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)	
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COURSE: INTERNET AND WAN TELECOMMUNICATION	COURSE CODE: IWT711S
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DURATION: 2 hours	MARKS: 60

FIRST OPPORTUNITY EXAMINATION QUESTION PAPER	
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THIS EXAMINATION PAPER CONSISTS OF 3 PAGES

(Excluding this front page)

INSTRUCTIONS

1. Answer **all questions**.
2. When writing take the following into account: The style should inform than impress, it should be formal, in third person, paragraphs set out according to ideas or issues and the paragraphs flowing in a logical order. Information provided should be brief and accurate.
3. Please, ensure that your writing is **legible, neat** and **presentable.**
4. When answering questions you should be led by the allocation of marks. Do not give too few or too many facts in your answers.
5. Number your answers clearly according to the question paper numbering.
6. Clearly mark rough work as such or cross it out unambiguously in ink.

PERMISSIBLE MATERIALS

1. Calculator.

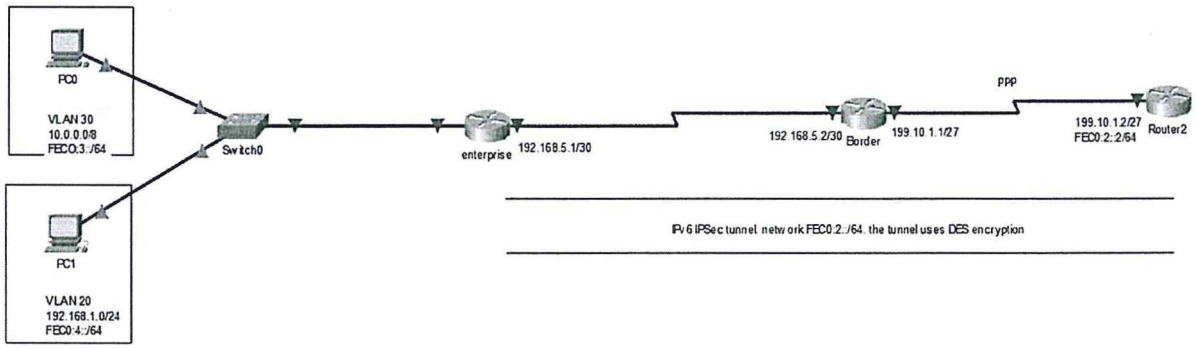

Figure 1

1. Use Figure 1 to answer question 1.
    a. What is the use of Network Address Translation (NAT)? [1]
    b. Given that Port Address Translation (PAT) is implemented on the border router using the pool 199.10.1.5-199.10.1.20 subnet mask 255.255.255.224 for both VLANs 30 and 20.
        i. State one valid Private IP address from VLAN 30 that can be translated to public address 199.10.1.6:3022 where 3022 is a port number. [1]
        ii. How is it possible to use only 16 public IP addresses for the more than 16 private addresses available in VLANs 30 and 20? [3]
        iii. Which other types of Network Address Translation (NAT) exist? [2]

2.
    a. State and explain two types of transmission medium. [2]
    b. What are the two varieties of twisted pair transmission medium? [2]
    c. What is the use of shielding in twisted pair transmission media? [2]
    d. Twisted pair may be used to transmit both analog and digital data. What is the maximum distance required before a signal is amplified for:
        i. Analog signals. [1]
        ii. Digital signals. [1]

3. Use Table 1 to answer question 3.
    a. State three types of IPv6 addresses [3]

Table 1

Device	interface	IPv6 address	MAC address
RouterA	Gi 0/0	BEEF:FACE:1:1::/64	1001FEEB6B41
RouterB	Gi 0/0	?	1001FEEB6B40

    b. Given that **RouterA** and **RouterB** in Table 1 are connected through their Gigabitethernet 0/0 interfaces. What will be the IPv6 address for **RouterB** Gigabitethernet 0/0 if it is autoconfigured? [4]
    c. What will be the default link-local address for **RouterA** Gigabitethernet 0/0 interface? [1]
    d. Describe the process **RouterB** uses to autoconfigure its Gigabitethernet 0/0 interface. [3]

4. Use Figure 1 to answer question 4.
    a. Explain briefly how a packet from Fec0:2::/64 connected from **Router2** LAN is transmitted via the VPN to Fec0:4::/64 LAN. [5]
    b. State and describe two primary IPSec protocols. [4]
    c. What are the IPv6 IPSec implementation guidelines? [2]

5. Frame Relay is a WAN protocol that operates at the physical and data link layers of the OSI reference model. A T1/E1 leased line, connects the routers to the ISP Frame Relay switches.

    a. What is the use of a DLCI? [2]
    b. Suppose the configuration frame relay link was changed from DLCI 200 to DLCI 400. What will happen after this configuration change? [2]
    c. Suppose the Committed Information Rate (CIR) is 4.5Mbps.
        i. What is CIR [1]
        ii. What happens to frames that are transmitted at 4.9Mbps? [1]
        iii. What happens to frames that are transmitted at 4.9 Mbps if the network is congested? [1]

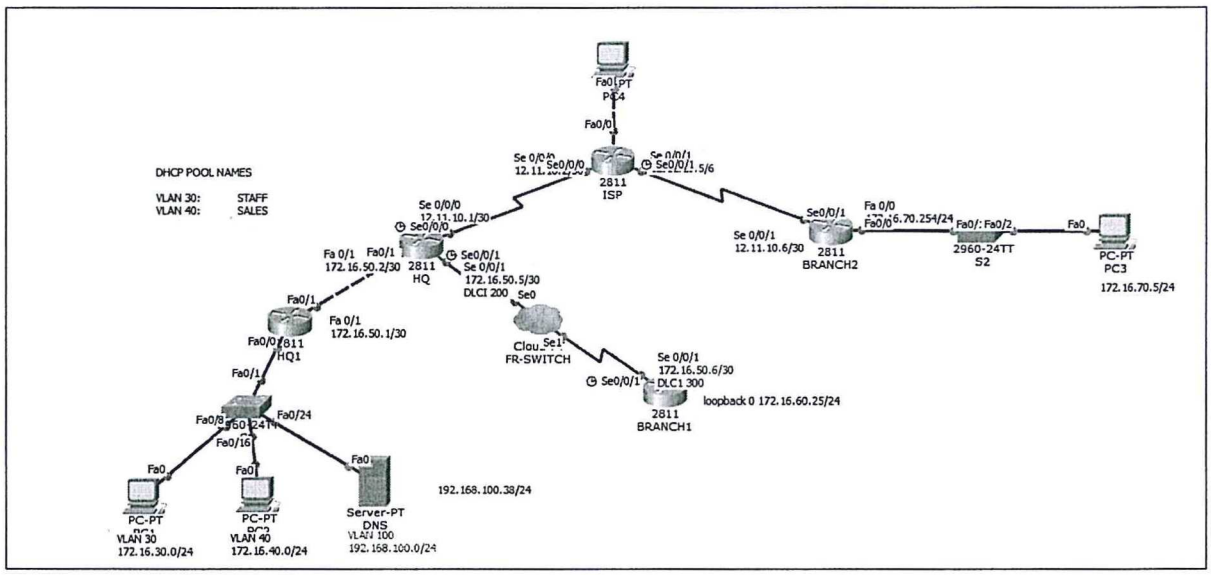

Figure 2

6. Use Figure 2 to answer question 6.

   You are given that the ISP network is connected through Multi-Protocol Label Switching (MPLS). You are also told that the ISP router is the first router in the MPLS network

   a. What type of MPLS router is the ISP router? What is this type of MPLS router responsible for in the MPLS network? [3]
   b. State and explain the use of any other two types of MPLS routers. [4]
   c. Describe two reasons why MPLS networks are popular. [2]
   d. If the ISP is implementing traffic engineering. Which Label distribution protocol is being used by the ISP? [1]
   e. Name any other label distribution protocol you know. [1]
   f. In which OSI layer is MPLS? [1]
   g. Is MPLS circuit switched or packet switched? [1]

7. Name and explain 3 components of the security triad. [3]

GOOD LUCK!!!