Assignment #2

Q#1:

i). The transport layer provides logical communication b/w application procedures by establishing connections, managing data flow, and ensuring data integrity. It abstracts the underlying network details, and allows application to communicate without worrying about the physical network.

Imagine two Computers A and B, connected over a network. Computer A is running multiple application eaching requiring Communication with specific application on computer B.

1. Transport layer ou Computer A recieves data from different app and adds port numbers to distinguish b/w them.

2. Transport layer segments the data if needed and sends it to Computer B.

3. Computer B the transport layer recieves the segments, reassemble them based on the port number and delivers the data to respective app.

ii) examples.

(Skype, Zoom)

Real Time Communication: VoIP, online gaming.
Streaming Media: Netflix, Youtube, Twitch
DNS: Quick domain name resolution
IOT and Sensor Data: IOT devices, sensor network.
Broadcasting: Live video streaming.

iii) rdt_rcv() & rdt_send()

redt_rcv()
~~Rate~~ Responsible for receiving data from the network, error checking, and delivery to upper layer whereas

rdt_send() is responsible for sending data over the network, providing reliable delivery, error checking and flow control.

iv) Purpose of udt_send() function in RDT protocol

protocol simulates the sending of data over an unreliable channel. It allows the RDT protocol to test and validate the reliability and correctness of the data transfer mechanism's in a controlled environment, mimicking the behavior of real network.

Q2)
```
   u  u
  2 2 21 2 1 2 1 1 1
1011100101011001011
 101100110101000            0000000 1100 10010     1 = 1
 1011101100 110101                                 2 = 10
 101000011 0010000                                 3 = 11
Sum =                       101010010101011100     4 = 100
Complement of sum = 001000101010001 → checksum     5 = 101
                                                    6 = 110
                                                    7 = 111
```

Q2)
```
    1101  101 1  1011 111
    0111  0010  1011  0011
    1011  0011  1010  1000
+   1011  1011  0011  0101
  (1)1110 0001 1001 0000
                    → + 1

    1110 0001 1001 0001
```

Complement ~   0001 1110 0110 11 10

checksum.

SP	DP	Seg No	ACK NO.				
000Y	0020	0000 0001	0000 0000	3FF0 0000	000X	FFFF	0100 0000
							0010 0000

Q//3 (a) ID = 21K-4653   X=4, Y=6, Z=5

Source Port = (000 Y)₁₆ → 06 (Decimal Notation).
Destination Port = (0020)₁₆ → 058

Sequence No. (0000 0001)₁₆ = 1
Ack No. (0000 0000)₁₆ = O
TCP Header

$$3 = 0011$$
$$3FF0 \begin{cases} F = 1111 \\ F = 1111 \\ 0 = 0000 \end{cases}$$

TCP HL
0011 1111 1111 0000 →

URG PSH   SYN
ACK RST   FIN

TCP Header Length: 3×4 = 12 bytes

ACK bit = 1   Type of segment: ACK
FIN bit = 0
SYN bit = 0

Window Size: (0000)₁₆ = 0

Check sum = (000X) = (0004)₁₆ = 4

Q4/1.   IP = 202.28.33.21

UDP Header = 0019D36A001C001C

a) What is the source port number:-

first 16 bits.

0019 (hexa decimal)

b) what is the socket address of the sender end?

(hexa decimal) → (decimal)

0019   →   25 source port number.

and   source IP 202.28.33.21 → 202.28.33.21.25

c) What is the total length of user datagram:-

Total length of the user datagram is the third &
fourth 16-bit words. of the header. which is
001C (hexadecimal) = 28 (Decimal).

d) What is the length of data:-

= Total length of the user datagram — The length of
header

=   28 - 8 = 20 bytes length of data.

e) Determining whether the packet is directed from a
Client to a Server or vice versa solely based
on UDP header. UDP is connection leu protocol
and the distinction b/w client and server is not
inherent   in the protocol itself.