INU

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Course => Intro to Telecom.

Program => Bs (Tele)

Exam => Final

Submitted to

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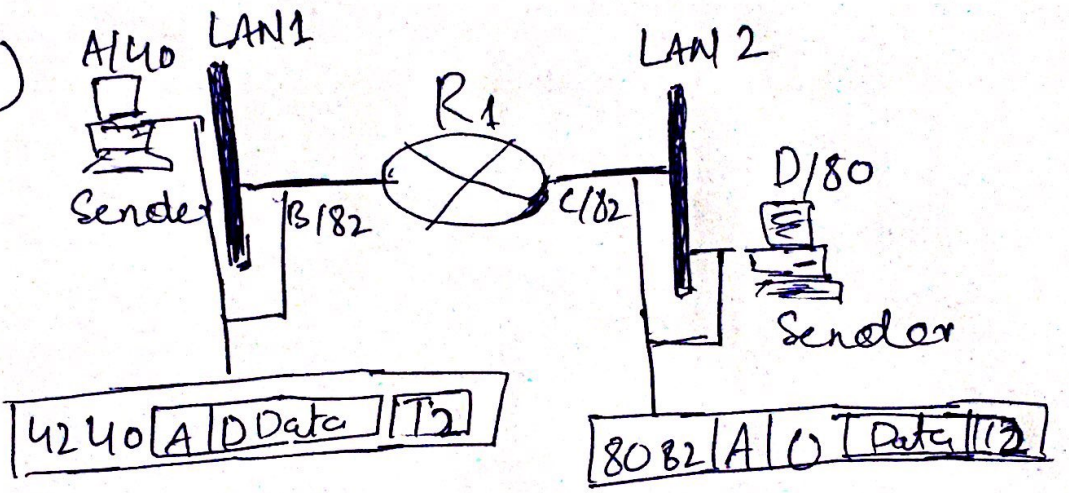
Qs No 1

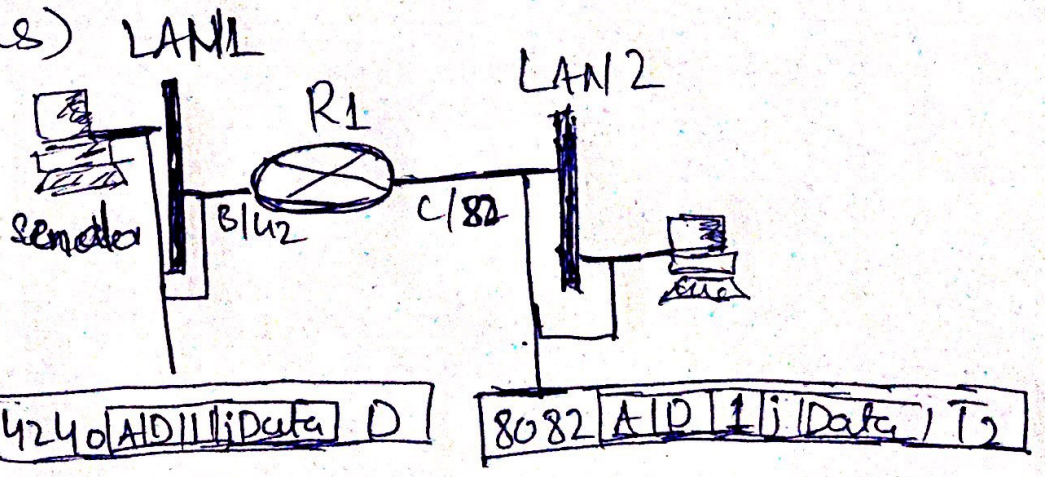
(A) For figure below computer A send a message ---
---transport layer for each hop.

(Ans)



In big 222 (given above) assume that the communication is between ----
----transport layer for each hop.

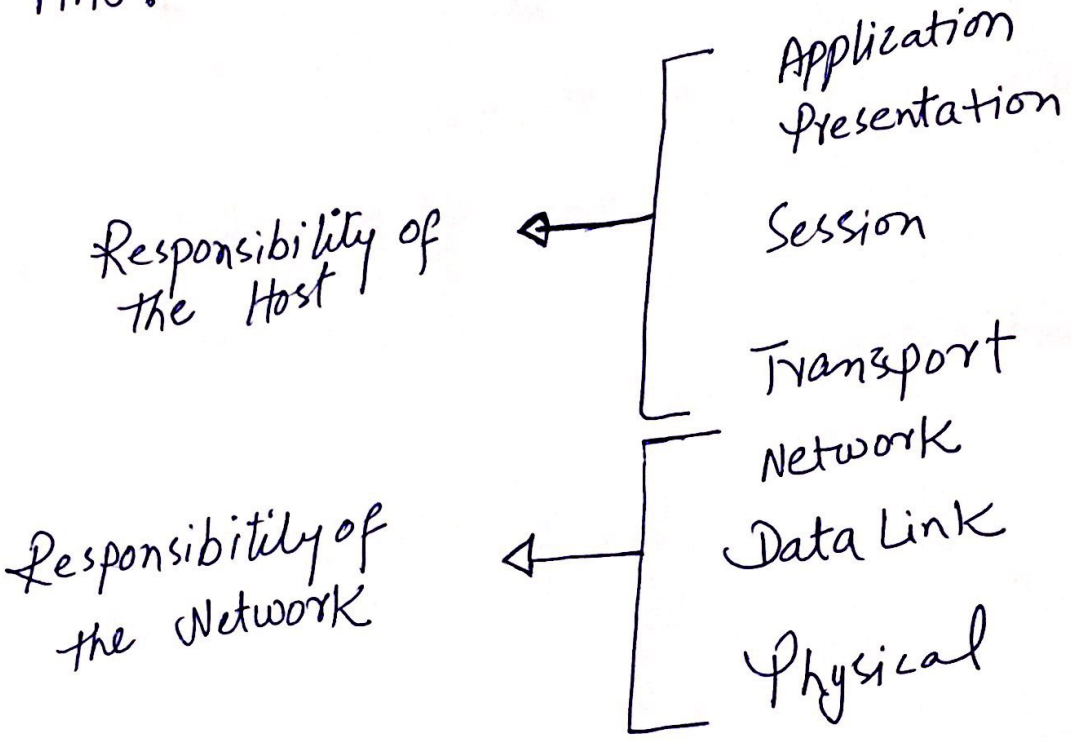
(Ans)



Question (1)

(B): Discuss briefly the main responsibilities of each ----- Model?

Ans:-



Application:
- End user layer
- HTTP, FTP, IRC, SSH, DNS

Presentation:-
- Syntax Layer
- SSL, SSH, IMAP, FTP, MPEG, JPEG

Session:-
- Synch & send to port
- API's, Sockets, Winsock

Transport:-
- End to end connection
- TCP, UDP

Network:-
- Packets
- IP, ICMP, IPSec, IGMP

Data Link :-

- Frames
- Ethernet, PPP, Switch, Bridge

Physical :-

- Physical structure
- Coax, Fiber, Wireless, Hubs, Repeaters.

Question No #02:-

a) Given an Amplifier with an effective noise - - - - - - - - - - its output?

Ans:- Calculate Thermal Noise Level

T = Effective noise temperature = 1100°K

B = Bandwidth = 12MHz

= 12×10^7 Hz ($\because$ 1MHz = 10^6 Hz)

= 10^{1+7} Hz ($\because a^m \times a^n = a^{m+n}$)

B = 10^8 Hz

K = Boltzmann's Constant = $1.38 \times 11-23$ J/K

_____ x _____ x _____

Question No# 02 :-

b:- What is the channel capacity for teleprinter channel noise?

Ans :-

From the given details we know

B (Bandwidth) = 450 Hz

SNR_{db} (signal-to-noise ratio decibel) = 6d

Suppose, C = channel capacity and SNR = Signal-to-noise ratio.

Now using decibel formula

$SNR_{db} = 10^x \log(SNR)$

That means

$6 = 10^x \log(SNR)$

$SNR = \log^{-1} 0.6$

$SNR = 10^{0.6}$

$SNR = 3.990$

Now Using Shannon's equations

$C = B^x \log_2 (1 + SNR)$

$C = 450^x \log_2 (1+3.99$

$C = 450 \times \log_2 (4.990$

$C = 778.50$

Hence Signal-to-noise ratio (SNR) = 3990

Therefore, the channel capacity for teleprinter channel is 778.50 bits per second.

(Q2)

Part (C) given a channel with an intended - - ———— - - - - achieve this capacity?

Answer:—

$SNR_{dB} = 10 \log_{10} SNR$

$SNR = 10^{SNR_{dB}/10}$

$SNR = 10^{2.2}$

$SNR = 158$

For Capacity

$C = B \log_2 (1 + SNR)$

$C = 4 \times 10^6 \times \log_2 (158)$

$C = 7.9$ Mbps

Question No 3

(A) A digital signaling system is required to operate - - - - - bandwidth of the channel.

Answer Using Nyquists equation

$$C = 2B \log_2 M$$

we have

$$C = 9600 \text{ bps}$$

$$C = 2B \log_2 M$$

$$9600 = 2B \times 8$$

and

$$9600 = 2B \times 8$$

$$\frac{9600}{2 \times 8} = \frac{2B \times 8}{2 \times 8}$$

$$= \frac{9600}{16} = B$$

$$B = 600 \text{ Hz}$$

$$600 \text{ Hz} = B$$

Q# 3:- PART b). If the received signal level for a Particular digital System is -150 dBW and the receiver System effective temperature is 1700k. What is E_b/N_0 for a link transmitting 2600 bps?

Answer:- E_b/N_0

$$\left(\frac{E_b}{N_0}\right)_{dB} = S_{dBW} - 10\log R - 10\log k - 10\log T$$

$$= S_{dBW} - 10\log R + 150\,dBW - 10\log T$$

- If a minimum E_b/N_0 of 8.4dB is needed to acheive a bit error rate of 10^{-4}
- Given:
  - The effective noise temprature, T, is 1700 k
  - The data rate, R, is 2400 bps

What is the minimum signal level required for the received signal?

$$8.4 = S(dBW) - 10\log 2600 + 150\,dBW - 10\log 1700$$

$$= S(dBW) - (10)(3.41) + 150 - (10)(3.23)$$

$$S = -151.3\ dBW$$