

Course name: Computer Networks II  
 Course Code: CNE401  
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Exam number: Fall 2010 – Model Answer  
 Exam Date: 10/01/2011  
 Time Allowed: Two hours

**Part 1.**

1. Which of the following best describes the main function of OSI Layer 1 protocols?  
**Answer: B**
2. Which of the following are part of the functions of OSI Layer 2 protocols?  
**Answer: A**
3. Which of the following is true about Ethernet crossover cables?  
**Answer: B**
4. Which of the following are true about the format of Ethernet addresses?  
**Answer: B, C, and E**
5. Which of the following is true about the Ethernet FCS field?  
**Answer: C**
6. Which of the following fields can be used by Ethernet as a “type” field, to define the type of data held in the “data” portion of the Ethernet frame?  
**Answer: C and D**
7. Which of the following are true about the CSMA/CD algorithm?  
**Answer: B**
8. Which of the following would be a collision domain?  
**Answer: A**
9. Which terms describe Ethernet addresses that can be used to communicate with more than one device at a time?  
**Answer: C and D**
10. With autonegotiation on a 10/100 card, what characteristics are negotiated if the device on the other end does not perform negotiation at all?  
**Answer: C**
  
11. Which of the following best describes the main function of OSI Layer 1 protocols?  
**Answer: B**
12. Which of the following typically connects to a four-wire line provided by a telco?  
**Answer: B**
13. Which of the following typically connects to a V.35 or RS-232 end of a cable when cabling a leased line?  
**Answer: B**
14. Which of the following functions of OSI Layer 2 is specified by the protocol standard for PPP, but is implemented with a Cisco proprietary header field for HDLC?  
**Answer: E**
15. Which of the following WAN data link protocols on Cisco routers support multiple Layer 3 protocols by virtue of having some form of Protocol Type field?  
**Answer: A, B, and C**
16. On a point-to-point WAN link between two routers, what device(s) are considered to be the DTE devices?  
**Answer: A**
17. Imagine that Router1 has three point-to-point serial links, one link each to three remote routers. Which of the following is true about the required HDLC addressing at Router1?  
**Answer: E**
18. What is the name of the Frame Relay field used to identify Frame Relay Virtual Circuits?  
**Answer: A**
19. Which of the following is true about Frame Relay virtual circuits?  
**Answer: B**

Total:	40
Part1:	20
Part2:	20

20. Which of the following defines a SONET link speed around 155 Mbps?

**Answer: E**

21. Which of the following describes the functions of OSI Layer 3 protocols?

**Answer: A and C**

22. Imagine that PC1 needs to send some data to PC2, and PC1 and PC2 are separated by several routers. What are the largest entities that make it from PC1 to PC2?

**Answer: C and E**

23. Which of the following does a router normally use when making a decision about routing TCP/IP?

**Answer: C**

24. Imagine a network with two routers that are connected with a point-to-point HDLC serial link. Each router has an Ethernet, with PC1 sharing the Ethernet with Router1, and PC2 sharing an Ethernet with Router2. When PC1 sends data to PC2, which of the following is true?

**Answer: A**

25. Which of the following are valid Class C IP addresses?

**Answer: B**

26. What is the range for the values of the first octet for Class A IP networks?

**Answer: D**

27. PC1 and PC2 are on two different Ethernets that are separated by an IP router. PC1's IP address is 10.1.1.1, and no subnetting is used. Which of the following addresses could be used for PC2?

**Answer: D and F**

28. How many valid host IP addresses does each Class B network contain?

**Answer: D**

29. How many valid host IP addresses does each Class C network contain?

**Answer: G**

30. Which of the following protocols allows a client PC to discover the IP address of another computer, based on that other computer's name?

**Answer: C**

31. Which of the following protocols are connection-oriented?

**Answer: A and B**

32. Which of the following protocols are reliable?

**Answer: B**

33. PC1 is using TCP, has a window of 4, and sends four segments numbered 2, 3, 4, and 5 to PC2. PC2 replies with an acknowledgment number 5. What should PC1 do next?

**Answer: D**

34. Which of the following are not features of a protocol that is considered to match OSI Layer 4?

**Answer: D**

35. Which of the following flow-control methods let the receiver tell the sender how much data the sender is allowed to send before the sender must wait for an acknowledgment?

**Answer: C**

36. Which of the following header fields identifies which TCP/IP application gets data received by the computer?

**Answer: E and F**

37. Which of the TCP connection-establishment flows sets both the SYN and ACK flags in the TCP header?

**Answer: B**

38. Which of the following is not a typical function of TCP?

**Answer: D and E**

39. Which of the following functions is performed by TCP and UDP?

**Answer: C**

40. Data that includes the Layer 4 protocol header, and data given to Layer 4 by the upper layers, not including any headers and trailers from Layers 1 to 3, is called what?

**Answer: C and G**

## **Part 2,**

### **1. Describe the process of data encapsulation as data is processed from creation until it exits a physical interface to a network. Use the OSI model as an example.**

Answer: Data encapsulation represents the process of a layer adding a header (and possibly a trailer) to the data as it is processed by progressively lower layers in the protocol specification. In the context of OSI, each layer could add a header so that— other than the true application data—there would be six other headers (Layers 2 to 7) and a trailer for Layer 2, with this L2PDU being encoded by the physical layer onto the network media.

### **2. Define the difference between broadcast and multicast MAC addresses.**

Answer: Both identify more than one device on the LAN. Broadcast always implies all devices on the LAN, whereas multicast implies some subset of all devices. Multicast is not allowed on Token Ring; broadcast is allowed on all LAN types. Devices that intend to receive frames addressed to a particular multicast address must be aware of the particular multicast address(es) that they should process. These addresses are dependent on the applications used. Read RFC 1112, “The Internet Group Message Protocol (IGMP),” for related information about the use of Ethernet multicast in conjunction with IP multicast. For example, the broadcast address is FFFF.FFFF.FFFF, and one sample multicast address is 0100.5e00.0001.

### **3. Explain the function of the loopback and collision-detection features of an Ethernet NIC in relation to half-duplex and full-duplex operations.**

Answer: The loopback feature copies the transmitted frame back onto the receive pin on the NIC interface. The collision-detection logic compares the received frame to the transmitted frame during transmission; if the signals do not match, a collision is occurring. With full-duplex operation, collisions cannot occur, so the loopback and collision-detection features are purposefully disabled, and concurrent transmission and reception is allowed.

### **4. Define the terms DCE and DTE in the context of the physical layer and a point-to-point serial link.**

Answer: At the physical layer, DTE refers to the device that looks for clocking from the device on the other end of the cable on a link. The DCE supplies that clocking. For example, the computer is typically the DTE, and the modem or CSU/DSU is the DCE. At the data link layer, both X.25 and Frame Relay define a logical DTE and DCE. In this case, the customer premises equipment (CPE), such as a router and a CSU/DSU, is the logical DTE, and the service provider equipment (the Frame Relay switch and the CSU/DSU) is the DCE.

### **5. Explain how many DS0 channels fit into a T1, and why the total does not add up to the purported speed of a T1, which is 1.544 Mbps.**

Answer: Each DS0 channel runs at 64 kbps. With 24 in a T1, the T1 speed seemingly would be  $24 * 64$  kbps, or 1.536 Mbps. T1 also includes 8 kbps for management, which, when added to the 1.536 Mbps total, gives you the full T1 rate—1.544 Mbps.

### **6. Name the two main parts of an IP address. Which part identifies which group this address is a member of?**

Answer: Network and host are the two main parts of an IP address. technically there are three portions of the IP address: network, subnet, and host. However, because most people think of the network and subnet portions as one portion, another correct answer to this question, using popular terminology, would be subnet and host. In short, without subnetting, the network part identifies the group; with subnetting, the network and subnet part together identifies the group.

**7. PC1 sends data to PC2 using TCP/IP. Three routers separate PC1 and PC2. Explain why the statement “PC1 sends an Ethernet frame to PC2” is true or false.**

Answer: False. Packets are delivered from end to end across a network, whereas frames simply pass between devices on each common physical network. The intervening routers discard the original Ethernet header, replacing it with other data-link headers as needed. A truer statement would be “PC1 sends an IP packet to PC2.”

**8. Describe the differences between a routed protocol and a routing protocol.**

Answer: The routed protocol defines the addressing and Layer 3 header in the packet that actually is forwarded by a router. The routing protocol defines the process of routers exchanging topology data so that the routers know how to forward the data. A router uses the routing table created by the routing protocol when choosing where to route a packet.

**9. Describe how TCP performs error recovery. What role do the routers play?**

Answer: TCP numbers the first byte in each segment with a sequence number. The receiving host uses the Acknowledgment field in segments that it sends back to acknowledge receipt of the data. If the receiver sends an acknowledgment number that is a smaller number than the sender expected, the sender believes that the intervening bytes were lost, so the sender resends them. The router plays no role unless the TCP connection ends in the router—for example, a Telnet into a router. A full explanation is provided in the section “Error Recovery (Reliability).”

**10. How many TCP segments must be sent to establish a TCP connection? How many are used with normal TCP connection termination?**

Answer: Three TCP segments are needed to establish the connection, and four are needed to tear it down under normal operation.