

Q1

Ans

DNS provides name-to-address resolution for TCP/IP-based network. Name-to-address resolution, also referred to as mapping, is the process of finding the IP address of a computer in a database by using host name as an index.

Q2

Ans

While it creates three segments to establish a connection, it takes four segments to terminate. During a TCP connection, if full duplex, each direction should be shut down alone.

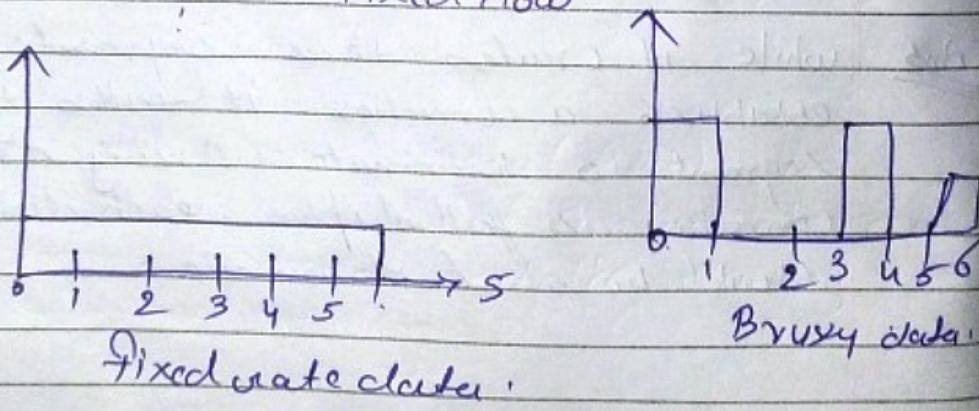
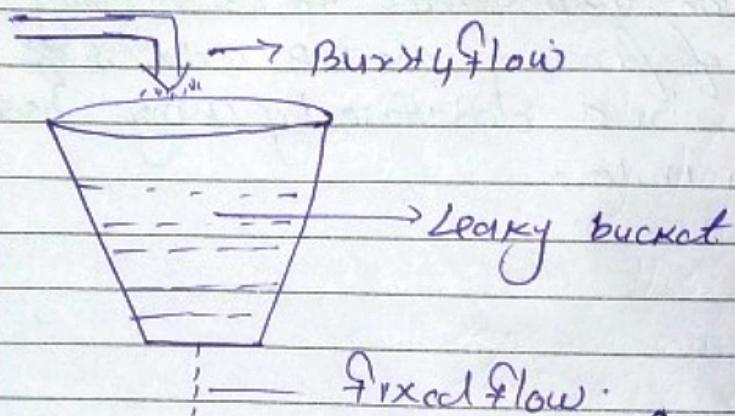
Q3

Ans

If a bucket has a small hole

Q3

- 1) A leaky bucket algorithm shapes bursty traffic into fixed rate traffic by averaging the data rate. It may drop the packets if the bucket is full.

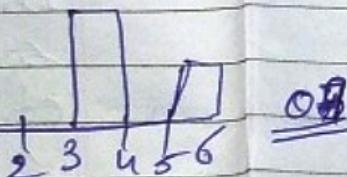
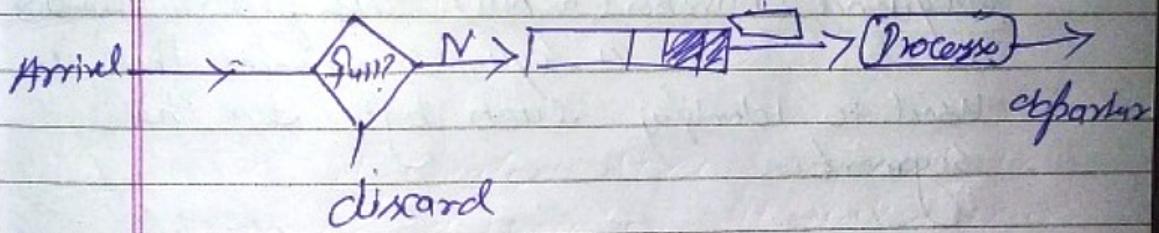
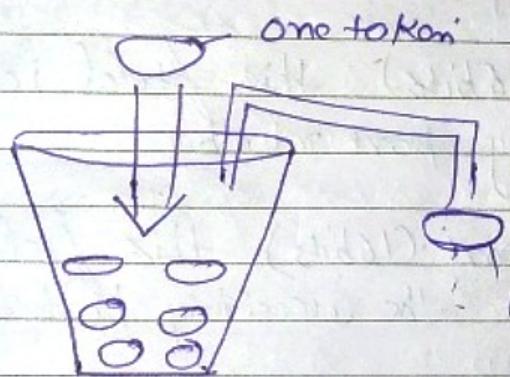
Ans

Traffic shaping is a mechanism to control the amount and rate of the traffic sent to a network. Two approaches: 1) Leaky bucket and token bucket

The
no
vel
etc
To

shapes
traffic
it may
not be full.

Token bucket: The token bucket allows traffic at a regulated maximum rate.



Bursty data

Ans The TCP is a protocol used in computer networks to establish and maintain a reliable connection between two devices. The TCP header is a part of the TCP segment.

in TO
of the
two

1 token budget

The TCP header has a fixed size of 20 bytes - although options can be included which can increase the size of the header

Q8

Source port (16 bits): this field identifies the sending port number

Ans

Destination port (16 bits): this field identifies the receiving port number

A 11
P

Sequence number (32 bits): this field contains a sequence number that is used to identify each byte in the segment.

② A
③ P

Acknowledgment number (32 bits): this field contains the next sequence number that the receiving device is expecting.

④ A
⑤ S

data offset (4 bits) => this field specifies the size of the TCP header in 32 bit words

⑥ P

Reserved (6 bits) => these bits are reserved for future use and currently set to 0.

e of
included
headers

Q8

Ans

Flags (6 bits) in TCP Header.

- ① URG (Urgent): indicates that the urgent pointer field is significant.
- ② ACK (Acknowledgment): indicates that the Acknowledgment field is significant.
- ③ PSH (Push): pushes the data to the receiving application immediately.
- ④ RST (Reset): Resets the connection.
- ⑤ SYN (Synchronize): synchronizes sequence number to initiate a connection.
- ⑥ FIN (Finish): indicates that the sender has finished sending data.

Q9

Ans

CIDR stands for classless inter domain Routing, which is a method for assigning the IP address and routing internet protocol packets more efficiently.

To determine on which interface the packet with address 131.23.151.76 will be forwarded, we need to find the longest matching prefix in the routing table.

Ans

Destination IP \rightarrow 131.23.151.76

Subnet mask 1111111.11110000.00000000.00000000

Network add 131.16.0.0

1 Prefix 131.16.0.0/12 : matches the destination IP address .12 bit subnet.

2 Prefix 131.20.0.0/14 \rightarrow do not match

- iii) Prefix : 131.19.0.0/16 does not match.
iv) 131.22.0.0/15 does not match
- Therefore, the longest matching prefix is 131.16.0.0/12. The packet will be forwarded to output interface 3 according to routing table.

domain
assigning
internal
interface
3.151.76.
And
the cracking
010

76

Ans

Bucket Algorithm

- i) Bucket Algo is a method of regulating network traffic that uses a virtual bucket to control the rate at which packets are transmitted.
- ii) When a packet arrives, it is added to the bucket.

- iii) if bucket is full, the packet is dropped.
- iv) Packets are then transmitted from the bucket at a fixed rate.

Leaky Bucket

- i) Leaky Bucket Algo is another of regulating networks traffic that uses a virtual bucket to control the rate at which packets are transmitted.
- ii) Packets are added to the bucket as they arrive.
- iii) the excess packets are dropped.

The main difference b/w Algorithm to packets up added to the virtual bucket

is dropped.

from the

a configuration

a virtual.

not as they

spec

in to
mail bucket

Q11

Ans

A domain name is an easy to remember strings of characters used to identify one or more IP addressing they are typically used to identify and locate websites on the internet.

The translation of domain name to its corresponding IP address is done through the Domain Name System. When you enter a domain name in your browser, the browser sends a request to your internet service provider's DNS server to resolve the domain name to an IP address.

Q12

Ans

The TCP is responsible for establishing and maintaining reliable communication between network devices.

Connection establishment

1) The clients send a SYN (Synchronous) packet to the Server, indicating that it wants to initiate connection.

2) The Server receives the SYN packet and responds with SYN-ACK packet. Q13

3) The Client receives the SYN-ACK packet and sends an ACK packet to the Server, completing the three-way handshake and establishing the connection.

Connection termination

1) The Client sends a FIN Packet to the Server, indicating that it wants to terminate connection.

2) The Server receives the FIN packet and send an ACK packet back to Client.

- ACK packet → 013
- 3) the server then sends its own FIN packet to the client indicating that it also wants to terminate the connection.
- 4) The connection is then closed on both ends.

synchronize
that

packet

ACK packet.

N-ACK

ACK packet Ans

the three way

connection

IPv6 (Internet Protocol Version 6) is the most recent version of the internet protocol that is designed to replace the current IPv4 protocol.

Advantages over IPv4, including

Packet to
+ wants

1) Larger Address space → 128 bit compared
to IPv4 32 bit address

2) Simplified Header format. IPv6 is simple.
Header format:

3) Better Security ⇒ IPv6 includes built-in security features such as IPsec + provides authentication and encryption.

Packet
back

4) improved quality of service

Q14

IPv4 Format

The IPv4 frame format consists 14 fields

Q15

- | | |
|--------------------|-----------------------|
| 1) Version | 8) Time to Live |
| 2) Header length | 9) Protocol |
| 3) type of Service | 10) Header checksum |
| 4) total length | 11) Source IP address |
| 5) Identification | 12) Destination IP , |
| 6) Flags | 13) Options |
| 7) Fragment offset | 14) data. |

Q16

S

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OR

COR

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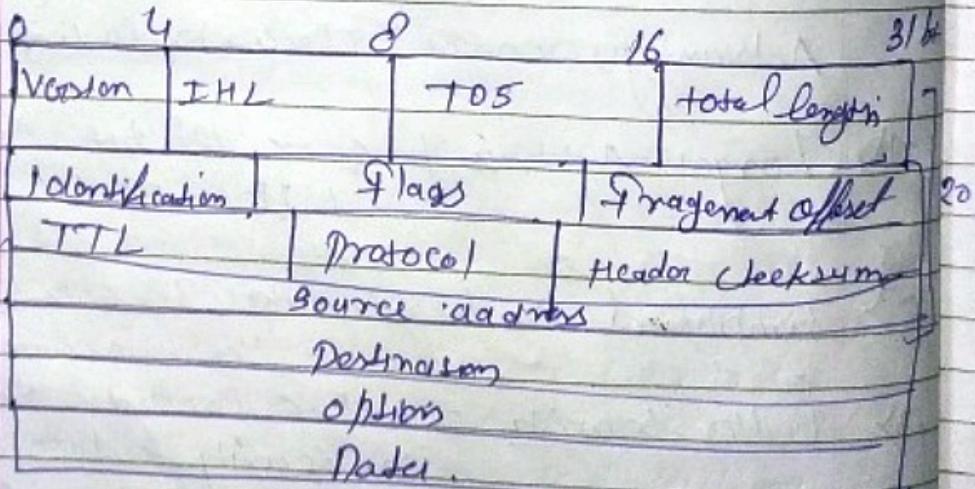
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Q14

By

Same as Q12

Ans 14 Fields

Q15

Live

Q16

TELNET \Rightarrow It is a protocol used for remote access to a computer or network device. It allows users to connect to a remote system and interact with it as if they were physically present. Telnet is an unencrypted protocol.

314

SMTP (Simple mail transfer protocol)

It is used for sending and receiving email messages. It is used to send messages from client to mail server over the mail server. SMTP is port based protocol that is based 25 ports by default.

3) FTP (File Transfer Protocol)

It is a protocol used for transferring files over a network. It commonly used for downloading files from a remote server or uploading files to a remote server. FTP can use two channels Command channels and data channels. Command channel is used to send the command to the server while data channel is used to transfer files. The FTP is used port 21 for command channels and port 20 for data transfer.

4) HTTP (HyperText Transfer protocol)

It is used for transmitting data over the internet. It is the foundation of data communication on worldwide web. HTTP uses port 80 by default, but it can also use port 443 for secure communication over HTTPS. It provides encryption and authentication to ensure secure communication between client and server.

017

hosting files
need
a remote
a remote
a channel
channels
channel
send
while
parties
For
For

Ans

Classful addressing and classless addressing are two different approaches to assigning IP addressing.

Classful addressing was the original scheme for assigning IP addressing and it is based on dividing the IP address space into five classes A, B, C, D and E where each class has a predefined range addressing.

Classless: Classless addressing is now the standard method for assigning IP addressing. It allows for more efficient use of IP addressing space, more flexible network design and easier management of IP address.

08

rotors 13
data
conclusion
wide
difficult
443
HTTPS
connection
8110

Ans

Connecting devices, also known as networking devices, are essential components of any computer network. They allow different network devices to communicate with each other by transmitting and receiving data signals.

Q4

Ans

i) Hub : A hub is a simple connecting device that connects multiple network devices, such as computers, or printers etc.

ii) Switch → A switch is more advanced connecting device that is used to connect multiple devices on a network.

iii) Router : A router is a connecting device that is used to connect different networks together, such as a home network and Internet.

iv) Bridge → A bridge is a connecting device that connects two similar networks together.

① Repeater ② modem.

networking
of one
different
rate with
queueing

smoothing
the network
inter-arrive.

is advanced
is used
on a queue

smoothing
cannot
such as 9

networking
concept

Q4

Ans

$$\text{Bucket size} = (\text{Out Rate} \times \text{maximum}) + \text{input}$$

$$\text{Maximum Latency} = \text{Time b/w input} + \text{Time empty}$$

$$\text{maximum} = (48 + 12) = 60 \text{ seconds}$$

$$\text{inputBurst} = \text{Input Rate} \times \text{Time of input}$$

$$\text{Input Burst} = 100 \text{ kb/min} \times 12 / 60 \text{ min} = 20 \text{ kb}$$

$$\text{Bucket size} = (5 \text{ kb/min} \times 60 \text{ sec}) + 20 \text{ kb}$$

$$320 \text{ kb}$$

Q19

Ans

Number of bits reserved for network
ID = 8

number of bits reserved for Host ID
24

Q20b1

Source IP Address = 200.100.1.1

Destination IP Address = 255.255.255.255

Q22Q21a3

Minimum header size of IPv4 = 20 bytes.

Maximum header size = 60 bytes

Header length field IPv4 is 4 bits

maximum possible value (1111) = 15

the scaling factor = $\frac{60}{15} \rightarrow 4$

4 is introduced

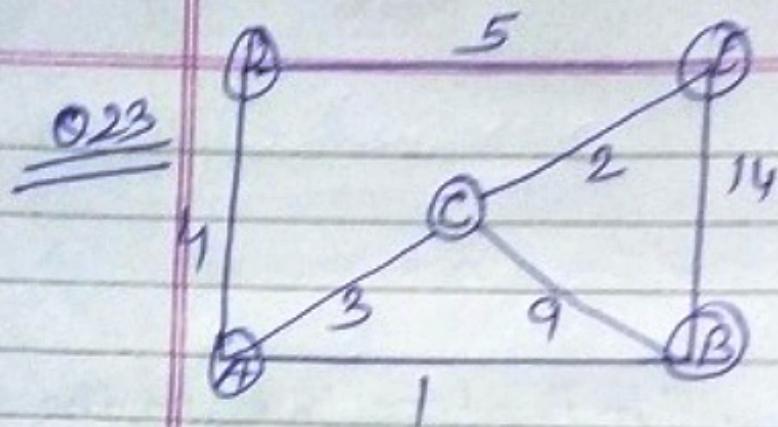
022

Ans

First address : The first address in the blocks can be found by setting $32-n$ rightmost bits in the binary notation of the address 0's.

Last Address \Rightarrow The last address in the blocks can be found $32-n$ rightmost binary notation of address 1's.

Number of Addresses : The number of addresses between the first and last address is 2^{32-n} .



Update C

A	Source	dest	next	B	Source	dest	next
A	0			A	1		
B	1			B	0		
C	3			C	9		
D	4			D	0		
E	0	C		E	14	A	

(C)

	Source	dest	next
A	3		
B	9		
C	0		
D	0	A	
E	2		

(D)

	Source	dest	next
A	5		
B	0	A	
C	0	E	
D	0		
E	5		

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e)

source	dest	next
A	0	(C)
B	14	
C	2	
D	5	
E	0	

Update only C'

new

so	dest	now
A	3	
B	9	
C	0	
D	0	(A)
E	2	

A + C'

so	dest	now	A + C
A	3		4
B	4		0
C	6		7
D	7		2
E	0		

C + E

3	0
4	16
0	4
9	7
2	2

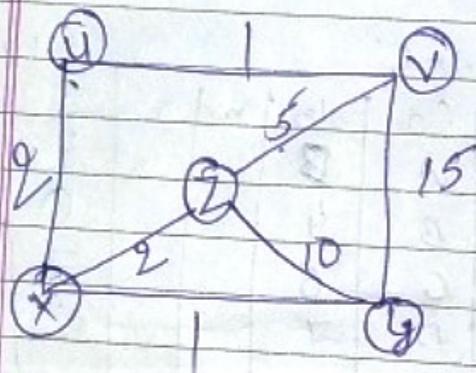
C + B

3	4	10	3
4	0	9	4
0	7	10	0
9	2	8	7
2	2	23	2

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final table c:

A	3
B	4
C	0
D	7
E	2



X	Source	dest	pred
X	0		
Y	1		
Z	2		
U	2	2	
V	0	0	0

Y	S	D	Next
X	X	1	
Y	Y	0	
Z	Z	10	
U	U	0	X
V	V	15	

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(D)	S	D	Next
X	2		
Y	10		
Z	0		
U	0	X	
V	5		

(W)	S	D	Next
X	2		
Y	0	X	
Z	0	X	
U	0	X	
V	1		

(V)	S	D	not
X	0	X	
Y	15		
Z	5		
U	1		
V	0		

Update Z

	X	Z+0X	Z+0Y	Z+0V	Z+0V	Z+0Y	
Z+	0	2	2	0	2	11	2
Z+	1	10	3	20	3	10	3
Z+	2	0	0	10	0	20	0
Z+	2	0	0	6	6	0	6
Z+Z	0	5	5	5	5	25	5

X	2
Y	3
Z	0

→ Update value of Z

Q25Ans.

Cryptography is technique of securing information and communication through use of codes so that only those person for whom the information is intended can understand its and process it.

Public key and private key are the part of Asymmetric Key cryptography.

Asymmetric Key \rightarrow Under system of

pair of keys is used to encrypt and decrypt information.

A public key is used for encryption and private key is used to decryption; public and private keys are different from each other.

Q26Ans.

Q26

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Ans. given IP in class C.

- 24 bits Net ID
- divided 2 subnets
- so 1 bit is borrow of host

Q2. The number bits remaining $ID = 7$

host per subnet = $\frac{7}{2} = 128$.

Subnet Address : $192.16.0.000000$
 $= 192.16.0.$

First Host ID $\rightarrow 192.16.0.1$

Last Host $= 192.16.0.126$.

Broadcast Address $\Rightarrow 192.16.0.11111111$
 $192.16.0.127$

Q27IPv4Ans

The 8 bit of packet are 01000000.
this corresponding to decimal 64
this value is not valid version
number for IPv4 protocol which
only supports version 4 and 6.
Therefore, the receiver discards
the packet as it is not a valid
IPv4 packet.

True \Rightarrow 4 (0100) and 6 (0110).