

Time: 3 Hours

DECEMBER 2015

Max. Marks: 100

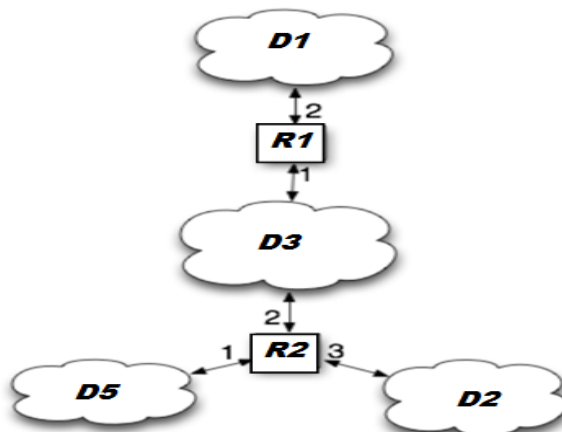
PLEASE WRITE YOUR ROLL NO. AT THE SPACE PROVIDED ON EACH PAGE IMMEDIATELY AFTER RECEIVING THE QUESTION PAPER.

NOTE:

- **Question 1 is compulsory and carries 28 marks. Answer any FOUR questions from the rest. Marks are indicated against each question.**
- **Parts of a question should be answered at the same place.**

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- Q.1 a. Write the ways in which the OSI reference model and TCP/IP reference model are different and the ways they are the similar.
- b. Consider the sliding window Go-Back-N ARQ system in which S sends packets 0,1,2,3,4,5 and 6. Packet 3 received at R is corrupted then what do S and R sends to each other next?
- c. Write name of OSI layer which is responsible for the following.
- (i) To route the packets, determine the best path
 - (ii) Responsible to provide end-to-end communications with reliable service
 - (iii) Provides node-to-node reliable communications
 - (iv) Provides the congestion control
- d. Write the key differences between IP addresses and MAC addresses.
- e. What is the man-in-the-middle attack? Can this attack occur when symmetric keys are used?
- f. Why was IPv6 created? Describe the most significant changes of IPv6 compared to IPv4.
- g. E-mail clients in personal computers mostly use the POP or the IMAP protocols to download incoming mail. Why do they not use SMTP? (7×4)
- Q.2 a. A slotted ALOHA network transmits 200-bit frames using a shared channel with a 200-kbs bandwidth. Find the throughput if the system (all stations together) produces (5)
- (i) 1000 frames per second
 - (ii) 250 frames per second
- b. What are fundamental differences which exist between NRZ-L and NRZI ? Sketch the Manchester encoding and Differential encoding for the bit stream: 0001110101? (6)
- c. Explain CSMA and its different versions. What are the limitations of each version? Briefly explain CSMA/CD and CSMA/CA. In which situation should we use each of the above? (7)

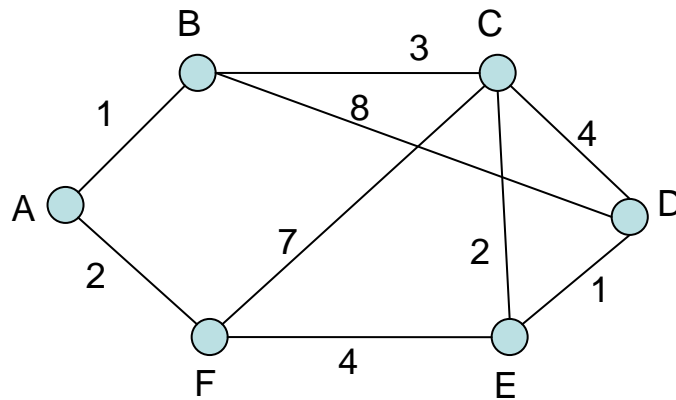
- Q.3** a. Consider that a 48,000 bit packet is to be transmitted on a link having the propagation speed of 2×10^8 m/sec and physical link length of 1,000 m. Now suppose that the node can transmit at a rate of 4 Gbps. (6)
- (i) What is the transmission time for the packet?
- (ii) What is the propagation delay on the link?
- (iii) Suppose that if the node starts transmitting the packet at time $t=0$, then at what time is the packet fully received at the destination?
- b. What is the key difference between a bridge and a repeater? Does a bridge achieve the same purpose similar to repeater? (6)
- c. If a binary signal is sent over a 3-kHz channel whose signal-to-noise ratio is 20 dB, what is the maximum achievable data rate? (6)
- Q.4** a. Consider a message D, presented by the following polynomial $x^{19} + x^{17} + x^{16} + x^{13} + x^{12} + x^{11} + x^9 + x^5 + x^2 + 1$, which is transmitted using the standard Cyclic Redundancy Check (CRC) method. The generator polynomial is $x^7 + x^5 + x^4 + x^3 + x^2 + 1$. Find the CRC and show the actual bit string to be transmitted. (7)
- b. Write the hamming code of the data 1001101. Consider that receiver receives the code 10010100101. When it uses the hamming encoding method with even parity, then which bit(s) is in error? What is the correct code? (6)
- c. Find out the 2-dimensional even bit parity check of the data 1100111 1011101 0111001 0101001. Write the data and parity bit which will be transmitted. (5)
- Q.5** a. Suppose that you have assigned the task of designing a network in which you have to setup two routers R1 and R2 as shown below in the figure. You have assigned at your disposal the address 128.119.248.0/21. Consider that D1 Network has 1000 nodes, D2 Network has 200 nodes, D3 Network has 500 nodes and D5 network has 250 nodes; assign network addresses to each of the four sub network in the form a.b.c.d/x. Justify how this address space can be distributed in the domain by presenting the network identifiers for each of the four networks and also provide the forwarding tables for the two routers. (13)



Network	No. of Nodes
D1	1000
D2	200
D3	500
D5	250

- b. Consider an organization which is assigned the network address 193.1.1.0/24. Organization wants to create six subnets. The largest subnet is required to support 25 hosts. Write the subnet mask and subnet addresses of all the six subnets. (5)

- Q.6** a. Consider the below given network topology. Show the iterations followed by node A in a tabular form to compute the shortest paths from itself to all the other nodes using the Dijkstra's algorithm. You can assume A has already collected all link state information in the network. (10)



- b. With an example explain Link state routing and compare it with distance vector routing algorithm. (8)

- Q.7** a. Consider that you have two browser applications which are active at the same time, and suppose that your two active applications are accessing the same server to retrieve HTTP documents at the same time. Explain how does the server will differentiates between the two applications? (4)

- b. Using RSA, choose $p = 3$ and $q = 11$, and encode the phrase "hello". Apply the decryption algorithm to the encrypted version to recover the original plaintext message. (9)

- c. A router has the following (CIDR) entries in its routing table:

Address/mask	Next hop
128.114.56.0/22	Interface 0
128.114.60.0/22	Interface 1
192.168.30/23	Router 1
Default	Router 2

For packets with the following IP addresses, show where the router will send the packet: (5)

- (i) 128.114.52.02
- (ii) 128.114.63.09
- (iii) 192.168.33.05
- (iv) 128.114.57.11