Solution for Quiz # 2

1. [1 point] For what concerns the telephone company, what is the difference between a normal telephone call and a call made by your modem?

Normal telephone call generates analog signals. Telephone is made to transmit analog signals.
Modem is a tool to transmit digital signal over the telephone network. To transmit, it uses digital to analog converter (DAC) and to receive, it uses analog to digital converter (ADC).
So both normal telephone call and calls made by the modem transmit/receive analog signals.

[1 point] You can use RS-232 to connect your computer to a modem, but you cannot use it to connect a video camera to your computer. Why?

RS-232 is a standard for serial communications between digital devices. Its bit rate is only 20-30 Kb/s. So it cannot be used to connect video camera because of insufficient bit-rate.

2. [3 points] The Network Interface Card (NIC) is a piece of hardware that manages the low-level details of packet transmission and reception. Does the NIC write to the host computer’s memory all of the packets it receives? Explain your answer.

No, NIC doesn’t write to the host computer’s memory all the packets it receives.

When NIC receives a packet, it reads the packet and checks the destination address. If the destination’s address matches the computer’s address, NIC writes it to the host computer’s memory and informs the CPU. Otherwise, it just discards the packet.

3. Suppose you want to connect to the Internet using ADSL.

[1 point] Does the ADSL provider of your choice need to connect your home with a new cable, or can you use your local loop?

ADSL provider need not connect a new cable, it can use local loop.

[1 point] Can you receive a video stream at 10 Mb/s on your ADSL connection?

For ADSL, downstream bit rate is 32 Kb/s to 6.4 Mb/s (typically, 1.5 Mb/s).
So it cannot receive a video stream at 10 Mb/s.
[1 point] Can you use your phone at the same time you connect with your computer to the Internet?

Yes, the user can use the telephone for analog voice communication and at the same time connect computer to internet.

[1 point] Suppose all the people in your neighborhood using ADSL decide to connect at the same time. Does this affect the available bit rate for your connection?

No, no. of users does not affect the available bit rate for ADSL connection. Since this is not a shared connection.

4. Ethernet connections can use thin coax cables, unshielded twisted pairs cables, and fiber optic cables.

[1 point] Which one of these three types of cables is the most economical?

Unshielded twisted pairs cable is the most economical.

[1 point] Can we use an unshielded twisted pair cable for a 50 meter connection?

Yes, we can use an unshielded twisted pair cable for a 50 meter connection. It can connect up to 100 meters.

[1 point] Can we use a fiber optic cable for a 500 meter connection?

Yes, we can use a fiber optic cable for a 500 meter connection.

5. Suppose you connect to the Internet using ISDN (Basic Rate Interface).

[1 point] What is the available bit rate if you use both B-channels in the Basic Rate Interface?

Bit rate for each B-channel is 64 Kb/s.
So for both B-channels available bit rate is $2 \times 64 = 128$ Kb/s.

[1 point] Can you use the local loop already connecting your home, or do you need a new cable?

For ISDN (Basic Rate Interface) connection new cable is not needed, it uses the local loop.
6. [3 points] Cable modems and ADSL provide asymmetric throughput: the available bit rate to the user is higher than the available bit rate from the user. Mention at least one application that requires symmetric (not asymmetric) throughput, and at least one application that can tolerate asymmetric throughput.

Application that require symmetric throughput: Videoconferences.

Application that can tolerate asymmetric throughput: Video-On-Demand, Internet Radio.

7. [3 points] The Media Access Control strategy used by Ethernet specifies that a station connected to the common medium can transmit a packet only when no other station is transmitting. However, there is a chance that two stations start transmitting a packet at the same time. What is the protocol’s strategy to deal with this event?

When two stations start transmitting a packet at the same time, a collision occurs. The messages they send becomes useless. The stations immediately realize that they are interfering with each other. Each station waits for a random period of time and then tries to transmit the packet all over again.

8. Suppose you want to connect to the Internet using a cable modem.

[1 point] Does the cable company need to connect your home with a new cable, or can you use your existing TV cable?

There is no need for a new cable. The cable company can use the existing TV cable.

[1 point] Can you receive a video stream at 10 Mb/s on your cable modem connection?

The downstream bit rate for cable modem is 1.5 to 2 Mb/s. So it cannot receive a video stream at 10Mb/s.

[1 point] Can you watch your TV at the same time you connect with your computer to the Internet?

Yes, because the splitter separates the TV and data signals.

[1 point] Suppose all the people in your neighborhood using cable modem decide to connect at the same time. Does this affect the available bit rate for your connection?

Yes. The available bit rate is reduced, since all users in the neighborhood share the same cable.
9. Compare the performances of Token Ring and Ethernet in terms of expected delay experienced by a packet.

[2 points] Which one of the two standards has better performances with low traffic, and why?

Ethernet has better performance with low traffic.
In Ethernet, when computer needs to transmit, it can immediately access the line. But in Token Ring, the computer needs to wait for the token. Also, in low traffic, Ethernet has very little chance of collision. Therefore, Ethernet performs better in low traffic.

[2 points] Which one of the two standards has better performances with high traffic, and why?

With high traffic, Token Ring is better.
In high traffic, Ethernet has high probability of collision and thus high average wait time. But in Token Ring, there is no chance of collision and therefore, performance is better.