西 安 电 子 科 技 大 学

考试时间 120 分钟

试　　题

题号	一 选择题	二、计算和应用题						总分
		1	2	3	4	5	6	
分数								

1.考试形式：闭卷☑ 开卷 ；　　2.本试卷共二大题，满分 100 分；

3.考试日期： 2022 年 月 日；　　(答题内容请写在装订线外)

I. Single Choice Question（1.5 points for each question, 30 points in total）

1. In the following description of the functions of each OSI layer, the INcorrect statement is_____.

A. The physical layer uses the transmission medium to transmit bit sequence.

B. The data link layer makes the error physical line into an error free data link.

C. The network layer has the functions of routing, packet forwarding, error control and so on.

D. The transport layer provides reliable "end-to-end" communication services.

网络层不提供差错控制

2. For a bandpass signal with a bandwidth of 100kHz and a minimum frequency of 150kHz, which of the following is its Nyquist sampling rate? _____

A. 200k samples/s　　B. 300k samples/s　　C. 400k samples/s　　D. 500k samples/s

3. The INcorrect statement in the following description is_____.

A. Transmission rate refers to the number of binary bits that the transmission system can transmit per second.

B. Transmission rate is one of the important technical parameters to describe data transmission system.

C. The unit of propagation rate is bit/s.　　m/s

D. The propagation rate is related to distance.

4. An analog data encoding method that represents number 0 and 1 by changing the amplitude of the carrier signal is called_____.

A. ASK **B. FSK** **C. PSK** **D. PCM**

127 63 2 191 192 31 223

5. Which of the following addresses is a multicast address? _____

A. 10.2.3.4 **B. 202.38.214.2** **C. 192.168.215.6** **D. 224.38.26.9**

A 0-127 B 128-191 C. 192-223 224-多播地址

6. Which of the following statements is INcorrect? _____

A. OSPF protocol is an intra domain routing protocol.

B. The core function of OSPF protocol is the network topology database, which generates the routing table.

C. OSPF is an inter domain routing protocol.

D. OSPF uses flooding to spread link state packets.

7. Which of the following fields is UNrelated to fragmentation and reorganization of IP packets? _____

A. Identification **B. Flags** **C. Fragmentation offset** **D. Survival time**

8. The application PING sends _____ message.

A. TCP request **B. TCP response** **C. ICMP request** **D. ICMP response**

A

9. When a host moves from one network to another network with a different network address, which of the following statement is correct? _____

A. IP address will change.

B. MAC address will change.

C. Both IP address and MAC address will change.

D. Neither IP address nor MAC address will change.

10. The main function of ARP protocol is_____.

A. resolving IP address to physical address **B. resolving physical address to IP address**

C. resolving host name to IP address **D. resolving IP address to host name**

B

11. Which of the following statement is correct? _____

A. IP packets can be fragmented by the source host and reorganized by routers.

B. IP packets can be fragmented by routers and reorganized by the destination host.

C. IP packets can be fragmented and reorganized by intermediate routers.

D. IP packets can be fragmented by intermediate routers and reorganized by the last router.

12. A department applied for a class C address to divide into 16 subnets with the same number of addresses. The subnet mask should be _____.

网络号 子网号 主机号

A. 255.255.255.0 **B. 255.255.255.192** **C. 255.255.255.240** **D. 255.255.255.255**

13. A TCP connection has established between host A and host B. Host A sends two TCP segments to host B, including 400 bytes and 500 bytes of data respectively. The sequence number of the first segment is 300. Host B correctly received the two segments and sends the acknowledgment to host A, and the acknowledgment number is _____.

A. 700 **B. 800** **C. 900** **D. 1200**

14. Host A expects to establish a TCP connection with host B by sending a TCP segment (SYN=1, seq=2021). If host B accepts the connection request, which of the following could be the correct TCP when host B sending back to host A? _____

A. SYN=0, ACK=0, seq=1234, ack=2022

B. SYN=1, ACK=1, seq=24689, ack=2022

C. SYN=1, ACK=1, seq=12340, ack=2021

D. SYN=1, ACK=0, seq=8734, ack=2021

202.118.10001001.0
202.118.10000010.0

A

15. There are two subnets 202.118.133.0/24 and 202.118.130.0/24. If route aggregation is performed, which of the following is the correct network address? _____

A. 202.118.128.0/21 B. 202.118.128.0/22 C. 202.118.130.0/22 D. 202.118.130.0/20

16. Regarding the NAT protocol, which of the following statements is correct? _____

A. NAT can convert between internal IP address and internal MAC address.

B. NAT can convert between internal IP address and external MAC address.

C. NAT can convert between domain name address and IP address.

D. NAT can convert between internal private IP address and external public IP address.

17. In the following description of FTP, the INcorrect statement is_____.

A. FTP uses control connection and data connection to complete file transfer.

B. The well-known port number used by the FTP server to control the connection is 21.

C. The well-known port number used by the FTP client to control the connection is 20.

D. The control connection in FTP keeps connecting during the FTP session.

18. Which of the following equipment can be used to interconnect LANs of the Administrative Building and the Laboratory Building in a school? _____

A. Switch B. MODEM C. Repeater D. Network card

19. Which of the following does not belong to the functions of the data link layer? _____

A. Framed B. Reliable transmission C. Flow control D. Route selection

A

20. The access control protocol used by wireless LAN in MAC sublayer is _____.

A. CSMA/CA B. CSMA/CD C. ALOHA D. Slotted ALOHA

II. Calculation and Application Questions (70 points in total)

1. In a network using CSMA / CD protocol, the transmission medium is a whole cable and the transmission rate is 1G bit/s. The signal propagation rate in the cable is 200,000 km/s. If the minimum data frame length is reduced by 800 bits, should the distance between the farthest two stations increase or decrease? How many meters is this change?（9 points）

最小帧长 $L = 2 \times$ 传播时延 $\times$ 传输速率

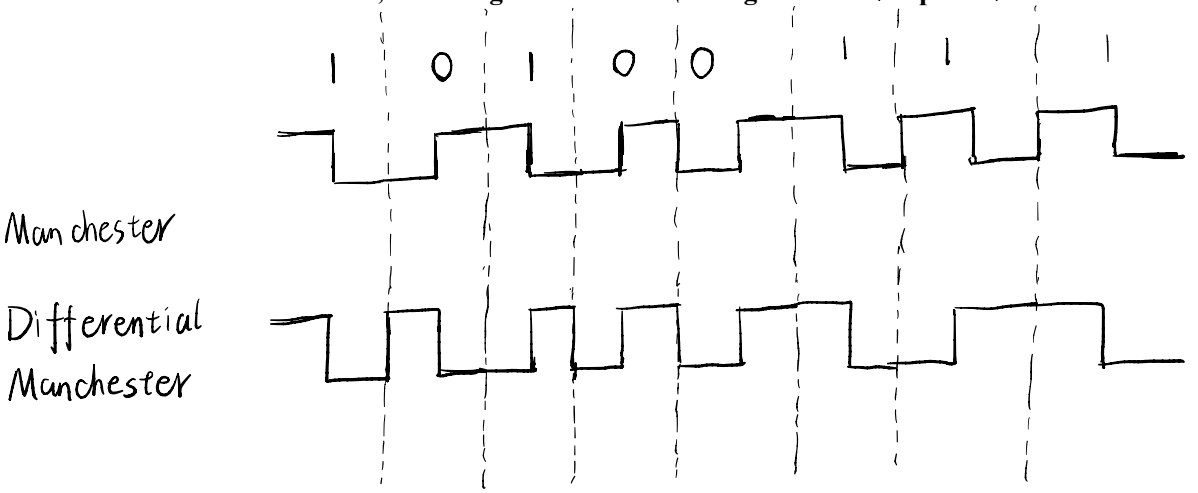
$$L = 2 \times \frac{d}{2\times10^8} \times 10^9 \Rightarrow \frac{L}{d} = 10$$

最小帧长减少 800 位，最远距离也将减少

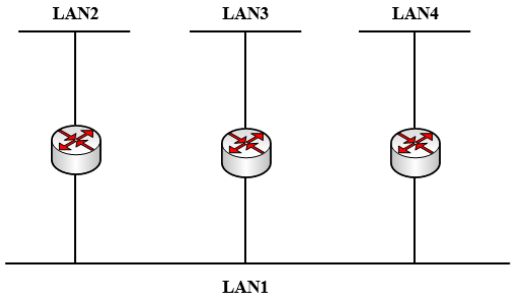
$$\frac{L-800}{d'} = 10 \qquad d - d' = \frac{1}{10} \times 800 = 80m$$

∴ 最远距离减少 80 m

2. Please draw the waveforms of Manchester code and Differential Manchester code of data stream 10100111, assuming the initial state is high level. （10 points）

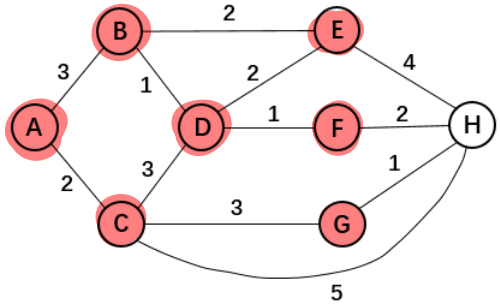


3. An autonomous system with IP address 61.138 118.23/23 has 4 LANs, and there are 165, 93 and 80 hosts from LAN2 to LAN4 respectively. Please list the network address, subnet mask and IP address range of each LAN. (10 points)



	网络地址	子网掩码	范围
LAN2	61.138.118.0	/24	61.138.118.0 ~ 61.138.118.255
LAN3	61.138.119.0	/25	61.138.119.0 ~ 61.138.119.127
LAN	61.138.119.128	/25	61.138.119.128 ~ 61.138.119.255

4. Please make the minimum cost routing table by Dijkstra routing algorithm and list the DETAILED calculation steps. A is the source.（15 points）



Iter	T	L(B)	Path	L(C)	Path	L(D)	Path	L(E)	Path	L(F)	Path	L(G)	Path	L(H)	Path
1	{A}	3	A→B	2	A→C	∞	-	∞	-	∞	-	∞	-	∞	-
2	{A,C}	3	A→B	2	A→C	5	ACD	∞	-	∞	-	5	ACG	7	ACH
3	{ABC}	3	A→B	2	A→C	4	ABD	5	ABE	∞	-	5	ACG	7	ACH
4	{ABCD}	3	A→B	2	A→C	4	ABD	5	ABE	5	ABDF	5	ACG	7	ACH
5	ABCDF	3	AB	2	AC	4	ABD	5	ABE	5	ABDF	5	ACG	7	ACH
6	ABCDEF	3	AB	2	AC	4	ABD	5	ABE	5	ABDF	5	ACG	6	ACGH
7	ABCDEFG	3	AB	2	AC	4	ABD	5	ABE	5	ABDF	5	ACG	6	ACGH
8	ABCDEFGH	3	AB	2	AC	4	ABD	5	ABE	5	ABDF	5	ACG	6	ACGH

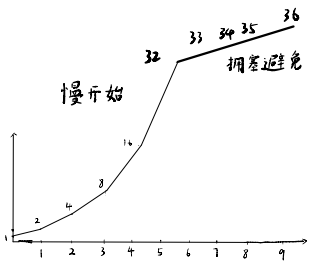
5. Given that the bandwidth of a channel is 50Mb/s, and the end-to-end propagation delay is 1ms. The receiver window (rwnd) is 20,000 bytes and the sending maximum segment size (MSS) is 500 bytes. If the initial value of the congestion window (cwnd) is 1 MSS, the cwnd will reach the slow start threshold at the end of the 5th round. (12 points)

(1) Please calculate the value of sending window in the 9th round and write down the detailed calculation process. (5 points)

(2) Please calculate the maximum throughput that can be achieved by the system. (4 points)

(3) Please calculate the channel utilization rate. (3 points)

(1)



$36 \times 500 = 18000$ bytes

发送窗口大小 18000 字节

(2) 最大吞吐率 $= \frac{500 \times 8}{\text{平均往返时延}} = \frac{4000}{2 \times 10^{-3}} = 2\text{Mb/s}$

(3) 信道利用率 $= \frac{2}{50} = 4\%$

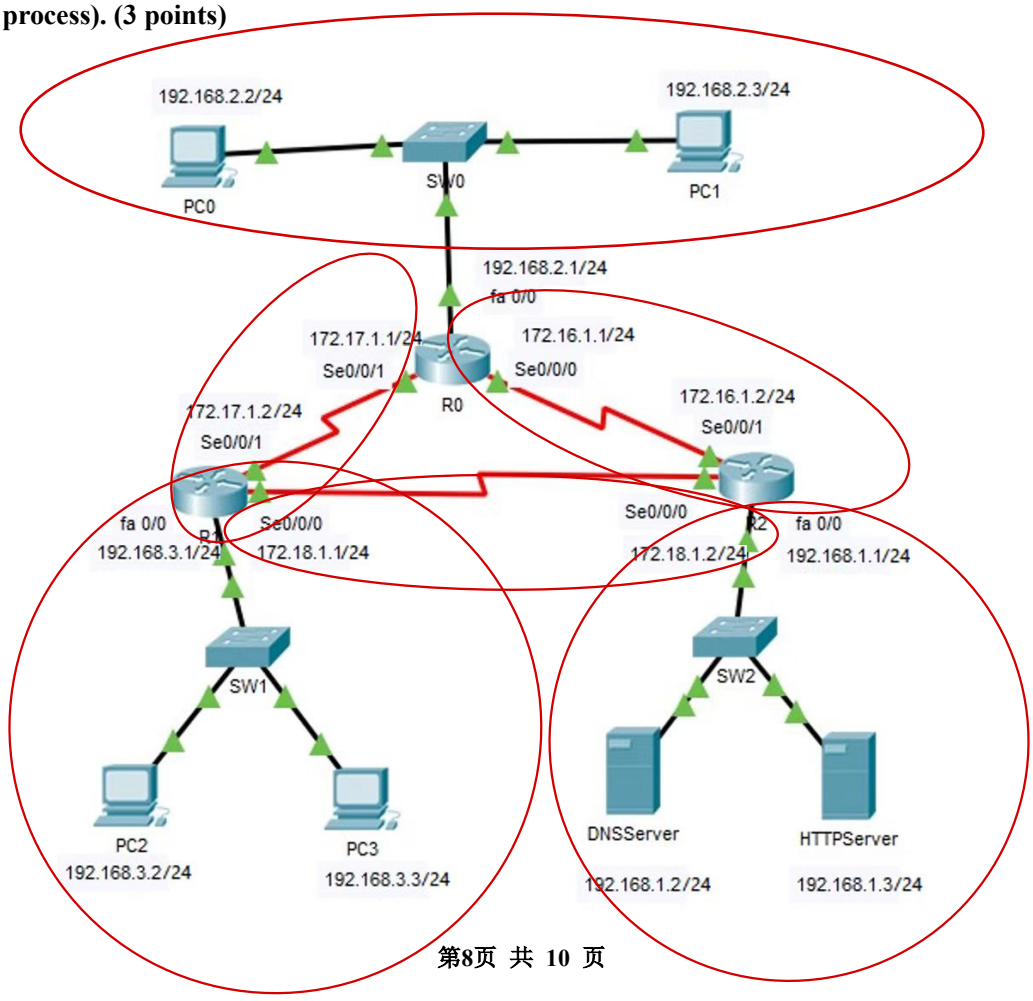
6. In the following network topology, DNSServer provides domain name resolution service and HTTPServer provides Web service. The main physical ports of networks and the corresponding IP addresses are shown in the figure. (14 points)

(1) How many subnets are there in the topology? Please list the network address and subnet mask of each subnet. (3 points)

(2) If the network between routers runs RIP protocol, please list the routing table when R0 is just started and that of R0 after exchanging routing information between routers. The header of the routing table should include destination network address, subnet mask, distance, and next-hop address. (6 points)

(3) How many times does the ARP protocol need to be run when PC1 communicates with PC2? (2 point) 3次

(4) If the domain name of HTTPServer is *www.jg.com*, please explain the execution process of the host PC0 accessing *http://www.jg.com* through the browser (explain only the Application Layer process). (3 points)



(1)

网络地址	子网掩码
192.168.2.0	255.255.255.0
172.17.1.0	255.255.255.0
172.18.1.0	255.255.255.0
192.168.3.0	255.255.255.0
192.168.1.0	255.255.255.0
172.16.1.0	255.255.255.0

(2)

之前

目标网络	子网掩码	距离	下一跳
192.168.2.0	/24	1	—
172.17.1.0	/24	1	—
172.16.1.0	124	1	—

之后

目标网络	子网掩码	距离	下一跳
192.168.2.0	/24	1	—
172.17.1.0	/24	1	—
172.16.1.0	124	1	—
192.168.3.0	/24	2	172.17.1.2
192.168.1.0	/24	2	172.16.1.2
172.18.1.0	124	2	172.17.1.2

图22.19 使用RIP的区域例子