Question 01: Select the correct answer(s) from the multiple choice questions and write them in the table given below. **Any answers outside the table will NOT be marked. [10]**

1) **b**	6) **b**
2) **c**	7) **c**
3) **d**	8) **a**
4) **b**	9) **a**
5) **a , b**	10)**d**

1. If the size of the packet is increased, the following delay will be increased

    a. Propagation delay

    b. Transmission delay

    c. None of the above

    d. Both of the above

2. The following is NOT a packet switching delay

    a. Queuing delay

    b. Processing delay

    c. Connection establishment delay

    d. Transmission delay

3. The utility used to determine the number of routers between sender and receiver is:

    a. route

    b. Ipconfig

    c. Ifconfig

    d. **Traceroute**

4. Which of the following layers can provide reliable data transfer facility to the applications?

    a. Application layer

    b. **Transport Layer**

    c. Network layer

d. None: Reliability needs to be implemented in the applications

5. Which of the following layer(s) are missing on routers?

a. **Application layer**

b. **Transport Layer**

c. Network layer

d. Data Link Layer

6. _____ socket(s) are needed to create a TCP connection

a. 1
b. 2
c. 3
d. 4

7. The following is NOT an advantage of DNS

a. Mail server Aliasing
b. Hostname to IP address resolution
c. Reliability
d. Load Distribution

8. In an ideal world scenario, we would like the Internet to

a. **Behave like circuit a switched network but use packet switching**
b. Behave like a packet switched network but use circuit switching
c. Always use packet switching
d. Always use circuit switching

9. If A wants to send an email to B, A will use _____ protocol(s) to send the email to B's mailbox

a. **SMTP**
b. POP3
c. IMAP
d. All of the above.

10. In order to download 4 files simultaneously from an FTP server, you need _____ connections

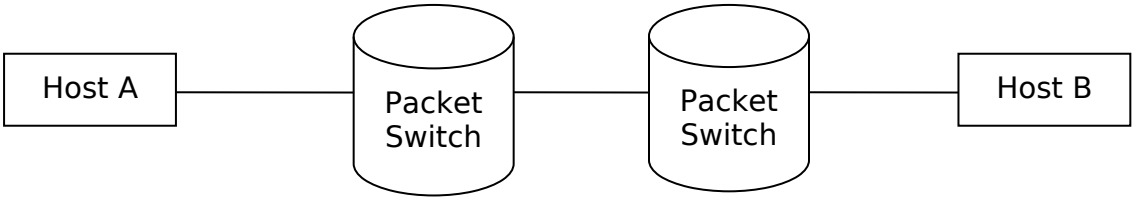
a. 2
b. 3
c. 4
d. **5**

Question 02: True/False questions [4]

1. [T / **F**] HTTP prefers out-of-band signaling.
2. [**T** / F] DNS uses UDP as the transport layer protocol.
3. [T / **F**] Since all the features provided by UDP are given by TCP as well, we don't need UDP.
4. [T / **F**] IMAP protocol is used for sending mail from a user agent to a user agent.

Question 03: In modern packet-switched networks, the source host segments long messages into smaller packets and sends the packets into the network. The receiver then reassembles the packets back into the original message. This process is called message segmentation.

Consider a message that is 8 x 10^6 bits long that is to be sent from source to destination in Figure shown below. Suppose each link in the figure is 2 Mbps. Ignore propagation, queuing, and processing delays.



(a) Consider sending the message from source to destination without message segmentation. Keeping in mind that each switch uses store-and-forward packet switching, what is the total time to move the message from source host to destination host? [4]

Time to send message from source host to first packet switch =

$(8 \times 10^6)/(2 \times 10^6) = 4$ seconds

The total time to move message from source host to destination host = 4sec×3 hops =12sec

(b) Now suppose that the message is segmented into 800 packets, with each packet being 10,000 bits long. Keeping in mind that each switch uses store-and-forward packet switching, How long does it take to move the file from source host to destination host when message segmentation is used? [6]

Time taken to move the first packet from source host to the first switch =

$(10{,}000/(2 \times 10^6)) = 0.005$ seconds

First packet reaches destination host at (0.005 * 3)

After that one packet is received every 0.005 seconds.

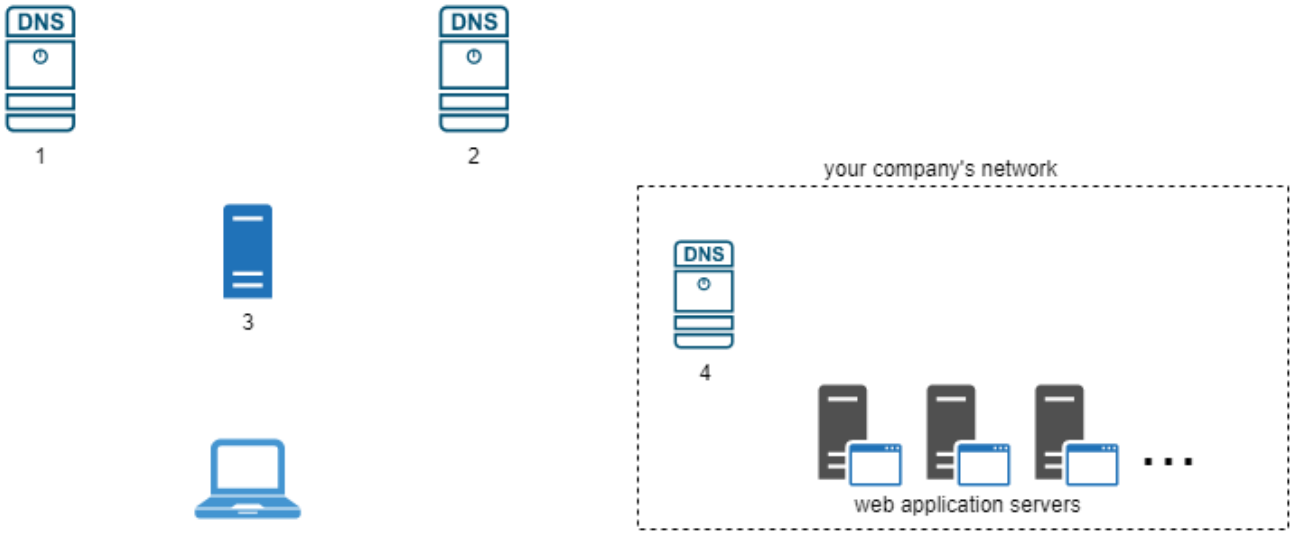
Thus total time = (0.005 * 3) + (799*0.005) = 0.015 + 3.995 = 4.01 seconds

Question 04: Suppose you would like to create a startup and register its domain name called www.TheBestCompany.com . In order to register a domain name, you will have to go to DNS registrar to enter Resource Records (RR) in the DNS distributed database. Below is a sketch that you will have to complete to show the connectivity between the end-systems to resolve the IP address of the startup you just initiated. Assume that you 100,000 web servers and your own name server.

You are required to write the two RRs needed to make this whole system work by filling the table below:

NAME	VALUE	TYPE

Draw the arrows and label each arrow with a sequence number below: (5)



A. End-hosts labelling (4)

1. _____
2. _____
3. _____
4. _____

B. Which type of query did you generate in the above diagram?

_____ (1)

C. In which server will the two RRs be inserted that you filled in the table above?

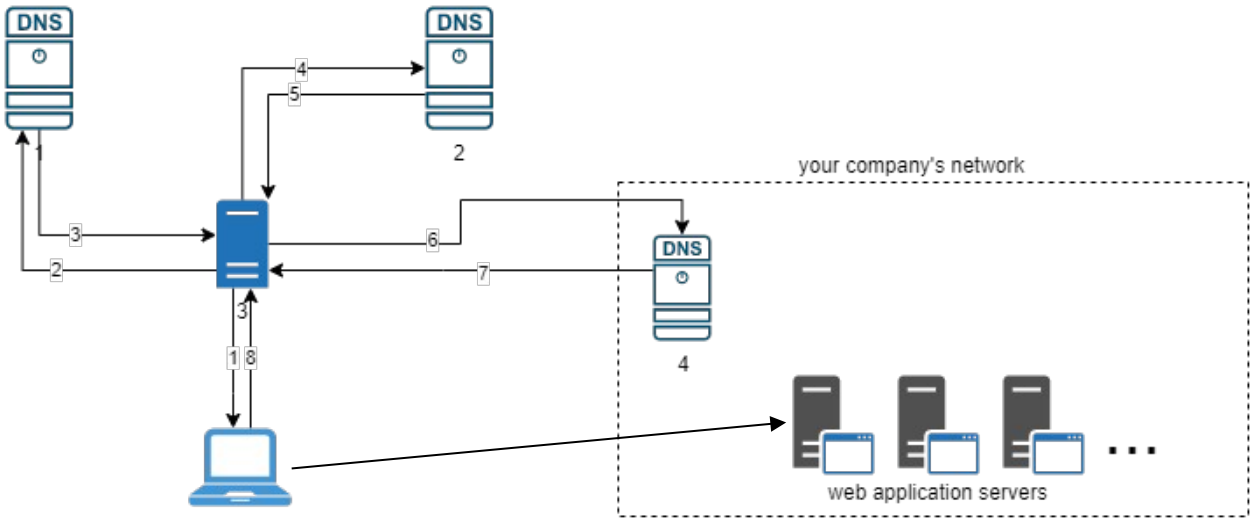
_____ (1)

Solution (4A): Suppose you would like to create a startup and register its domain name called www.TheBestCompany.com . In order to register a domain name, you will have to go to DNS registrar to enter Resource Records (RR) in the DNS distributed database. Below is a sketch that you will have to complete to show the connectivity between the end-systems to resolve the IP address of the startup you just initiated. Assume that you 100,000 web servers and your own name server.

You are required to write the two RRs needed to make this whole system work by filling the table below:

NAME	VALUE	TYPE
www.TheBestCompany.com	dns.authServ.TheBestCompany.com	NS
dns.authServ.TheBestCompany.com	152.79.111.57	A

Draw the arrows and label each arrow with a sequence number below: (5)



A. End-hosts labelling (4)

1. _____**Root DNS server**_____
2. _____**TLD name server**_____
3. _____**Local (default) name server**_____
4. _____**Authoritative DNS server**_____

B. Which type of query did you generate in the above diagram?

_____**Iterative**____ (1)

C. In which server will the two RRs be inserted that you filled in the table above?

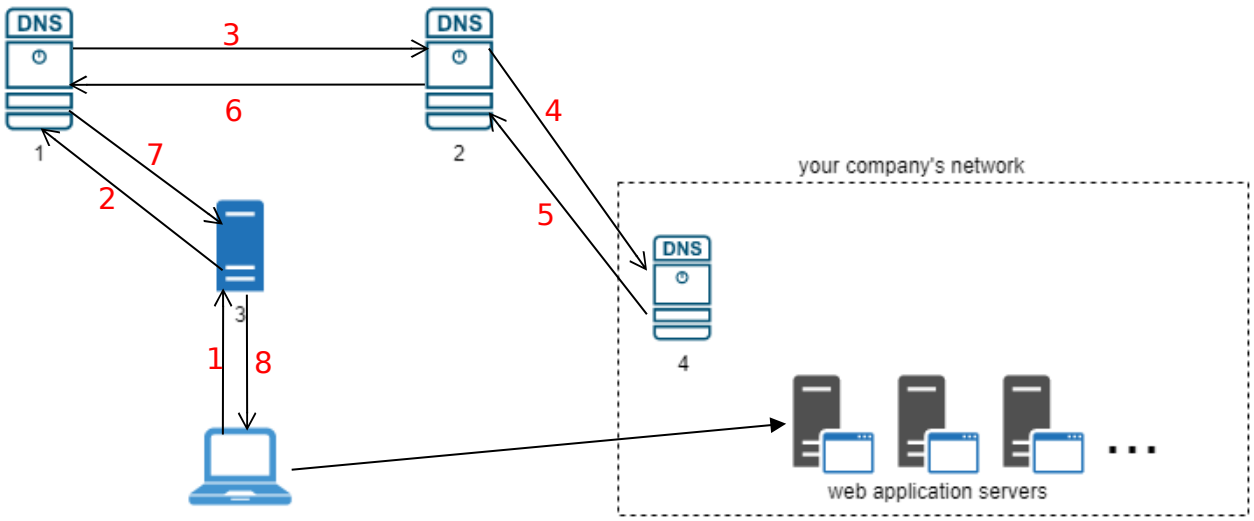
__**TLD**__ (1)

Solution (4B): Suppose you would like to create a startup and register its domain name called www.TheBestCompany.com . In order to register a domain name, you will have to go to DNS registrar to enter Resource Records (RR) in the DNS distributed database. Below is a sketch that you will have to complete to show the connectivity between the end-systems to resolve the IP address of the startup you just initiated. Assume that you 100,000 web servers and your own name server.

You are required to write the two RRs needed to make this whole system work by filling the table below:

NAME	VALUE	TYPE
www.TheBestCompany.com	dns.authServ.TheBestCompany.com	NS
www.TheBestCompany.com	152.79.111.57	A

Draw the arrows and label each arrow with a sequence number below: (5)



A. End-hosts labelling (4)

1. _____**Root DNS server**_____
2. _____**TLD name server**_____
3. _____**Local (default) name server**_____
4. _____**Authoritative DNS server**_____

B. Which type of query did you generate in the above diagram?

_____**Recursive**____ (1)

In which server will the two RRs be inserted that you filled in the table above?
__**TLD**__ (1)