A9-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 What is the potential number of IP address available?
A) 65,536
B) 16,777,216
C) 4,294,967,296
D) Limitless

1.2 According to the Nyquist Rule, the sampling rate of sound is roughly:
A) Half of what humans can hear
B) The same as what humans can hear
C) Twice what humans can hear
D) Three times what humans can hear

1.3 The principle characteristics of connectionless service are
A) No handshaking
B) No guarantees of reliable data transfer
C) No flow control or congestion
D) All of the above

1.4 The accuracy of a digitized sound is determined by:
A) The sampling rate
B) The bit rate
C) The size of the digitized file
D) All of the above

1.5 In HDLC, a supervisory frame
A) Is used to acknowledge messages
B) Does not have sequence numbers
C) Holds poll or final bits
D) Is used to hold data

1.6 A PC based network is to be cabled. The requirements are for a token ring LAN (Local Area Network). The correct type of cable media to use is

A) Twisted pair
B) Microwave
C) Fiber optic
D) Co axial cable

1.7 Sharing time on a communications circuit among many devices is known as

A) Time-division multiplexing
B) Frequency-division multiplexing
C) Amplitude modulation
D) Phase modulation

1.8 Analog information is:

A) Continuous
B) Random
C) Digital
D) Discrete

1.9 The X.25 standard uses which protocol at the Frame Level?

A) V.24
B) LAP-B
C) X.3
D) None of the above

1.10 Which of the following is a widely used Data Link Layer protocol, often used to access the Internet, supports link error detection and multiple protocols?

A) PPP
B) HDLC
C) IP
D) SLIP

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 A LAN sniffer is similar in function to a breakout box.

2.2 The central management device in SNMP is known as the manager, and the devices being managed contain agents.

2.3 FTP use port number 80.

2.4 The nominal voice channel has a bandwidth of 300Hz to 3.4KHz.

2.5 A NAT proxy server uses an address table to translate private data link layer addresses used inside the organization into proxy data link layer addresses used on the Internet.

2.6 The data link layer accepts messages (in packet form) from the network layer.

2.7 Token passing is a term that refers to hub polling, in which one computer starts a poll and passes it to the next computer on a multipoint circuit.

2.8 A symmetric algorithm uses a different key to encrypt and decrypt a particular bit stream.

2.9 In serial data transmission, the most significant bit is transmitted first.

2.10 Baud rate is expressed as the number of line changes per second.

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	It examines the source and destination address of every network packet that passes through it.	**A.**	Mesh network
3.2	Wireless communication	**B.**	ETX
3.3	Web	**C.**	Dual ring
3.4	A network where every user is physically connected to every other user is	**D.**	SMTP
3.5	Computes the least-cost path between source and destination using complete, global knowledge about the network	**E.**	Star network
3.6	TCP	**F.**	HTTP
3.7	A binary synchronous character meaning the end-of-text	**G.**	Packet level firewall
3.8	FDDI	**H.**	Application level firewall
3.9	E-mail	**I.**	Link state algorithms
3.10	Binary orientated protocol	**J.**	BSE
		K.	Bi-Sync
		L.	IEEE 802.11
		M.	Distance-vector routing
		N.	IEEE 802.3
		O.	Sliding window protocol

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.	Bandwidth	**B.**	7	**C.**	Transmission
D.	Secure	**E.**	FDM	**F.**	Proxy
G.	TDM	**H.**	128 Kbps	**I.**	56 Kbps
J.	Circuit-switched	**K.**	Denial-of-service attack	**L.**	Virtual circuit
M.	Spamming	**N.**	Modulating	**O.**	Filter
P.	64 Kbps	**Q.**	Packet-switched	**R.**	8

4.1 The capacity in bits per second of an ISDN B channel _____.

4.2 Data communications term which describes the range of frequencies which a data channel will allow to pass is _____.

4.3 _____ number of bits is used by the American National Standards Institute Code for Information Interchange (ASCII) to represent the entire range of symbols it supports.

4.4 A _____ is a situation in which a hacker attempts to disrupt the network by sending messages to the network that prevent normal users' messages from being processed.

4.5 A _____ network can guarantee a certain amount of end-to-end bandwidth for the duration of a call.

4.6 In _____ circuit switching, each host gets the same slot in a revolving TDM frame.

4.7 Dial up modems in bits per second can work up to _____.

4.8 ATM uses the _____ approach.

4.9 ASK, FSK and PSK are _____ techniques.

4.10 For Ethernet networks, a _____ hub can make eavesdropping more difficult.

PART TWO

(Answer any **FOUR** questions)

5.

a) State some major differences between the PSTN and the ISDN.

b) Explain the following terms with respect to ATM technology:
Virtual Path, virtual connection, UNI, SVC and Octet

c) Discuss in brief about X.25 technology.

(5+5+5)

6.

a) How does a router determine whether datagram to a particular host can be directly delivered through one of its interfaces?

b) What are the main differences between a distance vector routing protocol and a link state routing protocol? Give examples for each type of protocol.

c) What is the difference between an Ethernet switch and an Ethernet hub? Which is more suitable for a network with a high traffic load, a switch or a hub? Explain.

(5+5+5)

7.

a) HTTP and FTP are both standard ways of sending/receiving files through a network. How do they compare with respect to privacy? How do they compare with respect to convenience?

b) How many TCP connections are used by FTP?

c) Suppose Alice wants to send an email message to Bob. Explain the sequence of events (with the name of protocols) that will take place in order to do so.

d) Which systems generate ICMP route redirect messages – routers, hosts, or both?

e) Compare TDM and FDM.

(3+3+3+3+3)

8.

a) Describe the following terms that are used in the Domain Name System.

- Top-level domain
- CNAME (canonical name)
- Resolver

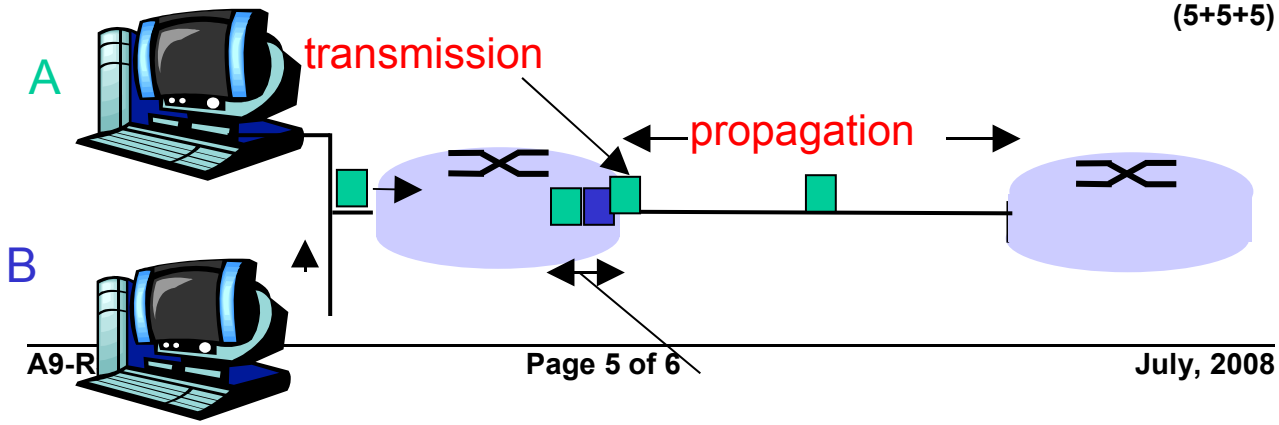
b) What is a firewall? What are its limitations?

c) In the packet switched network shown below in the figure the Packets experience delay on end-to-end path. There are four sources of delay at each hop namely:

- nodal processing
- queuing
- Transmission delay
- Propagation delay

Explain all these delays and why they occur.

(5+5+5)




nodal
processing
queueing

9.

a) Explain the difference with diagram between pure ALOHA and slotted ALOHA.

b) FSK is a good choice for low speed modems. Explain, it is not suitable for high speed modems?

c) A system can supports a data rate of 100 Kbps. How many users can it multiplex, if each user is a 3KHz bandwidth signal, sampled at the Nyquist rate and using 7 bit-digitization coding?

(5+5+5)