



**NAMIBIA UNIVERSITY
OF SCIENCE AND TECHNOLOGY**

Faculty of Computing and Informatics

Department of Computer Science

QUALIFICATION: BACHELOR OF COMPUTER SCIENCE, BACHELOR OF COMPUTER SCIENCE IN CYBER SECURITY, BACHELOR OF ENGINEERING: ELEC. & TELECOM	
QUALIFICATION CODE: 07BACS, 07BCCS, 35BEET	LEVEL: 6
COURSE: Communication Networks	COURSE CODE: CMN620S
DATE: November 2019	
DURATION: 2 hours	MARKS: 50

FIRST OPPORTUNITY EXAMINATION QUESTION PAPER	
EXAMINER	Peter Gallert
MODERATOR:	Prof Dharm Singh Jat

THIS QUESTION PAPER CONSISTS OF 2 PAGES
(Excluding this front page)

INSTRUCTIONS

- 1) Answer all questions in Section A. Answer only one question from Section B.
- 2) When answering questions you should be led by the allocation of marks.
- 3) Write clearly and neatly in your examination book. Answers that appear only on the question paper **cannot be marked**.

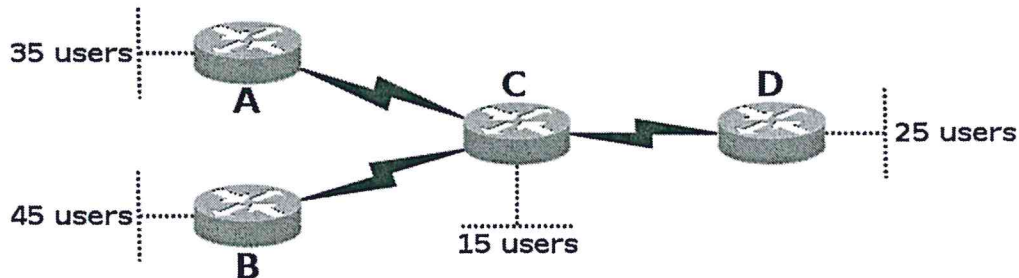
PERMISSIBLE MATERIALS

- 1) Calculators are **not allowed!**



Section A: Answer all questions

1. Can you subnet a class-D IP address block? Why/why not? Explain in some detail. (4)
2. Consider the following network topology:

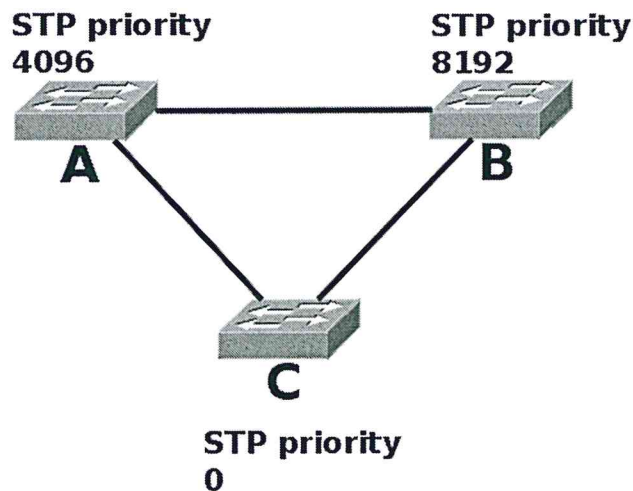


- (a) You have been allocated the class-C IP address block 192.168.13.0 /24. Subnet this address block to provide valid IP addresses to all users in the four different LANs, and to the WAN links between the routers. (8)
 - (b) Assign valid IP addresses to all interfaces of router C. Label them clearly in your answer sheet, for instance: LAN, WAN to router A, WAN to router B, WAN to router D. (4)
 - (c) Write down the range of the unallocated address space. (2)
3. Explain OSPF designated router election, in particular:
 - (a) Name a condition where OSPF routers, although properly configured, would choose *not* to conduct such election. Also briefly explain the rationale of this behaviour. (3)
 - (b) If an election is held, how is the winner determined? (3)
 - (c) What is the command on a Cisco router to display the result of the election? (1)
 4. Compare and contrast the three routing protocols RIP, OSPF, and BGP with respect to the following:
 - (a) In what types of networks are they used? (1 mark per routing protocol) (3)
 - (b) By which mechanism do routers running this protocol obtain knowledge about their neighbours? Only mention the mechanism, don't describe how it exactly works! (1 mark per routing protocol) (3)
 - (c) To which IP address(es) do they send routing updates? (1 mark per routing protocol) (3)



Section B: Answer question 5 or question 6

5. Answer the following questions with regard to the IEEE 802.1Q encapsulation:
- (a) What is its purpose? (3)
 - (b) How does it operate? Consider in particular how it changes the encapsulation compared to 802.3 / Ethernet. (3)
 - (c) What does a router do if a frame in 802.1Q encapsulation arrives? (2)
 - (d) What does a switch do if a frame in 802.1Q encapsulation arrives? (2)
 - (e) What does a workstation do if a frame in 802.1Q encapsulation arrives? (2)
 - (f) On a switch, what commands are necessary to convert port fa 0/1 to 802.1Q encapsulation? (1)
 - (g) On a router, what commands are necessary to convert port fa 0/1 to 802.1Q encapsulation? (3)
6. Consider the network below. STP is running on all switches, the priorities have been configured as indicated.



- (a) When Spanning Tree is operating in this network, what roles (designated, root, alternative) will each of the active switch ports assume? Write in your answer sheet e.g.: *A to C: designated, C to A: root, and so on* (6)
- (b) What does a port in alternative role do? Consider user traffic as well as Spanning Tree protocol traffic. (2)
- (c) How would the port roles be allocated if all switch priorities were the same? (2)
- (d) What will happen if during normal operation of this network an access point is connected to one of the free switch ports of switch C? (3)
- (e) What will happen if during normal operation of this network Spanning Tree is disabled on all switches? Consider the two main consequences. (3)

End of question paper