

Midterm 24:370

Name (print): \_\_\_\_\_

March 1, 2000

Student Number: \_\_\_\_\_

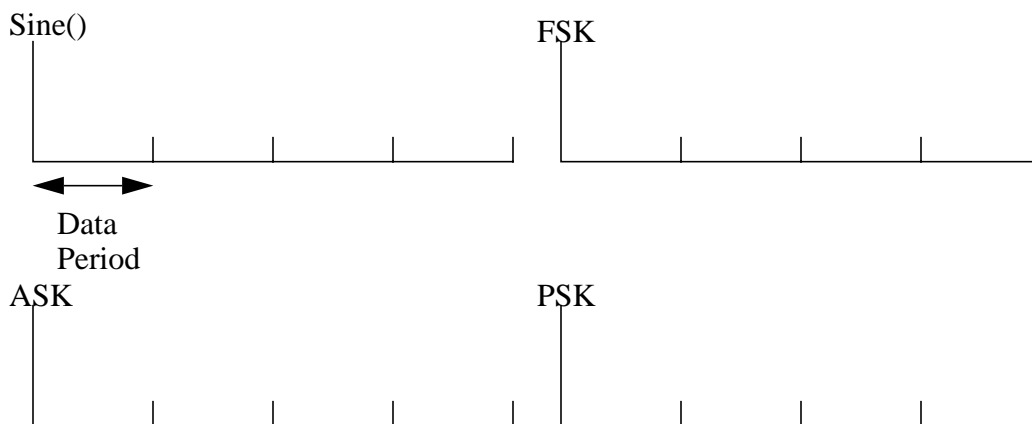
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**Part 1 Ethernet Bits: (value 10 - 1 mark each)**

1. What does the term **full duplex** mean?
2. In ALOHA, if a station wants to transmit a message, what does it do?
3. In ALOHA, how does a station know that a message is received?
4. In ALOHA what are the two likely reasons that a station determines that a message was not received correctly?
5. Is bus based Ethernet full duplex?
6. With the Ethernet protocol, what is the role of Carrier Sense (CS)?
7. With the Ethernet protocol, what occurs when there is a positive Collision Detection (CD)? That is, if a transmitting station detects a collision, what happens?
8. Having sent a frame on an Ethernet LAN, how does the transmitting station know the frame was received?
9. When a collision is detected what do the stations involved in the collision do next?
10. If two stations detect a collision (for the first time with the respective frames), what is the probability the two stations will experience another collision (with the same frames)?

**Part 2 Telephony and Modulation Bits (value 13 - 1 mark each, 4 for #16)**

11. Is a traditional telephone call **packet switched** or **circuit switched**? (circle one)
12. If the nominal bandwidth of voice is less than 4KHz, why is voice sampled at 8000 times/sec?
13. Voice is sampled with a resolution of 8 bits. What is the data rate for a telephone channel?
14. 24 voice channels are multiplexed onto a T1. What is the data rate of 24 voice channels?
15. The raw data rate of a T1 is 1.544 Mbps. Why is this different than for 24 voice channels?
16. Draw a sinusoidal carrier with 2 cycles per data symbol. Given a data stream 1 0 1 0, draw a ASK, FSK, and a PSK representation.



17. The decibel system is typically used when measuring a signal in terms of power. If a transmitter on a cell phone has a requirement not to exceed 0dBm, what is the actual power?
18. If the signal from the question above undergoes a 20 dB attenuation while propagating from the sender to the receiver, what is the actual power level at the receiver?
19. For a CDMA system, if a spreading code or chip sequence is 1010111000, assuming a bipolar code, what is the autocorrelation value at time shifts of 0, 1, and 2 chips.
20. How is the pattern 101 modulated by the chip sequence from the above question? What is the spreading gain?

**Part 3 Acronyms and stuff: (value 11 - 1 mark each)**

For questions 21 to 29:

What do the following terms or acronyms stand for and mean?

e.g. Question and answer: WDM: WDM stands for wavelength division multiplexing. WDM associates a channel with a given wavelength.

21. BPSK:

22. FDMA:

23. CDMA:

24. FHSS:

25. CRC:

26. ARP:

27. DNS:

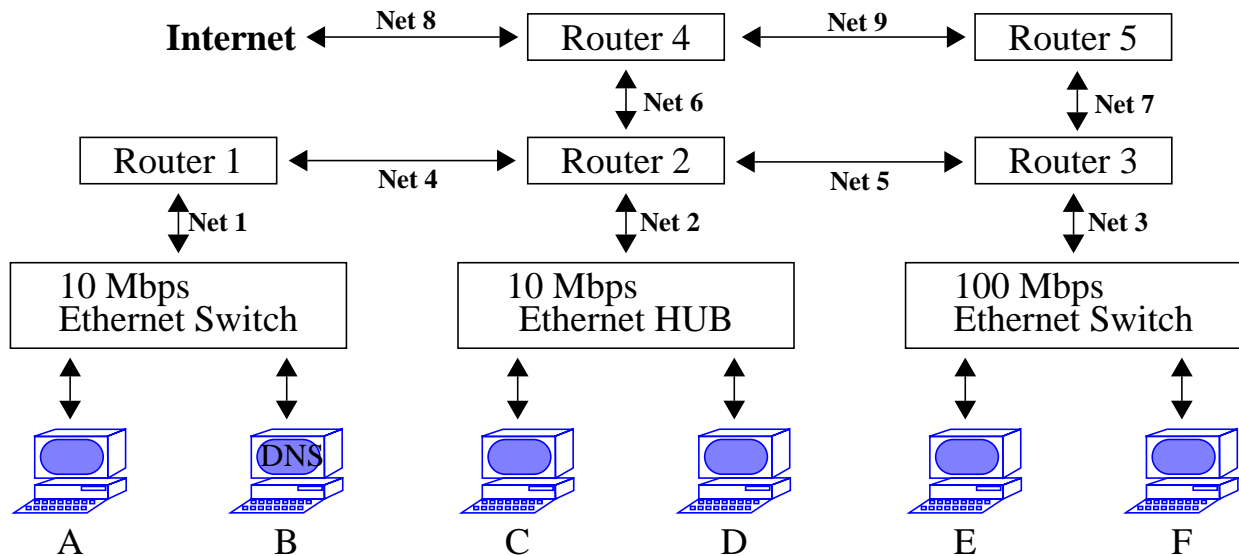
28. DHCP:

29. MAC:

30. How many bytes in and Ethernet MAC address?

31. What is a baseband signal?

This illustration is to be used with the questions in Part 4.  
This page may be ripped out of the test, and does not need to be returned.



<b>A</b>	(a.deptx.company.com)	129.1.10.1	(MAC-A)
<b>B</b>	(b.deptx.company.com)	129.1.10.2	(MAC-B)
- DNS server for *.company.com)			
<b>C</b>	(c.depty.company.com)	129.1.20.1	(MAC-C)
<b>D</b>	(d.depty.company.com)	129.1.20.2	(MAC-D)
<b>E</b>	(e.deptz.company.com)	129.1.30.1	(MAC-E)
<b>F</b>	(f.deptz.company.com)	129.1.30.2	(MAC-F)
<b>R1</b>	(router 1)		
	r1.deptx.compnay.com	129.1.10.3	(MAC-R1)
	r1.net1-2.company.com	129.1.40.3	
<b>R2</b>	(router 2)		
	r2.depty.compnay.com	129.1.20.4	(MAC-R2)
	r2.net1-2.company.com	129.1.40.4	
	r2.net2-3.company.com	129.1.50.4	
	r2.net2-4.company.com	129.1.60.4	
<b>R3</b>	(router 3)		
	r3.deptz.compnay.com	129.1.30.5	(MAC-R3)
	r3.net2-3.company.com	129.1.50.5	
	r3.net3-5.company.com	129.1.70.5	
<b>R4</b>	(router 4)		
	r4.net2-4.company.com	129.1.60.6	(MAC-R4)
	r4.net4-5.company.com	129.1.80.6	
	r4.net-ext.company.com	129.1.90.6	
<b>R5</b>	(router 3)		
	r5.net3-5.compnay.com	129.1.70.7	(MAC-R5)
	r5.net4-5.company.com	129.1.80.7	

**Part 4 IP: (value 30 - {10, 6, 1, 3, 10})**

32. Fill in the routing table in Router 1.

**Table 1: Routing Table for Router 1**

Network Entry	Destination Network (IP addr)	Next Router (IP addr)	Number of Hops
Net 1:			
Net 2:			
Net 3:			
Net 4:			
Net 5:			
Net 6:			
Net 7:			
Net 8:			
Net 9:			

33. An IP packet is transmitted from host **A** to host **D**. Fill in the following table with the source and destination IP and MAC addresses for each network leg that the packet takes.

Network Leg		Source	Destination
First Leg	IP address		
	MAC address		
Second Leg	IP address		
	MAC address		
Third Leg	IP address		
	MAC address		

34. What is the network part of the IP address for **company.com**?

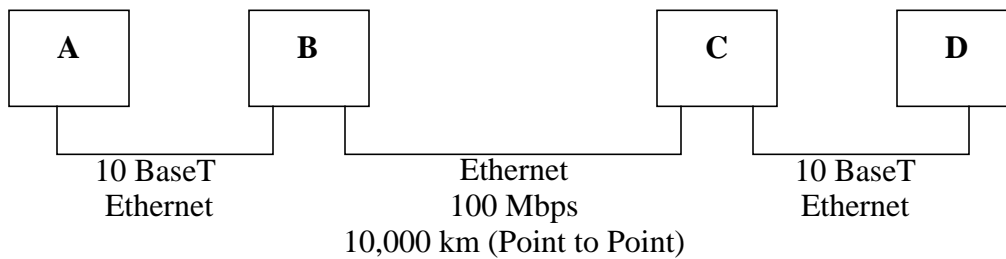
35. What is the most likely Subnet mask for this network (do not calculate), explain your answer:

36. Assuming that all ARP tables are initially empty, the routing tables are stable, and the DNS server can resolve any request:

Show the sequence of packets that will occur for **A** to send a single packet to **D**.

**Part 5 LANs: (value 6 - 2 marks each)**

37. Given the following network configuration:



Host **A** wants to send 14,800 bytes of IP data to host **D**. In addition to the data, the IP header is 20 bytes and the Ethernet header is 26 bytes. The maximum payload of an Ethernet frame is 1500 bytes.

a) What is the minimum number of Ethernet frames possible, and what is the percentage of overhead transmitted?

b) What is the maximum number of Ethernet frames that would be required (assume that no frames, except the last, may be padded), and what is the percentage of overhead transmitted?

c) In the best case scenario, and assuming the transmission gets 50% of the available bandwidth on the first LAN (and as much as it needs over the remaining links), how long would the transfer take?

(Include both transmission and propagation time, use  $\frac{2}{3}c$  for the speed of light in the medium.)