NATIONAL INSTITUTE OF BUSINESS MANAGEMENT

Diploma in Software Engineering (DSE22.1F/CO) (NIBM-SOC-COM-211-1-2-4-07)
Diploma in Software Engineering (DSE22.1F/KU) (NIBM-SOC-COM-211-1-2-4-07)
Diploma in Software Engineering (DSE22.1F/KD) (NIBM-SOC-ITB-1-2-3-07)
Diploma in Software Engineering (DSE22.1F/GA) (NIBM-SOC-COM-211-1-2-4-07)
Diploma in Software Engineering (DSE22.1F/MT) (NIBM-SOC-COM-211-1-2-4-07)

COMPUTER NETWORKS

15th February, 2023, 09:00 am - 12:00 pm

The exam has Two (Part A and Part B) Parts. You must answer both parts.

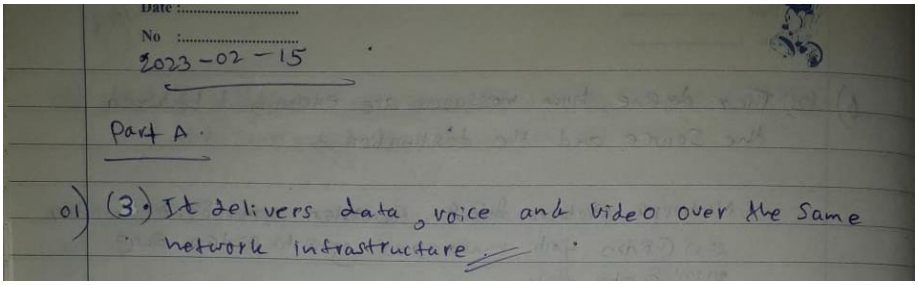
Calculators are not allowed.
Date:15-02-2023 | Time:0900-1200 H
Duration:3 Hours

Part A (20 marks)

Answer all questions. All questions carry equal marks.

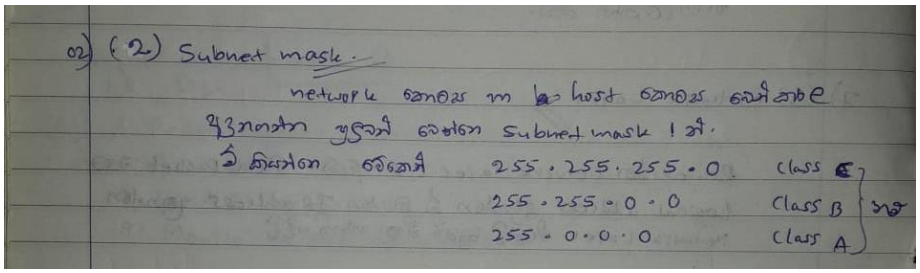
1. What is a characteristic of a converged network?

1. it provides only one path between the source and destination of a message
2. it limits the impact of a failure by minimizing the number of devices affected
3. it delivers data, voice, and video over the same network infrastructure
4. A converged network requires a separate network infrastructure for each type of communication technology



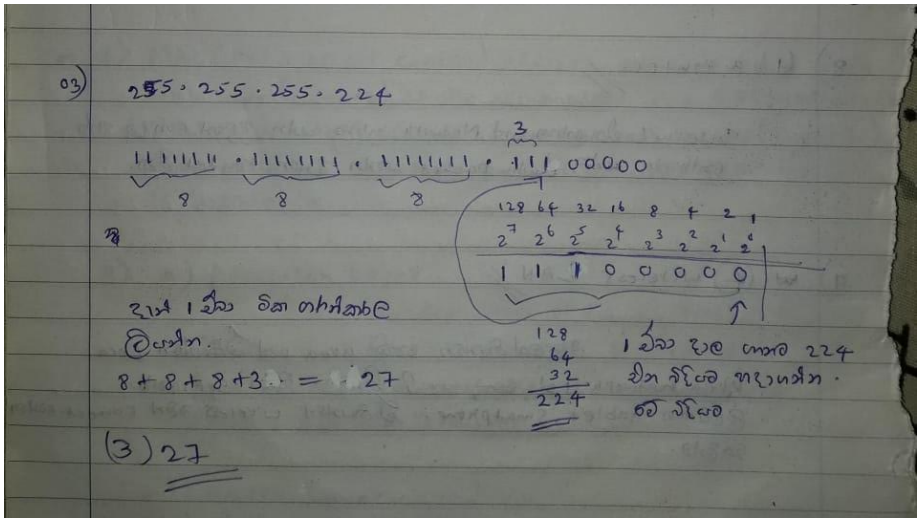
2. When IPv4 addressing is manually configured on a web server, which property of the IPv4 configuration identifies the network and host portion for an IPv4 address?

1. DNS server address
2. subnet mask
3. default gateway
4. DHCP server address



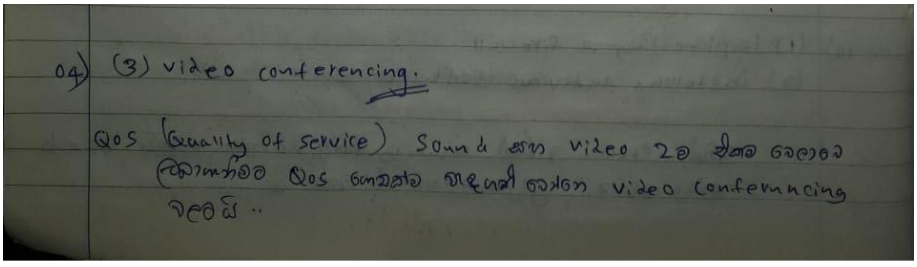
3. What is the prefix length notation for the subnet mask 255.255.255.224?

1. /25
2. /26
3. /27
4. /28



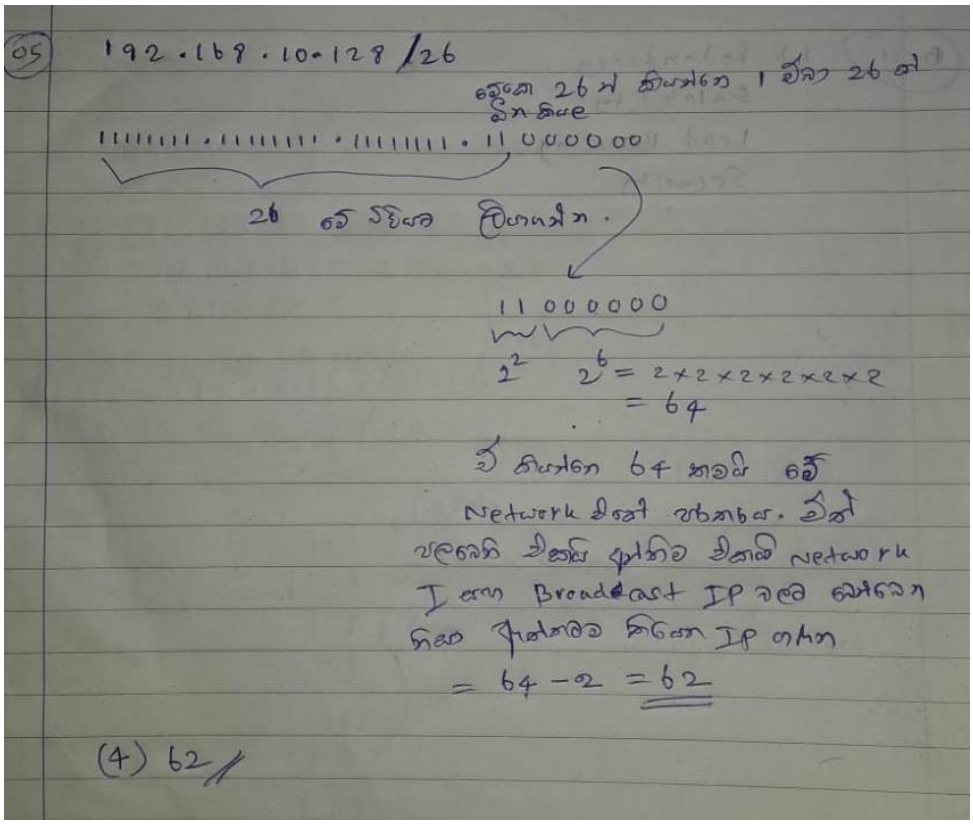
4. What type of network traffic requires QoS?

1. email
2. on-line purchasing
3. video conferencing
4. wiki



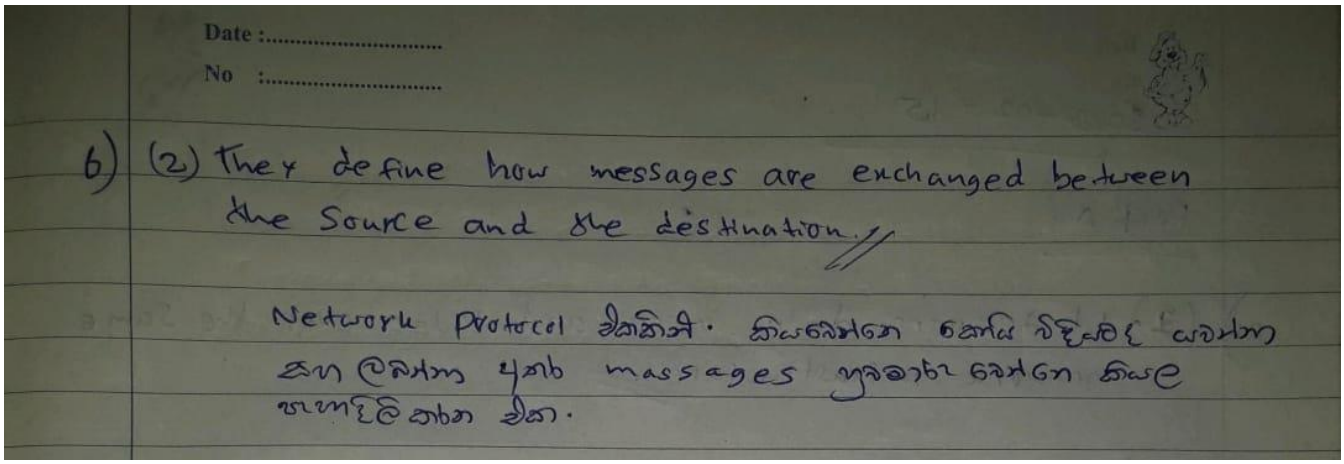
5. How many host addresses are available on the 192.168.10.128/26 network?

1. 30
2. 32
3. 60
4. 62
5. 64



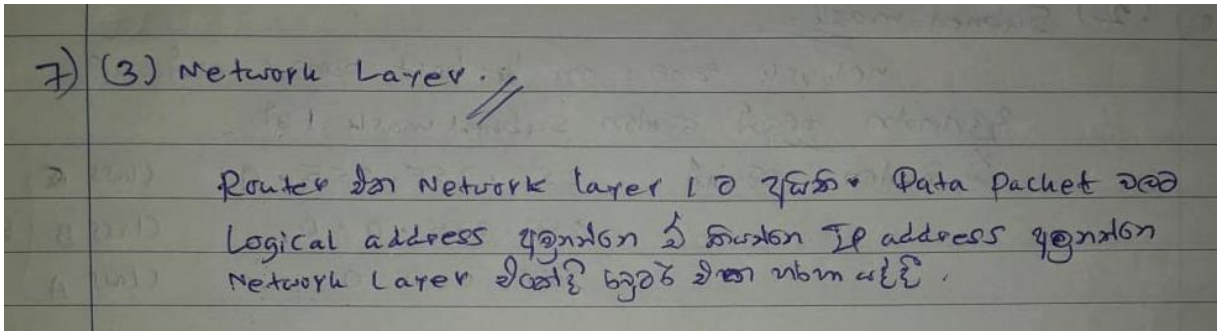
6. Which statement is correct about network protocols?

1. Network protocols define the type of hardware that is used and how it is mounted in racks.
2. They define how messages are exchanged between the source and the destination.
3. They all function in the network access layer of TCP/IP.
4. They are only required for exchange of messages between devices on remote networks.



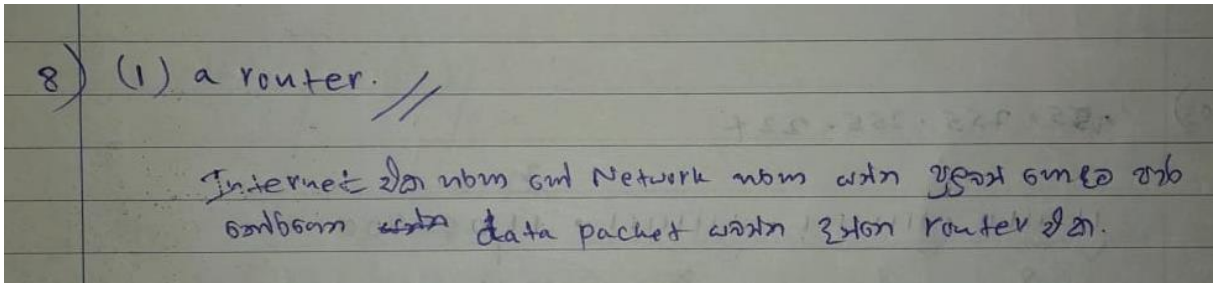
7. At which layer of the OSI model would a logical address be encapsulated?

1. physical layer
2. data link layer
3. network layer
4. transport layer



8. Which device performs the function of determining the path that messages should take through internetworks?

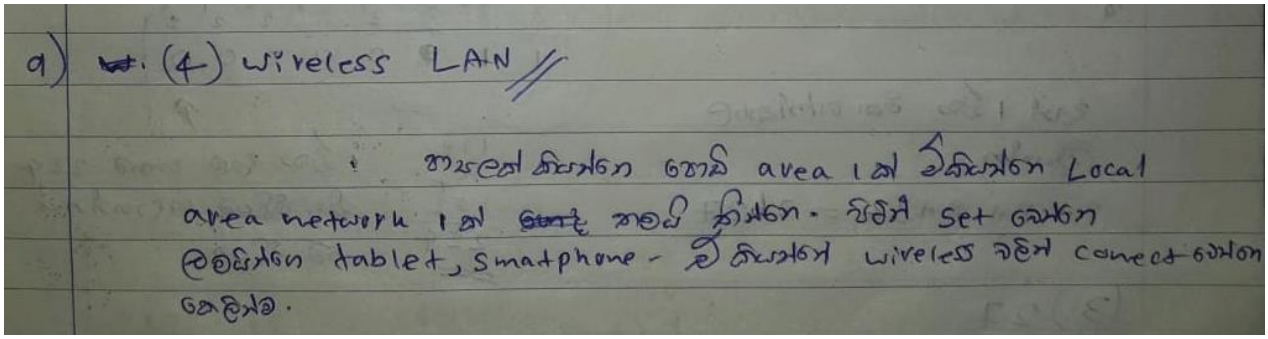
1. a router
2. a firewall
3. a web server
4. a DSL modem



9. Which area of the network would a college IT staff most likely have to redesign as a direct result of many students bringing their own tablets and smartphones to school to access school resources?

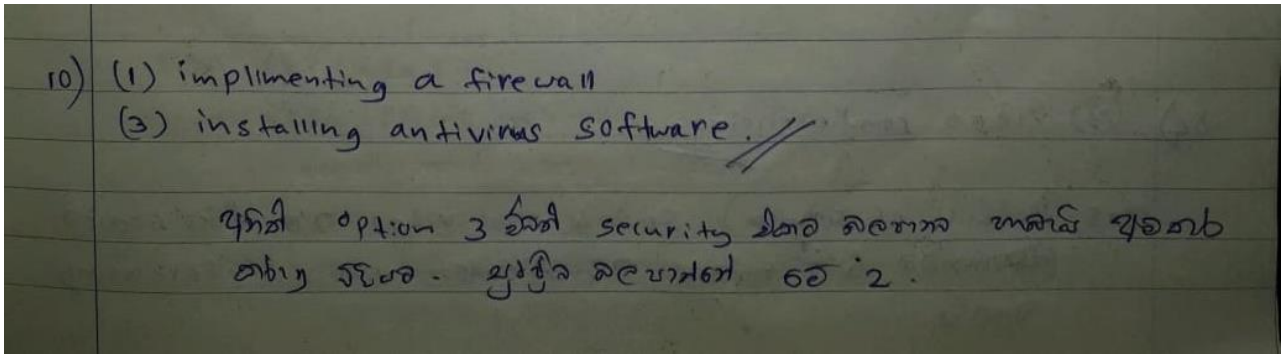
1. extranet

2. intranet
3. wired LAN
4. wireless LAN
5. wireless WAN



10. A user is implementing security on a small office network. Which two actions would provide the minimum-security requirements for this network? (Choose two.)

1. implementing a firewall
2. installing a wireless network
3. installing antivirus software
4. implementing an intrusion detection system
5. adding a dedicated intrusion prevention device



----------PART B----------

Answer all questions. The marks given in brackets are indicative of the weight given to each part of the question.

B1) This question is about Basic Network Concepts. (30 Marks)

1. List down **04** main characteristics of a reliable network architecture **[4 marks]**
2. What's the difference between a MAC address and an IP address? **[3 marks]**
3. Briefly explain the functionality of following OSI model layers **(9 marks)**
    - **a.** Application layer
    - **b.** Network layer
    - **c.** Transport layer
4. Briefly explain the following commands **(4 marks)**
    - **a.** tracert
    - **b.** ipconfig
5. Explain the functionality of the following intermediary devices **(4 marks)**
    - **a.** Firewall
    - **b.** Router
6. Explain following message delivery options. **(6 marks)**
    - **a.** Unicast
    - **b.** Multicast
    - **c.** Broadcast

Part B

1) B1

(01) 1. Redundancy
2. Scalability
3. Load Balancing
4. Monitoring and management.

2) MAC (Media access control) address operates at the data Link Layer (Layer2) of the OSI model and IP (Internet Protocol) address operate at the network Layer (Layer 2) their Address structure ~~and~~ scop and Hierarchy is difference

3) a) Application Layer.

This is the top layer of the OSI model & it provide end-user applications & services. Provide application services like email, web browsing and file transfer.

b) Network Layer.

This responsible for routing data packets between devices in diferent networks

Logical addresing
Routing
packet forwarding is the some functions of this.

c) Transport Layer.

This Layer manages end-to-end communication between devices and ensures data integrity, reliability and flow control.

4) a) tracert

is a network diagnostic tool used to trace the route that data packets take from a source device to a destination device or server. It helps identify the network path.

b) ipconfig.

this command is used in windows Operating Systems to display the configuration of the network interfaces on a local computer. it provide details about IP addresses subnet masks, default gateways like that....

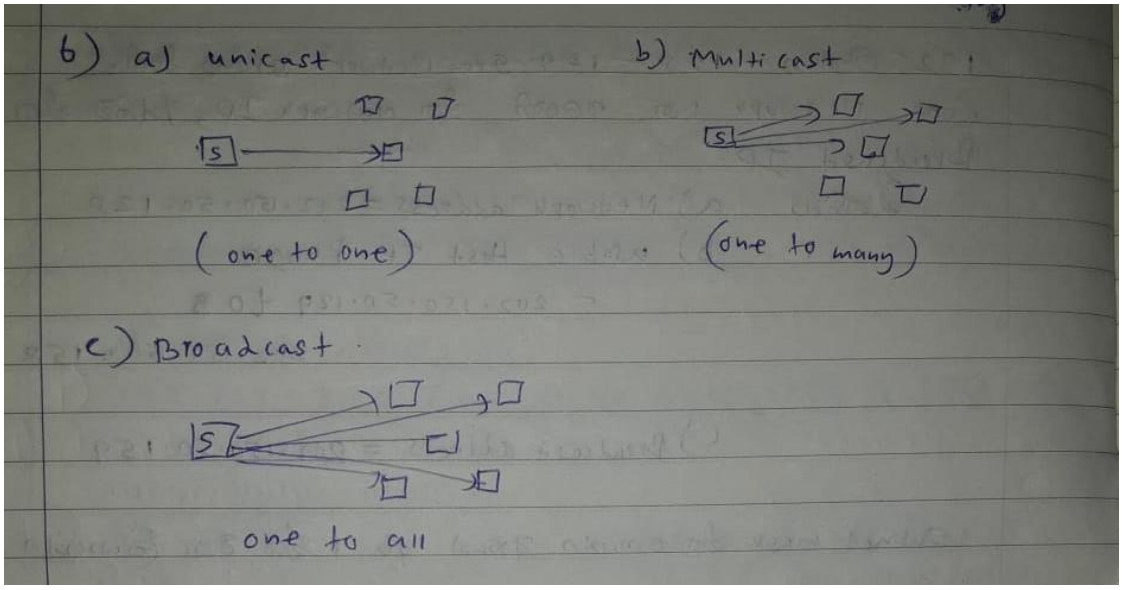
5) a) Firewall –

is a intermidiate divice or software. that serves as a security gateway between a private network and external networks.

Packet filtering, Stateful inspection

b) Router –

is an intermediary device that connects different networks, such as LAN to a WAN or internet. main functions are packet forwarding, Network address Translation, Dynamic Routing. access controll like that.



B2) This question is about IP addressing. (25 Marks)

Note: Please Select only 03 questions and answer them.

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1. A host was given the IP addresses **202.150.50.132/27** Consider this address and indicate:
   - **a.** Network Address
   - **b.** Usable Host IP Range
   - **c.** Broadcast Address
   - **d.** Subnet Mask **[8 marks]**
2. Considering IPv4 classless addressing, an organization is granted a block of addresses with the beginning address **192.168.3.0/24**. The organization needs to have 2 sub-blocks of addresses to use in its three subnets as shown below:
   - **a.** One subblock of 58 addresses.
   - **b.** One subblock of 27 addresses.

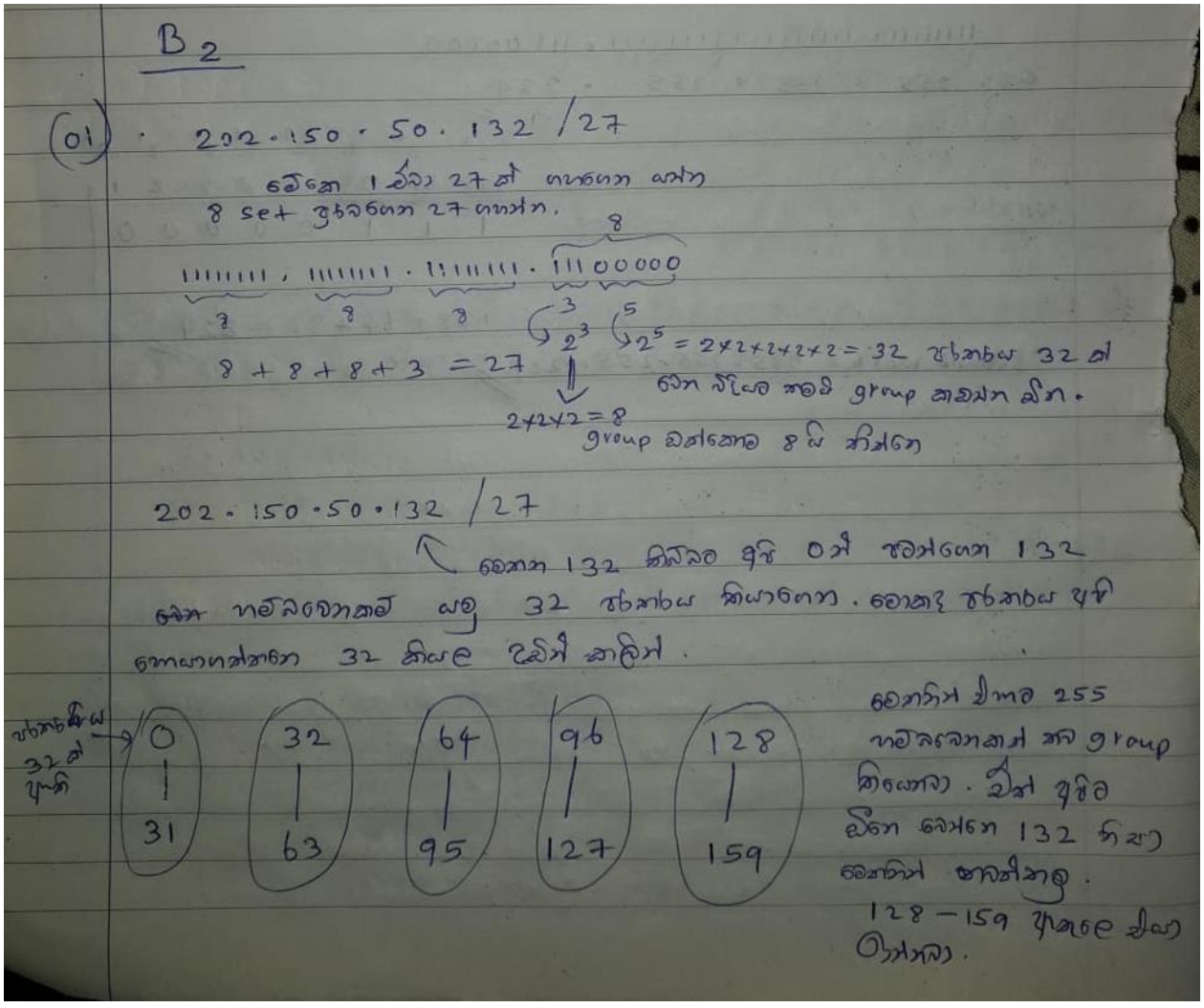
Indicate the **network address, Usable IP range, Broadcast IP and the subnet mask** for each of the sub blocks. **[8 marks]**

3. Write the shortest compressed format of the following IPv6 addresses **[9 marks]**

- **a.** 2041:016A: 0000:0000:0000: 0000:875B:131B
- **b.** 2031:0000:130F: 0000:0000:09C0:876A:130B
- **c.** 2031:0000:0000: 268A0:12AD: 0000:0000:137B

4. Match following each IP address with the correct category **[9 marks]**

	Private	Public	
192.168.31.3,			10.0.17.7, 200.0.0.1,
120.22.250.25,			172.16.255.255,
117.22.10.10,			11.8.8.8,
192.168.5.254,			20.0.0.2



132 තියෙන 128 — 159 ~~grou~~ Network group එකේ.
ඒකෙම Network එක පළවෙනි එක Network IP, අන්තිම එක Broadcast IP.

එනිසා a) Network address = 202.150.50.128

b) usable Host IP Range

= 202.150.50.129 to

202.150.50.158

c) Broadcast address = 202.150.50.159

Subnet mask එක හොයන්න ඉස්සරහින් 27 1 වල ටික ලියාගන්න.

11111111.11111111.11111111.11100000

c) 255 . 255 . 255 . 224

2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0
128	64	32	16	8	4	2	1
1	1	1	0	0	0	0	0

128 + 64 + 32 = 224

Subnet mask = 255.255.255.224

2) · 192.168.3.0 /24

මේ IP address එක Sub blocks 2 කට කඩන්න තියෙන්නෙ පළවෙනි block 1 ට IP address 58 ක් ඕනෙනවා. 2 වෙනි එකට IP address 27 ක් ඕනෙනවා.

මුලින්ම මෙහෙම කරමු.

192.168.3.0 /24 ← 24 තියන නිසා 1 වලා 24ක් ලියාගමු, 8 set වලින් -

11111111.11111111.11111111.

(8) (8) (8)

දැන් මෙහෙම අපි එක '1' ක් වැඩිකොට එකන අගය බෙදෙන මෙහෙමයි:

10000000

2^1 $2^7 = 2\times2\times2\times2\times2\times2\times2$
$= 128$

ඒ නිසා IP address 128 ක් ලැබෙන block 1 ක් හැදෙයි

පේනවනෙ. ඒක ඕනවට වැඩියි. මොකද පළවෙනි ඕනෙ කරන block එක 58 ක් නෙ. ඒ නිසා තව 1 ක් දාල බලමු.

11000000

2^2 $2^6 = 2\times2\times2\times2\times2\times2$
$= 64$ ← අපිට ඕනෙ හරි 64 ක් ලැබෙනවා. ඒ නිසා 58 ට ළඟම ගාණක්. ඊටත් වැඩි 2 කට කරන්න නෑ. මොකද ඕනෙ අවශ්‍යතාව.

දැන් ඒ group එක ලියමු.

පළමු 64 යි { 0 … 63 }

මෙතන Network IP එක = 192.168.3.0
Broadcast IP = 192.168.3.63

usable IP range = 192.168.3.1 to 192.168.3.62

Subnet mask එක හොයන්නෙ

128	64	32	16	8	4	2	1
1	1	0	0	0	0	0	0

$128 + 64 = 192$

255.255.255.192

58 කියන IP address එක තියෙන 0 – 63 range එකේ නිසා මේ උත්තරය අදාළ වෙන්නෙ එකට (a) වලට

දැන් ඒ විදියට (b) ත් හදන්න.

b වලදී අහන්නෙ 27 block එකක්. දැනටම අපි 0 ඉඳල 63 වෙනකම් IP හදල තියෙන්නෙ. එතන ඉඳල තමයි 27 block : හදන්න වෙන්නෙ.

එනමුත් මේ විදියට ලියාගෙන 27 ත් හොයාගන්න try කරන්න

192.168.3.0/24

11111111.11111111.11111111.111 00000

2^3 $2^5 = 2\times2\times2\times2\times2 = 32$

කලින් විදියටම 1 එක දාල 27 ට ලඟම අගය හොයාගන්න try කරන්න. එතකොට මේ විදියට 32 ලැබෙයි. දැන් එතකොට 27 තියෙන 32 group එක ආකාරයෙ. ඒත් මේ 32 ගණන් කරන්න ඕන කලින් අපි හදන්න 63 ඉඳල ඊළඟ එක 64 කියන තැන ඉඳල 32 ක් එකතුකරනව.

$63 + 32 = 95$

ඒ කියන්නේ මේ 27 group එකේ range එක 64 — 95

∴ Network IP = 192.164.3.64
Broadcas IP = 192.164.3.95

usable IP range = 192.164.3.65 to
192.164.3.94

subnet mask එක හොයමු.

128	64	32	16	8	4	2	1
1	1	1	0	0	0	0	0

128 + 64 + 32
= 224

255.255.255.224 ← Subnet mask for 27 group

(03) a) 2041 : 016A : 0000 : 0000 : 0000 : 0000 : 875B : 131B

'0' විතරක්ම තින set 1කට වැඩියෙන් තියෙනවා නම් ඒ ඔක්කොම නොසලකා හැර :: යොදන්න එතනට

[illegible] මුලට තින '0' නොසලකා හරින්න

අනිත්වා ඒ විදියටම ලියන්න.

2041 : 16A :: 875B : 131B

b) 2031 : ~~0000~~ : 130F : 0000 : 0000 : 09C0 : 876A : 130B

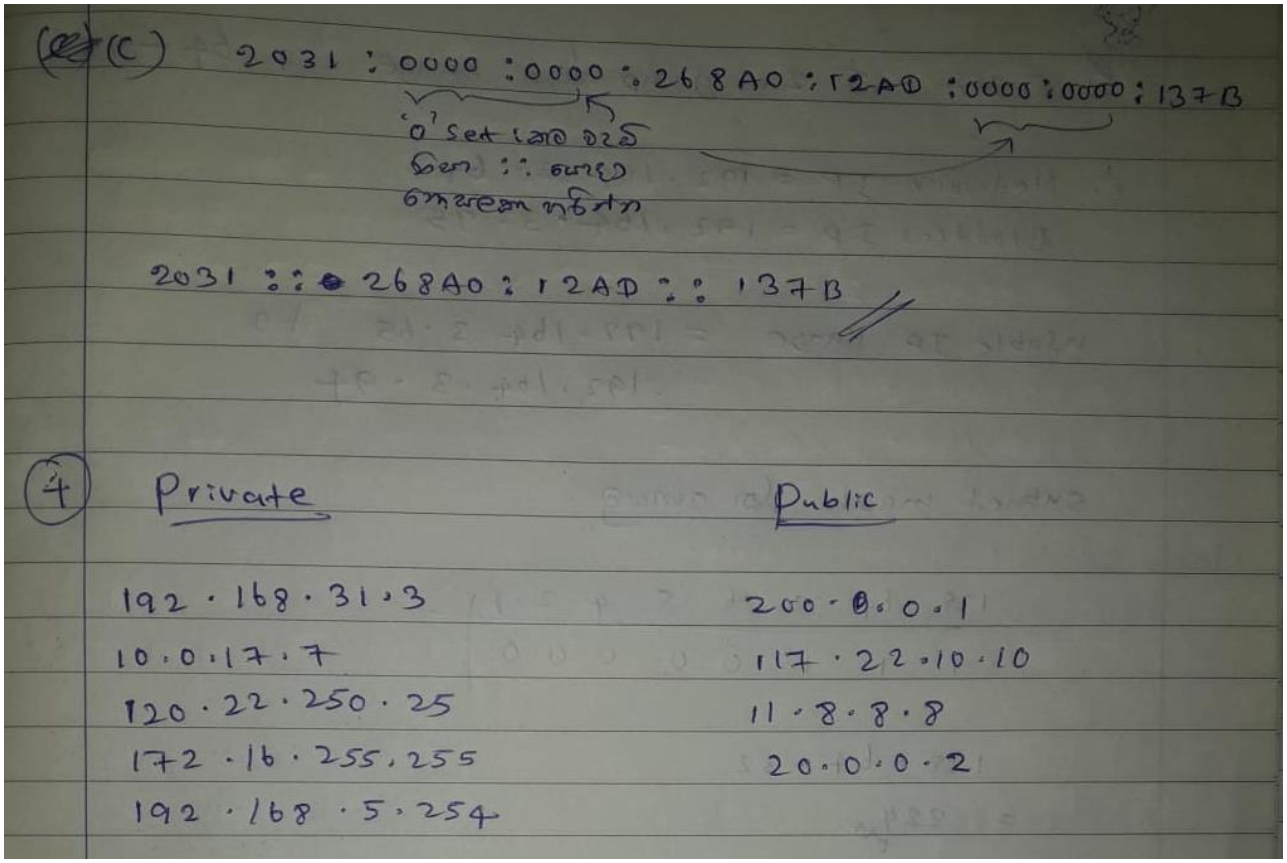
'0' set 1ක් තියෙන එක 0ක් විතරක් ලියන්න.

මේ '0' ද නොසලකා හරින්න මුලට තින නිසා.

'0' set 1කට වැඩි නිසා :: යොදන්න
0 set 2ම නොසලකා හරින්න.

~~2031~~

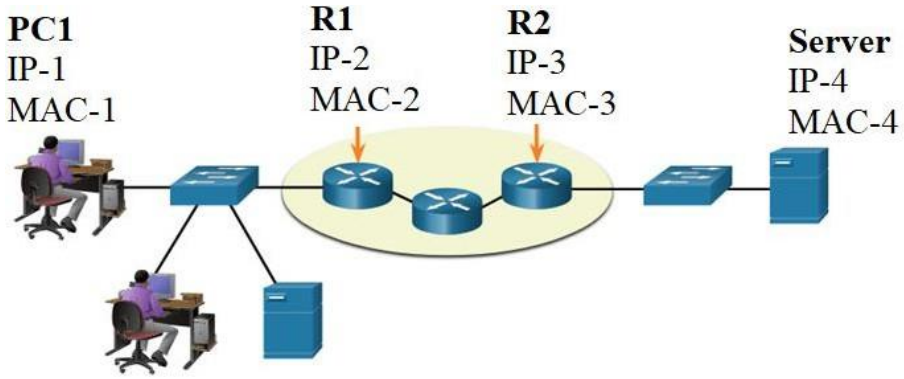
2031 : 0 : 130F :: 9C0 : 876A : 130B



B3) (25 Marks)

1. List down 03 migrating techniques that can be used, network administrators migrate their networks to IPv6. **[3 marks]**
2. What Is the Dynamic Host Configuration Protocol, briefly explain with the diagram **[4 marks]**
3. Compare TCP features with UDP features? **[4 marks]**
4. Briefly explain the dynamic routing & static routing process **[4 marks]**
5. Write the port numbers for below protocols? **[6 marks]**

   SMTP, IMAP, SSH, POP3, FTP, HTTPS
6. Fill in the blanks, a packet leaves from PC1 to Server. **[4 marks]**



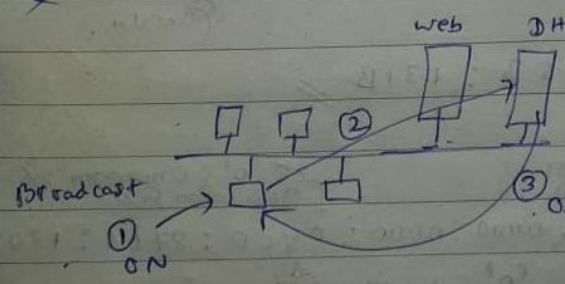
When a packet leaves from PC1 (to Server):

Source IP	Source MAC	Destination IP	Destination MAC

B-3

(01) 1) Dual-stack transition
2) Tunneling
3) ~~Next~~ Network Address Translation 64 (NAT64)

(02)



We can use DHCP Protocol for get automaticaly IP address. It will give a IP address automatricaly when you conect to the internet

(03)

TCP	UDP
Connection oriented	Connectionless
Sequenced	unsequenced
Reliable	unreliable
Provide flow control	No flow control
Acknowledgment	No Acknowledgment
Error Control	No Error Control
Has overheads	Low oreotheads.

(04) Static routing mean the network administrator enters a rout manually in to the router.

Dynamic Routing mean uses ~~the~~ a route that the routing Protocol automatically assigns. Dynamic rout relies on the routing protocol.

(05)
SMTP – port 25
IMAP – port 143
SSH – Port 22
Pop 3 – port 110
FTP – port 21
HTTPS – port 443.

(06)

Source IP	Source MAC	Destination IP	Destination M
IP 1	MAC 1	IP 4	MAC 4.