A9-R4: DATA COMMUNICATION AND NETWORKS 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 **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. (1x10)

1.1 In TCP/IP, Packets may arrive out of sequence (they may have been routed differently, or one may have been dropped), so the _____ in each packets allow TCP to reassemble the packets in the correct order and to request retransmission of any missing packets

A) Sequence numbers
B) Port numbers
C) Source_id number
D) Reassembling of the packets in the correct order is not permitted

1.2 UDP is a fast, unreliable protocol and unreliable means there is

A) No sequencing
B) No guaranteed delivery
C) No automatic retransmission of lost packets
D) All of the above

1.3 Two conductors separated by insulation such as TV 75 ohm cable refers to

A) Thinnet cable
B) Thicknet cable
C) Coaxial cable
D) Fiber optic cable

1.4 _____ is a client-server protocol used to monitor and manage networks remotely

A) SMTP
B) SNMP
C) TFTP
D) NFS

1.5 GSM uses following Control channel
A) Broadcast Control Channel
B) Dedicated Control Channel
C) Common Control Channel
D) All the above

1.6 Present Cellular networks employ the following multiple access schemes namely
A) FDMA, TDMA and CDMA
B) TDMA and CDMA
C) FDMA and TDMA
D) FDMA and CDMA

1.7 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

1.8 _____ is the protocol used in Ethernet networks to ensure that only one network node is transmitting on the network wire at any one time.
A) CSMA
B) CSMA/CD
C) CSMA/CA
D) IEEE 802.3

1.9 QPSK
A) can be used to double the data rate compared with a BPSK system while maintaining the same bandwidth of the signal
B) can be used to Quadruple the data rate compared with a BPSK system while maintaining the same bandwidth of the signal
C) can be used to double the data rate compared with a BPSK system while halving the bandwidth needed
D) can be used to Quadruple the data rate compared with a BPSK system while doubling the bandwidth needed

1.10 Dynamic Host Configuration Protocol (DHCP) is a network protocol that
A) automatically assign an IP address to a computer from a defined range of numbers
B) manually configures a computer to use a specific IP address
C) is used to translate protocol addresses to hardware interface addresses
D) is used to translate hardware interface addresses to protocol addresses

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. (1x10)

2.1 Routers can transform information from one data format such as TCP/IP to another such as IPX/SPX.
2.2 Collisions cannot occur in Token Ring networks.
2.3 Each virtual circuit in an ATM network gets affected by traffic on other virtual circuits.
2.4 3G offers data rates of more than 144 Kbit/s, thereby opening the door to multimedia uses such as video transmission, video-conferencing or high-speed internet access.
2.5 NFS is a system to share directories and files with others over a network.
2.6 In VOIP Analog voice data is encoded as digital data and the resulting voice data is inserted into IP datagrams.
2.7 The twisting of the individual pairs in twisted pair increases electromagnetic interference.
2.8 FDDI is a ring based network.
2.9 Optical fiber consists of a column of glass or plastic surrounded by an opaque outer jacket.
2.10 HDLC, a point to point protocol, could be used as a data link layer protocol on a LAN.

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. (1x10)

	X	Y	
3.1	_____ refers to the technique of digitalizing an analog signal by sampling the magnitude of the signal at uniform intervals and converting it into a series of digital or binary code	**A.**	Packet Switching
3.2	The open shortest path first (OSPF) protocol	**B.**	IPSec
3.3	Small packet size and a simple header structure	**C.**	259 Mbps
3.4	IP network-layer encryption.	**D.**	Gets and Puts
3.5	The OC-5 data rate.	**E.**	PCM
3.6	The most commonly used telecom standard in Europe that uses the 900 MHz and 1800 MHz frequency bands.	**F.**	One 64Kbps B-channels with two 16Kbps D channel
3.7	Basic Rate ISDN (BRI)	**G.**	link state routing method
3.8	Unused frequency spaces between channels, known as.	**H.**	Circuit Switching
3.9	SNMP	**I.**	56 Kbps
3.10	X.25 network	**J.**	GSM (Global System for Mobile communications)
		K	Guard bands
		L.	Two 64Kbps B-channels with one 16Kbps D channel
		M.	ATM

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. (1x10)

A.	Firewall	**B.**	Virtual Local Area Networks (VLANs)	**C.**	CDMA (Code Division Multiple Access)
D.	MAC	**E.**	Synchronous	**F.**	Cyclic Redundancy Check
G.	Router	**H.**	TCP	**I.**	IP
J.	FSK	**K.**	Two-pair (four-wire)	**L.**	Synchronous
M.	UDP				

4.1 A _____ is a method of detecting errors in a block of data by performing a math calculation on a stream of data.

4.2 _____ implements an access control policy.

4.3 _____ logically segment the physical LAN infrastructure into different subnets.

4.4 _____ uses a spread spectrum technique that allows a radio signal to be broadcast over a large frequency range.

4.5 The _____ address is a 48-bit address expressed as 12 hexadecimal digits.

4.6 Actions that are measured against a time reference, or a clock signal, are referred to as _____ actions.

4.7 SONET/SDH are point-to-point blank networks _____.

4.8 A _____ interconnect two or more physically and logically separate network segments.

4.9 _____ is a technique that can be considered as a frequency modulated binary PCM.

4.10 The protocol used by DNS is _____.

PART TWO

(Answer any **FOUR** questions)

5.

a) What is digital Modulation? How is it different from Analog Modulation? Briefly differentiate between ASK, FSK, PSK. In PSK clearly distinguish between BPSK and QPSK.

b) What is A virtual circuit? How is it different from a circuit in a circuit switched network Name some network technologies that implement virtual circuits?

c) What are the differences between multiplexing and multiple access techniques? Discuss three access techniques namely FDMA, TDMA and CDMA?

(5+5+5)

6.

a) Draw a Schematic diagram for fiber-optic communication system clearly showing transmitter, receiver and signal repeaters *(**hint:** include a detector, amplifier, and a signal regenerator).* Then explain the function of each component in detail. What are the reasons by which fiber degrades the signal which type of modulation technique is used by Fiber-optic telecommunication systems?

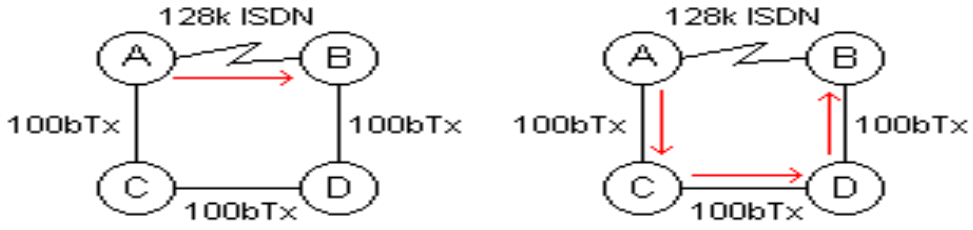
b) Explain HDLC protocol. On which layer does it work and explain how it reduces the chance of errors.

c) What do you understand by terms physical topology and logical topology. Explain three most popular LAN topologies namely Bus, Ring and Star. Discuss the merits and demerits of each of these topologies.

(4+5+6)

7.

a) Explain Distance Vector and Link State routing protocols. See the Figure given below. If all routers were running a Distance Vector protocol, explain why the path or 'route' chosen would be from A to B directly over the ISDN serial link, even though that link is about 10 times slower than the indirect route from A C D B.
Also explain why a Link State protocol would choose the A C D B path? Which routing protocol would be better to run in this example and why?



b) Differentiate between:
- FTP and TFTP
- SMTP and HTTP

c) Why Ad Hoc Networks are needed? What are Mobile Ad Hoc Networks (MANET)?

(5+6+4)

8.

a) Give an overview of SSL/TLS protocol. What is the difference between an http and an https connection when used for transferring data?

b) What is ALOHA? Discuss how Slotted ALOHA is different from Pure ALOHA.

c) Give the brief history of Ethernet. What is Carrier Sense Multiple Access with Collision Detection (CSMA/CD) that Ethernet uses? Discuss IEEE 802.3 frame format explaining each field.

(4+3+8)

9. Write Short notes on any **three** of the followings:

a) Digital Subscriber Line (DSL)

b) Transmission Control Protocol/Internet Protocol (TCP/IP) Suite

c) Very Small Aperture Terminal (VSAT)

d) Internet Protocol version 6 (IPv6)

e) Network Address Translation *(*NAT*)*

(3x5)