四川大学期末考试试题（闭卷）

（2019~2020 学年第 1 学期）　　B 卷

课程号：311105040　课程名称：计算机网络和分布式系统　任课教师：

适用专业年级：软件工程 2017 级　学号：　姓名：李美瑾

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		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

D A (1). A user requests a Web page that consists of some text and three images. For this page, the client will send _____ request message and receive four response messages

A. one　　B.two　　C. Three　　D.four

D (2). There is no network congestion in a _____

A. packet switching network　　B. datagram network

C. virtue circuit network　　D. circuit network

C (3). In the following options, which belongs to the guided media? _____

A. UTP　　B. STP　　C. Fiber　　D. Radio channel

C (4). The Internet's network layer is responsible for moving transport-layer packets known as

_____from one host to another.

A. frame　B. datagram　C. segment　D. message

A (5). Suppose a web page consists of a base HTML file, and 6 embedded JEPG images, and also suppose HTTP uses persistent connection with pipelining, the total response time is _____.

A. 3 RTT　B. 4 RTT　C. 8 RTT　D. 14 RTT

C (6). Suppose host A sends host B one TCP segment with sequence number 100, acknowledgement number 200, and 10 bytes of data. Then the sequence number in the acknowledgement to this segment is _____

A. 100　B. 110　C. 200　D. 210

D (7). 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 have to fragment the datagram. To the last fragment, the value of offset should be _____

$\frac{480}{8} = 60$ 分3份

A. 960　B. 1000　C. 100　D. 120

D (8). Which of the flags in TCP header is used during the shutdown of a TCP connection?

A. URG　B. ACK　C. SYN　D. FIN

A (9). What physical media is used in Ethernet most popularly?

A. Twisted-Pair Copper Wire　B. Coaxial Cable

C. Fiber　D. Radio Channels

B (10). Transmission delay is determined by (　)

A. the speed of eletromagenetic wave in physical media.

B. the time needed for pushing one packet to the link.

C. the time needed for receiving and analysing one packet

D. the speed of analog to digital conversion.

A (11). (　) is used to download e-mails from one E-mail server to local.

A. POP3　B. FTP　C. SMTP　D. HTTP

C (12). The full name of DNS is (　)

A. Dot Network System　B. Dedicated Network System

C. Domain Name System　D. Data Network System

D (13). When transport layer receives on message from application layer, it _____

A. divides the message into multiple segments

B. sends this message to network layer

C. buffers the message

D. handles the message according the required transportation layer service.

B (14).About the congestion control of TCP, which one is correct? _____

A. Receive Window is used for congestion control

B. Congestion Window is employed

C. TCP can detect the congestion through ICMP

D. Congestion avoidance is implemented only in some special OS.

A (15).HOL congestion happens in _____

A. The input queue of a router

B. The output queue of a router

C. The input queue and output queue of a router

D. The switch fabric.

B (16).NAT is employed to _____

A. translate the IP address only　　B. translate the IP address and port number

C. translate the port number only　　D. translate the IPv4 to IPv6

B (17).The topology of a switch Ethernet is _____

A. bus topology　　B. star topology　　C. net topology　　D. grid topology

C (18).The switch table is _____

A. generated with the similar methods of router table

B. built by a special host sofware

C. constructed through the self-learning of switch

D. updated according the instructions from default router.

1000 0000
+ 1001 1001
0001 1001
1

C (19).Let's assume there is 16-bit piece data 1000 0000 1001 1001, The 8-bit Internet checksum for this data should be _____　　1110 0101

A. 00011010　　B. 00011001　　C. 11100101　　D.11100110

(20).For the data in the last problem , the CRC is applied to it with generator 1001. Thus the CRC bits should be 001

A. 000　　B. 011　　C. 010　　D. 111

评语教师	得分

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

1	2	3	4	5	6	7	8	9	10

√ (1). ARP table maps the MAC address to the IP address

√ (2). CSMA/CD cannot be implemented on a wireless channel

X (3). HTTP uses persistent connections without pipeline in its default mode.

X (4). The header of both UDP and TCP has the sequence number field.

X (5). Cookie can reduce traffic on an institution's access link to the Internet.

√ (6). POP3 uses TCP as its underlying transport protocol.

X (7). An ethernet switch has to be configured before it deployed in a network.

X (8). BGP is a DV-based routing algorithm.

X (9). In ethernet, nodes access the link by CSMA. CSMA/CD

X (10). All the IPv6 nodes have to have a complete IPv4 implementation

评语教师	得分

3. please answer following questions briefly (30 points)

林老师说本题有误，不考

(1). (10 points) Consider a datagram network using 32-bit host addresses. Suppose a router has four links, numbered 0 through 3, and packets are to be forwarded to the link interfaces as follows:

Destination Address Range	Link Interface
11100000 00000000 00000000 00000000 through 11100000 00111111 11111111 11111111	0
11100000 01000000 00000000 00000000 through 11100000 01000000 11111111 11111111	1
11100000 01000001 00000000 00000000 through 11100001 01111111 11111111 11111111	2
Otherwise	3

<应改为0>

1) Provide a forwarding table that has five entries, uses longest prefix matching, and forwards packets to the correct link interfaces. (6 points)

Prefix Match 用CIDER表示	Link Interface

2) Describe how your forwarding table determines the appropriate link inter-face for datagrams with destination addresses: （4 points）

11001000 10010001 01010001 01010101
11100001 01000000 11000011 00111100
11100001 10000000 00010001 01110111
11100000 10000000 01010000 10010001

(2). (10 points) Host A wants to send an 8000 bytes file F over a TCP connection. Several assumptions: F=8k

- This TCP connection uses the Reno congestion control scheme with an initial THRESHOLD value of 4000 bytes. ssH=4K MSS=1K rwnd=2K
- The MSS is 1000 bytes.
- The receiver's advertised window is initially 2000 bytes.
- 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 out-of-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 start to be pushed onto the network at 10 ms. T=10ms
- Unless indicated otherwise, each successfully transmitted segment has a round trip time of exactly 80ms (40 ms each way). This time includes transmission time. RTT=80ms
- The timer on host A of this TCP connection is always set as 100 ms. Timer=100ms
- 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 ACK of the third data segment is slow, taking 80 ms(instead of 40ms as mentioned above). → 收ACK: 90+40+80=210
- The first transmission of the 5th data segment is not received by the receiver. rwnd=4k
- In the ACKs for the 4th data segment and subsequently, the receiver's advertised window is reset to 4000 bytes

sending time	seq	ack
0	0	100
80 收①	1k	100 rwnd=2不加
90	2k delay	100 ACK210到
160 timer开始 收1K	3K	100
210 窗口滑走 收2K	4K lost	100
240 rwnd=4 收3K	5K x1	100 timer开始
250	6K x2	100 rwnd=4k
260 导致fast retrans	7K x3	100
340 timeout+retrans	4K	100

2 3
3 4
4 5 6 7
4 5 6 7

the first data byte in the segment, as described in Section 3.5.2. Also note that if the timer is already not running for some other segment, TCP starts the timer when the segment is passed to IP. (It is helpful to think of the timer as being associated with the oldest unacknowledged segment.) The expiration interval for this timer is the

(3). (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.

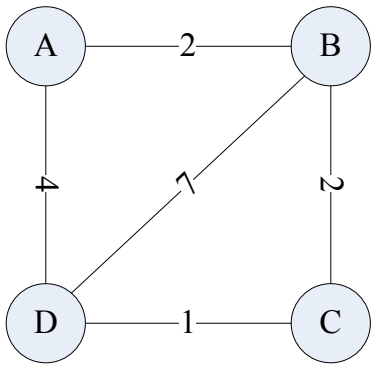


Fig 1.

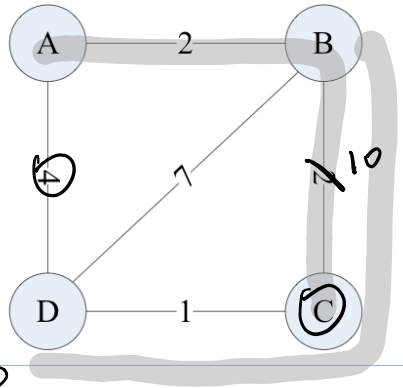
1) Please show the distance entries at the node A (4 points).
2) After the DV algorithm converged, the link cost between node C and node B increases from 2 to 10. Once detecting this change, node C has to update its distance vector and inform its new distance vector to D. What's this new distance vector C sends to D?(2 points)
3) As soon as D received C's update, D will recalculate its own distance vector. If D has computed a new distance vector, D will inform C this new distance vector. Will D update its distance vector? If so, what's the new distance vector D will send to C?.(3 points)
4) Let's assume that the network in Figure. 2 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? (1 point)

评阅教师	得分

4. Analysis (20 points)

Consider the network in figure 2. There are 1 Router, 1 Switch, and 1 Hub and 7 hosts.

1) Please show the distance entries at the node A (4 points).
2) After the DV algorithm converged, the link cost between node C and node B increases from 2 to 10. Once detecting this change, node C has to update its distance vector and inform its new distance vector to D. What's this new distance vector C sends to D?(2 points)
3) As soon as D received C's update, D will recalculate its own distance vector. If D has computed a new distance vector, D will inform C this new distance vector. Will D update its distance vector? If so, what's the new distance vector D will send to C?.(3 points)
4) Let's assume that the network in Figure. 2 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? (1 point)



采用毒性逆转 start by build (两种均可)

(1) Node A:

Src \ Dest	A	B	C	D
A	0	2	4	4
B	2	0	2	3
D	4	3	1	0

(2) C原来的表项

Src \ Dest	C	A	B	D
C	0	4	2	1
B	2	2	0	∞
D	1	4	∞	0

C A B D
C更新为 (0, 5, 10, 1)

因为此时D→B为∞，算法不可立刻知其为7+1

A B C D
则C告知D: ∞, 10, 0, 1

(3) 原来D的表项为:

Src \ Dest	D	A	B	C
D	0	4	3	1
A	4	0	2	4
B	3	2	0	2
C	1	4	2	0

更新为:

Src \ Dest	D	A	B	C
D	0	4	6	1
A	4	0	2	4
B	3	2	0	2
C	1	∞	10	0

D告知C: 4, 6, 1, 0 (到A、B、C、D)

(4) 不是, A: eBGP+DV

其他: iBGP+DV

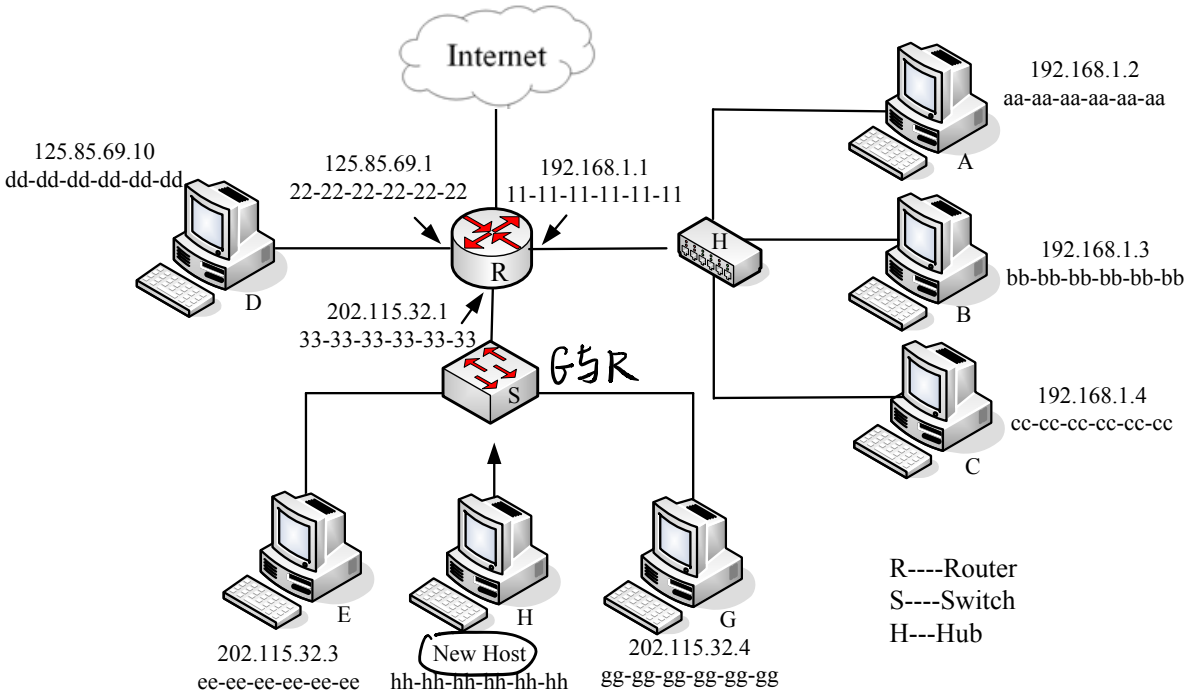


Fig. 2

a) How many subnets are in the above network? (1 point) 3个子网

b) To make sure each host to access the internet, what services has to be provided by R? (2 points) NAT

c) There is a new host (host H) moves into the network. Thus the new host has to get its IP address from the DHCP server running on the Router R. Please list the sequence the number of packets sent or received by the new host until it gets an IP address 202.115.32.5. (4 points)

IP广播时 MAC广播（林老师说）

但教材写时描述的并非如此 MAC应为发出者

Source MAC	*Destination MAC*	*Source IP*	*Destination IP*
hh	FF	0.0.0.0	255.255.255.255
33	FF	202.115.32.1	255.255.255.255
hh	FF	0.0.0.0	255.255.255.255
33	FF	202.115.32.1	255.255.255.255

d) After getting the IP address of 202.115.32.5, if Host H wants to send an IP datagram to Host E. Will Host H ask router R to help forward the datagram ? Why? (2 points)

不需要，在同一子网中

e) Let's still suppose Host H wants to send an IP datagram to Host E. Assume the ARP cache of all the hosts in the network is empty. Further suppose that the switch

R会收到该广播.

S's forwarding table contains entries for Host G and router R only. Thus, H will broadcast an ARP request message, will router R receive this ARP request message? Once Host E receives this ARP request message, it will send back to Host H an ARP response message. But will it send an ARP query message to ask for H's MAC address? Why? Will router R receive the ARP response message from E? Why? (3 points)

不会,收到的ARP request中已含有H's MAC地址.

f) Now suppose Host E want to send an IP datagram to D. Let's assume the ARP cache of all the hosts in this network is empty while the Router 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 D. (4 points)

不会,同一子网,无需转发给R.

Source MAC	*Destination MAC*	*Source IP*	*Destination IP*
ee	FF	202.115.32.3	202.115.32.1
33	ee	202.115.32.1	202.115.32.3
ee	33	202.115.32.3	125.85.69.10
22	dd	202.115.32.3	125.85.69.10

g) Now suppose Host A want to send an IP datagram to D, what are the source and destination's IP and MAC addresses in the frame sent by A and what are the source and destination's IP and MAC addresses in the frame received by D? (2 points)

Frame sent by A

Source MAC	*Destination MAC*	*Source IP*	*Destination IP*
aa	11	192.168.1.2	125.85.69.10

Frame received by D

Source MAC	*Destination MAC*	*Source IP*	*Destination IP*
22	dd	125.85.69.1	125.85.69.10

h) Suppose that all links in the subnet including Host E, H and G and the subnet including Host A, B and C are 100Mbps. What's the maximum total aggregate throughput that can be achieved in these two subnets respectively? (2 points)

包含E,H,G的子网：300Mbps

包含A,B,C的子网：100Mbps