A9.3-R5 : NETWORK MANAGEMENT

अवधि : 03 घंटे **अधिकतम अंक : 100**
DURATION : 03 Hours **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 questions. Each question carries ONE mark)

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 If a network switch is working in a "non-blocking" state, then which option is correct ?

(A) IP Packets can be forwarded simultaneously from multiple I/P ports to single O/P port.

(B) IP packet can be forwarded from any I/P port to any O/P port.

(C) IP Packets can be forwarded simultaneously from any of the I/P ports to any of the O/P ports.

(D) None of the above.

1.2 DNS Resource Records contain a "Time to Live" field. This is so that :

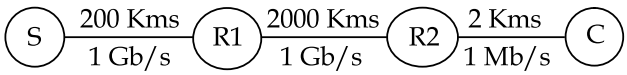
(A) If a Record is lost during transmission, it will not circulate endlessly.

(B) Cached copies of the record will expire eventually.

(C) Redundant servers can trace the record back to its creation time so that it can be validated.

(D) None of these.

1.3 The figure below shows a network path connecting a server to a client.



What is the total propagation delay for two packets going from the server to the client(you may assume that the speed of light is 200,000 Km/s) ?

(A) 10 ms
(B) 11.01ms
(C) 22.02 ms
(D) 20 ms

1.4 In TCP congestion control Slow Start Phase what will be the *cwnd* size after 4^{th} RTT :

(A) 1
(B) 4
(C) 8
(D) 16

1.5 A link state routing algorithm :

(A) is a decentralized algorithm that requires only link costs of its neighbour
(B) needs to use broadcast to collect information about the whole network
(C) is based on Bellman-Ford equation to find the least cost path
(D) none of the above

1.6 Which of the following is/are true about wireless networks ?

(A) All wireless networks must use access points.
(B) The sender can always detect a collision without feedback from the receiver.
(C) Collisions are maximized when RTS/CTS mechanisms are used.
(D) TCP congestion control mechanisms work poorly in wireless environments if link-layer retransmission is not performed.

1.7 What is the UDP checksum of two 16-bit words ?

0110 1011 0111 1001 and 1011 0110 1110 0110

(A) 0010 0010 0110 0000

(B) 1101 1101 1001 1111

(C) 1101 1101 1001 1110

(D) 0010 0010 0110 0001

1.8 If two nodes, A and B, are using slotted ALOHA protocol with node A having more data to transmit than the other node, then what is total efficiency of the protocol for a channel with these two nodes only ?

(A) $pA(1-pB)+pB(1-pA)$

(B) $pA+pB$

(C) $(1-pA)(1-pB)$

(D) $pA(pA-pB)+pB(pB-pA)$

1.9 What is size of Ethernet frame preamble field and what is last byte of the preamble ?

(A) 64 bits, 10101010

(B) 64 bits, 10101011

(C) 56 bits, 10101011

(D) 56 bits, 10101010

1.10 IP header has identification field. What is the purpose of this field ?

(A) Provides sequence number of packets

(B) Provides sequence number to bytes of data in IP packet

(C) Provides sequence number to fragmented packets

(D) Provides sequence number to bytes of data in fragmented packets

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 With Go-back-N error control protocol, it is not required that each individual frame be acknowledged.

2.2 A host with 192.9.200.14 IP address is attached to a Class C IP network.

2.3 When using the 1-persistent CSMA technique, if the medium is busy, the station continues to listen until the channel is sensed idle and then transmits immediately.

2.4 TCP waits until it has received three duplicate ACKs before performing a fast retransmit.

2.5 There are 3 Flags in TCP header.

2.6 Count-to-infinity problem occur in link state algorithms.

2.7 ARP can be used to detect and avoid duplicate IP addresses in the subnet.

2.8 HTTP and DNS use same cache at the host computers.

2.9 Two distinct Web pages (for example, www.mit.edu/research.htmland www.mit.edu/students.html) cannot be sent over the same persistent connection.

2.10 HTTP response messages never have an empty message body.

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	CRC	**A.**	Hamming Distance
3.2	HTTP	**B.**	Router
3.3	Flow control	**C.**	History
3.4	DNS	**D.**	Network Layer
3.5	Subnetting	**E.**	ICMP
3.6	Cookies	**F.**	TCP
3.7	Flag	**G.**	Cyclic Redundancy Check
3.8	Forwarding	**H.**	Iterative Query Processing
3.9	ISP	**I.**	Handshake
3.10	1-bit error detection & correction	**J.**	Internet Service Provider
		K.	UDP
		L.	Link State Routing
		M.	Application Layer

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.	20, 21	**B.**	3	**C.**	4
D.	6	**E.**	3-way handshake	**F.**	Dynamic Host Configuration Protocol
G.	Checksum	**H.**	Packet forwarding	**I.**	DNS
J.	UDP	**K.**	Slow senders or slow receivers in TCP	**L.**	HTTP
M.	1				

4.1 DHCP stands for _____.

4.2 UDP header has _____ fields.

4.3 FTP works on two ports, namely, _____.

4.4 Silly window syndrome relates to _____.

4.5 Longest prefix matching is used in _____.

4.6 Number of bits reserved in IP header for flags are _____.

4.7 TCP uses _____ for connection establishment.

4.8 The footer in Ethernet frame is used for _____.

4.9 Port 80 is used in _____.

4.10 Window size at receiver end is fixed at _____ in GBN.

PART TWO

(Answer any FOUR questions)

5. (a) Distinguish between circuit and packet switching.

(b) Explain the terms : Transmission Delay, Propagation Delay, Processing Delay and Queuing Delay

(c) Differentiate between HTTP and HTTPS Protocol. **(8+3+4)**

6. (a) Explain congestion control mechanism of TCP using proper RTT vs cwnd graph.

(b) Explain with suitable example and diagram why the sender and receiver window must be at most one-half of 2^m in selective repeat ?

(c) Explain UDP based communication between client and server. **(8+4+3)**

7. (a) What is the difference between routing and forwarding ?

(b) Explain Link State Routing with suitable example.

(c) What is the use of CIDR ? For a host in a subnet with an IP network address 192.168.0.64, find out IP network address, the host range, and the subnet mask for a subnet that can contain up to 30 clients. What is the maximum number of hosts per subnet if you have 24 subnet mask bits ? **(4+8+3)**

8. (a) Compute the efficiency of slotted Aloha.

(b) Distinguish between DHCP and ARP address resolution.

(c) Suppose two nodes, A and B, are attached to opposite ends of an 800m cable, and that they each have one frame of 1,500 bits (including all headers and preambles) to send to each other. Both nodes attempt to transmit at time t = 0. Suppose there are four repeaters between A and B, each inserting a 20-bit delay. Assume the transmission rate is 100 Mbps, and CSMA/CD with backoff intervals of multiples of 512 bits is used. After the first collision, A draws K = 0 and B draws K = 1 in the exponential backoff protocol. Ignore the jam signal and the 96-bit time delay.

(i) What is the one-way propagation delay (including repeater delays) between A and B in seconds ? Assume that the signal propagation speed is 2 * 108 m/sec.

(ii) At what time (in seconds) is A's packet completely delivered at B ? **(4+3+8)**

9. (a) Explain the concept of hidden and exposed nodes in wireless communication.

(b) Explain three way TCP handshake using appropriate sequence numbers.

(c) Why does Internet have unreliable connectionless UDP based services when TCP can provide reliable connection oriented services ? **(4+8+3)**

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SPACE FOR ROUGH WORK

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