Indian Institute of Technology Kharagpur

Department of Computer Science and Engineering

Class Test-5, Spring 2020-21

Computer Networks (CS31006)

Students: 155 **Date**: 10-April-2021

Full marks: 30 **Time**: 60 minutes

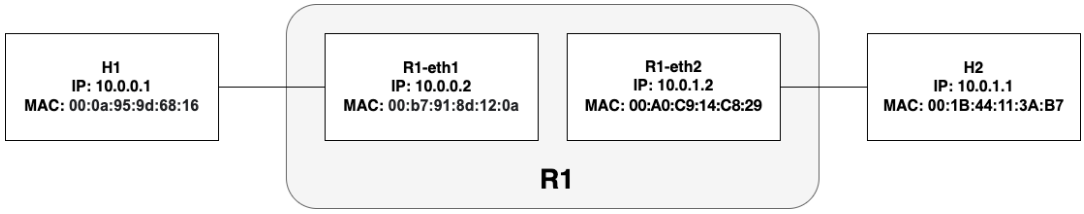
Credit: 20%

INSTRUCTIONS: This is an OPEN-BOOK, OPEN-NOTES test. Please write your answers in a text file/.doc file, convert it to PDF, and submit this PDF file containing ONLY YOUR ANSWERS on Moodle. PLEASE DO NOT SUBMIT SCANNED HAND-WRITTEN ANSWERS, SUCH ANSWER-SCRIPTS WILL NOT BE GRADED. DO NOT FORGET TO WRITE YOUR NAME AND ROLL NUMBER AT THE TOP OF YOUR ANSWER SHEET. ANY DETECTED CASE OF PLAGIARISM WILL BE DEALT WITH STRICTLY, WITH ALL THE IMPLICATED STUDENTS RECEIVING ZERO IN THIS TEST. You may use calculators if required. This question paper contain one page. ANSWER ALL QUESTIONS.

1. Suppose the ASCII-encoded word corresponds to the first four and the last two characters of your roll number has to be sent over the internet. For example, if your roll number is 17CS10062, then you have to send ASCII-encoded 17CS62. Calculate the 16-bit Internet checksum that would be generated at the sender. Also, show the calculation at the receiver, when transmission happens without any error. You need to show the calculation steps. [Given: ASCII code of '0' is 0x30, 'C' is 0x43 and that of 'S' is 0x53.]

[5+5 = 10]

2. Two hosts H1 and H2 are connected via a router R1, which has two physical interfaces – R1-eth1 and R1-eth2, as shown in the below diagram. Assume that H1 wants to send a data packet to H2.



   (a) When the packet is received at the input packet-queue of R1-eth1, what will be the source IP, destination IP, source MAC, and destination MAC of the packet?

   (b) The routing procedure running at R1 will forward the packet at the output packet-queue of the interface R1-eth2 to be delivered to H2. When the packet is waiting at the output packet-queue of the interface R1-eth2, what will be the source IP, destination IP, source MAC, and destination MAC of the packet?

   (c) After the routing procedure running at R1 decides the next hop of the packet, how does R1 decide about the destination MAC address for the packet?

[4+4+2 = 10]

3. Assume that you are building a CSMA/CD network running over a $((N\%4) + 1)$ Gbps cable, where N is the last two digits of your roll number. The length of the cable is 1km, and the cable does not have any repeaters. The signal speed in the cable is 200000 km/sec. What should be the minimum frame size for the cable? Explain your answer and show all the calculation steps. [% indicates the remainder operation, for example, $21\%4 = 1$.] **[5]**