B2.4-R4: DATA COMMUNICATIONS & 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 Which is not a component of data communication?
A) Message
B) Sender
C) Receiver
D) None of the above

1.2 Which is a connectionless internet transport protocol?
A) IMAP
B) IP
C) UDP
D) TCP

1.3 In which routing method do all the routers have a common database?
A) Distance vector
B) Link state
C) Dijkstra method
D) None of the above

1.4 To connect a device like TV set with a co-axial cable, _____ connector is used.
A) RS 45 connector
B) BNC connector
C) RJ 11 connector
D) None of the above

1.5 If data frames arrive at the receiver site faster than they can be processed by the receiver, then it is needed to tell the receiver to be slow down. The protocol used in this situation is:
A) Wait and watch
B) Suspend
C) Stop and wait
D) None of the above

1.6 Which of the following is a valid IPv4 address?
A) 111.56.45.78
B) 221.34.7.8.20
C) 75.45.301.14
D) None of the above

1.7 Which of the networks allows different speed links?
A) Message-switched networks
B) Packet-switched networks
C) Circuit-switched networks
D) None of the above

1.8 FDDI (Fiber Distributed Data Interface) is an example of which topology?
A) Bus Topology
B) Ring Topology
C) Star Topology
D) None of the above

1.9 Frame relay technique uses _____.
A) Circuit switching
B) Message switching
C) Connection Oriented Packet switching
D) Hybrid switching

1.10 Decryption and encryption of data are the responsibility of which of the following layer?
A) Physical layer
B) Data Link layer
C) Presentation layer
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 A digital signature uses a pair of asymmetric keys - a public key and a private key.

2.2 The term burst error means that 2 or more bits in the data unit have changed from 1 to 0 or from 0 to 1.

2.3 CSMA/CA is an access method in which collision is added in a queue of detected collisions.

2.4 Unguided media transport electromagnetic waves without using a physical conductor and also referred as wireless communication.

2.5 Repeater is a data link layer device.

2.6 The use of subnet ensures division of large network into several smaller networks.

2.7 Each IP packet must contain a source and destination address.

2.8 The Hamming distance between 001111 and 010011 is 4.

2.9 Star topology does not allow direct traffic between devices.

2.10 The TCP/IP reference model has 8 layers.

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	A network topology	**A.**	Simplex transmission
3.2	Kind of transmission used for short distance communication (such as used in remote control)	**B.**	Ring
3.3	Transfer of data with start - stop bits and a variable time interval between data units	**C.**	Parity bit
3.4	Transmission in both directions at the same time	**D.**	IPv6
3.5	Number of signal changes per second	**E.**	Infrared transmission
3.6	Minimum header size of an IP packet	**F.**	Fully Qualified Domain Name (FQDN)
3.7	It uniquely identifies a host within a DNS hierarchy	**G.**	Full duplex transmission
3.8	Adding one extra 0 whenever five consecutive 1s follow a 0	**H.**	16 bytes
3.9	No need to have an account or password to use this special FTP	**I.**	Baud rate
3.10	Next Generation Internet Protocol	**J.**	Asynchronous transmission
		K.	Anonymous FTP
		L.	20 bytes
		M.	Bit stuffing

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.	PGP	**B.**	Test	**C.**	STAR
D.	Bus	**E.**	TDMA (TDD-TDMA)	**F.**	Symmetric-Key Cryptography
G.	X.25	**H.**	Mobile adhoc network (MANET)	**I.**	Ping
J.	Jitter	**K.**	OSPF (Open Shortest Path First)	**L.**	Ring
M.	Telnet				

4.1 _____ refers to the variation in the packet arrival time.

4.2 _____ is used diagnostically to ensure that a host computer the user is trying to reach is actually operating.

4.3 _____ is a kind of half-duplex communication, where the slave and receiver send and receive data, but not at the same time, in a Bluetooth network.

4.4 A virtual-circuit switching network called _____ is used in absence of frame relay.

4.5 _____ topology is used in Ethernet.

4.6 _____ protocol is used to provide security to Emails.

4.7 _____ is a client/server application that allows a user to log on to a remote machine, giving the user access to the remote system.

4.8 In _____, the sender and receiver of a message share a single, common key that is used to encrypt and decrypt the message.

4.9 _____ protocol is a popular example of a link state routing protocol.

4.10 _____ is a continuously self-configuring, infrastructure-less network of mobile devices connected without wires.

PART TWO

(Attempt **any FOUR** questions)

5.

a) What is protocol? Write a brief note on UDP.

b) What is multiplexing? Distinguish between FDM and TDM.

c) Assume there are five channels, each with a 100-kHz bandwidth. These channels are to be multiplexed together. What is the minimum bandwidth of the link if there is a need for a guard band of 10kHz between the channels to prevent interference?

(6+6+3)

6.

a) Describe in brief the structure of OSI reference model of network and explain the basic functions supported by any two layers of your choice.

b) Change the following IPv4 addresses from dotted-decimal notation to binary notation.

i) 111.56.45.78

ii) 221.34.7.82

(11+4)

7.

a) Describe the structure of a twisted-pair cable and explain its properties. Also distinguish an unshielded twisted-pair (UTP) and shielded twisted-pair (STP).

b) Describe: (i) Fixed size framing and (ii) Variable size framing.

(10+5)

8.

a) Differentiate static routing and dynamic routing. Also describe any dynamic routing algorithm.

b) What is the main objective of cellular telephony? Write a brief note on typical cellular telephony system.

(10+5)

9.

a) Describe in brief IPSecurity (IPSec). Also explain the transport mode and tunnel mode in one line each.

b) Define cryptography. Explain the process of cryptography by discussing major components of cryptography such as plain text, cipher text, cipher, and key.

c) Distinguish HTTP and Secure HTTP.

(5+5+5)