National University of Computer and Emerging Sciences, Lahore Campus

Course Name:	Computer Networks	Course Code:	CS3001
Degree Program:	BS (CS)	Semester:	Fall 2022
Exam Duration:	60 Minutes	Total Marks:	30
Paper Date:	10-November-2022	Weight	15%
Section:	ALL	Page(s):	4 + 1 (Rough Page)
Exam Type:	Mid-II		

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Instruction/Notes:
- Attempt all questions on the provided question paper.
- Space for rough work is provided at the end of the paper.
- Even if you do use rough sheets, they should NOT be attached with final paper.

Question #	1	2	3	4
Total Marks	5	7	7	11
Obtained Marks	4	3	7	11
CLO #	1	1	4	3

Question 1: Answer the following multiple-choice questions by filling the following table. Cutting and overwriting is not allowed. [1+1+1+1+1 = 5 Marks] (CLO 1)

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Any answers outside the table will NOT be marked.

1	A
2	B
3	C
4	B xc
5	A

1.1. The first 8 bits of IPv4 datagram will be --------- if all optional fields are included in header of datagram.

A. 01001111
B. 01000101
C. 01001101
D. 01001100

1.2. Responsibility of communication between a client process running on client machine and server process running on server machine rests with ---------- layer.

A. physical
B. transport
C. data link
D. network

1.3. The major differences between Go-Back-N (GBN) & Selective Repeat (SR) protocols are

A. They are the same
B. SR uses cumulative ACK & single timer, while GBN uses individual ACKS & individual timers for each packet.
C. GBN uses cumulative ACK & single timer, while SR uses individual ACKS & individual timers for each packet.
D. None of the above

1.4 Difference between flow control & congestion control is

A. They are the same
B. Flow control: Network is not overwhelmed; Congestion control: Receiver is not overwhelmed
C. Flow control: Receiver is not overwhelmed; Congestion control: Network is not overwhelmed
D. None of the above

1.5. The Network Address Translation router --------for all outgoing datagrams leaving the subnet

A. rewrites the source IP address and source port number
B. It rewrites the destination IP address and destination port number
C. It rewrites the both the source and destination IP addresses and the source and destination port
D. It only modifies the TTL value

Question 2: The table below shows various transmission rounds (i.e., RTTs 1 to 13) and size of congestion win (i.e., cwnd as MSS) at the start of each RTT of the TCP congestion control algorithm. Assume that initial value of ss_thresh is equal to16. Referring to this table, please answer the following questions: [1x 7 = 7 Marks] (CLO

RTT	1	2	3	4	5	6	7	8	9	10	11	12	13
Congestion window	2	4	8	16	1	2	4	8	9	10	11	12	6 or 9

0.5 i. The data in table depicts TCP Tahoe or TCP Reno congestion control approach? Justify your answer.

Answer: The table shows TCP Reno because it ~~takeoffs~~ after second ss_thresh reach, it grows linearly.

ii. What happened after RTT 4? What is the value of ss_thresh after RTT 4?

Answer: ss_thresh reached and cwnd set to 1, The value of ss_thresh after RTT 4 = 16

iii. What happened after RTT 12? What is the value of ss_thresh after RTT 12?

Answer: ss_thresh reached and value of ss_thresh is 12.

iv. Which state/phase is the TCP in at transmission round (RTT) 13.

Answer: The TCP is in state when cwnd is halfed or halfed and added three to it.

0.5 v. Which state/phase is the TCP in between transmission rounds (RTTs) 5 to 8.

Answer: TCP is in state where ss_thresh is reached and cwnd is set to 1 and grows exponentially.

0.5 vi. Which state/phase is the TCP in between transmission rounds (RTTs) 9 to 12.

Answer: The TCP is in state of linear growth of cwnd, because half of ss_thresh is reached.

vii. Which state/phase is the TCP in between transmission rounds (RTTs) 1 to 3.

0.5 Answer: The TCP is in ~~state~~ initial state and exponentially increasing cwnd.

on 3: A UDP receiver has received the following data bits and checksum bits. [3+1+3 = 7 Marks] (CLO 4)

bits: 0110 0110 0110 0000 0101 0101 0101 0101 1000 1111 0000 1100

hecksum bits: 1011 0101 0011 1101

How will the receiver verify if the data received is valid or in error? (Show detailed step by step working.)

Answer:

7

0110 0110 0110 0000

0101 0101 0101 0101

1011 1011 1011 0101

1000 1111 0000 1100

0100 1010 1100 0001

+ 1

0100 1010 1100 0010

First the receiver will divide the data bits into chunk of 16 bits Here, 3 chunks will be made. After that receiver will add up all the chunks with wrap-up (if carry) and take 1's complement of the sum. If the sum equals checksum bit it means data is valid otherwise incorrect.

Complementing bits

1011 0101 0011 1101

(1011 0101 0011 1101)

which is equal to check sum bits

Hence, the data bits received by receiver are valid.

If sum would not have been equal to checksum, data would be incorrect.

Question 4: An ISP is granted a block of addresses starting with 170.25.100.0/20. The ISP [2+4.5+4.5 = 11] these addresses to three groups of customers as follows:

- The first group has 8 customers: each customer needs 256 addresses (including network and
- The second group has 16 customers: each customer needs 64 addresses (including network and broadcast).
- The third group has 64 customers: each customer needs 16 addresses (including network and broad

The IT department of ISP designs the sub-block (subnets) for each group of customers strictly accord addresses required by customers in each group.
You are required to answer the following questions with respect to this scenario. Make sure that IP addresse are necessarily written in dotted decimal notation.

I. Write the subnet mask for each group of customers. [2]

Answer:

Subnet mask for first group customers:

255.255.255.0

Subnet mask for third group customers:

255.255.255.240

II. Write the network address for 1st customer of each group: [1.5+1.5+1.5]

Answer:

Network address of 1st customer of first group:

170.25.96.0/24

Network address of 1st customer of second group:

170.25.104.0/26

Network address of 1st customer of last group:

170.25.108.0/28

III. Write the broadcast address of last customer of each group: [1.5+1.5+1.5]

Answer:

broadcast address of last customer of first group:

170.25.103.255/24

broadcast address of last customer of second group:

170.25.107.255/26

broadcast address of last customer of third group:

170.25.111.255/28