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**UNITED STATES INTERNATIONAL UNIVERSITY – AFRICA (USIU)**

**CLASS ASSIGNMENT I**

**SUMMER SEMESTER 2022**

**APT2050: TELECOMMUNICATIONS & COMPUTER NETWORKS**

**INSTRUCTOR: DR. ABRAHAM NYETE**

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***INSTRUCTIONS:***  ANSWER **ALL** QUESTIONS

**Question One 15MARKS**

(a) Draw the OSI protocol architecture model and explain the function of each layer

**[12 Marks]**

|  |  |
| --- | --- |
| Application Layer | Deals with the user’s interaction |
| Presentation Layer | Is where data formatting and encryption takes place |
| Session Layer | Maintains dialog discipline between different processes |
| Transport Layer | Is responsible for the establishment, maintenance and termination of a connection |
| Network Layer | Is where IP addressing and routing is done |
| Data Link Layer | Is where error control, flow control and network access processes are done |
| Physical Layer | Is where transmission media are and where data modulation and encoding is done |

b). Given the frequency-domain graph below, answer the following:

i) What is the frequency spectrum? **3-16**

ii) What is the bandwidth? The bandwidth is **16-3=13Hz**

iii) Is this an analog or digital signal? Why? **This is an analog signal because it has varying frequency** **[3 Marks]**

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**Question Two 15Marks**

(a) Differentiate between analog and digital signals. **Analog signals are signals that are continuous in nature while digital signals are discrete in nature**  **[1 Marks]**

b) Signals play a critical role in communications. What characteristics are used to differentiate between different periodic signals**. [4 Marks]**

* **The Amplitude (A) of the signal**
* **The Time Period (T)**
* **The Frequency (f)**
* **The wavelength (lambda)**

c) Why is fiber optic a better transmission medium compared to twisted pair. What the applications of fiber optic cables. **[3 Marks]**

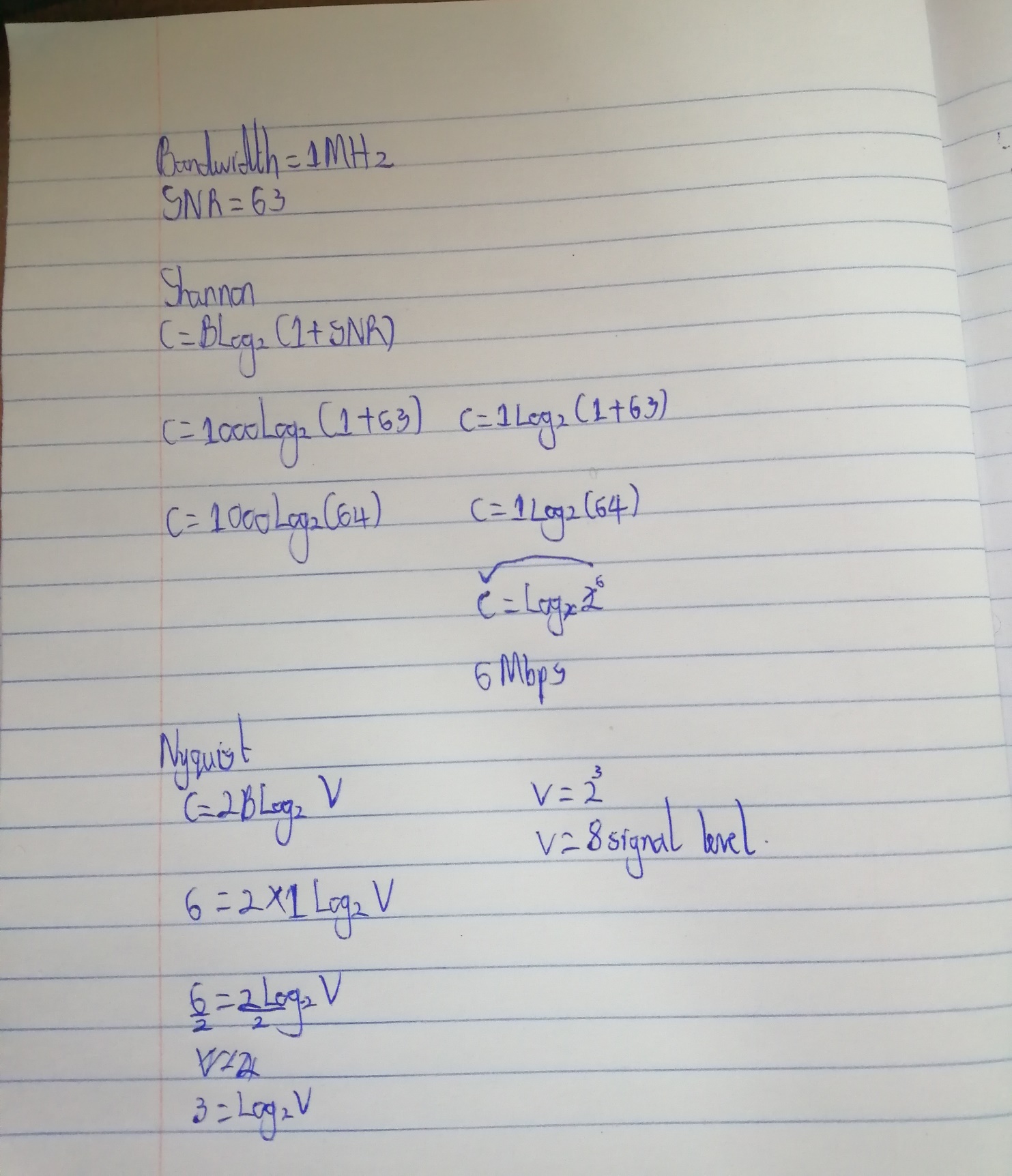
**Fiber Optic transmission is better than twisted pair because:**

* **It has a lower attenuation as compared to the twisted pair.**
* **It has greater capacity with data rates of hundreds of Gbps.**

**Fiber Optic transmission is applicable in:**

* **Subscriber Loops to the customer, e.g Safaricom home fiber**
* **Metropolitan areas such as Faiba**
* **Transfer of large quantities of data across continents under the sea.**

(d) We have a channel with a 1 MHz bandwidth. The SNR for this channel is 63. What are the appropriate bit rate and signal level? **[7 Marks]**

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