Data Communicating & Networking

Assignment # 01

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Question no 01.

TCP/IP Model :-

1) Physical Layer :- Responsible for moving the individual bit from one hop to another. via cable, fiber wire or wireless network.

2) Data Link layer :- Responsible for moving the frame across the network from one hop to another. It is also called host-to-network and uses Ethernet protocols with mac address and switches (CRN)

3) Network layer :-
It is also called ~~three~~ ~~layer~~ d Responsible for delivering the individual packets from the source host to the destination host. It uses routers (3 layer device) and IP addresses to identify packet source and destination.

4) Transport layer :-
Responsible for delivering the message from one process to another. It uses firewalls. It has SCTP, TCP, UDP port addresses for reliable and fast connections. It also divides packet into small segments.

5) Application Layer
Responsible for generation request and connections b/w user and remote hosts. It allows access to network resources. Examples are computer, laptop, mobile etc.

Question no 02:-

	Layer Name	PDU	Protocols	Device	Address
5)	Application	Data	HTTP, DNS	laptop	Specific
4)	Transport	Segments	TCP/UDP	Firewall	PORT
3)	Network	Packets	IP	Router	logical
2)	Data Link	Frame	Ethernet	Switch	Physical
1)	Physical	Bits	Ethernet/ Nlac	fibercable	Physical

Question no 03:-
Data:-
B = 4000 Khz
Signal power = 2 W
Noise power = 4m W

Req:
$SNR = ?$
$SNR_{DB} = ?$

Sol:-
$$SNR = \frac{Signal\ Power}{Noise\ Power}$$
$$= \frac{2\ W}{4m\ W}$$

$$= \frac{2}{4 \times 10^{-3}}$$

SNR = 500

$$\therefore \quad SNR_{DB} = 10 \log_{10}(SNR)$$

$$= 10 \log_{10}(500)$$

$$SNR_{DB} = 26.9897$$

Question no 04:-

Data:-

Signal-to-noise ratio = 1000
B = 4000 KHz

Req:- Data Rate / Bit Rate = ?

Sol:-

Bit rate = $B \times \log_2(1 + SNR)$

$= 4000000 \times \log_2(1 + 1000)$

$= 4000000 \times 9.9672$

$= 400000 \, 9.967 \, kbps$

OR

$= 40 \, Mbps$

Question no 045:-

Data:-

B = 4KHz
Bit rate / capacity = 100 kbps

Req:-

$SNR_{DB} = ?$
$SNR = ?$

∴ Capacity = Bandwidth $\times \log_2(1 + SNR)$

$$\frac{\cancel{SNR}}{100,000} = 4000 \times \log_2(1 + SNR)$$

$$\log_2(1 + SNR) = \frac{100,000}{4000}$$

$$\log_2(1 + SNR) = 25$$

$$1 + SNR = 2^{25}$$
$$SNR = 2^{25} - 1$$

$$SNR = 33554431$$

$$SNR_{DB} = 10 \log_{10}(33554431)$$

$$= 10(7.525)$$
$$SNR_{DB} = 75.2574$$