PAPUA NEW GUINEA UNIVERSITY OF TECHNOLOGY

DEPARTMENT OF MATHEMATICS & COMPUTER SCIENCE

FIRST SEMESTER EXAMINATIONS - 2022

THIRD YEAR BACHELOR OF SCIENCE IN COMPUTER SCIENCE

CS311 - NETWORKING II

TIME ALLOWED: 3 HOURS

INFORMATION FOR CANDIDATES

1. Write your student number and name clearly on the front of the answer booklet.
2. You have 10 minutes to read this paper. You must not write during this time.
3. **There are two (2) parts to the exam. You should attempt all the questions.**
4. All the answers must be written in the answer booklet. No other written materials will be accepted.
5. Put the answers for Questions 1 to 20 on one page of the answer booklet. Start the answer for each question, beginning with Question 21, on a new page.
6. Do **not** use red pen or pencil to write your answers.
7. **MOBILE PHONES MUST BE SWITCHED OFF** for the entire duration of the examination. Students failing to do so will be penalised.

MARKING SCHEME

Marks are indicated at the beginning of each question. Total is **100 marks**.

PART A: MULTIPLE CHOICE [1 MARK EACH = 20 MARKS]

Choose A or B or C or D from the alternatives given and write your choice in the answer booklet.

Question 1

The given IPv4 address 10.10.10.10 belongs to.

(A) Class A (B) Class B (C) Class C (D) Class D

Question 2

Which of the addresses given is a Class B IPv4 address?

(A) 192.168.11.0 (B) 202.1.40.21 (C) 180.20.20.1 (D) 224.120.20.11

Question 3

In a classful IPv4 network, which of these addresses would be the multicast destination address?

(A) 202.1.20.255 (B) 255.255.0.0 (C) 10.10.10.0 (D) 224.0.0.10

Question 4

Automatic Private IP addressing (APIPA) provides a pool of addresses that is guaranteed not to conflict with routable addresses. These addresses are given to computers in a network when the DHCP service is down for some reason. Which address below would be an example of this type of address?

(A) 127.100.0.1 (B) 169.254.100.22 (C) 200.10.10.25 (D) 224.120.20.11

Question 5

In a directed broadcast communication, Peter's PC is sending a broadcast message to network 202.1.40.0. What would be the destination IP on the packet?

(A) 202.1.40.192 (B) 255.255.255.0 (C) 202.1.40.255 (D) 255.255.0.0

Question 6

With the EUI-64 process, how many bits are added onto the MAC address to create the Interface ID of an IPv6 address?

(A) 4 bits. (B) 8 bits. (C) 16 bits. (D) 32 bits.

Question 7

In an IPv6 packet header, how many bits is given to the destination address?

(A) 64 bits. (B) 128 bits. (C) 164 bits. (D) 180 bits.

Question 8

The bits in the version field of an IPv6 packet would be _____.

(A) 0010 (B) 0100 (C) 1000 (D) 0110

Question 9

Which of these addresses is the IPv6 loopback address?

(A) : : / 128 (B) : : / 0 (C) : : 1 / 128 (D) FF02 : : 5

Question 10

Which of the addresses below is an example of an IPv6 link local address?

(A) FE80 : : 1/10 (B) FF01 : : 1/10 (C) FF02 : : A/8 (D) FD6D:8D64:AF0C:3 : : 1/64

Question 11

What mode is the router in with the prompt **Router(config)#**?

(A) privilege mode (B) router configuration mode (C) interface mode (D) global configuration mode

Question 12

What command would enable an administrator to view a Router's interface status?

(A) *Router#* show ip interface brief
(B) *Router#* show interface brief
(C) *Router#* show ip brief
(D) *Router#* show interface ip brief

Question 13

What command is used to copy the running configuration that exists on the RAM to the startup configuration that exists on the NVRAM?

(A) *Router#* copy running-config tftp
(B) *Router#* copy running-config startup-config
(C) *Router#* copy tftp running-config
(D) *Router#* copy runconfig to startconfig

Question 14

Which of the following commands creates a password on the router and also stores it in an encrypted format in the router's configuration?

(A) *Router(config)#* enable password <password>
(B) *Router(config)#* hostname <password>
(C) *Router(config-line)#* password <password>
(D) *Router(config)#* enable secret <password>

Question 15

Which command is used to go into telnet to set a password?

(A) *Router(config)#* line telnet 0
(B) *Router(config)#* line console 0
(C) *Router(config)#* line vty 0
(D) *Router(config)#* line aux 0

Question 16

Which layer of the OSI model that has its Protocol Data Unit (PDU) known as Segment?

(A) Application (B) Transport (C) Network (D) Data Link

Question 17

Which layer of the OSI model does the Protocol Data Unit (PDU) contains the source and destination MAC address?

(A) Application (B) Transport (C) Network (D) Data Link

Question 18

Select the Protocol Data Unit (PDU) that contains the source and destination port numbers?

(A) Data (B) Frame (C) Packet (D) Segment

Question 19

Using the OSPF metric cost, the reference bandwidth is 100Mbps (10^8). What would be the cost if a company is using an Ethernet Link of 10Mbps?

(A) 1 (B) 10 (C) 100 (D) 1000

Question 20

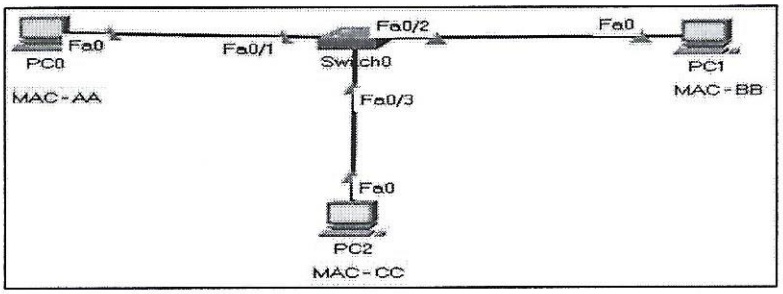
Using the OSPF metric cost, a line that has 1 Gbps would have a metric cost of _____.

(A) 0.01 (B) 0.1 (C) 1 (D) 10

PART B: SHORT ANSWERS [80 MARKS]

Question 21 [3 + 5 + 2 + (2 + 2 + 2 + 2 + 2) = 20 Marks]

(a) With an example, explain what a private IPv4 address is?
(b) Using the figure shown below, create a MAC address table for the switch.



(c) Give an example of the OSI Layer 2 and Layer 3 device.
(d) Given the IP address 202.1.40.184 and subnet mask 255.255.255.192.

i. Calculate the network address.
ii. Calculate the broadcast address for this network.
iii. How many available IP addresses are in this network?
iv. What would be the first available IP address?
v. What would be the last available IP address?

Question 22 [5 + 3 + 2 + 3 + 3 = 16 Marks]

(a) Use the EUI-64 process to generate the Interface ID of the given MAC address 8A-2B-F9-1C-16-2B.
(b) Write this AEEE:1044:0000:0000:00AB:0000:0000:0057 in its short form. State the steps involved as well.
(c) Write the IPv6 address given below in its Hexadecimal form.
0010000000000011 0000000000000000 0011001000111000 1101111111100001 0000000001100011 0000000000000000 0000000000000000 1111111011011011
(d) List the three communication modes in IPv6.
(e) Tunneling is one of the migration techniques from IPv4 to IPv6. Explain how tunneling is achieved.

Question 23 [3 + 2 + 7 + 3 = 15 Marks]

(a) What are static routes in a network?
(b) List two advantages of using static routes over dynamic routes.
(c) To reduce the number of routing table entries, multiple static routes can be summarized into a single summary route if all conditions are met. Shown below are four static routes on a router. Calculate the summary route with its new subnet mask.

Static Route	Exit Interface
172.32.0.0/16	Serial0/3/1
172.33.0.0/16	Serial0/3/1
172.34.0.0/16	Serial0/3/1
172.35.0.0/16	Serial0/3/1

(d) What is the CLI command that is used to remove the static route given below from the routing table?
Use the information provided below to answer the question.

Network Address	Subnet Mask	Directly connected Interface
192.168.1.0	255.255.255.0	s0/3/1

Question 24 [3 + 2 + 2 + 3 + 2 + 2 + (2 + 1) = 17 Marks]

(a) What is an Autonomous System (AS)?
(b) List two Link-State Routing Protocols.
(c) List two Distance Vector Routing Protocols.
(d) One of the characteristics of routing protocols is the speed at which convergence is reached. Explain how convergence is reached.
(e) Why is it important to configure the bandwidth on a serial link?
(f) What is the OSPF process ID?

(g) The following questions refer to the figure shown below.

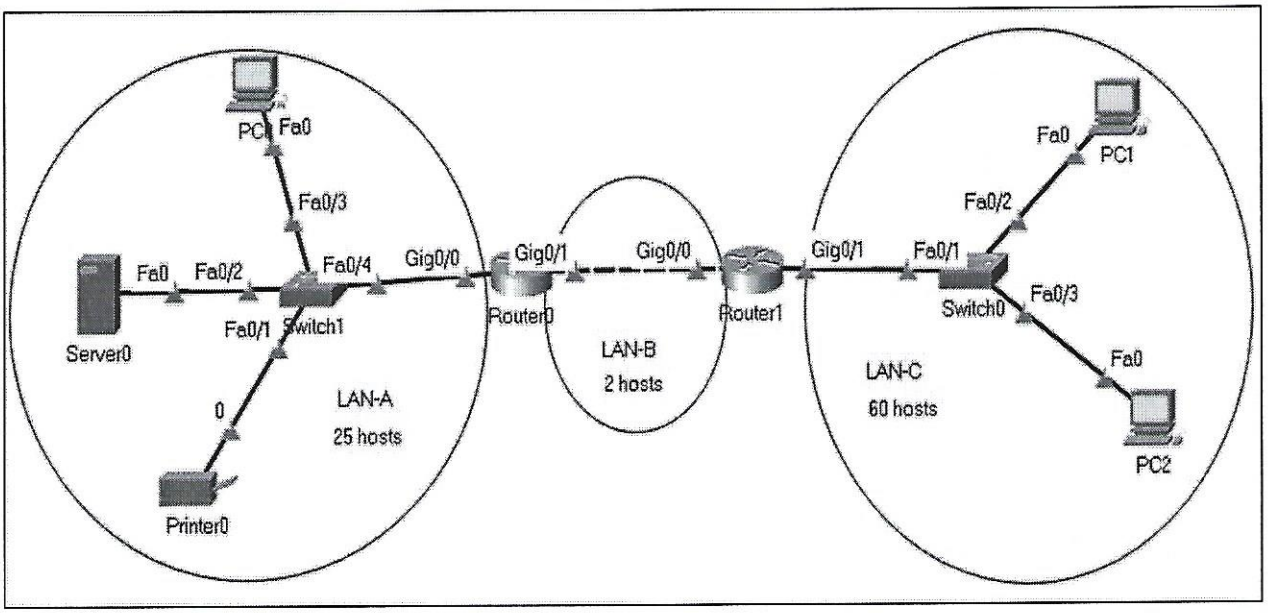
```
Router#show ip route ospf
O    20.0.0.0 [110/3] via 192.168.1.2, 00:01:17, FastEthernet0/1
     192.168.0.0/30 is subnetted, 3 subnets
O       192.168.0.4 [110/130] via 192.168.1.2, 00:01:17, FastEthernet0/1
O       192.168.0.8 [110/66] via 192.168.1.2, 00:01:17, FastEthernet0/1
     192.168.1.0/30 is subnetted, 2 subnets
O       192.168.1.4 [110/2] via 192.168.1.2, 00:01:17, FastEthernet0/1
     192.168.2.0/30 is subnetted, 3 subnets
O       192.168.2.4 [110/128] via 192.168.2.2, 00:01:52, Serial0/0/1
O       192.168.2.8 [110/66] via 192.168.1.2, 00:01:17, FastEthernet0/1
```

i. What does the two numbers in the brackets represent?

ii. How long ago was the last update done for the FastEthernet?

Question 25 [12 Marks]

Shown below is a network diagram. Using Variable Length Subnet Mask (VLSM) subnet this address *202.10.10.0/24* to cater for the network. Show the network, the broadcast, and the first and last available addresses for each of the LANs.



END OF EXAMINATION.