the above

1.6 The _____ field is used for error detection.

A) urgent pointer
B) checksum
C) sequence number
D) acknowledge number

1.7 In the following medium access methods, _____ is suitable for wireless medium.

A) ALOHA
B) CSMA/CD
C) CSMA/CA
D) Slotted ALOHA

1.8 Open Source Interconnection Reference Model, developed by _____ has _____ layers.

A) IEEE,7
B) ISI,5
C) ISO,7
D) None of the above

1.9 If user A wants to send an encrypted message to user B, the plaintext encrypted with the public key of

A) A
B) B
C) The network
D) Either A) or B)

1.10 Link State packets are used in _____ protocol.

A) Distance vector
B) OSPF
C) RIP
D) None of the above

2. Each statement below is either TRUE or FALSE. Choose the most appropriate one and ENTER in the "OMR" answer sheet supplied with the question paper, following instructions therein. (1x10)

2.1 Decryption and Encryption of data are in Application layer.
2.2 A system with a signal power of 10 MW has a noise of 1 microW. The Signal-to-Noice Ratio is 80 dB.
2.3 Checksum error detection scheme uses 1's complement arithmetic.
2.4 Repeater is used in application layer.
2.5 For interconnection of heterogeneous networks router is used.
2.6 ARP is for obtaining physical address for a given IP address.
2.7 ATM cell is a fixed size 53 bytes frame.
2.8 A valid SDLC frame has a minimum size of 46 bytes.
2.9 BGP is a interior routing protocol.
2.10 NAT is a useful mechanism for virtual private network.

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 "OMR" answer sheet supplied with the question paper, following instructions therein. (1x10)

X		Y	
3.1	Aloha	**A.**	VPN
3.2	RARP	**B.**	Wireless lan
3.3	Frequency domain	**C.**	Propagation speed related problem of composite signal
3.4	IPSec protocol	**D.**	Bipolar
3.5	IEEE 802.11	**E.**	Address Resolution Protocol
3.6	Distortion	**F.**	MAC Layer
3.7	DNS	**G.**	Peak Amplitude
3.8	PCM	**H.**	Manchester Encoding
3.9	QAM	**I.**	TDM
3.10	Polar	**J.**	Distance Vector Routing Algorithm
		K.	PSK
		L.	Pulse Amplitude Modulation
		M.	Domain Name

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 "OMR" answer sheet supplied with the question paper, following instructions therein. (1x10)

A.	Delay acknowledgment	**B.**	Router	**C.**	Nagle's algorithm
D.	Piggybacking	**E.**	Node to Node	**F.**	Digital to Analog
G.	Diffie-Hellman	**H.**	Clark's solution	**I.**	Process to process
J.	TCP	**K.**	Analog to analog	**L.**	Host to Host
M	IP				

4.1 AM and FM are example of _____ modulation.
4.2 ASK, PSK, FSK, and QAM are examples of _____ modulation.
4.3 When data and acknowledgement are sent on the same frame, this is called _____.
4.4 On a network that uses NAT, the _____ has a translation table.
4.5 Data link layer is responsible for _____ communication.
4.6 IP is responsible for _____ communication.
4.7 To prevent silly window syndrome created by a receiver that processes data at a very slow rate, _____ can be used.
4.8 To prevent silly window syndrome created by a sender that sends data at a very slow rate, _____ can be used.
4.9 The _____ protocol, is a very sophisticated symmetric key creation algorithm.
4.10 _____ is connection oriented protocol.

PART TWO

(Attempt **any FOUR** questions)

5.

a) For each of the following four networks, discuss the consequences if a connection fails.
   i) Mesh topology
   ii) Star topology
   iii) Bus topology
   iv) Ring topology

b) Given the following periods, calculate the corresponding frequencies.
   i) 5 s
   ii) 12 μs
   iii) 220 ns

c) The bit rate of signal is 3000. If each signal unit carries 6 bits, what is the baud rate?

d) How many voltage level polar line encoding scheme uses? Describe three variation of polar encoding in details.

(4+3+2+6)

6.

a) Illustrate "Destination Unreachable" state of ICMP.

b) With numerical analysis justify that the problem of address space exhaustion of IPv4 be solved with IPv6.

c) Describe how ARP packets can help to reach the destination whose IP address is only known.

d) What is the utility of proxy server?

(4+4+4+3)

7.

a) Given a 10 bit sequence 1010011110 and divisor 1011. Find the CRC.

b) Describe the function of HDLC protocol in brief.

c) Describe how Token Ring networks work.

d) Explain the working principle of piconet scheme in Bluetooth technology.

(4+4+4+3)

8.

a) Why IP is called "Best Effort Deliver" protocol?

b) Draw IP datagram and explain the fragmentation offset field.

c) i) Do port addresses need to be unique? Why or why not?
   ii) Why are port addresses shorter that IP addresses?

d) Describe briefly TCP segment format with diagram.

(2+4+(2+2)+5)

9.

a) An ISP is granted a block of address starting with 120.60.4.0/22. The ISP wants to distribute these blocks to 100 organizations with each organization receiving just eight address. Design the sub blocks and give the slash notation for each sub block. Find out how many address are still available after this allocations.

b) What is the basis of classification for the four types of links defined by OSPF?

c) Why do we need POP3 or IMAP4 for electronic mail?

d) What is sophisticated hash function?

(5+5+3+2)