



**NAMIBIA UNIVERSITY  
OF SCIENCE AND TECHNOLOGY**

**FACULTY OF COMPUTING AND INFORMATICS**

**DEPARTMENT OF COMPUTER SCIENCE**

<b>QUALIFICATION : BACHELOR OF COMPUTER SCIENCE, BACHELOR OF COMPUTER SCIENCE IN (CYBER SECURITY)</b>	
<b>QUALIFICATION CODE: 07BACS, 07BCCS</b>	<b>LEVEL: 7</b>
<b>COURSE: INTERNET AND WAN TELECOMMUNICATION</b>	<b>COURSE CODE: IWT711S</b>
<b>DATE: JULY 2019</b>	<b>PAPER: THEORY</b>
<b>DURATION: 2 hours</b>	<b>MARKS: 60</b>

<b>SUPPLEMENTARY/SECOND OPPORTUNITY EXAMINATION QUESTION PAPER</b>	
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**THIS EXAMINATION PAPER CONSISTS OF 4 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.

1.

- a. WAN technologies can be categorised as being either switched or dedicated. Indicate whether the following technologies are switched or dedicated. [3]
- i. Digital Subscriber Line (DSL)
  - ii. Frame Relay
  - iii. Multi-Protocol Label Switching (MPLS)
  - iv. T3/E3
  - v. Integrated Services Digital Network (ISDN)
  - vi. Asynchronous Transfer Mode (ATM)
- b. Briefly describe packet switching. [3]
- c. Briefly describe circuit switching. [3]
- d. Given that an ISDN connection has two 64Kbps channels and one 16Kbps channel.
- i. What type of ISDN is this? [1]
  - ii. What is the other ISDN type? [1]
- e. What is Fractional T1? [2]
- f. Imagine T1 uses time division multiplexing.
- i. What condition is necessary for multiplexing to work? [1]
  - ii. If six data sources A, B, C, D, E and F are being synchronously being time division multiplexed respectively so that each data source is allocated 13s to transmit at a time. Assuming that all the time is allocated to sending the frames generated. At 95s which device is adding data to the frame? [2]
  - iii. If six data sources A, B, C, D, E and F are being synchronously being time division multiplexed respectively so that each data source is allocated 13s to transmit at a time. Assuming that all the time is allocated to sending the frames generated. At 95s which frame is being generated? [2]
  - iv. What is the problem with time division multiplexing? [2]
  - v. Which type of multiplexing can solve the problem you mentioned in {1f(iv)}? [1]

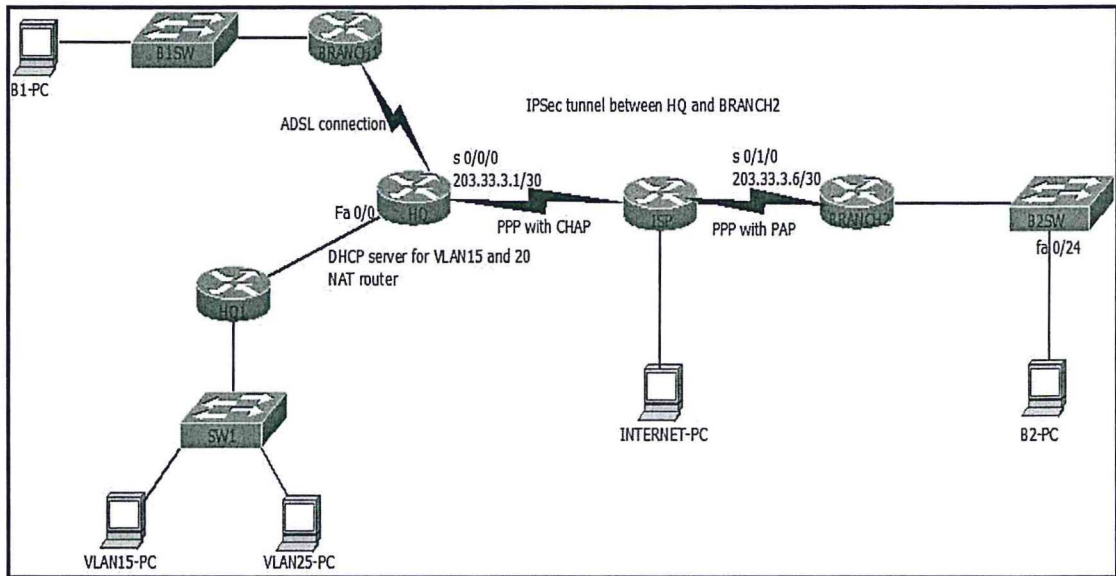


Figure 1

2.

- a. State two valid ADSL modulation techniques that can be used between HQ and BRANCH1 [1]
- b. Assume DMT ADSL is used between HQ and BRANCH1. Two consecutive channels are operating using the frequency 72.5 KHz and 77.5 KHz.
  - i. What is the size of each DMT channel? [1]
  - ii. What are the frequencies of these two channels? [2]
- c. What is the actual size of each DMT channel used in real ADSL networks? [1]
- d. DSL access multiplexer (DSLAM) is used to accept all of the ADSL connections and combines or multiplexes them into one link. Assume DSLAM is getting 15 different signals? How many frequencies does the DSLAM output to make one link? [2]
- e. Which multiplexing technique does the DSLAM use to achieve the result in '2d' above? [1]
- f. ADSL signals coexist with voice signals in the same physical medium. A DSL splitter is used to separate voice and data signals. A signal of 6Hz will represent what type of ADSL signal? [1]

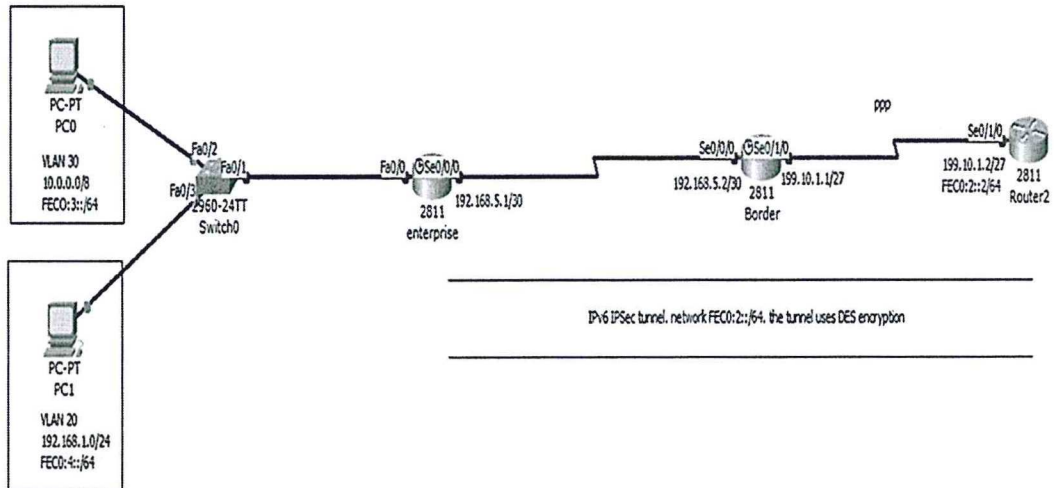


Figure 2

3.
  - 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 transmission. What is the maximum distance required before a signal is amplified for:
    - i. Analog signals [1]
    - ii. Digital signals [1]
4. Use Table 1 to answer question 4.
  - 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]

5. Use Figure 2 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]

**GOOD LUCK!!!**