四川大学期末考试试题（闭卷）

（2016~2017 学年第 1 学期）   B 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(10%)	四(40%)
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. Circuit switching is commonly used in （   C   ）.

    （A） Internet

    （B） Intranet

    （C） traditional telephone networks

    （D） all above

2. Which of the following protocol layers is **NOT** explicitly part of the Internet Protocol Stack? （   D   ）

    （A） application layer

    （B） transport layer

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（C） data link layer

（D） session layer

3. The performance of a network can **NOT** be measured in terms of （ A ）.

（A） congestion

（B） throughput

（C） packet loss

（D） delay

4. 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

5. A （ D ） is a network entity that satisfies HTTP requests on the behalf of an origin Web server.

（A） local server

（B） DNS server

（C） proxy server

（D） Web server

6. During an FTP session, the control connection is opened （ A ）.

（A） once

（B） twice

（C） many times

（D） none of the above

7. The transfer of a Web document from one host to another is: （ B ）

（A） loss-tolerant and time sensitive

（B） loss-intolerant and time insensitive

（C） loss-intolerant and time sensitive

（D） none of the above

8. Suppose a browser sends an HTTP request message with the If-modified-since: header. Suppose the object in a server has not changed since the last time a client retrieved the object. Then the server will send a response message with the status code: （ B ）

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（A）   404 Not Found

（B）   304 Not Modified

（C）   200 OK

（D）   none of the above

9. In （   ）resolution, the server returns the IP address of the server that it thinks can resolve the query.

（A）   iterative

（B）   recursive

（C）   straight

（D）   none of the above

10. Pipelining requires which of the following （   ）.

（A）   transmitting many packets before receiving acknowledgements

（B）   sender-side buffering of unacknowledged packets

（C）   unique sequence numbers for each in-transit packet

（D）   all of the above

11. The UDP header has only four fields, they are   （   ）.

（A）   source port number, destination port number, source IP and destination IP

（B）   source port number, destination port number, length and checksum

（C）   source IP, destination IP, source MAC address and destination MAC address

（D）   source IP, destination IP, sequence number and ACK sequence number

12. A File size of 10,000bytes, MSS equals 1000bytes. When we want to transmit this file with TCP, the sequence number of the first segment is 0, and the sequence number of the third segment is （   ）.

（A）   1999

（B）   2000

（C）   2001

（D）   1000

13. TCP applies fast retransmit to a segment when （   ）.

（A）   it estimates unusually large RTTs

（B）   the segment's timer expires

（C）   it receives three ACKs for an earlier segment

（D）   none of the above

14. Which ICMP message type is the basis for the Traceroute utility? （   ）

（A）   Echo Request

（B）　TTL

（C）　Host Unreachable

（D）　Fragment Reassembly Time Exceed

15. Routers in the path are not allowed to （　B　）.

（A）　fragment the packet they receive

（B）　decapsulate the packet

（C）　change source or destination address

（D）　all of the above

16. The source IP address in a DHCP offer message from DHCP server is （　B　）.

（A）　the IP address of DHCP client

（B）　the IP address of DHCP server

（C）　255.255.255.255

（D）　0.0.0.0

17. The broadcast address of network 223.10.198.250/29　is （　A　）.

（A）　223.10.198.255

（B）　223.10.199.255

（C）　223.10.198.250

（D）　223.10.198.0

18. If you are building a network in which only one host will be sending traffic, which of the following link protocols would give the best throughput? （　D　）.

（A）　frequency-division multiple access (FDMA)

（B）　time-division multiple access (TDMA)

（C）　token-passing

（D）　carrier sense multiple access (CSMA)

19. In an Ethernet network, which of the following is true: （　A　）.

（A）　Ethernet switches learn addresses by looking at the destination address of packets as they pass by

（B）　Ethernet hubs and repeaters learn addresses by looking at the address of packets as they pass by

（C）　Ethernet switches learn addresses by looking at the source address of packets as they pass by

（D）　a correctly operating Ethernet switch never sends a packet to the wrong outgoing port

20. In the following four descriptions about CSMA/CD, which one is not correct? （　D　）.

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（A）　A node listens to the channel before transmitting.

（B）　If someone else begins talking at the same time, stop talking.

（C）　A transmitting node listens to the channel while it is transmitting.

（D）　With CSMA/CD, the collisions can be avoided completely.

评阅教师	得分

二、判断改错题（本大题共 **10** 小题，每小题 **2** 分，共 **20** 分）

提示：正确填 T，错误填 F，将其结果填写在下表中，并改正。

1	2	3	4	5
6	**7**	**8**	**9**	**10**

1. There are four important delays in packet-switched network: processing delay, queuing delay, transmission delay and transport delay.　（ F ）

2. There are two basic switching method for networks, named, packet switching and circuit switching, respectively.　（ T ）

3. Traceroute program is a tool that can be used to determine the number of hops to a destination and the round trip time (RTT) for each hop.　（ F ）

4. A transport-layer protocol provides for logical communication between hosts while IP provides logical communication between application process running on different hosts.　（ F ）

5. SSL is a third Internet transport protocol as an enhancement of TCP.　（ T ）

6. With the SR protocol, it is possible for the sender to receive an ACK for a packet that falls outside of its current window.　（ T ）

7. If the retransmission timeout value is too small, this might lead to unnecessary retransmissions.　（ T ）

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8. A drawback of distance vector routing algorithm is count-to-infinity problem. (T)

9. If there are some errors in the routing tables at some routers, then, with IPv4, it is possible that a packet loops forever. (T)

10. CDMA networks have the wonderful property that different nodes can transmit simultaneously and yet have their respective receivers correctly receive a sender's encoded data bits. (F)

评阅教师	得分

三、简答题（本大题共 **3** 小题，共 **10** 分）。

1. What advantage and disadvantage does a packet-switched network have over a circuit-switched network? (3 points)

2. Consider an HTTP client that wants to retrieve a Web document from a given URL. The IP address of the HTTP server is initially unknown. What transport and application-layer protocols besides HTTP are needed in this scenario? (2 points)

3. Compare GBN, and SR. Assume that the timeout values for both protocols are sufficiently long such that 5 consecutive data segments and their corresponding ACKs can be received (if not lost in the channel) by the receiving host (Host B) and the sending host (Host A) respectively. Suppose Host A sends 5 data segments to Host B, and the 2nd segment (sent from A) is lost. In the end, all 5 data segments have been correctly received by Host B. How many segments has Host A sent in total and how many ACKs has Host B sent in total? (2 points) What are their sequence numbers? (3 points) Answer the above questions for the two protocols.
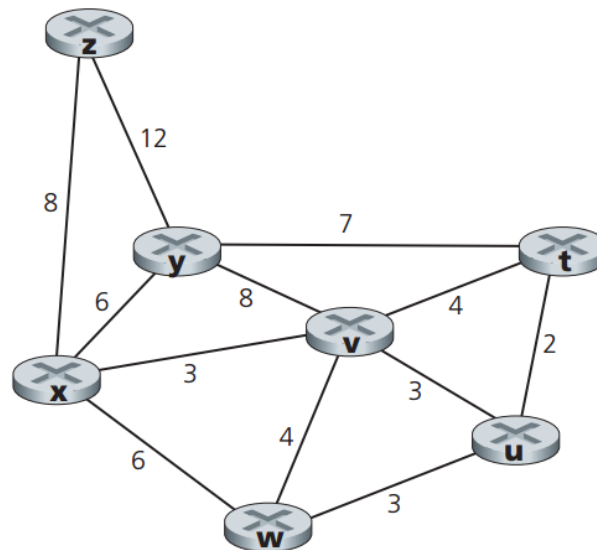
评阅教师	得分

四、计算、分析题（本大题共 5 小题，共 40 分）。

1. (**6 points**) In the following 5 problems, we are transferring a 30 Mbit high-quality music file from source host in Chengdu city to destination host located in New York city. All links in the path between source and destination have a transmission rate of 10 Mbps. Assume that the propagation speed is 2×10^8 meters/sec, and the distance between source and destination is 10,000 km.

a) Initially suppose there is only one link between source and destination. Also suppose that packet switching is used, with the message consisting of the entire music file. What is the transmission delay? What is the end-to-end delay (transmission delay plus propagation delay)? (2 points)

b) Referring to the above question, how many bits will the Chengdu's host have transmitted when the first bit arrives at the New York's host? (1 point)

c) Now suppose there are two links between source and destination, with one router connecting the two links. Each link is 5,000 km long. Again suppose the music file is sent as one message and there is no congestion, so that the message is transmitted onto the second link as soon as the router receives the entire message. What is the end-to-end delay? (1 points)
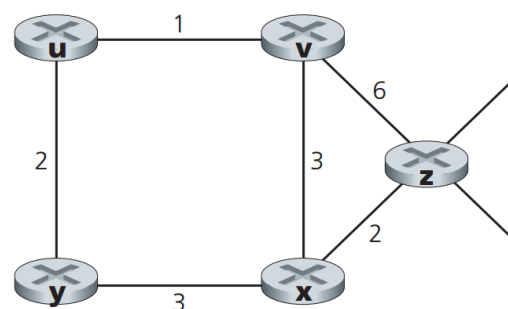
d) Now suppose that the music file is broken into 3 packets, each of 10 Mbits. Ignore headers that may be added to these packets. Also ignore router processing delays. Assuming store and forward packet switching at the router, the total delay is? (1 points)

e) Now suppose there is only one link between source and destination, and there are 10 TDM channels in the link. The music file is sent over one of the channels. The end-to-end delay is? (1 points)

2. **(8 points)** UDP and TCP use 1s complement for their checksums. Suppose you have the following three 8-bit bytes: 01010011, 01100110, 01110100. (Note that although UDP and TCP use 16-bit words in computing the checksum, for this problem you are being asked to consider 8-bit sums.)

a) What is the 1s complement of the sum of these 8-bit bytes? Show all work. (2 points)

b) Why is it that UDP takes the 1s complement of the sum as the checksum; that is, why not just use the sum? (2 points)

c) With the 1s complement scheme, how does the receiver detect errors? (2 points)

d) Can the receiver be absolutely certain that no bit errors have occurred if it computes the Internet checksum for the received UDP segment and finds that it matches the value carried in the checksum field? Explain. (2 points)

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3. **(7 points)** Consider the following network in the below figure. With the indicated link costs, use Dijkstra's shortest-path algorithm to compute the shortest path from *u* to all network nodes. Show how the algorithm works by filling in the follow table.
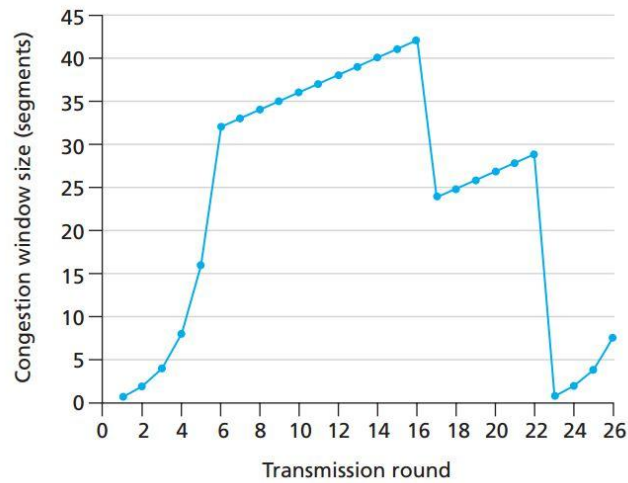

Step	N'	D(x), p(x)	D(t),p(t)	D(v),p(v)	D(w),p(w)	D(y),p(y)	D(z),p(z)
	u	∞	2,u	3,u	3,u	∞	∞

4. **(8 points)** Consider the network shown below, and assume that each node initially knows the costs to each of its neighbors. Consider the distance-vector algorithm and show the distance table entries at node z.

5. **(11 points)** Consider the following plot of TCP window size as a function of time. Assuming TCP Reno is the protocol experiencing the behavior shown above, answer the following questions. In all cases, you should provide a short discussion justifying your answer.

a)   Identify the intervals of time when TCP slow start is operating. (2 points)

b)   Identify the intervals of time when TCP congestion avoidance is operating. (2 points)

c)   After the 22nd transmission round, is segment loss detected by a triple duplicate ACK or by a timeout? (2 points)

d)   What is the initial value of Threshold at the first transmission round? (2 points)

e)   Assuming a packet loss is detected after the 26th round by the receipt of a triple duplicate ACK, what will be the values of the congestion window size and of Threshold? (3 points)