

## Quiz 1 Solution

1.

a)

Advantage -

- Modularity - Layers are independent of each other. Therefore easier to maintain and modify.
- Flexibility - Easier to extend and add new services.
- Easier to design - Using divide and conquer technique.

Disadvantage -

- Performance degrades because of extra processing/communication overhead of multiple layers.
- Duplication of efforts.

b)

- A dedicated link is a direct connection between two nodes.
- In switched network, multiple nodes are connected via switches.

c)

Local Area Networks (LANs) typically provide networking capabilities within a building or campus (typically within 5 mile radius).

Wide Area Networks (WANs) span greater geographic distances (e.g. world wide).

d)

Advantage -

- Easy to detect faults.
- No disruption to the network when connecting or removing nodes.
- Easy to install and wire.
- Each node is only two hops away from any other node.

Disadvantage -

- If hub fails, nodes attached are disabled.
- More expensive because of the cost of the hub or concentrator.

e)

i) The telephone company needed to switch to hierarchical addresses basically for scalability purposes. To avoid too many connections between switching offices and to avoid managing too many numbers.

ii) Postal address system.

f)

i) ADSL is asymmetric because it provides higher bit rate downstream than upstream.

ii) Asymmetry is acceptable when high bit rate data is transmitted to the user (i.e. downstream), which is the case for ADSL. For applications like web surfing, asymmetry is acceptable because the user submit a request that is usually much shorter than the data provided by the web server on the opposite direction.

g)

Because all users in the neighborhood share the same available capacity in the same cable. If all users in the neighborhood transmit data at the same time, the available bit rate is reduced.

h)

Because ADSL is not shared. It uses the local loop for data transmission.

2. Fill in the blanks:

a) ADC or Digitization is the process by which analog signals are converted to digital signal.

b) The components of a data network are End system (or hosts), Routers/Switches/Bridges and Links (cable, wires).

c) The number of times an analog signal is sampled in a given time period is called sampling frequency or sampling rate.

3. Problems

a) Sampling period =  $1 / \text{sampling frequency} = 1 / (20 * 1000) = 0.05 \text{ msec}$ .

b) Bit rate =  $F * B = 20 * 24 \text{ Kb/s} = 480 \text{ Kb/s}$

c)  $100 \text{ MB} = 100 * 1000 * 8 \text{ Kb}$

Time required to fill up 100 MB disk =  $(100 * 1000 * 8) / 480 = 1666.67 \text{ sec}$