

## B2.4-R4: DATA COMMUNICATION & NETWORK TECHNOLOGIES

अवधि: 03 घंटे  
DURATION: 03 Hours

अधिकतम अंक: 100  
MAXIMUM MARKS: 100

ओएमआर शीट सं.:					
OMR Sheet No.:					

रोल नं.:					
Roll No.:					

उत्तर-पुस्तिका सं.:					
Answer Sheet No.:					

परीक्षार्थी का नाम: \_\_\_\_\_; परीक्षार्थी के हस्ताक्षर: \_\_\_\_\_  
Name of Candidate: \_\_\_\_\_; Signature of candidate: \_\_\_\_\_

### परीक्षार्थियों के लिए निर्देश:

### Instructions for Candidate:

कृपया प्रश्न-पुस्तिका, ओएमआर शीट एवं उत्तर-पुस्तिका में दिये गए निर्देशों को ध्यान पूर्वक पढ़ें।	Carefully read the instructions given on Question Paper, OMR Sheet and Answer Sheet.
प्रश्न-पुस्तिका की भाषा अंग्रेजी है। परीक्षार्थी केवल अंग्रेजी भाषा में ही उत्तर कर सकता है।	Question Paper is in English language. Candidate can answer in English language only.
इस मॉड्यूल/पेपर के दो भाग हैं। भाग एक में चार प्रश्न और भाग दो में पाँच प्रश्न हैं।	There are <b>TWO PARTS</b> in this Module/Paper. <b>PART ONE</b> contains <b>FOUR</b> questions and <b>PART TWO</b> contains <b>FIVE</b> questions.
भाग एक "वैकल्पिक" प्रकार का है जिसके कुल अंक 40 हैं तथा भाग दो, "व्यक्तिपरक" प्रकार है और इसके कुल अंक 60 हैं।	<b>PART ONE</b> is Objective type and carries 40 Marks. <b>PART TWO</b> is subjective type and carries 60 Marks.
भाग एक के उत्तर, इस प्रश्न-पत्र के साथ दी गई ओएमआर उत्तर-पुस्तिका पर, उसमें दिये गए अनुदेशों के अनुसार ही दिये जाने हैं। भाग दो की उत्तर-पुस्तिका में भाग एक के उत्तर नहीं दिये जाने चाहिए।	<b>PART ONE</b> is to be answered in the <b>OMR ANSWER SHEET</b> only, supplied with the question paper, as per the instructions contained therein. <b>PART ONE</b> is <b>NOT</b> to be answered in the answer book for <b>PART TWO</b> .
भाग एक के लिए अधिकतम समय सीमा एक घण्टा निर्धारित की गई है। भाग दो की उत्तर-पुस्तिका, भाग एक की उत्तर-पुस्तिका जमा कराने के पश्चात दी जाएगी। तथापि, निर्धारित एक घंटे से पहले भाग एक पूरा करने वाले परीक्षार्थी भाग एक की उत्तर-पुस्तिका निरीक्षक को सौंपने के तुरंत बाद, भाग दो की उत्तर-पुस्तिका ले सकते हैं।	Maximum time allotted for <b>PART ONE</b> is <b>ONE HOUR</b> . Answer book for <b>PART TWO</b> will be supplied at the table when the answer sheet for <b>PART ONE</b> is returned. However, candidates who complete <b>PART ONE</b> earlier than one hour, can collect the answer book for <b>PART TWO</b> immediately after handing over the answer sheet for <b>PART ONE</b> .
परीक्षार्थी, उपस्थिति-पत्रिका पर हस्ताक्षर किए बिना अथवा अपनी उत्तर-पुस्तिका, निरीक्षक को सौंपे बिना, परीक्षा हॉल नहीं छोड़ सकता है। ऐसा नहीं करने पर, परीक्षार्थी को इस मॉड्यूल/पेपर में अयोग्य घोषित कर दिया जाएगा।	Candidate cannot leave the examination hall/room without signing on the attendance sheet or handing over his Answer sheet to the invigilator. Failing in doing so, will amount to disqualification of Candidate in this Module/Paper.
प्रश्न-पुस्तिका को खोलने के निर्देश मिलने के पश्चात एवं उत्तर देने से पहले उम्मीदवार यह जाँच कर यह सुनिश्चित कर ले कि प्रश्न-पुस्तिका प्रत्येक दृष्टि से संपूर्ण है।	After receiving the instruction to open the booklet and before answering the questions, the candidate should ensure that the Question booklet is complete in all respect.
<b>नोट: यदि हिन्दी संस्करण में कोई त्रुटि / विसंगति पाई जाती है, तो उस अवस्था में अंग्रेजी संस्करण ही मान्य होगा।</b> <b>Note: In case of any discrepancy found in Hindi language, English version will be treated as final.</b>	

जब तक आपसे कहा न जाए तब तक प्रश्न-पुस्तिका न खोलें।

**DO NOT OPEN THE QUESTION BOOKLET UNTIL YOU ARE TOLD TO DO SO.**

**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 The \_\_\_\_\_ protocol family was developed by the IEEE for covering wireless networking.
- A) IEEE-802.3
  - B) IEEE-802.5
  - C) Hiper LAN/2
  - D) IEEE-802.11
- 1.2 \_\_\_\_\_ permits data transfer in both direction, 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
- 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 Sliding window is a technique for \_\_\_\_\_.
- A) line discipline
  - B) error control
  - C) flow contrnrmol
  - D) session management
- 1.5 The data link layer takes the packets from \_\_\_\_\_ ad encapsulates them into frames for transmission.
- A) network layer
  - B) physical layer
  - C) transport layer
  - D) application layer
- 1.6 CRC stands for
- A) cyclic redundancy check
  - B) code repeat check
  - C) code redundancy check
  - D) cyclic repeat check
- 1.7 Which of the following signal can be used for short-range communication in a closed area using line-of-sight propagation?
- A) Infrared
  - B) Bluetooth
  - C) Radio
  - D) Microwave

- 1.8 The technique of temporarily delaying outgoing acknowledgements so that they can be hooked onto the next outgoing data frame is called
- A) piggybacking
  - B) cycle redundancy check
  - C) flether's checksum
  - D) none of the above
- 1.9 Frame relay technique uses \_\_\_\_\_.
- A) Circuit switching
  - B) Message switching
  - C) 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 your choice in the "OMR" answer sheet supplied with the question paper, following instructions therein. (1x10)**
- 2.1 The highest capacity wireless media is satellite microwave.
- 2.2 It is the network layer's responsibility to forward packets reliably from the source to the destination.
- 2.3 A router decides on a route for an IP packet based on its source and destination address.
- 2.4 HTML is a protocol to describe web content.
- 2.5 RSA is a public key cryptographic algorithm. In case one loses the private key, it is possible to reconstruct it from the public key.
- 2.6 Trojan house is a program that performs not only a desired task but also includes unexpected malicious functions.
- 2.7 The standard protocol of the Internet is Ethernet.
- 2.8 Media Access Control is a function of the data-link layer.
- 2.9 Sequence numbers are necessary to tolerate losses, but are not needed to tolerate bit errors alone.
- 2.10 Every router implements the transport layer.

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	programs written for destructive purposes	A.	Spoofing
3.2	device on each connected computer that enables it to communicate with the network.	B.	Bus
3.3	A disadvantage of a _____ topology is that the loss of the hub, switch, or central computer can bring down the entire network.	C.	DES
3.4	How many bits long is an IP address in Internet Protocol version 4 (IPv4)?	D.	128
3.5	Which wireless transmission uses short-range radio transmission technology?	E.	36,000 kilometers
3.6	The public-switched telephone network (PSTN) uses which switching.	F.	Network Interface Card (NIC)
3.7	A way to prevent unauthorized access by disguising information through algorithms is	G.	Circuit
3.8	To fool the target computer into believing that messages from the intruder's computer are actually coming from an authorized user inside the organizations's network	H.	Computer viruses
3.9	Geo-synchronous satellite	I.	IPv6
3.10	Secret key encryption algorithm	J.	Bluetooth
		K.	Star
		L.	Encryption
		M.	32

4. Each statement below has a blank space to fit one of the word(s) or phrase(s) in the list below. Choose the most appropriate option, enter your choice in the “OMR” answer sheet supplied with the question paper, following instructions therein. (1x10)

A.	Protocols	B.	Copper twisted pair	C.	Ethernet
D.	Token passing	E.	Topology	F.	HUB
G.	36, 18	H.	Binary exponential back off	I.	Stripping
J.	Jitter	K.	18, 36	L.	Ring
M.	Modem				

- 4.1 \_\_\_\_\_ is the geometric arrangement of computer systems in a network.
- 4.2 A device which is used as connection points between the various nodes are generally referred as \_\_\_\_\_.
- 4.3 The \_\_\_\_\_ performs Modulation and DEModulation of transmitted data.
- 4.4 For most of the time, the connection between the subscriber and their telephone exchange was \_\_\_\_\_ buried.
- 4.5 \_\_\_\_\_ are the definitions of common sets of rules and signals that specify how computers on a network communicate.
- 4.6 \_\_\_\_\_ and token ring are examples of network cabling standards.
- 4.7 In \_\_\_\_\_ technique, each node gets a chance to access the medium by rotation.
- 4.8 In slotted ALOHA, a maximum throughput of \_\_\_\_\_ percent at 100 percent of offered load can be achieved, while it is \_\_\_\_\_ percentage of pure ALOHA.
- 4.9 To achieve stability in CSMA/CD back off scheme, a technique known as \_\_\_\_\_.
- 4.10 When the frame returns to the sending station, that station removes the frame from the ring by a process called \_\_\_\_\_.

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

- 5.
- a) Explain the design issues for the layers.
  - b) What is the difference between Virtual circuit and Datagram subnet?
  - c) A system has n-layer protocol hierarchy. Applications generate messages of length M bytes. At each of the layers, an h-byte header is added. What fraction of the network bandwidth is filled with headers?

**(5+5+5)**

- 6.
- a) Draw the waveforms for the data 101011100 using the following line coding methods and define them. Unipolar NRZ, NRZ-L, NRZ-I and polar RZ.
  - b) What are the types of transmission modes in digital transmission?
  - c) Explain transmission impairment in detail.

**(5+5+5)**

- 7.
- a) Draw IP Protocol header format and briefly explain all the fields in it.
  - b) Assume that  $SNR_{db} = 36$  and the channel bandwidth is 2 MHz. What is the capacity of the channel?

**(10+5)**

- 8.
- a) Explain the Link state routing.
  - b) A large number of consecutive IP address are starting at 198.16.0.0. Suppose that four organizations A, B, C & D request 4000, 2000, 4000 & 8000 addresses respectively and in that order. For each of these, give the first IP address assigned, the last IP address assigned and the mask in the w.x.y.z/s notation.
  - c) Both TCP and UDP use port numbers to identify the destination entity when delivering a message. Give two reasons for why these protocols invented a port numbers, instead of using process ID's which already existed when these protocols were designed.

**(8+4+3)**

- 9.
- a) What is frequency reuse in cellular systems?
  - b) A certain city has an area of 1300 square miles and is covered by a cellular system using a seven cell reuse pattern. Each cell has a radius of 4 miles and the city has 40 MHz spectrum with full duplex channel bandwidth of 60 KHz. Find:
    - i) The number of cells in the service area.
    - ii) The number of channels per cell.
    - iii) Total number of subscribers that can be served.
  - c) What is the structure?

**(5+3+7)**

