NAMIBIA UNIVERSITY
OF SCIENCE AND TECHNOLOGY

## Faculty of Computing and Informatics

### Department of Computer Science

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|---|---|
| **QUALIFICATION:** BACHELOR OF COMPUTER SCIENCE IN CYBER SECURITY<br>BACHELOR OF COMPTER SCIENCE | |
| **QUALIFICATION CODE:** 07BCCS; 07BCMS | **LEVEL:** 7 |
| **COURSE:** COMMUNICATION NETWORKS | **COURSE CODE:** CMN620S |
| **DATE:** NOVEMBER 2024 | **SESSION:** PAPER 1 |
| **DURATION:** 2 HOURS 30 MINUTES | **MARKS:** 80 |

| **FIRST OPPORTUNITY EXAMINATION QUESTION PAPER** | |
|---|---|
| **EXAMINER(S)** | MR. NASIMANE EKANDJO<br>MS. LOINI IIYAMBO<br>MS. HELENA HAINANA<br>MR. BEN MWASHEKUNA<br>MR. SHOOPALA NAMBAHU<br>MS. TALENI ANDJAMBA<br>MS. ADELHEID GEINGOS |
| **MODERATOR:** | MR. EDWARD NEPOLO |

**THIS QUESTION PAPER CONSISTS OF 7 PAGES**
(Excluding this front page)

**INSTRUCTIONS**

1. Answer ALL the questions.
2. Write clearly and neatly.
3. Number the answers clearly.
4. When answering questions you should be guided by the allocation of marks. Do not give too few or too many facts in your answers.

**PERMISSIBLE MATERIALS**

1. Non-programmable calculator.

**Question 1**

For the following questions, answer True/False. [5]

1.1 The DHCPNAK is message from the client to the server in response to a DHCPREQUEST. The DHCPNAK indicates that the client does not acknowledge the request and does not agree to lease the specified IP address.

1.2 DHCP is a TCP Service and it runs on port 21 and 23.

1.3 Outside Global – the actual address assigned to an outside host (public address).

1.4 The maximum hop count for RIP is 15.

1.5 An IP address 172.47.17.1 can be issued to a LAN because it is a private IP address.

**Question 2**

Choose the correct answer from the multiple choice questions below. [5]

2.1 What does the cost metric in OSFP depend on by default?

a) Bandwidth

b) Latency

c) Hop count

d) Delay

2.2 Which protocol is used for sending emails?

a) DNS

b) SNMP

c) SMTP

d) ICMP

2.3 The IP address 255.255.255.255 is:

a) A reserved IP address

b) Addressing all hosts in the local network.

c) Unavailable for configuration on any interface.

d) All of the above

2.4 Which of the following values, a default route will have all 0s?

a) Source IP network

b) Destination IP network

c) Destination MAC address

d) Source MAC address

2.5 You are connecting a computer directly to a router. Which type of cable should you use?

a) Crossover

b) Coaxial

c) Roll over

d) Straight-through

**Question 3**

Define the following concepts/key words used in communication networks.

3.1 Subnetting [2]

3.2 ARP [2]

**Question 4**

4.1 Differentiate between contiguous and discontiguous network. [2]

4.2 Discontiguous subnets have several advantages over contiguous subnets. (Yes or No?) [1]

**Question 5**

As a Network Administrator, you can either make use of a twisted pair, coaxial or fiber optic cables as a means of data transmission medium.

5.1 Describe the physical construction characteristics of twisted pair cables in comparison to coaxial cables. [3]

5.2 In terms of distance and data rate, differentiate between twisted pair and fiber optic cables. [3]

**Question 6**

6.1 Name the three IP address allocation mechanisms that are supported by DHCP. [3]

6.2 What is DHCP Relay Agent used for? [2]

6.3 Mention any three drawbacks of utilizing DHCP services on a network. [3]

**Question 7**

Assume packets are being transmitted from a host source to a host destination through some network devices.

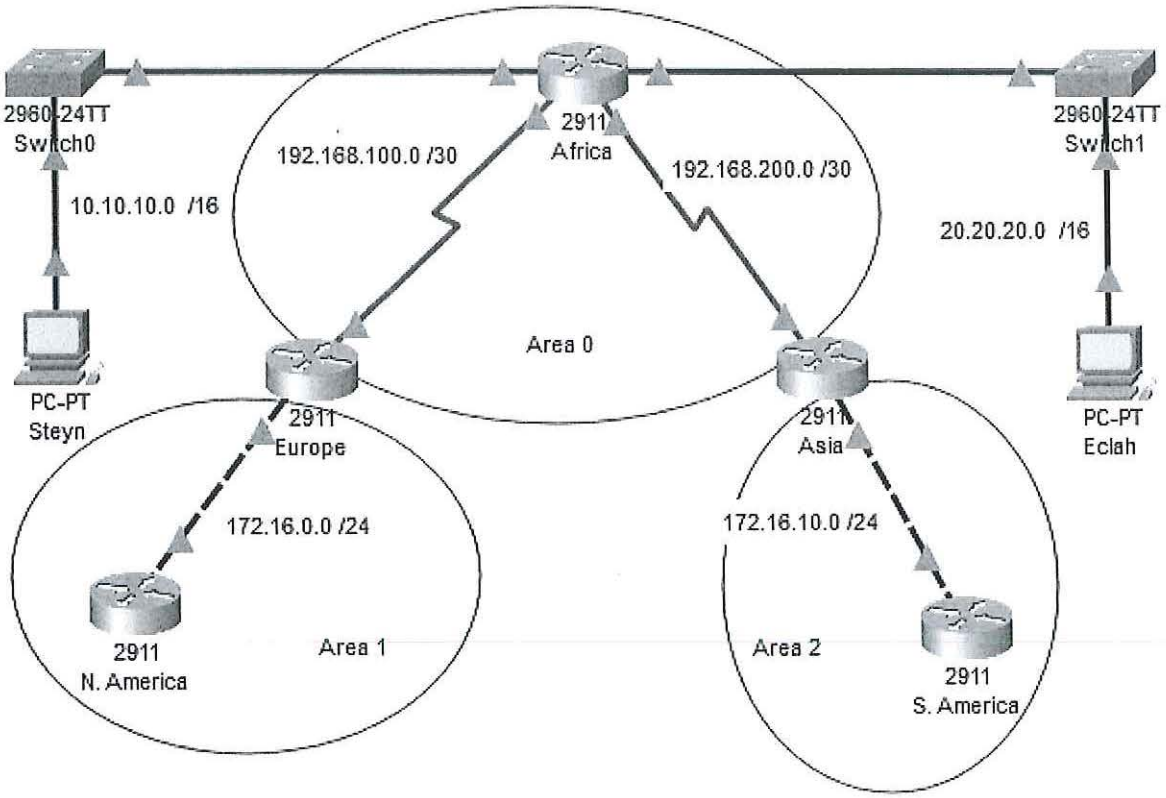
7.1 Define packet switching in networks. [2]

7.2 Explain how does loss and delay of such packets can occur. [2]

7.3 Explain how a router can overcome loss and delay. [2]

**Question 8**

Consider the topology below and answer the questions that follow.




8.1 You are requested to configure Asia router with OSPF as a routing protocol. Write down **all** the required commands to achieve this. Assume you are in this router mode: `Asia>` [3]

8.2 You would want to confirm if Asia router has learned any network route. What command will you use to check this? [1]

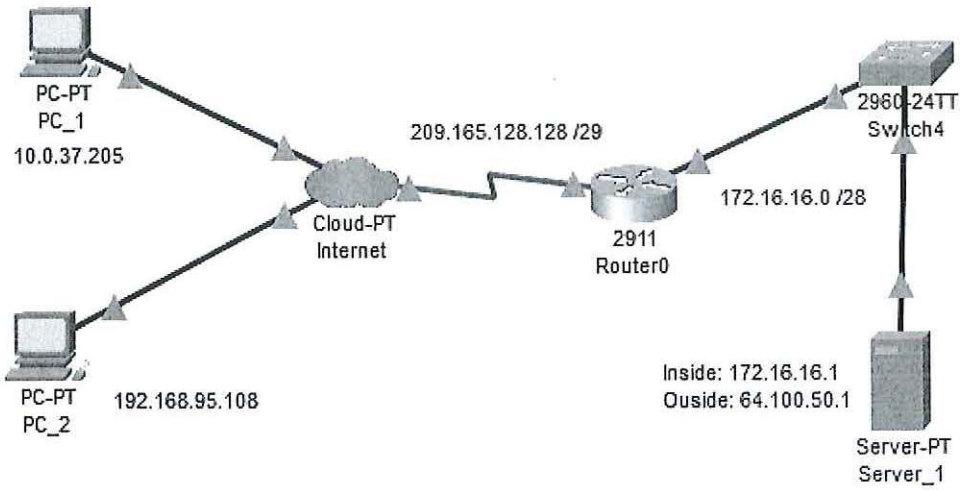
8.3 How do you understand by the command `default-information originate` and how is it useful? [2]

8.4 Below is an extract of Europe router that is configured with OSPF. List down any two networks that have been learned by this router. [2]

```
Europe#[redacted]
Codes: L - local, C - connected, S - static, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
       i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
       * - candidate default, U - per-user static route, o - ODR
       P - periodic downloaded static route

Gateway of last resort is not set

     10.0.0.0/16 is subnetted, 1 subnets
O       10.10.0.0/16 [110/65] via 192.168.100.1, 00:14:12, Serial0/3/0
     20.0.0.0/16 is subnetted, 1 subnets
O       20.20.0.0/16 [110/65] via 192.168.100.1, 00:14:12, Serial0/3/0
     172.16.0.0/16 is variably subnetted, 3 subnets, 2 masks
C       172.16.0.0/24 is directly connected, GigabitEthernet0/0
L       172.16.0.1/32 is directly connected, GigabitEthernet0/0
O IA    172.16.10.0/24 [110/129] via 192.168.100.1, 00:06:33, Serial0/3/0
     192.168.100.0/24 is variably subnetted, 2 subnets, 2 masks
C       192.168.100.0/30 is directly connected, Serial0/3/0
L       192.168.100.2/32 is directly connected, Serial0/3/0
     192.168.200.0/30 is subnetted, 1 subnets
O       192.168.200.0/30 [110/128] via 192.168.100.1, 00:14:12, Serial0/3/0

Europe#
```

## Question 9

Consider the figure below and answer the questions that follow:




9.1 Write down the full command that will create a static NAT translation to map the Server_1 inside address to its outside address. [3]

9.2 Mention any other method that can be used to configure NAT. [1]

9.3 Write down the commands that will configure the correct inside and outside interfaces on the router. Write separate commands for each of the two interfaces. [4]

9.4 Write down the command that you can issue on the router to verify the static NAT configurations. [2]

**Question 10**

As a Network Administrator of a company, you are given a class B IP address block: 192.168.7.0 /24

Utulising CIDR, calculate the subnets that will be assigned to each department of the company. You are informed that each department requires 16 users:

As per your subnetting, clearly indicate:

10.1 Number of subnets that will be created. [2]

10.2 Number of usable hosts per subnet. [2]

10.3 Answer the questions below regarding the subnets created.

a) Subnet 1: [2]

b) The very last subnet: [2]

c) Usable host range for subnet 1: [2]

d) Broadcast address of subnet 1: [1]

**Question 11**

You have been allocated the class C IP address block 172.20.20.0 /16.

Subnet this IP address block to provide valid IP addresses to all users in the four LANs. You are required to re-draw the table below and fill it in. [14]

| LAN | Network number | Range | Subnet mask (/) |
|---|---|---|---|
| Rehoboth: 8000 Users | | | |
| Karibib: 4000 Users | | | |
| Rundu: 250 Users | | | |
| Outjo: 6 Users | | | |
| Marks distribution: | [1.5 marks for each network]<br>[1 mark for each range]<br>[1 mark for each subnet mask (/)]<br>Total: 14 marks | | |

**End of Paper**