A9-R4/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. :					

रोल नं. : Roll No. :

उत्तर-पुस्तिका सं. : Answer Sheet No. :

परीक्षार्थी का नाम :
Name of Candidate : _____

परीक्षार्थी के हस्ताक्षर :
Signature of Candidate : _____

परीक्षार्थियों के लिए निर्देश :	Instructions for Candidate :
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 की भाषा अंग्रेजी है। परीक्षार्थी केवल अंग्रेजी भाषा में ही उत्तर दे 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 **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 है तथा **भाग दो** ''व्यक्तिपरक'' प्रकार का है और इसके कुल अंक 60 है।	**PART ONE** is Objective type and carries 40 Marks. **PART TWO** is Subjective type and carries 60 Marks.
भाग एक के उत्तर, **ओएमआर उत्तर-पुस्तिका** पर 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. **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 जाँच कर यह 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 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 In OSI model, Reliable process-to-process message delivery is the task of _____.

(A) Application Layer

(B) Transport Layer

(C) Network Layer

(D) Data Link Layer

1.2 Digital-to-analog conversion can be accomplished in following ways :

(A) amplitude shift keying (ASK)

(B) frequency shift keying (FSK)

(C) phase shift keying (PSK)

(D) All the above

1.3 Circuit switching uses the following :

(A) the space-division switch

(B) time-division switch

(C) both (A) and (B)

(D) none of the options

1.4 Multiple access protocols are _____.

(A) Random access

(B) Controlled access

(C) Channelization

(D) All the above

1.5 Multicast addresses in IPv4 are those that start with the pattern _____.

(A) 1100

(B) 1110

(C) 1111

(D) None of the above

1.6 The minimum size of an IP packet that carries an ICMP packet would be _____.

(A) 20 bytes

(B) 24 bytes

(C) 28 bytes

(D) 32 bytes

1.7 The minimum size of the process data that can be encapsulated in a UDP datagram is _____.

(A) 0 bytes

(B) 4 bytes

(C) 8 bytes

(D) 16 bytes

1.8 The performance of a network can be measured by _____.

(A) Delay

(B) Throughput

(C) Both Delay and Throughput

(D) None of the above

1.9 A client/server application that identifies each host on the Internet with a unique user-friendly name is known as _____.

(A) Peer to Peer System

(B) The Domain Name System (DNS)

(C) Robust System

(D) Centralized System

1.10 Transmission mode(s) used in FTP is/are _____.

(A) Stream

(B) Block

(C) Compressed

(D) All 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 port address identifies a process on a host.

2.2 Frequency is the rate of change with respect to time.

2.3 Block coding is the process of converting digital data to a digital signal.

2.4 In phase shift keying, the phase of the carrier is varied to represent two or more different signal elements. Both peak amplitude and frequency remain constant as the phase changes.

2.5 QAM uses four carriers, two in-phase and the other two with different amplitude levels for each carrier.

2.6 Frequency-Division Multiplexing (FDM) is an analog technique that can be applied when the bandwidth of a link (in hertz) is greater than the combined bandwidths of the signals to be transmitted.

2.7 Guided media have physical boundaries, while unguided media are unbounded.

2.8 In a datagram network, each packet is transferred using the same link as established between sender and receiver.

2.9 A virtual-circuit network is a cross between a circuit-switched network and a data-gram network. It has some characteristics of both.

2.10 BOOTP and Dynamic Host Configuration Protocol (DHCP) are client/server applications that deliver vital network information to either diskless computers or computers at firstboot.

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	The most common technique to change an analog signal to digital data (digitization) is called	**A.**	sliding window mechanism,
3.2	Responsible for controlling access to the network based on the predefined policy.	**B.**	Caching
3.3	The combination of ASK and PSK can be done using	**C.**	Pulse Code modulation (PCM).
3.4	The size of an ARP packet is	**D.**	PGP
3.5	TCP uses flow control and is implemented using	**E.**	Quadrature Amplitude Modulation (QAM)
3.6	Search time for a name is reduced by	**F.**	Variable
3.7	Client/Server application that allows a user to logon to a remote machine, giving the user access to the remote system.	**G.**	SNMP (Simple Network Management Protocol)
3.8	Protocols used for pulling messages from a mail server.	**H.**	TELNET
3.9	The main protocol used to access data on the World Wide Web (WWW).	**I.**	Security management
3.10	A framework for managing devices in an internet using the TCP/IP protocol suite.	**J.**	Post Office Protocol, version3 (POP3)
		K.	HTTP
		L.	MANET
		M.	DHCP

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 "OMR" answer sheet attached to the question paper, following instructions therein. (1x10)

A.	Topology	**B.**	Virtual Private Network (VPN)	**C.**	Encoder
D.	Key	**E.**	IP Security (IPSec)	**F.**	Node to Node communication
G.	TELNET	**H.**	Digital Signature	**I.**	Protocol
J.	Secure Sockets Layer (SSL)	**K.**	Binary microprogram	**L.**	Datagrams
M.	10				

4.1 _____ refers to the physical or logical arrangement of a network.

4.2 Data link control deals with _____.

4.3 _____ is a digital circuit that converts information into coded form.

4.4 Packets in the IPv4 layer are called _____.

4.5 A number or a set of numbers on which the cipher operates _____.

4.6 An asymmetric-key system is needed in _____.

4.7 A collection of protocols designed by the IETF (Internet Engineering Task Force) to provide security for a packet at the network level is _____.

4.8 Provide privacy for LANs that must communicate through the global Internet is _____.

4.9 Provide security and compression services to data generated from the application layer _____.

4.10 _____ is a set of rules that govern data communication; the key elements of it are syntax, semantics and timing.

PART TWO

(Answer any FOUR questions)

5. (a) What are the responsibilities of the transport layer in the Internet model ?

(b) A TV channel has a bandwidth of 6 MHz. If we send a digital signal using one channel, what are the data rates if we use one harmonic, three harmonics, and five harmonics ? **(7+8)**

6. (a) How can we distinguish a multicast address in IPv4 addressing ? How can we do so in IPv6 addressing ?

(b) How many invalid (unused) code sequences can we have in 5B/6B encoding ? How many in 3B/4B encoding ? **(5+10)**

7. (a) What advantages does TCP have over UDP ? What are the features, which make TCP a reliable protocol ?

(b) Calculate the baud rate for the given bit rate and type of modulation.

(i) 2000 bps, FSK

(ii) 4000 bps, ASK

(iii) 6000 bps, QPSK

(iv) 36,000 bps, 64-QAM

(c) Compare between space-division and time-division switches. **(6+4+5)**

8. (a) Ten sources, six with a bit rate of 200 kbps and four with a bit rate of 400 kbps are to be combined using multilevel TDM with no synchronizing bits. Answer the following questions about the final stage of the multiplexing :

(i) What is the size of a frame in bits ?

(ii) What is the frame rate ?

(iii) What is the duration of a frame ?

(iv) What is the data rate ?

(b) Compare and contrast three key long distance communication technologies, namely X.25, frame relay and ATM. **(8+7)**

9. (a) Are there any cipher suites in IPSec ? Explain your answer.

(b) Write short notes on **any three** of the followings :

(i) SNMP

(ii) VPN

(iii) SONET

(iv) Novell Netware **(6+[3+3+3])**

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SPACE FOR ROUGH WORK

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