



**NAMIBIA UNIVERSITY
OF SCIENCE AND TECHNOLOGY**

**FACULTY OF COMPUTING AND INFORMATICS
DEPARTMENT OF COMPUTER SCIENCE**

QUALIFICATION: BACHELOR OF COMPUTER SCIENCE, BACHELOR OF CYBER SECURITY	
QUALIFICATION CODE: 07BACS, 07BCCS	Level: 6
Course Name: Communication Networks	Course code: CMN620S
Date: January 2026	Paper: Theory
Duration: 3 hours	Marks: 70

Second Opportunity/Supplementary Examination Question Paper	
Examiners	Ms. Albertina Shilongo
Moderator	Mr. Edward Nepolo

THIS QUESTION PAPER CONSISTS OF 6 PAGES (Including this front page)

INSTRUCTIONS

1. Answer ALL the questions on the answer scripts provided.
2. Write clearly and neatly.
3. Be guided by the number of marks allocated when answering the questions.
4. Show all your calculations.
5. Number your questions clearly.

Permissible Material
Calculators.

Question 1: Multiple Choice and True/False.

Write the question number and the correct answer next to it.

Indicate whether the following statements are true or false.

- a) In addition to its security filtering duties, the Next-Generation Firewall (NGFW) can also perform basic routing functionalities.
- b) The main disadvantage of Static routing is that it consumes more CPU and memory resources than dynamic routing.
- c) 802.1q is the main type of encapsulation trucking protocol that is an IEEE standard.
- d) In the routing decision process, where three routes have the same prefix length, the route with the highest Administrative Distance (AD).
- e) Routing primarily takes place at Layer 2 of the OSI model.
- f) In a classful addressing system, an organisation with 1000 hosts, a Class C network would be the most efficient fit without any IP address wastage.
- g) With BGP configurations, neighbors are automatically discovered by other routers.
- h) The administrative distance for a route learned via eBGP is 200.
- i) A VLAN creates a single, large broadcast domain that spans across an entire switched network.
- j) RIP can function only with a minimum of 15 routers.

Multiple choice:

- k) A data packet with a destination IP address of 192.168.10.50 arrives at this router. Which route will I packet forward to and why?
 - a) Route B, because it has a better (lower) Administrative Distance.
 - b) Route A, because it has a longer prefix match.
 - c) Route B, because EIGRP is a more intelligent protocol than OSPF.
 - d) Route A, because it has a better (higher) Administrative Distance.
- l) Which of the following statements clearly differentiate Distance Vector from Link state routing protocols?
 - a) Distance Vector protocols use LSAs, while Link-State protocols use hop count to select the best route.
 - b) Distance Vector protocols use hop count, Link-State protocols use complete network topology to select the best route.
 - c) Distance Vector protocols are configured between Autonomous Systems, Link-State protocols are configured inside AS.
 - d) Distance Vector protocols usually have a higher AD than Link-State protocols.
- m) Why would route learned from OSPF(AD=110) be preferred over the one learned from RIP (AD=120) to the same destination network?
 - a) OSPF has a better metric than RIP as it counts the number of routers.
 - b) OSPF has a lower Administrative Distance.
 - c) OSPF functions with longer prefix matches as compared to RIP.
 - d) OSPF is an IGP, RIP is an EGP.

- n) An AD of 255 signifies that:
- a) The network route is directly connected
 - b) The network route is highly trustworthy
 - c) The network route is highly untrustworthy route
 - d) The network route is invalid and will never be used.
- o) A host is configured with the IP address 132.70.198.41 and a subnet mask of 255.255.192.0. Determine the network address that this host belongs to.
- a) 132.70.0.0
 - b) 132.70.192.0
 - c) 132.70.198.0
 - d) 132.70.255.0
- p) Which BGP table contains only the best routes to forward traffic?
- a) Neighbor Table
 - b) BGP Database Table
 - c) Routing Table
 - d) Topology Table
- q) What is the main function of a Designated Router (DR) in an OSPF multi-access network?
- a) To increase the number of OSPF areas.
 - b) To act as a central point where LSAs are exchanged.
 - c) To encrypt data in routing tables for security.
 - d) To assign IP addresses to all other routers on the network.
- r) If two routers have the same OSPF priority on a multi-access network, which option will be used as the breaker for electing the DR?
- a) The router with the lowest IP address
 - b) The router with the fastest link speed.
 - c) The router with the highest Router ID.
 - d) The router that was the highest IP address.
- s) What type of port should the network engineer configure when he needs the switch port to carry traffic for multiple VLANs.
- a) Access Port
 - b) Routed Port
 - c) Trunk Port
 - d) Dynamic Port
- t) Which of the following protocols is used to dynamically negotiate and manage VLAN information from multiple VLANs between switches?
- a) OSPF
 - b) STP

- c) ARP
- d) UDP

Question 2: Define the following concepts.

[10]

- a) Area Boundary router
- b) OSPF (Open Shortest Path First)
- c) Autonomous System (AS)
- d) The Longest Prefix Match Rule
- e) Hop Count

Question 3: Long Questions

[20]

1. NUST is in the process of acquiring a new satellite campus located 20km away from the main campus. The two campuses are connected via a dedicated high-speed fiber link. As the network administrator, you are tasked with implementing a dynamic routing protocol within this network that will route traffic between the two campuses, given these conditions:

- The Main Campus has over 50 interconnected routers and multiple paths for redundancy.
- The Satellite Campus is small for now, with only 10 routers with greater potential to grow soon.
- The Link between the campus has high bandwidth, but it is recommended that it should not be flooded with unnecessary traffic.

a) Which routing protocol would be the most appropriate given the case and conditions above? Justify your answer with at least three specific reasons. (7)

b) The implementation of the routing protocols you suggest in A was successful and the university's leadership is quite impressed with the network's reliability and stability. To build on this robust foundation, the management made a strategic decision to extend its connection to the global Internet by purchasing Internet transit services from two separate ISPs (Telecom and Paratus), for redundancy and have an option of better performance.

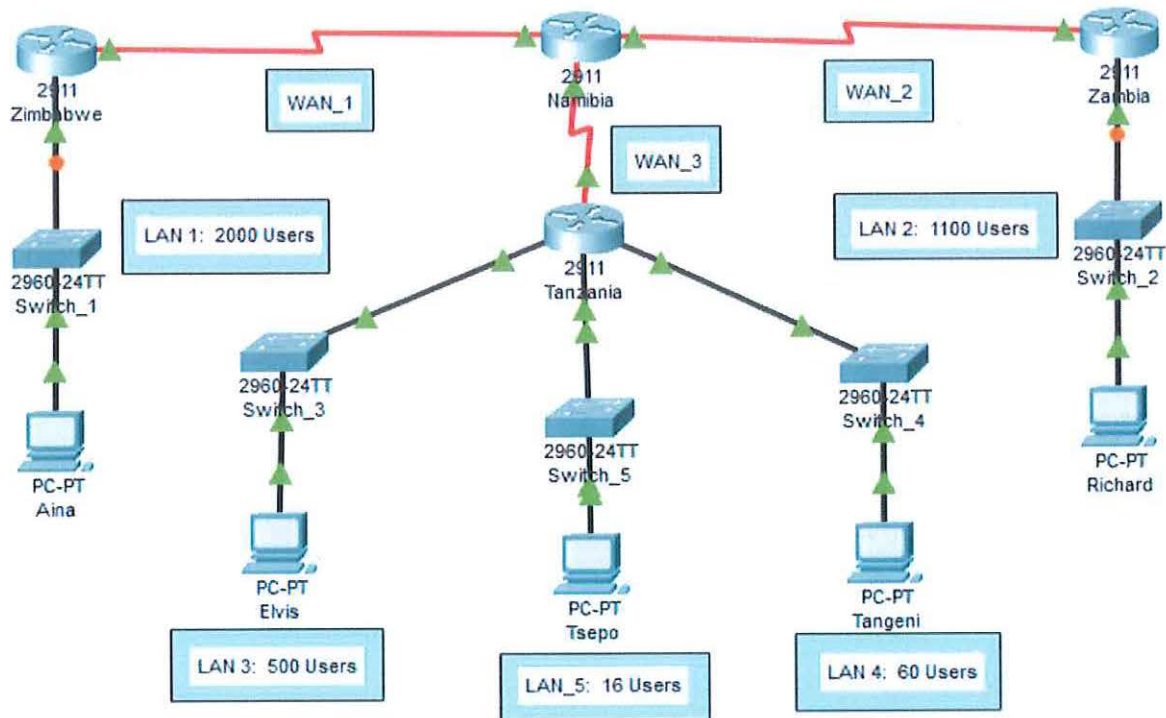
To establish and manage the redundant Internet connections, which routing protocol will you configure on the core router? Justify your selection by explaining its key advantages in this multi-homed ISP scenario. (10)

c) Explain the difference between eBGP and IBGP

Question 4: Practical

[20]

1. Consider the topology below. You are given the network: 192.168.50.0/24 to work with.



- a) Using the IP block 192.168.50.0/16, perform VLSM to create subnets for all LANs and WAN links. Indicate each subnet address with Subnet mask slash suffix and the broadcast address. Draw a table as the one indicated below in your answer sheet and populate it accordingly (12)

Do not write your answers on this sheet

LAN/WAN	Subnet address and SM slash suffix	Broadcast address
LAN 1		
LAN 2		
LAN 3		
WAN.....		

- b) What is the overall range of unallocated addresses? (2)
- c) Calculate the total number of IP addresses that the **192.168.50.0/16** block can provide. Show your work (2)

OSPF commands

- d) What command verifies that OSPF neighbors are established? (1)
- e) What command shows OSPF routes in the routing table? (1)
- f) What command displays OSPF interface information? (1)
- g) What command displays hello packets activities in real-time? (1)

Exam ends