# Quiz-1 Solutions
(CS-3530/CS-301)

Q 1) **Identify the correct statements: (Partial correct answers not accepted)** **[1 mark]**

A. "Vulnerability attack" targets the application running on the target host.
B. "Bandwidth flooding" targets the operating system running on the target host.
C. "IP spoofing" is the ability to make copies of every packet in the network.
D. "IP spoofing" can be stopped by employing 'end-point authentication '.

Ans) A, D

Q 2) **Consider a scenario shown in the figure below, where a bad guy wants to send malicious traffic to the target user-B (good guy) in the network. However, he cannot do that because the network has employed a mechanism to allow the packets only if the packet has been transmitted from a legitimate source (i.e. the network manages the list of legitimate source IP addresses). User-A (good guy) has access to this network.**
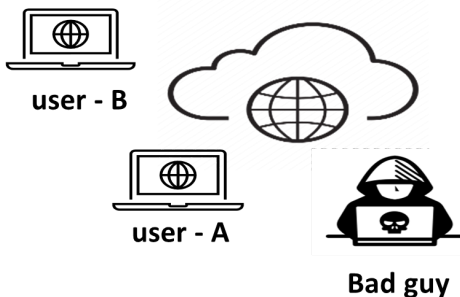
What techniques can the bad guy use to bypass the security check in the network? (Assuming that the bad guy can access user-A's machine) **[2 marks]**

Ans) The bad guy can sniff the traffic of user-A and get the source IP address. Then the bad guy can do IP spoofing and can masquerade as user-A while sending malicious traffic to user-B.

Q 3) **The intent of a _____ is to overkill the targeted server's bandwidth and other resources of the target website.** **[1 mark]**

A. Phishing attack
B. DoS attack
C. Website attack
D. MiTM attack

Ans) b) DoS attack

Q 4) **Explain how Internet facilities are provided using the telephone's DSL physical media.?**
[2 marks]

Ans: DSL stands for Digital subscriber line. It is a communication medium which is used to provide internet facilities through telecommunication lines. Typically, the host is connected to the DSL modem, which is a hardware device that converts analog signals to digital signals and vice-versa, which is further connected to splitter. Telephones are also connected to splitter. Job of the splitter is to split the data and telephonic traffic based on the frequency so that they don't get interrupted. Now the voice and data traffic which are at different frequencies are sent to Central office through a dedicated line. Central offices are connected to ISPs, as well as they have their own telephone network. The data over the telephone line is sent to the ISP and the voice over telephone line is sent to telephone network. Thus, telephone and Internet facility is achieved using DSL.

Q 5) **Which of the following physical layer technologies has the highest transmission rate and lowest bit error rate in practice?** **[1 mark]**

A. 4G/5G cellular
B. Satellite channel
C. WiFi Channel
D. Coaxial cable
E. Fiber optic cable
F. Twisted pair (e.g., CAT5, CAT6)

Ans) E – Fiber Optic cable

Q 6) **When packets occupy the link's buffer, the buffer gets full. Subsequently, the newly arrived packets are dropped as there is no space in the buffer to store these packets. This happens because if the _____ of packets is higher than the _____, then the packets are put in a queue.** **[2 marks]**

Ans) input/arrival rate, transmission rate

Q 7) **Match the layers of the internet protocol stack to their function.** **[1 mark]**

A. Process to process data transfer	1. Network Layer
B. Data transfer between neighbouring network elements.	2. Physical layer
C. Datagram delivery from source to destination	3. Link layer
D. Transfer of bit in and out of a transmission medium	4. Transport layer

Ans : a-4, b-3, c-1, d-2

Q 8) **Consider the figure below where message M from the source application is heading towards the destination application. Match the header added to the message by each protocol layer at the source** **[1 mark]**
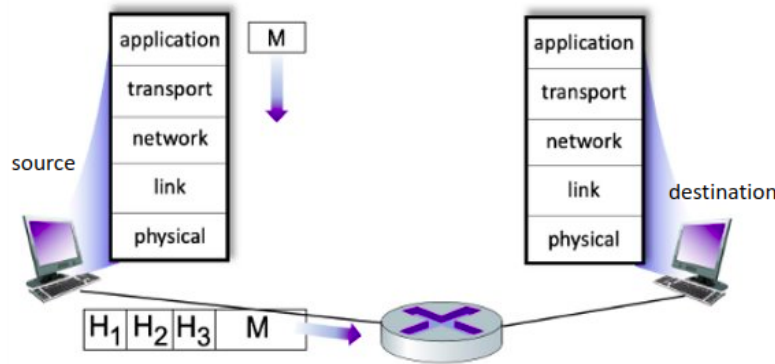
Ans) H1 - link layer, H2- network layer, H3 - transport layer

Q 9) **Explain the key difference between packet switching and circuit switching. Which multiplexing methods are used in Circuit Switching?** **[2 marks]**

Ans) The key difference between circuit switching and packet switching is that packet switching is connectionless, whereas circuit switching is connection-oriented. In-circuit switching has there are 3 phases: Connection Establishment,Data Transfer,Connection Releasing. But In Packet switching directly data transfer takes place. The Multiplexing Methods used in circuit switch are FDM and TDM.

Q 10) **Global ISPs are connected either via _____, or they can directly communicate using a _____ so that any host under any global ISP can communicate with any other host under any other global ISP.** **[1 mark]**

Ans) IXP(Internet Exchange Point), peering link

Q 11) **Explain how routers use a "forwarding table" and how a forwarding table is configured.?** **[2 marks]**

Ans) Each router has a forwarding table that maps destination addresses (or portions of the destination addresses) to the router's outbound links. When a packet arrives at a router, the router examines the address and searches its forwarding table, using the destination address in the packet and finding the appropriate outbound link. The router then directs the packet to this outbound link.

Routing protocols (or algorithms) automatically configure the forwarding tables. A routing protocol may, for example, determine the shortest path from each router to each destination and use the shortest path results to configure the forwarding tables in the routers.

Q 12) **When an application packet travels from source to destination, as shown in the figure below, how many times does the packet traverse the transport layer, network layer, link layer, and physical layer (strict ordering is followed)?** **[1 mark]**

switch   router

source   destination
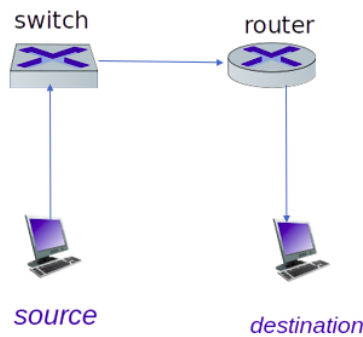
A. 2, 2, 4, 4

B. 2, 3, 5, 6

C. 2, 3, 4, 4

D. 2, 3, 4, 6

Ans) Option b - 2,3,5,6

Q 13) The time taken to examine a packet's header and determine where to direct the packet is part of the   **[1 mark]**

A.   Processing Delay
B.   Queueing Delay
C.   Transmission Delay
D.   Propagation Delay

Answer: a - Processing Delay

Q 14) Consider the network shown in the figure below, with three links, each with the specified transmission rate and link length. Assume the length of a packet is 8000 bits. The speed of light propagation delay on each link is 3x10^8 m/sec. What is the propagation delay for a bit at (along) link 2 (in milliseconds)? What is the time taken to transmit the packet on link 3 (in milliseconds)?

[2 marks]
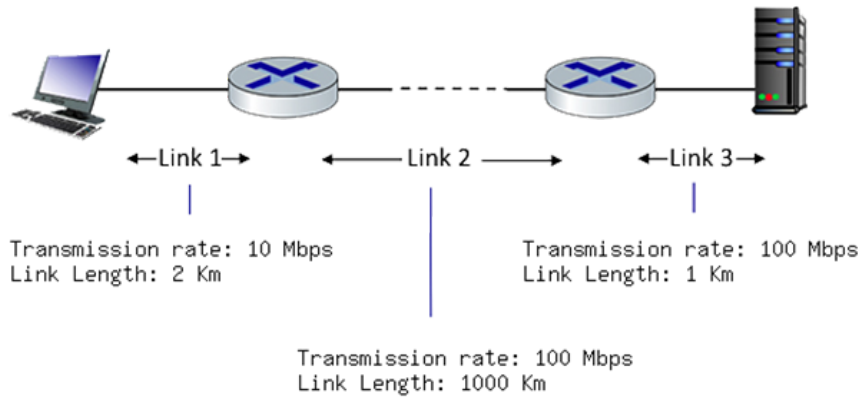
Ans) d(prop) = d/s = 1000 * 1000m / (3 * 10^8) m/s = 0.0033 sec = 3.3 milliseconds

d(trans) = L/R = 8000 bits / 100 Mbps = 0.08 milliseconds

Q 15)   Consider the figure below, in which a single router is transmitting packets, each of length *L* bits, over a single link with a transmission rate of *R* Mbps to another router at the other end of the link.
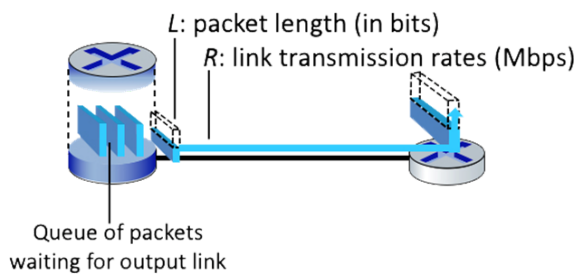
Suppose that the packet length is *L*= 16000 bits and that the link transmission rate along the link to the router on the right is *R* = 10 Mbps. What is the maximum number of packets per second that can be transmitted by this link?   [2 marks]

Ans) No of packets per second is R/L = 625

Q 16)   Consider the scenario shown below, with four different servers connected to four different clients over four three-hop paths. The four pairs share a common middle hop with a transmission capacity of R = 300 Mbps. The four links from the servers to the shared link have a transmission capacity of R$_S$ = 10 Mbps. Each of the four links from the shared middle link to a client has a transmission capacity of R$_C$ = 60 Mbps.

    A.   Define a bottleneck link?   **[1 mark]**
    B.   Which link is the bottleneck link here?   **[1 mark]**

C. Find the maximum achievable end-end throughput (in Mbps) for each of four client-to-server pairs, assuming that the middle link is fairly shared (divides its transmission rate equally)? **[1 mark]**

Ans)

1. It is the link on end-end path that constrains end-end throughput

2. a) The bottleneck link here is Rs

2. b) Maximum achievable end-end throughput here is 10 Mbps