B2.4-R4: DATA COMMUNICATION & NETWORK 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 **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 Class A network with address 10.0.0.0 with 40 subnets is required to add 60 new subnets very soon. Which subnet mask should be assigned to network?

A) 255.240.0.0
B) 255.248.0.0
C) 255.252.0.0
D) 255.254.0.0

1.2 Which of the following is done in the physical layer of the ATM network?

A) Monitoring of the user information field for bit errors and possible corrective actions
B) Transmission frame generation/recovery
C) Generic flow control
D) Cell multiplexing and demultiplexing

1.3 The probability that a single bit will be in error on a typical public telephone line using 4800 bps modem is 10 to the power -3. If no error detection mechanism is used, the residual error rate for a communication line using 9-bit frames is approximately equal to

A) 0.003
B) 0.009
C) 0.991
D) 0.999

1.4 Which of the following modulation used by ASK, PSK, FSK and QAM?

A) analog-to-digital
B) digital-to-digital
C) digital-to-analog
D) analog-to-analog

1.5 Which layer of OSI does the encryption/decryption?

A) Data Link layer
B) Network layer
C) Presentation layer
D) Application layer

1.6 Which of the following is not a key element of a protocol?
A) Syntax
B) Entities
C) Semantic
D) Timing

1.7 The event that will not cause recalculation of the distance vector is
A) discovery of a longer path to an existing destination
B) discovery of a long path to a new destination
C) discovery that a link to a neighbor has gone down
D) to receive a shorter path to an existing destination

1.8 Which of the options below is a property of flooding?
A) All possible routes are tried
B) All paths are loaded
C) All nodes are linked
D) Cannot be used to set up virtual circuit

1.9 Packet Switching
A) Does not require any advanced setup
B) Uses store and forward mechanism
C) Allows different packets to follow different paths depending on network conditions at the time they are sent
D) All the above

1.10 What device separates a single network into two segments, but lets the two segments appear as one to higher protocols?
A) PSTN line
B) a ground station
C) a dedicated line
D) a coaxial cable

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 Satellite transponders use a higher frequency for reception of radiation from earth stations and lower frequency for transmission to earth stations.

2.2 ARP is a low-level protocol that hides the underlying network physical addressing, permitting us to assign IP-addresses of our choice to every machine.

2.3 The synchronous modems are more expensive than the asynchronous modems because they contain clock recovery circuits.

2.4 Wireless LAN has no interference of transmissions from different computers.

2.5 Packet switching is a connection oriented service.

2.6 TCP/IP model Application layer incorporates OSI Application and presentation layers.

2.7 Quantization means measuring amplitudes of signal at equal intervals.

2.8 Data link layer deals with mechanical and electrical specifications of transmission medium and interface.

2.9 HTTP is a non-persistent, stateless protocol.

2.10 A fixed IP address can be allotted if a host is mobile.

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	In IPv4, an HLEN value of decimal 10 means there are 40 bytes in	**A.**	Socket address
3.2	Intranets and extranets can use their network fire walls and other security features to establish secure Internet links within an enterprise or with its trading partners is known as	**B.**	Session layer
3.3	Error detection at a data link level is achieved by	**C.**	Link state routing
3.4	A medium access control technique for multiple access transmission media is	**D.**	Hamming distance
3.5	In OSI network architecture, the dialogue control and token management are responsibilities of	**E.**	Decoding
3.6	A signal that repeats a pattern over a regular interval of time is called	**F.**	Cyclic redundancy codes
3.7	Data segmentation is a function related with	**G.**	Multiplexing
3.8	To allow multiple users to share total capacity of a transmission medium is called	**H.**	Transport layer
3.9	The Open Shortest Path First or OSPF protocol is an intra-domain routing protocol based on	**I.**	Aloha
3.10	The combination of an IP address and a port number is called a	**J.**	The header
		K.	Sine wave
		L.	Periodic signal
		M.	Virtual Private Network

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.	TCP/IP	**B.**	Contention	**C.**	Classless addressing
D.	Mesh Topology	**E.**	Biphase	**F.**	Internet Control Message Protocol
G.	UDP	**H.**	Bridge	**I.**	Loopback
J.	Gateway	**K.**	Physical layer	**L.**	Multicasting
M.	IGMP				

4.1 _____ separates a single network into two segments but lets the two segments appear as one to higher protocols.

4.2 SMTP uses _____ protocol is for transferring electronic mail messages from one machine to another.

4.3 _____ capability is embedded in the UDP software but not in the TCP software.

4.4 At the _____, a DCE takes data generated by a DTE.

4.5 _____ is a protocol that handles error and control messages.

4.6 Manchester is a type of _____ encoding.

4.7 Address 127.0.0.0 is called the _____.

4.8 _____ is the condition when two or more stations attempt to use the same channel at the same time.

4.9 Address aggregation simplifies the forwarding process in _____.

4.10 _____ requires the maximum number of I/O ports.

PART TWO

(Answer any **FOUR** questions**)**

5.

a) What is the Hamming distance? What is the minimum Hamming distance? What kind of error is undetectable by the checksum?

b) List and explain the fields related to IPv4 Fragmentation.

c) Define Infinity in distance vector routing. Explain how split horizon can resolve problem of infinity.

(5+6+4)

6.

a) What is a peer-to-peer process? What are the concerns of the physical layer in the Internet model?

b) Draw the flow diagram for the CSMA/CD.

c) Write a short note on Network Address Translation (NAT).

(3+6+6)

7.

a) Compare the telephone network and the Internet. What are the similarities? What are the differences?

b) Write the features of frame-relay network. There are no sequence numbers in Frame Relay. Why?

c) What is Fiber-Optic Cable? Explain multimode propagation modes of Fiber-Optic cable.

(4+6+5)

8.

a) Name the four basic network topologies, and cite an advantage of each type. For n devices in a network, what is the number of cable links required for a mesh, ring, bus, and star topology?

b) What is Block coding? If data need to be sent at a 1-Mbps rate, what is the minimum required bandwidth, using a combination of 4B/5B and NRZ-I or Manchester coding?

c) What is framing in the data link layer? Explain Byte stuffing and unstuffing in character-oriented framing.

(4+6+5)

9.

a) How is an STS multiplexer different from an add/drop multiplexer since both can add signals together? What are the four SONET layers?

b) What is a Loop Problem in Transparent Bridge? Explain a spanning tree protocol in LAN.

c) How is an ATM virtual connection identified? Briefly describe the issues involved in using ATM technology in LANs.

(6+4+5)