

DATA COMMUNICATION X CLASS

RAFIQA MAHARANI PUTRI SIREGAR – L 200 154 010

- Mid Test Assignment, answer the question of mid test and set it to github.

1. Draw the model of the data communication system, explain every single component in the model.

Answer:

```

graph LR
    Source[Source] --> Transmitter[Transmitter]
    Transmitter --> TransmissionSystem[Transmission System]
    TransmissionSystem --> Receiver[Receiver]
    Receiver --> Destination[Destination]
  
```

SOURCE = Generates data to be transmitted, like telephones and personal computers.

TRANSMITTER = Converts data into transmittable signal.

TRANSMISSION SYSTEM = Carries data from source to destination. It can be a single transmission line or a complex network connecting source and destination.

RECEIVER = Accepts the signal from the transmission system and converts it into a form that can be handled by the destination device.

DESTINATION = Takes the incoming data from receiver.

2. Describe all type of media which is used in the data communication system and describe the important characteristic as well!

Answer:

A GUIDED MEDIA

| | Frequency Range | Bandwidth | Repeater Spacing |
|---------------------------|---------------------------------|-----------------------------------|------------------|
| Twisted pair (Cat 7 UTP) | 600 MHz to 1000 MHz | 600 MHz | 100 meters |
| Coaxial cable | Theoretically 2500 Hz – 3000 Hz | Theoretically 0 Hz to Millions Hz | 500 meters |
| Fiber Optic (Single mode) | Approximately 180 THz – 330 THz | 20 GHz | 3 Kilometers |

B. UNGUIDED

• Wireless

→ Frequency range → up to 5.9 GHz

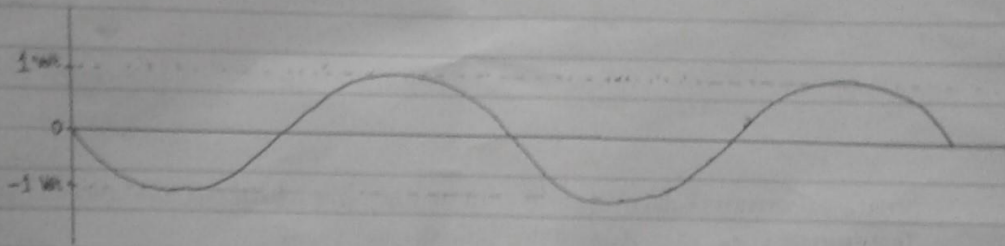
→ Bandwidth → 20 MHz or 40 MHz

→ Signal range → Terjauh 900 m

3. a). frequency (f) = 2 Hz

Max Amplitude (A) = 1 volt

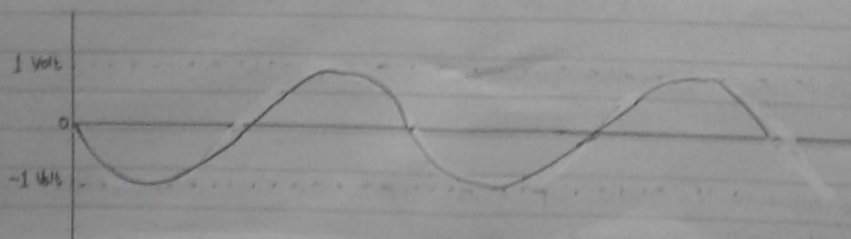
Phase (θ) = zero (0)



b) frequency (f) = 2 Hz

Max amplitude (A) = 1 volt

Phase (θ) = 180°



c) for (a)

$$\begin{aligned} t = 1 \quad s(t) &= A \sin(2\pi ft + \theta) \\ &= 1 \sin(2\pi \cdot 2t + 0) \\ &= \sin(2 \cdot 3.14 \cdot 2) \\ &= -0.0063 \end{aligned}$$

for (b)

$$\begin{aligned} t = 1 \quad s(t) &= A \sin(2\pi ft + \theta) \\ &= 1 \sin(2 \cdot 3.14 \cdot 2 + 180) \\ &= \sin(192.56) \\ &= -0.797 \end{aligned}$$

4. Text consist of two characters "BN" should be sent through computer network using manchester encoding.

(a) Write down the data "BN" in binary

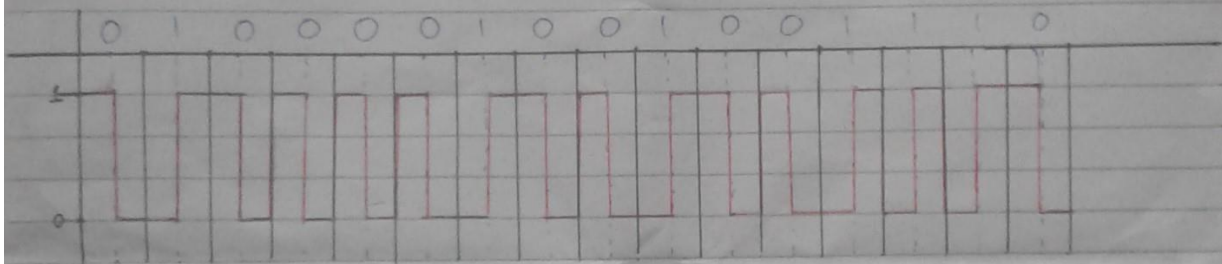
BN

B = 42 (Hex) = 0100 0010

N = 4E (Hex) = 0100 1110

So BN = 0100 0010 0100 1110

(b) Draw digital signal which is used manchester to encode the digital data "BN"



5. Make the signal from digital signal above into analog using phase shift Keying encoding techniques. Note: phase 0° is for data 0 and phase 180° for data 1.

