A9-R4: DATA COMMUNICATION AND 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   Which of the following statement is NOT true with respect to Differential Phase Shift Keying (DPSK)?
A)   DPSK has the advantage of reduced receiver complexity
B)   Energy efficiency of DPSK is inferior to that of coherent PSK by about 3 dB
C)   DPSK is a general type of phase modulation that conveys data by changing the phase of the carrier wave
D)   DPSK is a coherent form of phase shift keying which needs a coherent reference signal at the receiver

1.2   Wave Division Multiplexing (WDM) is an analog multiplexing technique to combine _____ signals.
A)   Optical
B)   Audio
C)   Video
D)   Noise

1.3   _____ carriers are present in the GSM band and _____ channels are there in each carrier.
A)   124, 8
B)   128, 8
C)   256, 16
D)   128, 16

1.4   The _____ protocol family was developed by the IEEE for covering wireless networking.
A)   IEEE-802.3
B)   IEEE-802.5
C)   HiperLAN/2
D)   IEEE-802.11

1.5   Which of the following is NOT true with respect to a MANET?
A)   All the nodes in a MANET are free to move arbitrarily
B)   Power consumption is a major issue in MANETs
C)   MANETs offer less mobility as compared to Wi-Fi networks
D)   MANETs are more vulnerable to security threats than wired or Wi-Fi networks.

1.6   When the network size grows, the number of routers in the network increases. Consequently, the size of routing tables increases, as well, and routers can't handle network traffic as efficiently. _____ routing can be used to overcome this problem.
A)   Open Shortest Path First
B)   Hierarchical
C)   Distance Vector
D)   Link State

1.7   Which one of the following is a LAN protocol?
A)   HDLC
B)   PPP
C)   Frame relay
D)   Ethernet

1.8   The reason to use NAT (Network Address Translation) is
A)   Administration
B)   Security
C)   Shortage of IP addresses
D)   All of the above

1.9   Which of the following is an invalid IPv6 communication type?
A)   Unicast
B)   Multicast
C)   Broadcast
D)   Anycast

1.10   _____ permits data transfer in both directions, but the data will flow in one direction at a time. It requires only one transmission channel, but the channel must be bidirectional.
A)   Simplex
B)   Half Duplex
C)   Full Duplex
D)   All 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 In X.25, Packet layer protocol (PLP) is the routing protocol that manages the network layer and X.3 controls the transport layer.

2.2 Infrared (IR) light is part of the electromagnetic wave spectrum that borders the highest frequency/shortest wavelength among those that make up visible light.

2.3 Using several different types of control packages in CSMA/CA (Carrier Sense Multiple Access with Collision Avoidance) protocol, it is possible to detect and avoid collisions of data package transfer and this technique works decentralized, which is great for ad hoc networking environments.

2.4 Open Shortest Path First (OSPF) is a Distance Vector routing protocol.

2.5 SMTP communications are transported by UDP to ensure end-to-end transport and the format of SMTP messages is defined by RFC 823.

2.6 Coaxial cable can be run longer distances than shielded twisted pair STP and unshielded twisted pair UTP without the need for repeaters.

2.7 PGP is a program that encrypts the mail so that nobody but the intended person can read it.

2.8 At its core, SONET uses frequency-division multiplexing to move data at speeds of up to 2.488G bit/sec.

2.9 CDMA-based systems use a narrower frequency band to achieve the same rate of transmission as FDMA.

2.10 ISDN is available in two speeds: 64 Kbps and 128 Kbps, both of which are significantly slower than most DSL connections.

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	Direct-Sequence Spread Spectrum (DSSS)	**A.**	Physical layer
3.2	Self Healing network	**B.**	Address-to-name
3.3	Unused bandwidth is wasted	**C.**	TFTP
3.4	Network Repeaters	**D.**	Pseudo random noise
3.5	Reverse lookup in DNS	**E.**	Frame Relay
3.6	A method of storing and retrieving email	**F.**	Transport Layer
3.7	A protocol to transfer files	**G.**	FDDI
3.8	Asynchronous Transfer Mode (ATM)	**H.**	HTML
3.9	Producing hypertext for the Web is accomplished by creating documents with a language called	**I.**	Name-to-address
3.10	Provides reliable and sequential packet delivery through error recovery and flow control mechanisms	**J.**	POP3
		K.	Network Layer
		L.	Circuit switching
		M.	Cell Switching

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.	VSAT	B.	Aloha	C.	Distance vector
D.	IPsec	E.	DHCP	F.	CRC
G.	Packet switching	H.	45 MHz.	I.	PSK
J.	Firewall	K.	Mounting	L.	Circuit Switching
M.	Management Information Base, MIB				

4.1   The _____ protocol is an interesting example of a MAC protocol of the contention-type.

4.2   _____ is a redundancy checking technique, appends a sequence of redundant bits derived from binary division to the data unit.

4.3   Bandgap between the uplink and downlink carrier in GSM is _____.

4.4   NFS allows data to be stored on central servers and easily accessed from client devices in a client/server network configuration via a process called _____.

4.5   A _____ allows us to establish certain rules to determine what traffic should be allowed in or out of our private network.

4.6   The terms Ku-Band and C-band in _____ refer to the frequency ranges in Gigahertz (GHz) that signal transmits and receives on.

4.7   _____ is a protocol that assigns unique IP addresses to devices, then releases and renews these addresses as devices leave and re-join the network.

4.8   _____ is a communication method in which packets are routed between nodes over data links shared with other traffic.

4.9   To work with SNMP, network devices utilize a distributed data store called _____.

4.10   _____ provides two choices of security service: Authentication Header (AH), which essentially allows authentication of the sender of data, and Encapsulating Security Payload (ESP), which supports both authentication of the sender and encryption of data as well.

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

5.
a) What are the differences among router, switch, bridge and hub?
b) Decompose the signal (1+0.1cos5t)cos100t into a linear combination of sinusoidal function, and find the amplitude, frequency and phase of each component. (Hint: Use the identity for cos a cos b).
c) What are the four layers of the TCP/IP model?
d) What three packets are exchanged between two hosts when establishing a TCP connection?
e) What is the purpose of the Internet layer in the TCP/IP protocol suite?

(4+3+2+3+3)

6.
a) What is Fast Ethernet (100BaseT)? How is it different from standard Ethernet (10BaseT) and Gigabit Ethernet (1000BaseT)? Write salient features of Gigabit Ethernet.
b) How distance vector routing is different than link state routing? A network with four routers A, B, C, D uses Distance Vector Routing. The distance table for the router A is < 0 1 4 100>. Router A receives from B the vector < 1 0 1 1 >. Show the updated distance table for router A.
c) How many network and host bits are in a class A, B and C IP network addresses? An organization need to connect 350 computers in a network. Show how these computers can be connected. What will happen with respect to IP addresses if organization decides to use:
   i) a class B network
   ii) two class C networks in superetting.
d) Identify the port numbers for the following applications, any four:
   i) Telnet
   ii) HTTP (Hypertext Transfer Protocol)
   iii) FTP (File Transfer Protocol)
   iv) DNS (Domain Name Server)
   v) DHCP (Dynamic Host Control Protocol)

(5+3+5+2)

7.
a) What is DNS? DNS uses which protocol? Why?
b) What is meant by client server architecture? Differentiate between two tier and three tier client/server architectures. List out the characteristics of client server computing.
c) Differentiate between flow control and congestion control?
d) List three functions of monitor in a token ring network which make the token ring robust.

(5+5+2+3)

8.
a) What are Public Keys and Private Keys?
b) Discuss the operation of Mobile IP.
c) How S-HTTP (Secure HTTP) is different from the Hypertext Transfer Protocol (HTTP).
d) What is Asynchronous Transfer Mode (ATM)? 'ATM technology can transport all kinds of transmissions (e.g, data, voice, video, etc.) in a single integrated data stream over any medium'. Justify the statement.

(4+3+3+5)

9. Write Short notes on **any three** of the following:
a) HDLC
b) Continuous time and discrete-time sinusoidal signals
c) CSMA/CA and CSMA/CD
d) Cellular Radio

(5+5+5)