

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

अवधि : 03 घंटे

DURATION : 03 Hours

अधिकतम अंक : 100

MAXIMUM MARKS : 100

ओएमआर शीट सं. :  
OMR Sheet No. :

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रोल नं. :

Roll No. :

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उत्तर-पुस्तिका सं. :

Answer Sheet No. :

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परीक्षार्थी का नाम :

Name of Candidate :

परीक्षार्थी के हस्ताक्षर :

Signature of Candidate :

परीक्षार्थियों के लिए निर्देश :	Instructions for Candidates :
कृपया प्रश्न-पुस्तिका, ओएमआर शीट एवं उत्तर-पुस्तिका में दिये गए निर्देशों को ध्यानपूर्वक पढ़ें।	Carefully read the instructions given on Question Paper, OMR Sheet and Answer Sheet.
प्रश्न-पुस्तिका अंग्रेजी भाषा में है। परीक्षार्थी उत्तर लिखने के लिए केवल अंग्रेजी भाषा का ही प्रयोग कर सकते हैं।	Question Paper is in English language. Candidate has to 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 TWO PARTS in this Module/Paper. PART ONE contains FOUR questions and PART TWO contains FIVE questions.
भाग एक "वैकल्पिक" प्रकार का है जिसके कुल अंक 40 हैं तथा भाग दो "व्यक्तिपरक" प्रकार का है और इसके कुल अंक 60 हैं।	PART ONE is Objective type and carries 40 Marks. PART TWO 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।	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 for PART TWO.
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 पश्चात् 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 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 to the Invigilator.
परीक्षार्थी, उपस्थिति-पत्रिका पर हस्ताक्षर किए बिना और अपनी उत्तर-पुस्तिका, निरीक्षक को सौंपे बिना, परीक्षा हॉल/कमरा नहीं छोड़ सकते हैं। 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 and handing over his/her 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 पश्चात् एवं उत्तर लिखना आरम्भ करने से पहले उम्मीदवार यह जाँच कर सुनिश्चित कर लें कि प्रश्न-पुस्तिका प्रत्येक दृष्टि से संपूर्ण है।	After receiving the instruction to open the booklet and before starting to answer the questions, the candidate should ensure that the Question Booklet is complete in all respect.

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 Questions; each question carries ONE marks)**

**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** Modulation is the process of :

- (A) sending a file from one computer to another computer
- (B) converting digital signals to analog signals
- (C) converting analog signals to digital signals
- (D) echoing every character that is received

**1.2** The protocol data unit (PDU) for the application layer in the Internet stack is :

- (A) Segment
- (B) Datagram
- (C) Message
- (D) Frame

**1.3** Checksum is used for :

- (A) error detection
- (B) error correction
- (C) error prediction
- (D) error elimination

**1.4** What is the port number of the SMTP ?

- (A) 20/21
- (B) 23
- (C) 25
- (D) 80

**1.5** Protocols in which the sender sends one frame and then waits for an acknowledgement before proceeding are called :

- (A) sliding window
- (B) stop-and-wait
- (C) frame buffer
- (D) ARQ

**1.6** X.25 is an example of :

- (A) circuit switched network
- (B) packet switched network
- (C) frame relay network
- (D) ring based network

**1.7** The default subnet mask for a class B network can be :

- (A) 255.255.255.0
- (B) 255.0.0.0
- (C) 255.255.192.0
- (D) 255.255.0.0

- 1.8 What is the main function of transport layer?
- (A) Synchronization
  - (B) Updating and maintenance of routing tables
  - (C) Process-to-Process delivery of message
  - (D) Node-to-node delivery of message
- 1.9 An Ethernet frame that is less than the IEEE 802.3 minimum length of 64 octets is called :
- (A) short frame
  - (B) runt frame
  - (C) mini frame
  - (D) small frame
- 1.10 Alice digitally signs a message and sends it to Bob. Verification of the signature by Bob requires :
- (A) Alice's public key
  - (B) Bob's public key
  - (C) Bob's private key
  - (D) Alice's private key
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 In a point-to-point connection, two and only two devices are connected by a dedicated link.
  - 2.2 Transmission media lie above the transport layer.
  - 2.3 A digital signal is a composite analog signal with an infinite bandwidth.
  - 2.4 10 Base 5 uses optical fibre cable.
  - 2.5 Datagrams using header extension are called jumbograms.
  - 2.6 The IP address of a system can be known using the DOS command ipconf.
  - 2.7 Addresses in class D are used for unicast communication.
  - 2.8 Error control refers to a set of procedures used to restrict the amount of data that the sender can send before waiting for acknowledgment.
  - 2.9 In OS network architecture, the dialogue control and token management are responsibilities of session layer.
  - 2.10 TELNET uses the network virtual terminal (NVT) system to encode characters on the local system.

3. Match words and phrases in column X with the closest related meaning / words(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	HTTP	A.	Physical layer
3.2	UDP	B.	Circuit switching
3.3	Modulation	C.	Error control mechanism
3.4	Ethernet	D.	Multiple access protocol
3.5	Pretty good privacy (PGP)	E.	Application layer
3.6	Telephone system network is an example of	F.	IEEE 802.3
3.7	Third layer of OSI	G.	Encryption
3.8	Stop-and-wait ARQ	H.	Email security
3.9	RSA algorithm	I.	Network layer
3.10	ALOHA	J.	Transport layer
		K.	Session layer
		L.	Packet switching
		M.	Device security

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.	Persistent	B.	FSK	C.	POP3
D.	ARP	E.	Spoofing	F.	21
G.	Asynchronous	H.	TCP/IP protocol	I.	Shielded Twisted Pair
J.	IGMP	K.	RARP	L.	ICMP
M.	Application Layer				

- 4.1 Data transmission between the keyboard and the computer is usually \_\_\_\_\_.
- 4.2 With respect to physical media, STP cables stands for \_\_\_\_\_.
- 4.3 \_\_\_\_\_ is used to facilitate the simultaneoustransmission of a message to a group of recipients.
- 4.4 In \_\_\_\_\_ the frequency of the carrier signal is varied based on the information in a digital signal.
- 4.5 FTP server listens for connection on port number \_\_\_\_\_.
- 4.6 SNMP is the framework for managing devices in an internet using the\_\_\_\_\_.
- 4.7 The default connection type used by HTTP is \_\_\_\_\_.
- 4.8 \_\_\_\_\_ is responsible for accessing the mail service on a client machine.
- 4.9 When a DNS server accepts and uses incorrect information from a host that has no authority giving that information, then it is called DNS \_\_\_\_\_.
- 4.10 \_\_\_\_\_ is a dynamic mapping method that finds a physical address, given a logical address.

**PART TWO**

**(Answer ANY FOUR questions)**

5. (a) What is multiplexing ? Illustrate the difference between CDM and WDM.  
(b) Explain the relationship between data rate and bandwidth.  
(c) What are the advantages of dividing an Ethernet LAN with a bridge ?  
(5+5+5)
6. (a) Explain the difference FDMA and TDMA.  
(b) What is channel allocation. State the difference between static channel allocation and dynamic allocation.  
(c) Why do we prefer CSMA over ALOHA?  
(5+5+5)
7. (a) Explain TCP/IP protocol suite with a diagram.  
(b) Illustrate the differences between a "thick Ethernet" and a "thin Ethernet".  
(c) What is the relationship between a base station and a mobile switching center ? Also, write the functions of a mobile switching center.  
(5+5+5)
8. (a) What are different types of error detection methods? Explain the CRC error detection technique using generator polynomial  $x^3 + 1$  and data 11100011.  
(b) Why SONET is called a synchronous network? Discuss the functions of each SONET layer.  
(c) In a block of addresses, we know the IP address of one host is 25.34.12.56/16. What are the first address (network address) and the last address (limited broadcast address) in this block?  
(5+5+5)
9. (a) Define firewall. What are the three types of firewalls?  
(b) Discuss features of NMS.  
(c) Define Cryptography. Discuss its application in network management.  
(5+5+5)

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**SPACE FOR ROUGH WORK**

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