

CS323 Computer Networks

Sunday, June 28, 2020

Course Instructor

Dr. Bilal Khan

Serial No:

Final Exam

Spring Semester 2020

Max Time: 3 Hours

Max Marks: 50

Name & Roll No

Section

General Instructions:

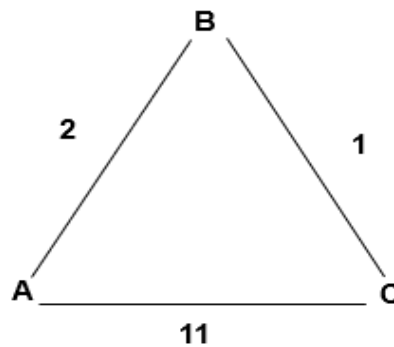
1. There are Five (5) Questions in total. Q-0 carries 3 points for students who follow the submission guidelines
2. Questions reading and understanding are also part of the exam, only answer what is asked.
3. Read the questions carefully for clarity of context and understanding of meaning and make assumptions wherever required, for neither the invigilator will address your queries, nor the teacher/examiner will respond to any of your queries.

Guidelines for Submission:

1. You should submit solution both in PDF document and .docx document. [1 Point]
2. The first page of the document shall clearly mention the full name and roll number of the student. [1 Point]
3. **Text** of the solution maybe typed or handwritten as long as it is readable.
4. Only diagram in the solution **drawn by hand** is acceptable. The image of the hand-drawn diagram shall be put in the main solution file under the respective question.
5. You must submit your solution before due time via **Google Classroom**. Submissions submitted after the due time shall not be considered.
6. Naming Convention of the main solution file must be followed. [1 Point]
Example:
 - a. Rollnumber_Section_CN-Final.pdf
 - b. f171023_6D_CN-Final.pdf
7. If you don't finish every part of a question, don't worry! You can still submit what you've done to get marks based on your efforts.
8. In case of copied or plagiarized solutions in exam Or If a student provided help to another student during exam both will be awarded "F" grade and it will affect the student CGPA.
9. Viva of any student can be conducted by the instructor after conducting an online exam in case of any doubt.
10. This document should be submitted through LMS (**Google Classroom**). But in worst case, you can email it within the deadline.

	Q-0	Q-1	Q-2	Q-3	Q-4	Q-5
Total Marks	3	10	5	15	12	5
Marks Obtained						

1. Assume the sender is using **Go-back-N (GBN)** and has to send 10 packets using window size of 5 and the sequence number of the first packet starts from **0**. Further assume that the ACK of the data packet with sequence number 2 within the window is lost and the loss is detected by timeout mechanism. [e.g., the sender received all the **ACKs** for the packets except for the sequence number 2 before the timer expires.] Draw a timeline diagram showing which packets maybe transmitted after time out. **(Indicate the IDs of the 5 packets that can be transmitted).** [10 Points]
2. In which circumstances shall **GBN** protocol be preferred over **Selective Repeat (SR)** Protocol and vice versa? Your answer to this question shall NOT be more than 5 lines. [5 Points]
3. Suppose a process in Computer **S** wants to send a stream of data to a process in Computer **R** over a full duplex TCP connection. Computer **R** has already received from Computer **S** all bytes up through byte **108**. Suppose Computer **S** then sends two packets to Computer **R** back-to-back. The first and second packets contain 52 and 35 **bytes** of data, respectively. Computer **R** sends an acknowledgment whenever it receives a packet from Computer **S**. [15 Points]
 - a) **[3 points]** In the second packet sent from computer S to R, what is the sequence number?
 - b) **[3 points]** If the first packet arrives before the second packet, in the acknowledgment of the first arriving packet, what is the acknowledgment number?
 - c) **[4 points]** If the second packet arrives before the first packet, in the acknowledgment of the first arriving packet, what is the acknowledgment number?
 - d) **[5 points]** Suppose the two packets sent by S arrive in order at R. The first acknowledgment is lost and the second acknowledgment arrives after the first timeout interval. Draw a timing diagram, showing these packets and all other packets and acknowledgments sent. (Assume there is no additional packet loss.) For each packet in your figure, provide the sequence number and the number of bytes of data; for each acknowledgment that you add, provide the acknowledgment number.
4. Consider the topology given below for this question. Assume the nodes A, B and C use the Distance-Vector Algorithm (i.e. Bellman Ford) to find minimum cost routing (distance) tables. Answer the following questions. [12 Marks]



- (a) Give the initial routing (distance) tables at each node. [3]
 - (b) Suppose **B** sends its initial routing table to **C**. Give the updated routing table at node **C**. [1]
 - (c) Give the optimal routing tables at nodes **A** and **B**. These are the routing tables that appear after the Distance Vector algorithm has converged. [2]
 - (d) Suppose the cost from **A** to **B** changes from 2 to 15. Give the Node **B** optimal routing table after the change (without considering poisoned reverse). [2]
 - (e) Explain how the optimal routing table at **B** is established and indicate the number of messages that would be required (without considering poisoned reverse). [2+2]
5. Consider the sender is using the Cyclic Redundancy Check (CRC) algorithm for error detection and correction (EDC). Suppose that the 4-bit generator (G) is 1001, that the data payload (D) is 10011001. [5 Points]
- a) Calculate the CRC bit (R). [2.5 Points]
 - b) Also find out the codeword before the sender transmits it. [2.5 Points]