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:
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 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 दे सकता है।	Question Paper is in English language. Candidate can answer in English language only.
इस मॉड्यूल/पेपर के **दो भाग** है। **भाग एक** में चार प्रश्न और **भाग दो** में पाँच प्रश्न है।	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 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, इस प्रश्न-पत्र के साथ दी गई **ओएमआर उत्तर-पुस्तिका** पर, उसमें दिये गए अनुदेशों के अनुसार ही दिये जाने है। **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 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 **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**.
परीक्षार्थी, उपस्थिति-पत्रिका पर हस्ताक्षर किए बिना एवं अपनी उत्तर-पुस्तिका, निरीक्षक को सौंपे बिना, परीक्षा हाल नहीं छोड़ सकता हैं। ऐसा नही 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 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.

_____

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 Coaxial cable is an example of
A) Guided media
B) Unguided media
C) Wireless Media
D) Satellite Communication

1.2 Which one of the following is not a Media Access Control Protocol?
A) FDMA B) NFS
C) CSMA D) DSSS

1.3 Full form of CCITT is
A) Common Committee for International Telephony and Telegraphy
B) Consultative Committee for International Transport and Transfer
C) Common Committee for International Data Transport and Transfer
D) Consultative Committee for International Telephony and Telegraphy

1.4 Which is true with respect to Gigabit Ethernet?
A) Offers 1000 Mbps of Bandwidth
B) IEEE 802.3z Standard
C) Uses CSMA/CD protocol
D) All of the above

1.5 SDH (Synchronous Digital Hierarchy) is a standard technology for synchronous data transmission on
A) Optical media B) Copper media
C) Aluminum media D) None of the above

1.6 Number of layers in the Open Systems Interconnect (OSI) model are
A) 4 B) 5
C) 7 D) 8

1.7 QPSK (Quadrature Phase Shift Keying) is classified as
A) Digital modulation B) Analog modulation
C) Both of the above D) None of the above

1.8 Cell Switching is used in
A) Ethernet B) ATM
C) Telephone Network D) None of the above

1.9 The device Router works at
A) Application Layer B) Transport Layer
C) Network Layer D) Data Link Layer

1.10 HTML
A) Is a markup language
B) Is used to write word documents
C) Is Object Oriented Language
D) Is used to form connections between a client and a server

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 If a channel can transmit frequencies between 3 MHz and 4 MHz then its Bandwidth is 4 MHz.
2.2 MANETS use wireless connections to connect to various networks.
2.3 A firewall is a system designed to prevent unauthorized access to or from a private network.
2.4 Dynamic Host Configuration Protocol (DHCP) is a network protocol that enables a server to automatically assign an Hardware (MAC) address to a computer from a defined range of numbers configured for a given network.
2.5 Slotted ALOHA requires that time which is segmented into slots of a fixed length should be less than the packet transmission time.
2.6 Hypertext Transfer Protocol (HTTP) is an application-layer Internet standard protocol used by local e-mail clients to retrieve e-mail from a remote server over a TCP/IP connection.
2.7 IPSec works at the network layer and provides data security in various ways such as encrypting and authenticating data.
2.8 Internet Protocol version 6 (IPv6) provides larger addressing space (as compared to IPv4) by using 256-bit addresses.
2.9 In ASK (Amplitude Shift keying), logic levels are represented by different frequencies of signals.
2.10 HDLC operates at Data Link Layer.

ROUGH WORK SPACE:

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	Is Used to Control the Broadcast Domain.	**A.**	FSK
3.2	Uses window based flow control mechanism	**B.**	GSM
3.3	A protocol for sending e-mail messages between servers	**C.**	PGP
3.4	Radio Communication	**D.**	VSAT
3.5	Connectionless protocol	**E.**	VLAN
3.6	Public Key Cryptography	**F.**	TCP
3.7	A network device used to regenerate or replicate a signal.	**G.**	Wireless Communication
3.8	Anywhere connectivity is made possible even at those locations, which cannot be connected through conventional media like copper cable, optical fibre, radio, microwave and any other wire-line / wireless links.	**H.**	SMTP
3.9	It operates at either the 900 MHz or 1800 MHz frequency band.	**I.**	Repeater
3.10	A frequency modulation scheme in which digital information is transmitted through discrete frequency changes of a carrier wave.	**J.**	PPP protocol
		K.	Bridge
		L.	Mobile Telephony
		M.	UDP

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.	TDM	**B.**	VPN	**C.**	FHSS
D.	FTP	**E.**	Cryptography	**F.**	Microwave
G.	Congestion	**H.**	FDM	**I.**	SNMP
J.	Routing protocol	**K.**	Mobile IP	**L.**	DNS
M.	Star				

4.1 _____ provides a user the full channel capacity but divides the channel usage into time slots.

4.2 By using _____ one can retrieve information about network devices like routers, printers, hubs or even computers.

4.3 _____ is an open standard that allows users to keep the same IP address, stay connected, and maintain ongoing applications while roaming between IP networks.

4.4 A _____ is a private network that uses a public network (usually the Internet) to connect remote sites or users together.

4.5 _____ in a network may occur when the load on the network (i.e. the number of packets sent to the network) is greater than the capacity of the network.

4.6 _____ is a method of storing and transmitting data in a particular form so that only those for whom it is intended can read and process it.

4.7 _____ the protocol for exchanging files over the Internet.

4.8 The _____ topology reduces the chance of network failure by connecting all of the systems to a central node.

4.9 _____ transmission refers to the technology of transmitting information by the use of electromagnetic waves whose radio spectrum ranges across frequencies of roughly 1.0 GHz to 30 GHz.

4.10 The purpose of a _____ is to dynamically communicate information about all network paths used to reach a destination and to select the best path to reach a destination network, from these paths.

ROUGH WORK SPACE:

PART TWO
(Answer any FOUR questions)

5.
a) What is Pulse Code Modulation? How do you obtain a pulse coded modulated wave from an analog waveform? Describe all the steps (sampling, quantizing, encoding).

b) What is CSMA/CD stand for? Describe CSMA/CD. Does CSMA/CD provide for dedicated or shared bandwidth?

c) What is Data Encapsulation? What are the differences between OSI and TCP/IP model?

d) i) Which layer is responsible for converting data packets from the Data Link layer into electrical signals?
ii) At which layer is routing implemented, enabling connections and path selection between two end systems. ?
iii) Which layer combines bits into bytes and bytes into frames, uses MAC
iv) Which layer segments and resembles data into a data stream?

(5+4+4+2)

6.
a) What is the difference between:
   i) GSM mobile telephony standard and CDMA mobile telephony standard
   ii) HTTP and HTTPS
   iii) Circuit Switching and Packet Switching

b) What is Open Shortest Path First Routing Protocol? What are its advantages and disadvantages?

c) What is DSL (Digital Subscriber Loop)? What are the advantages and disadvantages of DSL?

(9+3+3)

7.
a) What is NAT (Network Address Translation)? Why is it used?

b) What do you understand by X.25? In what kind of networks does X.25 generally operate? Name the three general categories into which X.25 devices fall.

c) What is wireless networking? What is the relationship between wireless networking and IEEE 802.11. If a computer is connected to a wireless LAN, can it communicate with computers on a wired LAN as well?

(5+5+5)

8.
a) What is HTML? What is the difference between HTML elements and tags? Do all HTML tags come in pair? What are some of the common lists that can be used when designing a page?

b) What is TCP (Transmission Control Protocol) and UDP (User Datagram Protocol)? Explain their differences? Why UDP is faster than TCP?

c) i) In the IPv4 addressing format, the number of networks allowed under Class C addresses is (Explain your answer)
A) 2^{14}
B) 2^{7}
C) 2^{21}
D) 2^{24}
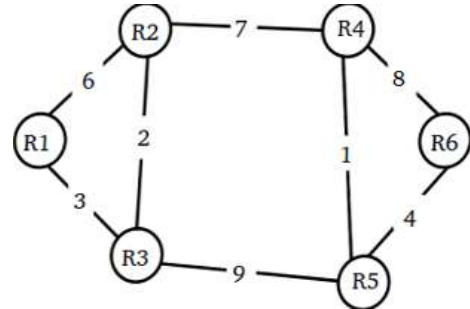
ii) All the routers use the distance vector based routing algorithm to update their routing tables. Each router starts with its routing table initialized to contain an entry for each neighbour with the weight of the respective connecting link. After all the routing tables stabilize, how many links in the network will never be used for carrying any data? (Explain your answer)
A) 4
B) 3
C) 2
D) 1

iii) One of the header fields in an IP datagram is the Time to Live (TTL) field. Which of the following statements best explains the need for this field?
A) It can be used to priortize packets
B) It can be used to reduce delays
C) It can be used to optimize throughput
D) It can be used to prevent packet looping

(4+5+6)

9. Write Short notes on (**any three**):
a) SONET/SDH
b) Guided Transmission Media (Twisted Pair, Co-axial cable and Optical Fiber)
c) Simple Mail Transfer Protocol, SMTP
d) Asynchronous transmission and Synchronous transmission

(3x5)

ROUGH WORK SPACE: