

## Assignment-III

NAME:

Class Roll No. :

Section:

University Roll No:

Note: Student must submit hard Copy by 18.04.2022

1. Explain the basic name resolution techniques in DNS
2. Explain the process of calculating the checksum for UDP datagram.
3. Explain the connection establishment and termination process in TCP.
4. In a leaky bucket used to control network flow, what should be the size of the bucket to hold the data flow for 10 mins, if the output rate is 5kb/min, there is an input burst 100 kb/min for 12s, followed by no input for 48s, in each cycle of 1 min?
5. Mention in detail the traffic shaping approaches.
6. Consider an instance of TCP's additive increase Multiplicative Decrease (AIMD) algorithm. Where the window size at the start of the slow start phase is 2kB and threshold at the start of the first transmission is 8 KB. Assume that a time out occurred.
7. Explain the detailed TCP Header Format.
8. Explain in details the six flag bits in TCP header.
9. What is CIDR? Class less Inter domain Routing (CIDR) receives a packet with address 131.23.151.76. The router's routing table has the following entries: Prefix Output Interface Identifier

Prefix Output Interface	Identifier
131.16.0.0/12	3
131.28.0.0/14	5
131.19.0.0/16	2
131.22.0.0/15	1

On which interface this packet will be forwarded. Justify your answer with suitable reason

10. How token Bucket algorithm is different from Leaky bucket algorithm.
11. What is domain name? How is a domain name translated into equivalent IP address?
12. Explain the connection establishment and termination process in TCP.
13. What is IPv 6? Explain its advantage over IP v4. Also explain the frame format of IP v4.
14. Explain the Three way Handshaking in TCP.
15. Explain the TELNET,SMTP ,FTP,HTTP protocol in brief.
16. Explain the all Connecting Devices in Detaille.
17. Explain the Classful addressing and classless addressing.
18. Explain the all Routing Protocol with suitable example.

**Section B**

**Note: Attempt any Four Questions (3x4=12)**

- I. Explain the basic name resolution techniques in DNS.
- II. Explain the process of calculating the checksum for UDP datagram.
- III. Explain the connection establishment and termination process in TCP.
- IV. In a leaky bucket used to control network flow, what should be the size of the bucket to hold the data flow for 10 mins, if the output rate is 5 kb/min, there is an input burst of 100 kb/min for 12 s, followed by no input for 48 s, in each cycle of 1 min.?.
- V. Mention in detail one of the traffic shaping approaches.

**Section C**

**Note: Attempt any Three Questions (4x3=12)**

- I. Consider an instance of TCP's Additive Increase Multiplicative Decrease (AIMD) algorithm where the window size at the start of the slow start phase is 2 KB and the threshold at the start of the first transmission is 8 KB. Assume that a time out occurred

Page 2 of 3

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**End Term.pdf**

**Note: Attempt any Four Questions (3x4=12)**

during the seventh transmission. Find the congestion window size at the end of the tenth transmission.

- II. Explain in details Electronic Mail using neat diagrams to represent various components used.
- III. Given with prime numbers  $p = 11$  and  $q = 13$  select a suitable  $e$  and  $d$  and explain the RSA Asymmetric key encryption and decryption technique.
- IV. Explain in detail the use of the six flag bits in TCP header.

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Attempt all question. Open with Google Docs 7 x 5 = 35 Marks

(i) What is CIDR? Classless Inter-domain Routing (CIDR) receives a packet with address 131.23.151.76. The router's routing table has the following entries: **Prefix Output Interface Identifier**

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• 131.16.0.0/12	3	
• 131.28.0.0/14	5	
• 131.19.0.0/16	2	
• 131.22.0.0/15	1	

On which interface this packet will be forwarded. Justify your answer with suitable reason.

(ii) Compare and contrast byte-stuffing and bit-stuffing with example. Which technique is used in byte-oriented protocols? Which technique is used in bit-oriented protocols?

(iii) Compare Go-Back-N protocol with Selective-Repeat protocol in terms of efficiency, number of retransmissions and window size (both sender and receiver). In GB3 if every 5th packet is lost and we need to send 10 packets so how many retransmissions are required?

(iv) How pure ALOHA network differs from slotted ALOHA? What is the vulnerable time of each? We have a pure ALOHA network with 100 stations. If  $T_{fr} = 1 \mu s$ , what is the number of frames/s each station can send to achieve the maximum efficiency.

(v) Write the responsibilities of network and transport layer in OSI reference model at Page 53 / 62 model

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Attempt all question. Open with Google Docs 7 x 5 = 35 Marks

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send to achieve the maximum efficiency.

(v) Write the responsibilities of network and transport layer in OSI reference model and compare OSI model with TCP/IP model.

(vi) Discuss the role of router and gateway in the network. Assume that source S and destination D are connected through two intermediate routers labeled R. Determine how many times each packet has to visit the network layer and the data link layer during a transmission from S to D.

(vii) What do you understand by the term cryptography? How symmetric key cryptography is differing from asymmetric key cryptography? Discuss the substitution cipher and transposition cipher.

**Section-B**

**(a) Attempt all question.** **3 x 2 = 6 Marks**

(i) How token bucket algorithm is differing from leaky bucket?

(ii) Generate the public key and secret key for the following prime numbers using RSA algorithm,  $P=3$ ,  $Q=11$  take  $E=5$ .

Page 53 / 62 —  +

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**Main Content Area:**

Section-B

**(a) Attempt all question.** **3 x 2 = 6 Marks**

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(iii) What is domain name? How is a domain name translated into equivalent IP address?

Page 53 / 62 —  +

Activity

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The screenshot shows a Windows desktop environment with a web browser open. The browser's address bar displays a URL from Google Drive: [drive.google.com/drive/u/0/folders/1E1-oKtCdtl7IK95wBcWRgtmDC-dDtnU](https://drive.google.com/drive/u/0/folders/1E1-oKtCdtl7IK95wBcWRgtmDC-dDtnU). The page content is a question from a document titled "term.pdf". The question is:

**(b) Attempt all question**

**3 x 3 = 9 Marks**

(i) Consider an instance of TCP's Additive Increase Multiplicative Decrease (AIMD) algorithm where the window size at the start of the slow start phase is 2 MSS and the threshold at the start of the first transmission is 8 MSS. Assume that a time out occurs during the fifth transmission. Find the congestion window size at the end of the tenth transmission.

(ii) IPv4 has some deficiencies that make it unsuitable for the fast-growing Internet and provide space for IPv6; comment on it, also explain the frame format of IPv6 datagram.

(iii) Explain the connection establishment and termination process in TCP.

In the background, a PDF viewer window is visible, showing a document with text and a table. A watermark for "GLA University, Math..." is present. At the bottom of the screen, there is a taskbar with various icons and system status indicators.

The screenshot shows a Windows desktop environment with a web browser open. The browser's address bar displays a URL from testbook.com: [testbook.com/question-answer/consider-an-instance-of-tcp-s-additive-incre--60925ea981ee1e9776e8b914](https://testbook.com/question-answer/consider-an-instance-of-tcp-s-additive-incre--60925ea981ee1e9776e8b914). The page content is a question from the "Computer Networks" section of the site.

**Question**

Consider an instance of TCP's Additive Increase Multiplicative Decrease (AIMD) algorithm where the window size at the start of the slow start phase is 2 MSS and the threshold at the start of the first transmission is 8 MSS. Assume that a timeout occurs during the fifth transmission. Find the congestion window size at the end of the tenth transmission.

This question was previously asked in GATE CS 2012 Official Paper. There is a "Download Solution PDF" button and an "Attempt Online" button.

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**More Computer Networks Questions**

Q1. If only 6 bits are reserved for sequence number field, then the

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**EXPLANATION:**

Initial window size or window size for first transmission: cwnd = 2 MSS

For 2nd transmission → cwnd =  $2^2 = 4$  MSS

For 3rd transmission → cwnd =  $2^3 = 8$  MSS

When threshold is reached then additive increase

For 4th transmission → cwnd =  $8 + 1 = 9$  MSS

For 5th transmission → cwnd =  $9 + 1 = 10$  MSS(fails)

Now window size reduced to  $10/2 = 5$  MSS

For 6th transmission → cwnd = 1 MSS

For 7th transmission → cwnd =  $2^1 = 2$  MSS

For 8th transmission → cwnd =  $2^2 = 4$  MSS

Threshold reached now additive increase

For 9th transmission → cwnd =  $4 + 1 = 5$  MSS

For 10th transmission → cwnd =  $5 + 1 = 6$  MSS

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For 5th transmission → cwnd =  $9 + 1 = 10$  MSS(fails)

Now window size reduced to  $10/2 = 5$  MSS

For 6th transmission → cwnd = 1 MSS

For 7th transmission → cwnd =  $2^1 = 2$  MSS

For 8th transmission → cwnd =  $2^2 = 4$  MSS

Threshold reached now additive increase

For 9th transmission → cwnd =  $4 + 1 = 5$  MSS

For 10th transmission → cwnd =  $5 + 1 = 6$  MSS

So, at the end of 10th successful transmission

The congestion window size will be  $6 + 1 = 7$  MSS

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**Note: Attempt ANY FIVE Questions.**  $5 \times 4 = 20$  marks

(I) a) Suppose two friends have created a network using Bluetooth. Mention the name of IEEE standard that these friends will be making use of.  
 b) What is the relationship between period and frequency?

(II) a) What is vulnerable time in slotted aloha?  
 b) How do guided media differ from unguided media?

(III) a) List the name of protocol or protocols, in which it is possible for the sender to receive an ACK for a packet that falls outside its current window?  
 b) 50 employees are working in an organization and everybody wants to link with everyone. If the length of one link is 5 meters, then how much length of cable required?

(IV) a) How many bits are allocated for NID and HID IN 23.197.157.234?  
 b) A host with IP address 200.100.1.1 wants to send a packet to all hosts in same network, what is the source IP address and destination IP address?

(V) a) Compare and contrast a circuit-switched network and a packet-switched network.  
 b) What is difference between bit rate and baud rate? Explain it with suitable diagram?



2. a) How many bits are allocated for NID and HID in 23.197.157.234?

b) A host with IP address 200.100.1.1 wants to send a packet to all hosts in same network. What is the source IP address and destination IP address.

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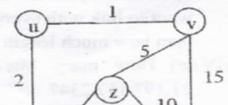
**Note: Attempt ALL Questions.**  $5 \times 3 = 15$  marks

(VI) a) An IPv4 packet has arrived with the first 8 bits as shown:  
 $01000010$  The receiver discards the packet. Why?  
 b) Explain the role of Network Layer.

**Section- B**

(I) A block of addresses is given to a small organization. One of the addresses is 215.16.38.39/28, What is the  
 i. First address  
 ii. Last address  
 iii. No. of addresses

(II) Consider the network shown below, and assume that each node initially knows the costs to each of its neighbors. Consider the distance vector algorithm and show the distance table entries at node z



3) An IPV4 packet has arrived with the first 8 bits as shown: 01000010 the receiver discards the packet. Why?

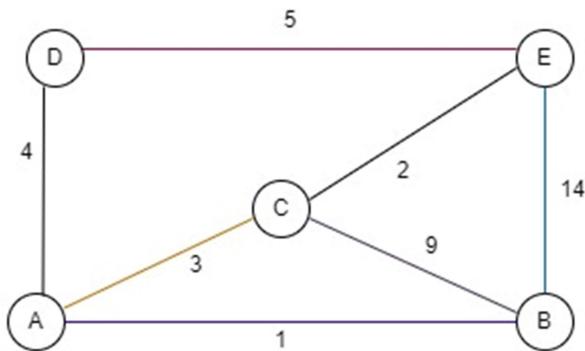
4). A block of address is given to a small organization. One of the address is 215.16.38.39/28 what is the

i) First Address

ii) Last Address

iii) No. of address

5. Consider the network shown below and assume that each node initially knows the costs to each of its neighbours consider the distance vector algorithm and show the distance table entries at node C.



the addresses is 215.16.38.39/28, What is the

- First address
- Last address
- No. of addresses

(II) Consider the network shown below, and assume that each node initially knows the costs to each of its neighbors, Consider the distance vector algorithm and show the distance table entries at node z

(III) Discuss the three-way Handshaking process of TCP connection management.

(IV) Draw and Explain IPv4 Datagram Header?

(V) What do you understand by cryptography? explain the public and private key cryptography?

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Section-C

Note: Attempt ANY THREE Questions. 3 x 5 = 15 marks

(I) Consider an instance of TCP's Additive Increase Multiplicative Decrease(AIMD) algorithm where the window size at the start of the slow start phase is 2 MSS and the threshold at the start of the first transmission is 8 MSS. Assume that a time out occurs during the fifth transmission. Find the congestion window size at the end of the tenth transmission

(II) If Classless Inter-domain Routing (CIDR) receives a packet with address 180.70.65.140. The router's routing table has the following entries:

Mask	Network Address	Next Hop	Interface
/26	180.70.65.192	—	m2
/25	180.70.65.128	—	m0
/24	201.4.22.0	—	m3
/22	201.4.16.0	—	m1
Any	Any	180.70.65.200	m2

Identify output interface on which this packet will be forwarded.

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The screenshot shows a Google Drive document titled "End Term.pdf". The document contains the following text and tables:

Transmission  
 (II) If Class C host (R) receives a packet with address 180.70.65.200, host R's routing table has the following entries:

Mask	Network Address	Next Hop	Interface
/26	180.70.65.192	—	m2
/25	180.70.65.128	—	m0
/24	201.4.22.0	—	m3
/22	201.4.16.0	—	m1
Any	Any	180.70.65.200	m2

Identify output interface on which this packet will be forwarded.

(III) Explain the difference between IPv4 and IPv6?  
 (IV) Suppose a network with IP Address 192.16.0.0. is divided into 2 subnets, find number of hosts per subnet.  
 Also, for the first subnet, find-

- Subnet Address
- First Host ID
- Last Host ID
- Broadcast Address

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Windows taskbar icons: Start, Search, Task View, Edge, File Explorer, Mail, Google Chrome, OneDrive, Paint, Word.

6. Suppose a network with IP address 192.16.0.0 is divided into 2 subnets, find the number of hosts per subnet.

Also for the first subnet, find

1. Subnet address
2. First Host ID
3. Last Host ID
4. Broadcast Address

7.

Instruction for students: [Open with Google Docs](#)

**Attempt All Questions**

**Detail of Question**

No.	Question	Marks	CO	BL	KL
1	How Go Back N -ARQ is differ from Selective repeat request. Explain with suitable example.	4	3	R	F
2	Write a note on guided transmission media? Draw neat diagram wherever required.	4	2	R	F
3	Distinguish 1 persistence, Non-persistence and P persistence CSMA	4	3	R	F
4	What is class full and class less IP addressing scheme. A block of addresses is granted to a small organization. We know that one of the addresses is 205.16.37.39/28. What is the first address in the block?	4	5	A	P
5	How TCP is differing from UDP? Discuss connection Establishment process of TCP.	4	6	U	C

**Section - B**

**Detail of Question**

No.	Question	Marks	CO	BL	KL
6	Explain Public Key and Private Key cryptography. In a RSA cryptosystem a particular A uses two prime numbers $p = 13$ and $q = 17$ to generate her public and private keys. If the public key of A is 35, then generate private key of A.	3	7	A	P

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**Attempt All Questions**

**Detail of Question**

No.	Question	Marks	CO	BL	KL
6	Explain Public Key and Private Key cryptography. In a RSA cryptosystem a particular A uses two prime numbers $p = 13$ and $q = 17$ to generate her public and private keys. If the public key of A is 35, then generate private key of A.	3	7	A	P

**3 X 5 = 15 Marks**

7 Name the event at A,B,C,D,E,F which occurs that causes the sender to decrease its window of TCP's Additive Increase Multiplicative Decrease(AIMD) algorithm.

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7 Name the event at A,B,C,D,E,F which occurs that causes the sender to decrease its window of TCP's Additive Increase Multiplicative Decrease(AIMD) algorithm.

8 What is two node instability problem? Discuss the difference between distance vector and Link State Routing.

9 What is the purpose of a subnet mask? Is the subnet mask 255.255.0.255 valid for a Class A address? If a class B network on the Internet has a subnet mask of 255.255.248.0, what is the maximum number of hosts per subnet?

10 An IPv4 packet has arrived with the first 8 bits as shown:01000010. The receiver discards the packet. Why? Consider sending a 3,000-byte datagram into a link which has an MTU of 500 bytes. Suppose the original datagram is stamped with the identification number 422. How many fragments are generated? What are their characteristics

3	6	U	C
3	5	R	F
3	5	U	C
3	8	An	P

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Section - C

Attempt All Questions

5 X 3 = 15 Marks

No.	Detail of Question	Marks	CO	BL	KL
11	Consider an instance of TCP's Additive Increase Multiplicative Decrease(AIMD) algorithm where the window size at the start of the slow start phase is 2 MSS and the threshold at the start of the first transmission is 8 MSS. Assume that a time out occurs during the fifth transmission. Find the congestion window size at the end of the tenth transmission.	5	6	A	C

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The following is a dump of a TCP header in hexadecimal format.  
05320017 00000001 00000000 500207FF  
00000000

a. What is the source port number?  
b. What is the destination port number?  
c. What is the sequence number?  
d. What is the acknowledgment number?  
e. What is the length of header?  
f. What is the type of segment?  
g. What is the window size?

An Internet Service Provider (ISP) has the following chunk of CIDR-based IP addresses available with it: 245.248.128.0/20. The ISP wants to give half of this chunk of addresses to Organization A, and a quarter chunk of addresses to Organization B, while retaining the remaining with itself. What will be valid allocation of addresses to A and B? Explain your answer with proper justification.

12 5 5 An C

13 e. What is the length of header?  
f. What is the type of segment?  
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12 Consider the following routing table at an IP router for each IP address in Group-I identify the correct choice of the next hop using the entries from the routing table below.

Network No.	Net Mask	Next Hop
128.96.170.0	255.255.254.0	Interface 0
128.96.168.0	255.255.254.0	Interface 1
128.96.166.0	255.255.254.0	R2
128.96.164.0	255.255.254.0	R3
0.0.0.0	Default	R4

13 Group - I  
A. 128.96.171.92

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e. What is the length of header?  
f. What is the type of segment?  
g. What is the window size?

An Internet Service Provider (ISP) has the following chunk of CIDR-based IP addresses available with it: 245.248.128.0/20. The ISP wants to give half of this chunk of addresses to Organization A, and a quarter chunk of addresses to Organization B, while retaining the remaining with itself. What will be valid allocation of addresses to A and B? Explain your answer with proper justification.

12 5 5 An C

13 Consider the following routing table at an IP router for each IP address in Group-I identify the correct choice of the next hop using the entries from the routing table below.

Network No.	Net Mask	Next Hop
128.96.170.0	255.255.254.0	Interface 0
128.96.168.0	255.255.254.0	Interface 1
128.96.166.0	255.255.254.0	R2
128.96.164.0	255.255.254.0	R3
0.0.0.0	Default	R4

13 Group - I  
A. 128.96.171.92

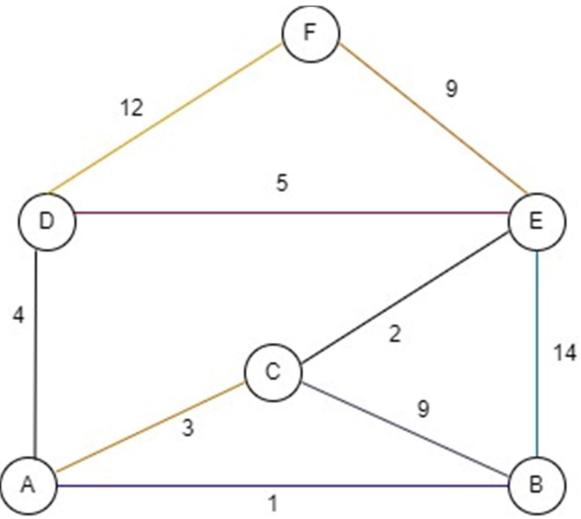
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Activity

Activate Windows Go to Settings to activate Windows.

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### 7. Construct the link state routing table for Node D



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128.96.164.0	255.255.254.0	R3
0.0.0.0	Default	R4

Group - I

A. 128.96.171.92  
 B. 128.96.167.87  
 C. 128.96.163.121  
 D. 128.96.165.121

Activity

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