* 遗漏

○不确定.

四川大学期末考试试题（闭卷）

（2016~2017 学年第 1 学期）　　A 卷

课程号：311015040　课程名称：计算机网络　任课教师：_____

适用专业年级：软件工程、计算生物学 2014 级　学号：_____　姓名：_____

考生承诺

我已认真阅读并知晓《四川大学考场规则》和《四川大学本科学生考试违纪作弊处分规定（修订）》，郑重承诺：

1、 已按要求将考试禁止携带的文具用品或与考试有关的物品放置在指定地点；

2、 不带手机进入考场；

3、 考试期间遵守以上两项规定，若有违规行为，同意按照有关条款接受处理。

考生签名：

题　　号	一(30%)	二(20%)		三(30%)	四(20%)
得　　分					
卷面总分		教师签名		阅卷时间	

注意事项： 1. 请务必将本人所在学院、姓名、学号、任课教师姓名等信息准确填写在试题纸和添卷纸上；

2. **请将答案全部填写在本试题纸上；**

3. 考试结束，请将试题纸、添卷纸和草稿纸一并交给监考老师。

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评阅教师	得分

一、单项选择题（本大题共 20 小题，每小题 1.5 分，共 30 分）

提示： 在每小题列出的四个备选项中只有一个是符合题目要求的，请将其代码填写在下表中。错选、多选或未选均无分。

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20

1. An application can rely on the connection to deliver all of its data without error and in the proper order. The sentence describes (C).

   A. flow control　　B. congestion-control

   C. reliable data transfer　　D. connection-oriented service

2. In the Internet, end systems are connected together by (C).

   A. copper wire　　B. coaxial cable

   C. communication links　　D. fiber optics

3. Which of the following protocol layers is not explicitly part of the Internet Protocol Stack? (B).

A. application layer　　B. session layer
C. data link layer　　D. transport layer

4. In a circuit-switched network, if each link has n circuits, for each link used by the end-to-end connection, the connection gets (A) of the link's bandwidth for the duration of the connection.
A. a fraction 1/n　　B. all　　C. 1/2　　D. n times

5. We send a packet from host A to host B, which immediately acknowledges it. We measure the interval between the time the packet is sent by A and its acknowledgement is received. This interval is found to be 120 milliseconds. What can be said about the latency of the link from A to B? （ A ）
（A） It is smaller than 120 ms
（B） It is greater than 120 ms
（C） It is exactly 120 ms
（D） It is exactly 60 ms

$2(d_{prop}+d_{tran}+d_{proc}+d_{queue})$
$=120ms$
0

6. A process sends messages into, and receives messages from, the network through its (A).
A. socket　　B. program　　C. client　　D. peer

7. FTP uses two parallel TCP connections to transfer a file, there are (A).
A. control connection and data connection
B. receiving connection and sending connection
C. client connection and sever connection
D. program connection and process connection

8. Among the following applications, which one is not suitable for P2P architecture? (C).
A. file sharing　　B. electronic banking　　C. video streaming　　D. instant message

9. Suppose a web page consists of a base HTML file and 4 JEPG images, and also suppose HTTP uses persistent connection without pipelining, the total response time is (B).
A. 2RTT　　B. 6 RTT　　C. 8 RTT　　D. 10 RTT

2RTT + 4 x RTT

10. Suppose A (with a Web-based e-mail account) sends a message to B (who accesses his mail server using POP3), which application-layer protocol is not used? (D).
A. HTTP　　B. SMTP　　C. POP3　　D. IMAP

11. The broadcast address of network 202.115.32.0/22 is (C).
A. 202.115.32.255　　B. 202.115.33.255　　C. 202.115.35.255　　D. 202.115.255.255

202.115.00100000.0

12. In transport layer, the send side breaks application messages into (B), passes to network layer.
A. Frames　　B. Segments　　C. Data-grams　　D. bit streams

13. Provided RcvBuffer = 30, LastByteRcvd = 30, LastByteRead = 25, then RcvWindow=(C).

$30-(30-25)=25$

A. 5　　B. 15　　C. 25　　D. 0

14.HOL blocking happens on (A).

A. input port　　B. output port　　C. switching fabrics　　D. all of above

15.There are three kinds of switch fabric for a router normally, those three switch fabric do not includes(D)?

A. Switching via memory　　B. Switching via a bus

C. Switching via an Interconnection-Network　　D. Packet switching

16.In the following four fields, which is in IPV6 header but not in IPV4? (D).

A. source address　　B. destination address　　C. version　　D. flow label

17.The most common Ethernet technologies are 10BaseT and 100BaseT. "10" and "100" indicate (C).

A. the maximum length between two adapters

B. the minimum length between two adapters

C. the transmission rate of the channel

D. the transmission rate of the node

18.DHCP protocol is a four-step process: ①DHCP request. ②DHCP ACK. ③DHCP discovery. ④DHCP offer. The correct sequence is (C)　③→④→①→②

A. ①②③④　　B. ③②①④　　C. ③④①②　　D. ①④③②

19.Let's assume there is 16-bit piece data 1010 1010 1101 1001, The 8-bit Internet checksum for this data should be (?).

A. 01000100　　B. 10001011　　C. 10111011　　D. 10111100

20.For the data in (19), the CRC is applied to it with generator 1001. Thus the CRC bits should be (　).

A. 000　　B. 001　　C. 010　　D. 111

评阅教师	得分

二、判断（本大题共 20 小题，每小题 1 分，共 20 分）

提示：正确填 T，错误填 F，将其结果填写在下表中。

1	2	3	4	5	6	7	8	9	10
11	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**

F　1. The network that forwards packets according to virtual-circuit numbers is called datagram network.

F　2. In message-switched networks, the resources needed along a path to provide for communication

between the end systems are reserved for the duration of the communication session.

3. Consider an application that transmits data at a steady rate, and once this application starts, it will stay on for a relatively long period of time. According to the characteristic, a packet-switched network would be more appropriate for this application than a circuit-switched network.
4. If the traffic intensity is close to zero, the average queuing delay will be close to zero.
5. In P2P architecture, peer has a fixed well-known address.
6. A web cache can raise the response time for a client request.
7. UDP supports a self-regulating "throttle" feature that prevents network saturation
8. The MSS is the maximum amount of application-layer data in the segment
9. With the pipelined protocol, the receiver must send one ACK for several packets (cumulative ACK), whereas in the stop-and-wait protocol the receiver can not send the cumulative ACK.
10. Either of the two processes participating in a TCP connection can end the connection.
11. BGP uses a distance vector protocol to improve route stability
12. All nodes connected to the Internet must implement UDP.
13. Media Access Control is a function of the data-link layer.
14. The design of the global Internet exactly follows the 7-Layer OSI Reference Model.
15. A half-duplex link can carry data from Alice to Bob, or from Bob to Alice, but not in both directions at the same time.
16. Assume we send packets of some fixed size through a network, and assume routes do not change. Then the only random component in total packet delay is the queuing delay.
17. In a datagram network (such as IP), routers keep track of connections between end systems.
18. The TTL (time to live) field is decremented at every hop in the network in order to avoid that a packet can accidentally loop in the network. This TTL field is part of the TCP header.
19. RIP is a DV based routing protocol.
20. Every router implements the network layer.

评阅教师	得分

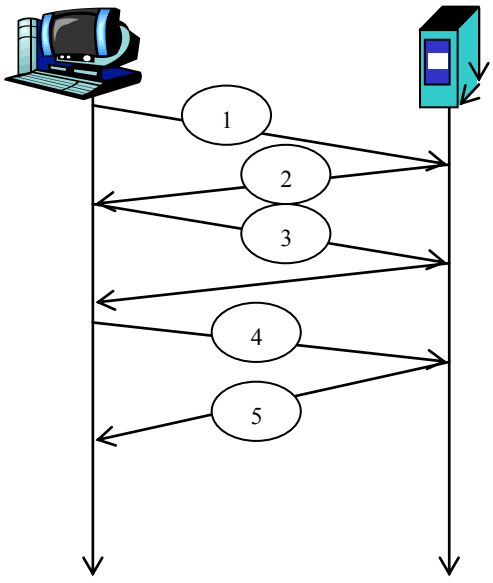
三、简答题（本大题共 3 小题，共 30 分）。

1. **(5 points)** Fill in the value of the congestion window size (number of segments) for each transmission round. Assume the threshold starts at 30 segments and the following events occur:.
   - triple duplicate ACK during round 5

- timeout during round 10
- triple duplicate ACK during round 13
- timeout during round 16
- timeout during round 19

Round	Congestion Window Size	Round	Congestion Window Size
1	1	11	1
2	2	12	2
3	4	13	4
4	8	14	5
5	16	15	6
6	11	16	7
7	12	17	1
8	13	18	2
9	14	19	3.5
10	15	20	1

2. The client A wants to request a Web page from Server B. The time-sequence diagram is shown below, please fill in the blanks. **(5 points, 0.5 point for each blank).**



Packet 1 to Packet 3 are TCP connection's setup segments, then:

Packet 1: SYN flag bit = 1　　ACK flag bit = 0　　Sequence number = 92

Packet 2: SYN flag bit = 1　　ACK flag bit = 1　　Sequence number = 100

ACK number= 93

Packet 3: SYN flag bit = 0　　ACK flag bit = 1　　Sequence number = 93

ACK number= 101

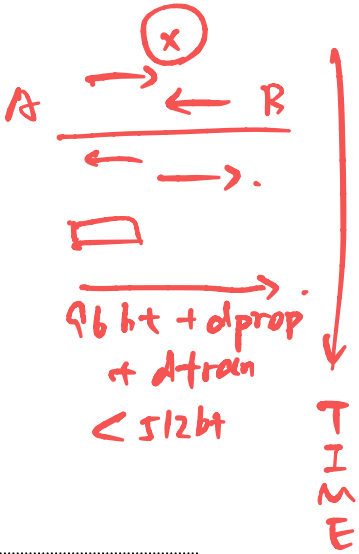
The first HTTP request send from A is in Packet 3

3. **(10 points)** Suppose two nodes, A and B, are attached to opposite ends of a 900 m cable, and that they each have one frame of 1000 bits (including all headers and preambles) to send to each other. Both nodes attempt to transmit at time t=0. Suppose there are four repeaters between A and B, each inserting a 20 bit delay. Assume the transmission rate is 10 Mbps, and CSMA/CD with backoff intervals of multiples of 512 bits is used. After the first collision, A draws K=0 and B draws K=1 in the exponential backoff protocol. Ignore the jam signal.

   1) **(5 points)** What is the one-way propagation delay (including repeater delays) between A and B in seconds? Assume that the signal propagation speed is $2 * 10^8$ m/sec.

$$d_{prop} = \frac{900\,m}{2\times10^8\,m/s} + \frac{20\,bits}{10\times10^6\,bps} \times 4$$

   2) **(5 points)** At what time (in seconds) is A's packet completely delivered at B?



$$t = 96\,bit\,time + d_{prop} + d_{prop}$$

find idle　　abort　　back

$$+ 96\,bit\,time + d_{prop} + d_{tran}$$

find idle again

4. **(10 points)** Consider the network with 4 routers in figure 1, with link cost labeled. Assume that a distance vector algorithm with poisoned reverse is used. Assume that each node initially know only the costs to their neighbors. Assume that the DV algorithm works in a synchronous manner, where all nodes simultaneously receive distance vectors from their neighbors, compute their new distance vectors, and inform their neighbors if their distance vectors have changed.

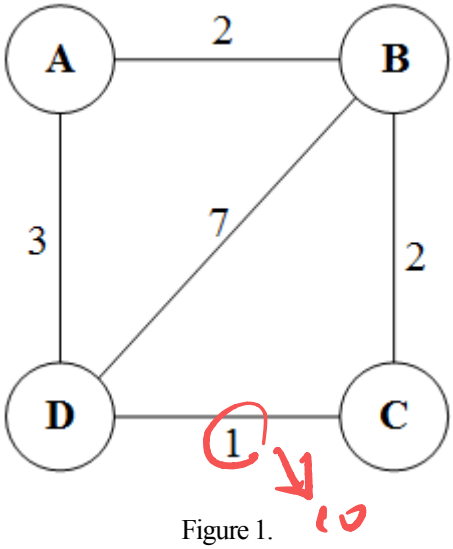


Figure 1.

1) **(4 points)** Please show the distance entries at the node A.

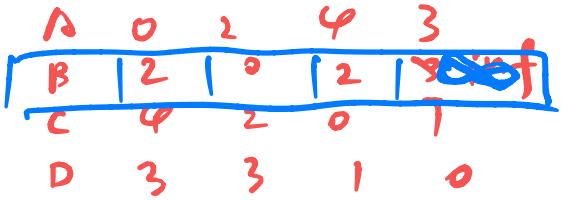
	A	B	C	D
A	0	2	4	3
B	2	0	2	3
C	4	2	0	1
D	3	3	1	0

2) **(2 points)** After the DV algorithm converged, the link cost between node C and node D increases from 1 to 10. Once detecting this change, node C has to update its distance vector and inform its new distance vector to B. What's this new distance vector C sends to B?

	A	B	C	D
B	2	0	2	3
C	4	2	0	~~1~~ 5
D	3	3	1	0

3) **(3 points)** As soon as B received C's update, B will recalculate its own distance vector. If B has computed a new distance vector, B will inform C this new distance vector. Will B update its distance vector? If so, what's the new distance vector B will send to C?

Yes.



4) **(1 point)** Let's assume that the network in Figure. 1 is an autonomous system in the Internet with AS number 0. Node A is the BGP gateway of this AS. Is A the only router in this network that runs BGP and DV algorithm simultaneously?

X. 每一个 Router 都运行 BGP 和 DV

评阅教师	得分

四、综合分析题（本大题共 20 分）

1. Consider a campus network as shown in Figure 2, where there two routers R1 and R2, a HUB H1, and a switch S1 that connect 3 Ethernet LANs. The numbers (1,2, or 3) besides the routers indicate their interfaces, and the IP address block (e.g., 128.101.0.0/18) near an Ethernet represents the IP address block assigned to the corresponding Ethernet (thus hosts on the Ethernet).

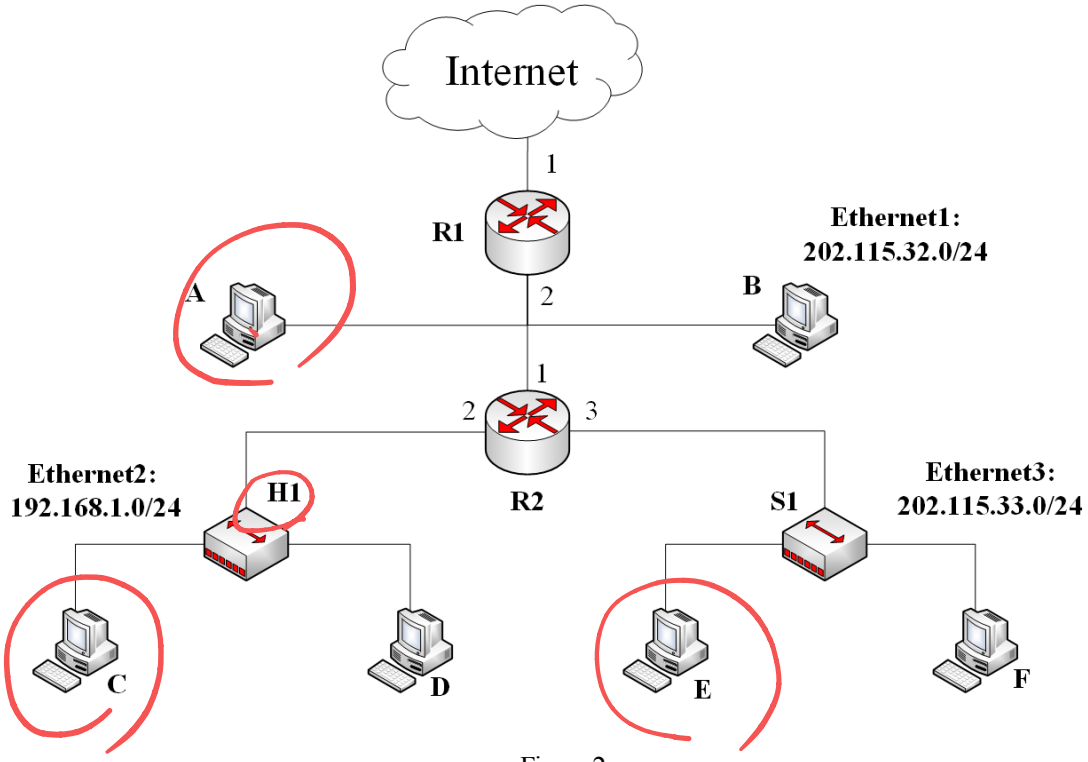


Figure 2.

1) **(2 points)** To make sure each host (from A to F) to access the Internet, what services has to be provided by R2?

NAT

2) **(2 points)** With route aggregation, whose reachability information is propagated to Internet by R1?

202.115.32.0/24

202.115.00100001.0/24] aggregation → 202.115.32.0/23

3) **(2 points)** Suppose host E wants to send an IP datagram packet to host F. Host E will send a packet like below. How does host E knows that it can directly forward the packet to host F instead of asking for its default router R2 to help deliver it

The packet from E to F

Source MAC	Destination MAC	Source IP	Destination IP
E's MAC address	F's MAC address	E's IP address	F's IP address

(E和F有相同的网络号)

通过子网掩码，E可以发现与F位于同一个子网中，可以直接投递。

4) **(2 points)** Will the R2's interface 3 receive the packet from E to F? Please explain your answer

不会，交换机只会向目标下转发

5) **(2 points)** If D send a packet to C, will the R2's interface 2 receive this packet? Please explain your answer

会，集线器只负责增强信号，会向与它连接的所有接口转发

6) **(6 points)** Now suppose host E want to send an IP datagram to A. Let's assume the ARP caches of all the hosts in this network is empty while the routers (R1 and R2) has cached all the ARP records needed. List the source and destination's IP and MAC addresses of all the frames to transfer this IP datagram from E to A.

Source MAC	Destination MAC	Source IP	Destination IP
E's MAC	FF-FF-FF-FF-FF-FF	E's IP	R2#3's IP
R2#3's MAC	E's MAC	R2#3's IP	E's IP
E's MAC	R2#3's MAC	E's IP	A's IP
R2#1's MAC	A's MAC	E's IP	A's IP

7) **(4 points)** Now suppose host C want to send an IP datagram to A, what are the source and destination's IP and MAC addresses in the frame sent by C and what are the source and destination's IP and MAC addresses in the frame received by A?

	Source MAC	Destination MAC	Source IP	Destination IP
C sent	C's MAC	R2#2's MAC	C's IP	A's IP
A recv	R2#1's MAC	A's MAC	R2#1's IP	A's IP