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东 北 大 学 考 试 试 卷 （ A 卷 ）

2009 —2010 学 年 第 一 学 期

课程名称：计算机网络（Computer Networks）

总分	一	二	三	四	五		



I . Multiple Choice （20 points,1 point for each）

Directions: Choose the correct answer for each question and fill it in the corresponding blank. There is ONLY ONE correct answer for each question.

- (        )1. [物理层]There are two kinds of coaxial cables usually used. One is the baseband cable and the other is the broadband cable. The impedance of the baseband cable is:  
A. 50Ω      B. 70Ω      C. 75Ω      D. 90Ω
- (        )2. According to the ISO/OSI reference model, the Ethernet switch (交换机)works on:  
A. Data link layer      B. Network layer      C. Transport layer      D. Presentation layer
- (        )3. Which device extends the LAN on network layer?  
A. Repeater      B. Hub      C. Switch      D. Router
- (        )4. How many network segments can be there at most for network connected by hubs(集线器)?  
A. 5      B. 4      C. 3      D. 2
- (        )5. 10BaseT network takes:  
A. thick coaxial cable, bus topology      B. twisted pair, ring topology  
C. thin coaxial cable, star topology      D. twisted pair(双绞线), star topology
- (        )6. When two computers communicate via a telephone line, which of the following device is necessary?  
A. network adapter      B. MODEM      C. repeater      D. coaxial cable
- (        )7. If a package is to be broadcasted to the local network, then the destination IP address of the package should be:  
A. 255.255.255.255      B. 0.0.0.0  
C. the lowest address of the subnet      D. the highest address of the subnet
- (        )8. What many bytes are there in the payload of an ATM cell?  
A. 48      B. 53      C. 64      D. 36
- (        )9. The core of the Internet protocols is:

- (        )10. With respect to protocol layer, the ARP protocol in TCP/IP corresponds to:  
A. physical layer      B. data link layer      C. network layer      D. transport layer
- (        )11. The lower layer of OSPF protocol uses: 【OSPF 网络层】  
A. UDP      B. TCP      C. ARP      D. IP
- (        )12. Which port on sever does the POP3 protocol use?  
A. 20      B. 23      C. 25      D. 110 【答案有误】
- (        )13. What is the mask for a smallest subnet usable in practice?  
A. 255.255.255.0      B. 255.255.255.254      C. 255.255.255.252      D. 255.255.255.255
- (        )14. Which of the following IP address CANNOT be assigned to a host?  
A. 141.107.255.80/16      B. 201.255.0.11/24  
C. 116.1.0.255/16      D. 198.121.254.255/24
- (        )15. When installing a MODEM to a PC, the interface standard we take is:  
A. X.25      B. RJ11      C. RS232      D. RJ45
- (        )16. Which of the following is NOT an advantage of a layer model?  
A. Dividing the complex network operation into a more manageable layer approach.  
B. Allowing changes to occur in one layer without having to change all layers.  
C. Allowing changes to occur in all layers without having to change one layer.  
D. Defining a standard interface for the plug-and-play multivendor integration.
- (        )17. How many bits are there for an Ethernet MAC address?  
A. 32      B. 48      C. 64      D. 128
- (        )18. The protocol for two computers to transport files is:  
A. FTP      B. WWW      C. Telnet      D. SMTP
- (        )19. The Internet can be traced back to its origin:  
A. ARPANET      B. ALOHA      C. NEFNET      D. Ethernet
- (        )20. Which of the following IPv6 address is correct?  
A. 2001:::8::417A      B. 12.20.3.3:0:0:0:0:FFFF      C. ::145.20.15.29      D. 145.20.15.29::

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II. Fill in the Blanks (10 points, 1 point for each blank)  
Directions: Fill proper contents into the blanks according to the context.

1. The length of an IPv6 header is 60 bytes.
2. The TCP/IP protocol consists of 5 (how many) layers.
3. ping 127.0.0.1 command will test the internal loopback(回环测试?) of a computer. (Fill the complete command with parameters)
4. 254 (how many) usable subnets are created by applying the subnet mask 255.255.255.0 to a Class B network.
5. FF-FF-FF-FF-FF-FF is a Layer-2 broadcast address.
6. The switching method that traditional telephone takes is circuit switching(电路交换), while the method that IP telephone takes is packet switching(分组交换).
7. The common used guided transmission media are coaxial cable【同轴电缆】, twisted pair【双绞线】, and optical fiber【光纤~】.

III. True or False (10 points, 1 point for each)  
Directions: Answer the following using T (True)/F (False). You do not need to explain your answers.

- ( T )1. Carrier Sense Multiple Access with Collision Detection uses first-come, first-served approach.
- ( T )2. Ethernet provides unreliable, connectionless service.
- ( T )3. The feature of a Token Ring network is collisionless environment.
- ( F )4. 8 broadcast domains are created when you segment a network with an 8-port switch.
- ( T )5. Packet-switching networks place a tight upper limit on block size.
- ( T )6. Network Address Translation technology is a solution to expand the number of IP addresses available for public use.
- ( T )7. Latency through the store-and-forward switch varies with frame length.
- ( F )8. Security is one of the advantages of using static routes over dynamic routes.
- ( F )9. OSPF is an inter-AS routing protocol, while BGP is an intra-AS routing protocol. 【inter-AS 是自治系统间，intra 是内部】
- ( F )10. In Time-Division Multiplexing, each user cannot get all of the bandwidth periodically during its slot.

IV. Fill in the Forms (20 points)  
Directions: Fill proper contents into the forms.

1. Make a comparison among the three network interconnection devices: hubs, routers and switches. Fill in “Yes” or “No” in the blanks of the following form to say whether the device can perform the corresponding function. (6 points)

	Hubs	Routers	Switches
Traffic Isolation	No	Yes	Yes
Plug & Play	Yes	No	Yes
Optimal Routing	No	Yes	No
Cut Through	Yes	No	Yes

2. Consider the TCP/IP protocol suite:
- (1) Fill the names of protocol data units corresponding to each layer in the PDU column. (4 points)
- (2) Match the following functions to one of the five layers in the Function column. (10 points)
- ①Reliable process-to-process message delivery
  - ②Packet switching
  - ③Defines frames
  - ④Provides user services such as email and file transfer
  - ⑤Transmission of bit stream across physical medium
  - ⑥Mechanical, electrical, and functional interface
  - ⑦Reassembly of data packets
  - ⑧Ensure reliable transmission of data
  - ⑨Network selection
  - ⑩Route determination

Layer	PDU	Functions
Application Layer	Message	④
Transport Layer	Segment	①
Network Layer	Packet	②⑦⑨⑩
Data Link Layer	Frame	③⑧
Physical Layer	Bits on the wire	⑤⑥

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V. Comprehensive Calculation (40 points)

1. 【PASS 课本 P18】(5 points) How long does it take to send a file of 640K bits from host A to host B over a circuit-switched[电路交换] network?

- All links are 1.536 Mbps
- Each link uses TDM with 24 slots/sec
- 500 milliseconds to establish end-to-end circuit

Solution:

Transmission Speed:  $1.536\text{Mbps} \div 24 = 64\text{Kbps}$

Transmission Time:  $640\text{K} \div 64\text{Kbps} = 10\text{s}$

Connection Establishment Time: 0.5s

File sending time: 10.5s

【照这个意思好像是每个时隙单独传递各自的数据？】

2. (5 points) The distance between host A and host B is  $L = 10000\text{Km}$ . The bandwidth of the link is  $R = 1\text{Mbps}$  ( $2^{20}\text{bps}$ ). Suppose the propagation speed over this link is  $V = 2.5 \times 10^8\text{m/s}$ .

- (1) What is the propagation time  $T_p$ ?
- (2) During this time, how many bits have been sent to the link by host A?
- (3) What is the distance  $d$  between two adjacent bits?

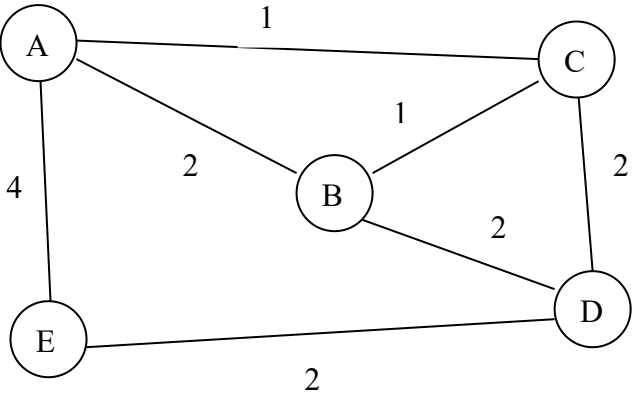
Solution:

$T_p = L \div V = 0.04\text{s}$

$\text{Numb} = T_p \times R = 41943$

$d = L \div \text{Numb} = 238\text{m}$

3. 【PASS】(6 points) Use Dijkstra Algorithm to find out the shortest paths from origin E to every other node in the following graph, and calculate corresponding costs.



Solution: 【这个答题形式只能说结果正确。不能体现 Dijk】

$E \rightarrow A$ :  $E \rightarrow A$ ,  $\text{cost}(E,A) = 4$

$E \rightarrow B$ :  $E \rightarrow D \rightarrow B$ ,  $\text{cost}(E,B) = 4$

$E \rightarrow C$ :  $E \rightarrow D \rightarrow C$ ,  $\text{cost}(E,C) = 4$

$E \rightarrow D$ :  $E \rightarrow D$ ,  $\text{cost}(E,D) = 2$

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4. 【PASS】 (9 points) An organization is granted an IP address 211.17.185.0. The network administrator wants to create 32 subnets.  
(1) Find out the subnet mask.  
(2) Find out the number of host addresses in each subnet.  
(3) Find out the network address of the first subnet.  
(4) Find out the first and last host addresses in the first subnet.  
(5) Find out the subnet directed broadcast address and limited broadcast address in the first subnet.

Solution:  
  
(1) 255.255.255.252  
(2) 2  
(3) 217.17.185.4  
(4) 217.17.185.5  
          217.17.185.6  
(5) 211.17.185.7  
          255.255.255.255[limited broadcast address??]

5. (15 points) Consider a router with the following routing table:

Destination Address	Subnet Mask	Next Hop
128.96.57.0	255.255.255.128	Interface 0
128.96.39.128		Interface 1
128.96.90.0	255.255.255.128	R2
192.4.131.0	255.255.255.192	R3
Default		R4

This router can forward packets directly through Interface 0 and Interface 1, and it can also forward packets through neighboring routers R2, R3, or R4. Suppose the router received 5 packets with the following IP addresses respectively:  
(1) 128.96.57.10                   (2) 128.96.90.12                   (3) 128.96.39.128  
(4) 192.4.131.17                   (5) 192.4.131.90  
Try to calculate the next hop of each packet.

Solution:  
  
(1) The result of 128.96.57.0 AND 255.255.255.128 is 128.96.57.0, so Packet 1 is forwarded to Interface 0. (3 points)  
(2) The result of 128.96.90.12 AND 255.255.255.128 is 128.96.90.0, so Packet 2 is forwarded to R2. (3 points)  
(3) 128.96.39.128 has the single IP entry, so Packet 3 is forwarded to Interface 1. (3 points)  
(4) The result of 192.4.131.17 AND 255.255.255.192 is 192.4.131.0, so Packet 4 is forwarded to R3. (3 points)  
(5) The result of 192.4.131.90 AND MASK cannot match any entry, so Packet 5 is forwarded to R4. (3 points)