FAST NATIONAL UNIVERSITY OF COMPUTER AND EMERGING SCIENCES
KARACHI CAMPUS

Spring 2024
Computer Networks (CS 3001)

Assignment No. 2
"Transport Layer Services"

Date: 15/03/2024

Maximum mark: 50

Submission Guidelines:

- **Assignment should be completed neatly in handwritten and submitted in pdf format.**

- **Write your name, roll number and section on top of the first page of the assignment.**

- **Submission deadline by 24th March 2024. All the submission will be via Google Class Room.**

- **Email submission will not be considered.**

- **Plagiarism will be treated strictly. Marks will be reduced for assignment that have found in plagiarism.**

- **Penalties for late submission of assignment:**

   o **50% reduction will be applied for submissions made 24 hours after the deadline**
   o **No awards will be granted 48 hours past the deadline.**

Question 1:   **[4 * 2.5 = 10 Marks]**

i.   The transport layer provides logical rather than physical communication between application processes. Explain and illustrate how?

ii.   Provide examples of applications where UDP is preferred over TCP.

iii.   Define the role of the **rdt_rcv()** function in the RDT protocol. How does it differ from the **rdt_send**() function?

iv.   Describe the purpose of the **udt_send**() function in the RDT protocol.

Question 2:   **[10 Marks]**

Checksum is an error-detecting code used in many Internet standard protocols, including IP, TCP, and UDP. You have to generate Checksum for the following data blocks, which are transmitted using UDP.

| 0111001010110011	1011001110101000	1011101100110101

Question 3: [10 * 2 = 20 Marks]

Write the values of the following fields of the TCP header, in 'decimal' notation format. The stream, from which the values are to be extracted, is written below in hexadecimal notation.

000Y 00Z0 0000 0001 0000 0000 3FF0 0000 000X FFFF 0100 0000 0010 0000

(1) Source Port number, (2) Destination Port, (3) Sequence Number, (4) Acknowledgement number, (5) TCP header length, (6) ACK bit, (7) FIN bit, (8) SYN bit, (9) Window size, and (10) Checksum.

Note!
(a) The given stream is of total 224 bits.
(b) In the given stream, 'Option' field uses 32-bits to show its value.
(c) There is also some contents of the 'data' field, and is shown by the last 32-bit values in the given stream.
(d) X, Y, and Z in the given stream are the parts of student ID number. The most significant digit of the ID will be assigned to variable X, second-most-significant to Y and Z for third-most-significant (i.e. the 2nd last) digit in ID. That is, if the student ID is "20k-1165", then X=1, Y=1 and Z=6. Every student must have to calculate values of X,Y and Z, as per their IDs to attempt this question.
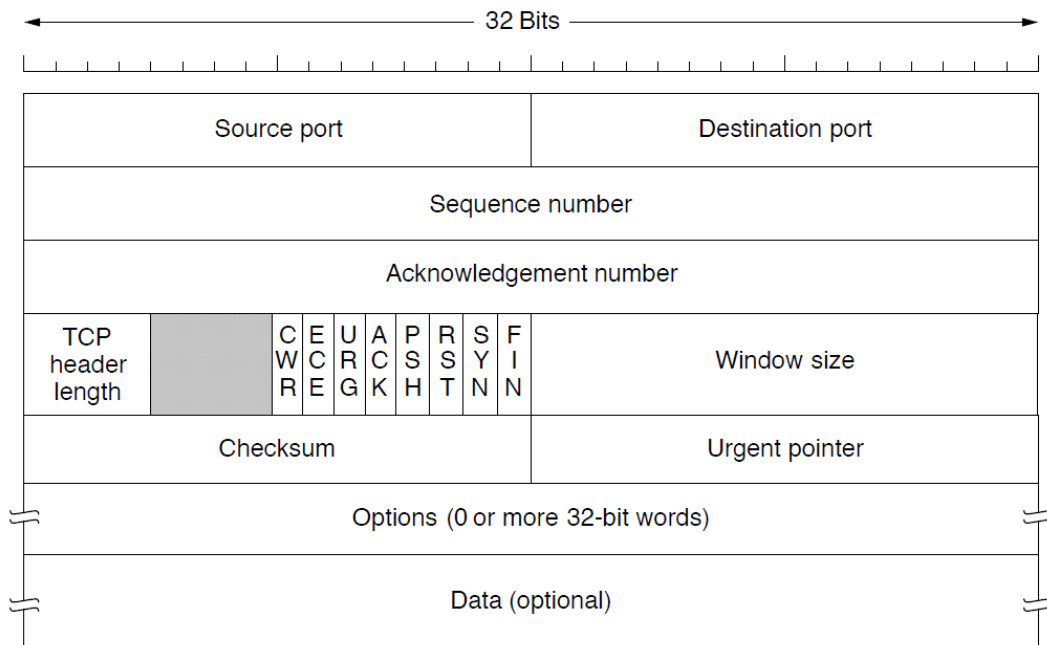
Question 4: [5 * 2 = 10 Marks]

A computer with IP Address: 202.28.33.21 sends a request to another computer. The request contains following UDP header:

0019D36A001C001C

Categorize content of above UDP header by answering the following questions
a)   What is the source port number?
b)   What is the socket address of the sender end?
c)   What is the total length of the user datagram?
d)   What is the length of data
e)   Is the packet directed from a client to a server or vice versa?

"THE END"