四川大学期末考试试题（闭卷）

（2017~2018 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 2015 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	1(30%)	2(20%)	3(30%)	4(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。

评阅教师	得分

1. Multiple Choice (30 points, 1.5 points for each question)

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

(1). The protocols of various layers are called (A).

A　the protocol stack　　B　TCP/IP

C　ISP　　D　network protocol

(2). In (A) networks, the resources are not reserved; a session's messages use the resources on demand, and as a consequence, may have to wait for access to communication link.

A　packet-switched　　B　data-switched

C　circuit-switched　　D　message-switched

(3). The following technologies may be used for residential access, except (D)

A. HFC　　B. DSL　　C. Dial-up modem　　D. FDDI

(4). Which kind of media is not a guided media? (D)

A　twisted-pair copper wire　　B　a coaxial cable

C　fiber optics　　D　digital satellite channel

(5). Suppose a web page consists of a base HTML file, 6 JEPG images and a java applet, and also

suppose HTTP uses persistent connection without pipelining, the total response time is (B).

A 8RTT B 9RTT C 10 RTT D 16RTT

(6). In the following descriptions about FTP, which one is correct? (B)

A FTP is p2p architecture.

B FTP sends its control information out-of-band.

C FTP messages are carried by UDP segments.

D FTP is a stateless protocol.

(7). In the following protocol, which one is stateless? (A)

A POP3 B SMTP C FTP D IMAP

(8). Which of the following protocols uses CSMA/CA for media access control? (B)

A. Ethernet B. Wi-Fi

C. blue-tooth D. FDDI

(9). 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

(10). Which one is not defined by an application-layer protocol? (D)

A the types of messages exchanged

B the syntax of various message types

C the semantics of the fields

D rules for determining when and how to translate the socket

(11). The job of gathering data chunks, encapsulating each data chunk with header information to create segments and passing the segments to the network is called (A).

A. multiplexing B. de-multiplexing

C. forwarding D. routing

(12). The field of Length in UDP segment specifies the length of (B).

A. the UDP segment, not including the header

B. the UDP segment, including the header

C. the UDP segment's header

D. the Length field

(13). 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

(14). The internet's network layer provides a single service----that is (D).

A. Reliable data transfer B. Flow control

C. Congestion control D. Best-effort-service

(15). An IP datagram of 1020 bytes (20 byte of IP header plus 1000 bytes of IP payload) arrives at a router and must be forwarded to a link with an MTU of 500 bytes. Thus the router has to fragment the datagram. To the last fragment, the value of offset should be (D)

A. 960 B. 1000 C. 100 D.120

(16). In the following four descriptions about random access protocol, which one is not correct? (A)

A. In slotted ALOHA, nodes can transmit at random time.

B. CSMA/CD cannot be implemented on a wireless channel.

C. The maximum efficiency of a slotted ALOHA is higher than a pure ALOHA.

D. In CSMA/CD, one node listens to the channel before transmitting.

(17). Which of the following IP address belongs to 202.115.32.64/27? (A).

A. 202.115.32.65 B. 202.115.32.63

C. 202.115.32.96 D. 202.115.32.128

(18). In the following four fields in IP header, which one will be updated after the IP datagram is forwarded by a router? ( ).

A. source IP address B. destination IP address

C. length D. checksum

(19). Let's assume there is 16-bit piece data 0101 0101 0001 0001, The 8-bit Internet checksum for this data should be ( ).

A. 01011001 B. 01010011

C. 10100110 D. 10101100

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

A. 010 B. 000 C. 111 D. 001

评阅教师	得分

2. True or False (20 points, 2 point for each statement)。

1	2	3	4	5	6	7	8	9	10

(1). There is no network congestion in a circuit switching network.

(2). With nonpersistent connection between browser and origin server, it is possible for a single TCP segment to carry two distinct HTTP request messages.

(3). Flow control reduces the transmission rate at the sender when the receiver is overloaded

(4). Suppose that host A wants to send data over TCP to host B, and host B wants to send data to host A over TCP. Two separate TCP connections - one for each direction - are needed.

(5). In a datagram network, the setup time is the only delay if we assume transmission delay, propagation delay, processing delay, and queuing delay are all negligible.

NO SETUP TIME

(6). The Date: header in the HTTP response message indicates when the object in the response was last modified.

(7). In Selective Repeat protocol, the receiver will not acknowledge a correctly received packet if it is out of order.

(8). RTS/CTS combats the Hidden Terminal problem.

(9). Media Access Control is a function of the network layer.

(10). All bit errors can be detected if a packet is sent twice..

评阅教师	得分

3. please answer following questions briefly (30 points)。

(1) Host A want to send a 10KB file F over a TCP connection.

Several assumptions:

- This TCP connection uses the slow-start congestion control scheme with an initial THRESHOLD value of 4 KB
- The MSS is 1KB.
- The receiver's advertised window is initially 4 KB.
- Unless indicated otherwise, all segments were received properly and received in the same order as they were sent
- The receiver will send ACK immediately, once receiving one data segment.
- The receiver will buffer all the dis-ordered segments.
- It takes the sender 10 ms to "push" the segment onto the network. This means that if the first data segment is pushed onto the network starting at time 0, then the second segment can started to be pushed onto the network at 10 ms.
- Unless indicated otherwise, each successfully transmitted segment has a round trip time of exactly 60ms (30 ms each way). This time includes transmission time.
- The timer on host A of this TCP connection is always set as 100 ms.
- The seq number and ack number of the first data segment are 0 and 100, respectively.

Under the set of assumptions above, Find the seq number, ack number and the time to send of each data segments if:

- The second data segment is slow, taking 50 ms(instead of 30ms as mentioned above).
- The first transmission of the 4th data segment is not received by the receiver.
- In the ACKs for the 7th data segment and subsequently, the receiver's advertised window is reset to 2 KB

(10 points)

Sending time	seq	Ack
0	0	100
60	1K	100
70	2K	100
140	3K	100
150	4K	100
160	5K	100
170	6K	100
230	8K	100
290	7K	100
300	8K	100
350	9K	100

(2). Suppose nodes A and B are on the same 10 Mbps Ethernet bus, and the propagation delay between the two nodes is 225 bit times.

dprop = 225 bit time

1) Suppose node A begins transmitting a frame and, before it finishes, node B begins transmitting a frame. Can A finish transmitting before it detects that B has transmitted? Why or why not? Hint: Suppose at time t = 0 bit times, A begins to transmitting a frame. In the worst case, A transmits a minimum-sized frame of 512+64 bit times. So A would finish transmitting the frame at t = 512 +64 bit times. Thus, the answer is no, if B's signal reaches A before bit time t= 512+64 bits. In the worst case, when does B's signal reach A? (5 points)

当最坏情况下：t = 224 时，B 开始发送第 1 个 bit

⇒ t = 224+225 = 449 时，B 的第 1 个 bit 到达 A

而 A 传输完共需 512+64 = 576 bit time

> 449 bit time

∴ A 不能完成传输

2) Suppose A and B send frames at the same time, the frames collide, and then A and B choose different values of K in the CSMA/CD algorithm. Assuming no other nodes are active, can the retransmissions from A and B collide? Why or why not? (5 points)

t = 0 时，A，B 发送

t = 225 bt 时，检测到碰撞

假设 $K_A = 0$，$K_B = 1$

t = 225+48 = 273 bt 时，完成传输 jamsignal

t = 273+225 = 498 bt 时 B 最后 1 bit 到达 A

(3). The laptop arrives a new network and wants to get IP address from the DHCP server. The time-sequence diagram is shown below. Packet 1 to Packet 4 are DHCP messages, please fill in the blank. (5 points, 0.5 point for each blank)

t = 498+96 = 594 bt 时，A 开始重传

t = 273+512 = 785 bt 时，B 开始侦听

t = 594+225 = 819 bt 时，A 第 1 bit 到达 B

∵ 819 − 785 = 34 bt < 96 bt

∴ A 与 B 的重传不会发生碰撞

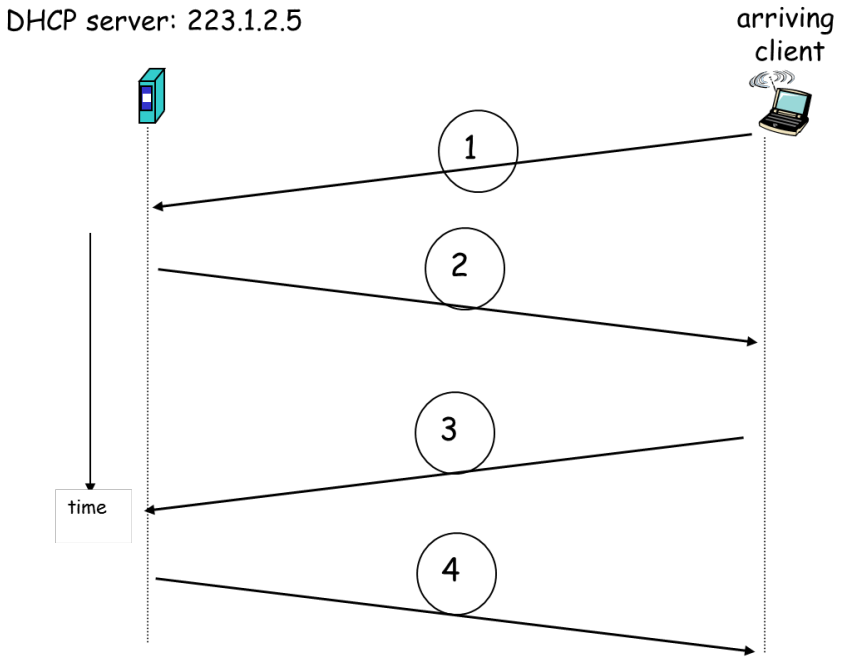

Fig1.

Packet 1 to Packet 4 are DHCP messages, then:

Packet 1: Source IP = 0.0.0.0

Destination IP= 255.255.255.255

yiaddr= 0.0.0.0

Packet 2: Source IP= 223.1.2.5

Destination IP= 255.255.255.255

yiaddr = 223.1.2.100

Packet 3: Source IP = 0.0.0.0

Destination IP= 255.255.255.255

yiaddr= 223.1.2.100

Packet 4: Source IP = 223.1.2.5

Destination IP= 255.255.255.255

yiaddr= 223.1.2.100

These DHCP messages are encapsulated in Udp segments.

(4). Consider the network with 5 routers in figure 2, with link cost labeled. Show the operation of Dijkstra's (Link State) algorithm for computing the least cost path from node A to all destinations by fill the table below. (5 points)

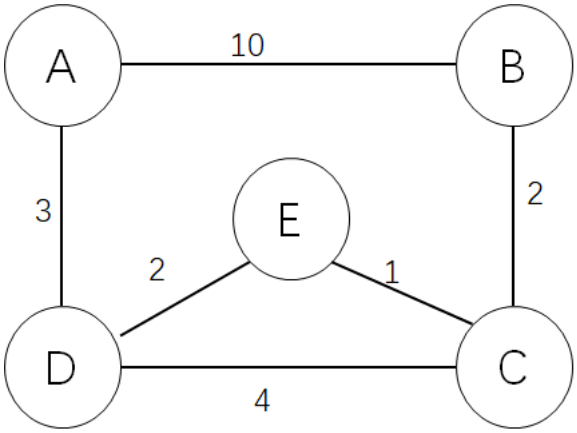

Figure 2.

step	N'	D(B),p(B)	D(C),p(C)	D(D),p(D)	D(E),p(E)
0	A	10	∞	3	∞
1	AD	10	7		5
2	ADE	10	6		
3	ADEC	8			
4	ADECB				

评阅教师	得分

4. Analytic (20 points)。

Consider a campus network as shown in Figure 3, where 9 hosts (from A to I), a web cache, and a DNS server are connected by 4 routers (r1,r2,r3 and r4), and 4 switches (s1,s2,s3 and s4). The numbers (1,or 2) besides the routers indicate their interfaces. Please answer the following questions (20 points)

1) How many subnets are in the campus network? (2 points)

4

2) Suppose this campus network is an autonomous system in the Internet with AS number 0. Router r1 is the BGP gateway of this AS. Is r1 the only router in this network that runs BGP? If not, please list all the network devices who runs BGP (3 points)

X R1 - 4

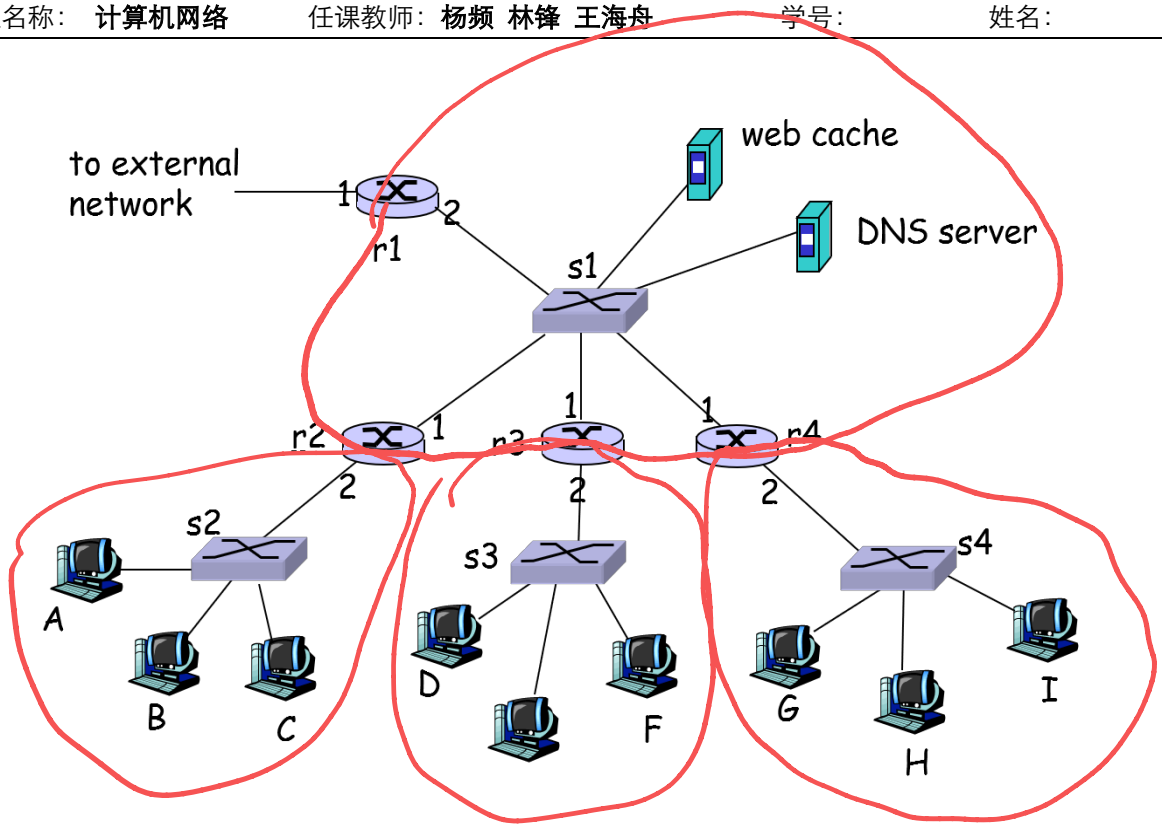

Figure 3.

3) With route aggregation, the reachable prefix propagated by r1 is 202.115.30.0/22. Suppose that the subnet that contains host A is required to support up to 500 interfaces, and the subnet that contains host D and the subnet that contains host G are each required to support up to 250 interfaces. Provide three prefix (of the form a.b.c.d/x) that satisfy these constraints. (3 points)

202.115.28.0/23
202.115.30.0/24
202.115.31.0/24

4) Suppose host A wants to send an IP datagram packet to host C. Host A will send a packet like below. How does host A knows that it can directly forward the packet to host C instead of asking for its default router r2 to help deliver it.(2 points)

The packet from A to C

Source MAC	*Destination MAC*	*Source IP*	*Destination IP*
A's MAC address	*B's MAC address*	*A's IP address*	*B's IP address*

5) Will the r2's interface 2 receive the packet from A to C? Please explain your answer (2 points)

X.

6) Now suppose host H 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,r2,r3,and r4) 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 H to A.(4 points)

Source MAC	*Destination MAC*	*Source IP*	*Destination IP*
H's MAC	FF-FF-···-FF	H's IP	R4#2's IP
R4#2's MAC	H's MAC	R4#2's IP	H's IP
H's IP	R4#2's MAC	H's IP	A's IP
R4#1's MAC	R2#1's MAC	H's IP	A's IP
R2#2's MAC	A's MAC	H's IP	A's IP

7) Now suppose the Web cache is serving for all the hosts in this campus network and the cache is empty initially. Host A wants to send a http request to a web server 137.254.25.1 which is outside the campus network. What are the source and destination's IP and MAC addresses in the frame that carries the http request message sent by A and what are the source and destination's IP and MAC addresses in the frame carries the http request message received by r1's interface 2? (4 points)

	Source MAC	Dest MAC	Source IP	Dest IP
①	A's MAC	R2#2's MAC	A's IP	webcache's IP
②	webcache's MAC	R1#2's MAC	webcache's IP	137.254.25.1