

## 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 **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 Quadrature Phase Shift Keying (QPSK) modulation
    - A) a cosine carrier is varied in phase while keeping a constant amplitude and frequency
    - B) a sine carrier is varied in phase while keeping a constant amplitude and frequency
    - C) a cosine carrier is varied in amplitude while keeping a constant phase and frequency
    - D) a sine carrier is varied in amplitude while keeping a constant phase and frequency
  - 1.2 Frequency Hopping Spread Spectrum (FHSS) is a
    - A) Spread spectrum RF technology for 4.8 GHz
    - B) Spread spectrum RF technology for 2.4 GHz
    - C) Spread spectrum RF technology for 4.8 KHz
    - D) Spread spectrum RF technology for 2.4 KHz
  - 1.3 Which layer is responsible for flow control with sliding windows and reliability with sequence numbers and acknowledgments?
    - A) Transport
    - B) Application
    - C) Internet
    - D) Network Interface
  - 1.4 IPv6 uses \_\_\_\_\_ bit address, whereas IPv4 uses \_\_\_\_\_ bit address
    - A) 128, 32
    - B) 64, 32
    - C) 128, 64
    - D) 256, 128
  - 1.5 Leased line and ISDN are two types of commonly used
    - A) LAN links
    - B) Radio Links
    - C) WAN links
    - D) Satellite Links

- 1.6 The GSM is a
- A) Packet-switched system that divides each 200kHz channel into eight 25kHz frequency-slots.
  - B) Circuit-switched system that divides each 250kHz channel into eight 25kHz time-slots.
  - C) Circuit-switched system that divides each 200kHz channel into ten 20kHz time-slots.
  - D) Circuit-switched system that divides each 200kHz channel into eight 25kHz time-slots.
- 1.7 ATM Technology uses the following features
- A) Fixed-size cells
  - B) Connection-oriented service
  - C) Asynchronous multiplexing
  - D) All of the above
- 1.8 When a network layer firewall is used, access to and from a whole network is controlled by means of a
- A) Switch operating at a data link layer
  - B) Router operating at a network layer
  - C) Hub operating at a network layer
  - D) Switch operating at a network layer
- 1.9 What is the range of addresses in the class C of internet addresses?
- A) 192.0.0.0 - 223.255.255.255
  - B) 240.0.0.0 - 247.255.255.255
  - C) 128.0.0.0 - 191.255.255.255
  - D) 224.0.0.0 - 239.255.255.255
- 1.10 A hypertext link is a
- A) Special tag that links one page to another page or resource
  - B) Special frame that links one page to another page or resource
  - C) Special header that links one page to another page or resource
  - D) Special frameset that links one page to another page or resource

2. Each statement below is either TRUE or FALSE. Choose the most appropriate one and ENTER in the 'tear-off' answer sheet attached to the question paper, following the instructions therein. (1x10)

- 2.1 CDMA uses unique spreading codes to spread the baseband data before transmission
- 2.2 Ipv4 address consists of three parts, The country number(ID), the network number(ID) and host number(ID).
- 2.3 Bandwidth is defined as the maximum number of bits that can flow through a network connection in a given period of time.
- 2.4 Telnet can be used to connect to virtually any machine irrespective of the fact that the machine listens on ports or not.
- 2.5 The term Very Small Aperture Terminal (VSAT) refers to a small fixed earth station that has the capability to receive as well as transmit signals via the satellite to other VSATs in the network
- 2.6 Routing occurs at the Transport layer of the OSI model.
- 2.7 In both UDP and TCP, check summing is optional.
- 2.8 When the booting computer sends the unicast ARP request, it places its own hardware address in both the sending and receiving fields in the encapsulated ARP data packet.
- 2.9 The standard connector for unshielded twisted pair cabling is an RJ-45 connector.
- 2.10 Internet Control Message Protocol (ICMP) is used for network error reporting and generating messages that require attention

3. Match words/phrases in column X with the closest related meaning/word(s)/phrases in column Y. ENTER in your selection the 'tear-off' answer sheet attached to the question paper, following the instructions therein. (1x10)

X		Y	
3.1	Hourglass model	A.	Multicast
3.2	Reservation ALOHA, or R-ALOHA	B.	NFS (Network File System)
3.3	_____ refers to the specifications for fiber optic cable carrying Ethernet signals.	C.	10Base2
3.4	The transmission of a packet to multiple destinations in a single send operation	D.	ISO Open Systems Interconnection
3.5	Dynamic Routing	E.	B, D Channels
3.6	_____ is a feature that allows systems on an internal network to use private IP addresses (such as those in the 192.168.0.0 range) to connect to the Internet using only one "real" IP address.	F.	channel access method for wireless transmission
3.7	_____ is an industry standard means of being able to share entire file systems among machines within a computer network.	G.	IEEE 802.3 Technology
3.8	Transmission Control Protocol (TCP)	H.	BGP
3.9	_____ standard defines Ethernet at the physical and data link layers of the OSI network model	I.	Network layer
3.10	Token Ring	J.	IBM
		K.	Reliable connection oriented service
		L.	NAT (Network Address Translation)
		M.	10BaseF

4. Each statement below has a blank space to fit one of the word(s) or phrases in the list below. Choose the most appropriate one and ENTER in the 'tear-off' answer sheet attached to the question paper, following the instructions therein. (1x10)

<b>A.</b>	DSSS	<b>B.</b>	DHCP	<b>C.</b>	DNS
<b>D.</b>	Core	<b>E.</b>	Cellular Radio	<b>F.</b>	Wavelength-Division Multiplexing (WDM)
<b>G.</b>	CSMA/CA	<b>H.</b>	TCP	<b>I.</b>	HTTP
<b>J.</b>	LAN	<b>K.</b>	Plastic	<b>L.</b>	Secure Socket Layers (SSL)
<b>M.</b>	X.25				

- 4.1 The \_\_\_\_\_ protocol, manages access to the wireless medium, to avoid messages getting lost due to frame collisions.
- 4.2 Fiber optic cables carry data signal in the form of light. The signal is propagated through \_\_\_\_\_ by reflection.
- 4.3 \_\_\_\_\_ allows a host to obtain an IP address dynamically (or automatically) from servers.
- 4.4 A secure Web Server uses the \_\_\_\_\_ technology to establish an encrypted connection between the Web Server and the client.
- 4.5 Radio communication based on a network of transmitters each serving a small area known as a cell is called as \_\_\_\_\_.
- 4.6 \_\_\_\_\_ is a technology which multiplexes a number of optical carrier signals onto a single optical fiber by using different wavelengths.
- 4.7 A popular standard for packet-switching networks is \_\_\_\_\_.
- 4.8 The reliable transport protocol that is connection oriented is called \_\_\_\_\_.
- 4.9 \_\_\_\_\_ avoids excessive power concentration by spreading the signal over a wider frequency band.
- 4.10 Internet system to translate names into IP addresses is known as \_\_\_\_\_.

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

- 5.**
- a) Explain the difference between
    - i) Static versus Dynamic IP Addressing
    - ii) Guided versus unguided media
    - iii) UDP versus TCP
  - b) What is Amplitude Shift Keying (ASK)? What are its merits and demerits? Why ASK modulation is not being used in wireless systems?
  - c) What are the primary responsibilities of the physical layer? Mention some of the network devices that are used in this layer.
- (5+5+5)**
- 6.**
- a) How does TCP handle the flow control problem? Explain it with the help of a diagram showing the status of sliding window at the different stages?
  - b) Compute the CRC-4 character for the 1100 0110 1011 01 message using a divisor constant of 10011.
  - c) Explain why a message is broken into packets by TCP/IP prior to transmission.
- (5+5+5)**
- 7.**
- a) What is the role of OSPF routing protocol? Explain with the help of an example the algorithm used under OSPF.
  - b) Can a computer have 2 DNS names that fall in different top-level domains? If so, give an example. If not, explain why not.
  - c) What do you understand by MIME?
- (5+5+5)**
- 8.**
- a) What is VPN (Virtual Private Network)? What is the relationship between VPN and firewalls?
  - b) Give main difference between encryption and digital signature.
  - c) "Distance vector protocols do not distribute any topology information; they simply advertise the next hop to a route, along with a cost." Discuss the statement.
- (5+5+5)**
- 9.** Write short notes on **any five**:
- a) Shared and private SSL
  - b) ATM Technology and Ethernet Technology
  - c) Some topologies for networks
  - d) Network Policies
  - e) Synchronous and asynchronous transmission
  - f) Circuit switching and packet switching
- (5x3)**