PART Ⅰ: Single Choice

|  |  |
| --- | --- |
| 得分 |  |

1. The primary function of the address resolution protocol (ARP) that resides in Internet hosts and routers is:

A. To provide LAN router functions

B. To translate between LAN addresses and physical interface addresses

C. To translate between IP addresses and LAN addresses

D. To calculate the shortest path between two nodes on a LAN

2. Queuing can **NOT**occur in

A. the router output ports B. the router input ports

C. physical medium D. an interconnection network

1. The host component of a CIDR address of the form *a.b.c.d/22* can contain addresses for:

A. 2(32-22) hosts minus “special” hosts

B. 512 hosts minus “special” hosts

C. *d* times 22 hosts

D. 10 hosts minus “special” hosts

4. The length of an Ethernet address is

A. 4 bytes B. 6 bytes

C. 14 bytes D. 20 bytes

5. Host A sends a TCP segment (Seq = 43, ACK = 103) to host B, and then host B replies with a TCP segment (Seq = 103, ACK = 57). The payload of the first TCP segment is

A. 14 bytes long B. 43 bytes long

C. 57 bytes long D. 60 bytes long

6. Longest prefix matching is used

A. in routers to know on which link can forward packets

B. in classless addressing to use the address space more efficiently than in classful addressing.

C. by NAT to increase the available address space

D. to assign subnet masks.

7. Using module 2 arithmetic to compute the CRC code for message 101101110011 with the generator 10011, the result is

A．01011 B．0011

C．10011 D．1110

8.Which windows command usually can be used to show the intermediate routers along the path to a remote destination?

A. ping B. showroute

C. nbtstat D. tracert

9. Which character is **NOT** distance-vector algorithm’s characters？

A. iterative B. global

C. asynchronous D. distributed

10. Which of the following media does not suffer from electromagnetic interference?

A. Copper wire B. Glass fiber

C. Radio D. Microwave

11. When a destination host transport layer receives data from the network layer, it unambiguously identifies the appropriate process to pass the data to by using a triplet consisting of:

A. Source port #, destination IP address, and source IP address

B. Destination port #, source port #, process ID#

C. Destination port #, source port #, destination IP address

D. Destination port #, source port #, source IP address

12. The FTP protocol runs over \_\_\_\_ and uses port \_\_\_\_.

A. TCP 21B. TCP 80

C. UDP 20D. TCP 110

13. \_\_\_\_ broadband technology uses multiple frequencies to achieve higher throughput.

A. TDMB. FDM

C. STDMD. B and C

14. Which of the following is the service that the transport layer does not provide for theapplication layer?

A. In-order delivery of data segments between processes

B. Best effort delivery of data segments between communicating hosts

C. Multiplexing and demultiplexing of transport layer segments

1. Congestion control

15. Processes on two different end systems communicate with each other by exchanging ( ) across the computer network.

A. packets B. datagram

C. framesD. messages

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

A twisted-pair copper wire B a coaxial cable

C fiber optics D digital satellite channel

17. The units of data exchanged by a link-layer protocol are called().

A Frames B Segments

C Datagrams D bit streams

18. ( )makes sure that neither side of a connection overwhelms the other side by sending too many packets too fast.

A Reliable data transfer B Flow control

C Congestion control D Handshaking procedure

19. The Internet’s network layer is responsible for moving network-layer packets known as ( ) from one host to another.

A frame B datagram

C segment D message

20．In the following options, which service does not be provided to an application by TCP?( )

A reliable transport B flow control

C video conferencing D congestion control

21. In the following options, which does not use UDP?( )

A Internet phone B video conferencing

C streaming multimedia D telnet

22. The time required to propagate from the beginning of the link to the next router is ( ).

A queuing delay B processing delay

C propagation delay D transmission delay

23. Which command can be used to show the intermediate routers along the path to a remote destination? ( )

A. ping B. showroute

C. tracert D. ls

24. The FTP protocol runs over \_\_\_\_ and uses port \_\_\_\_. ( )

A.UDP 21 B.UDP 20 C.TCP21 D. TCP 25

25. When a destination host transport layer receives data from the network layer, it unambiguously identifies the appropriate process to pass the data to by using a triplet consisting of ( )

A. Source port #, destination IP address, and source IP address

B. Destination port #, source port #, process ID#

C. Destination port #, source port #, source IP address

D. Destination port #, source port #, destination IP address

26. From the list below, select the items found in the TCP segment structure that are not found in the UDP segment structure ( )

A. Application Generated Data B. Sequence #

C. Source Port # D. DestinationPort #

27. Which of the following media does not suffer from electromagnetic interference? ( )

A. Copper wire B. Glass fiber

C. Radio D. Microwave

28. A socket is the interface between ( ) within a host.

A the network layer and the link layer

B the link layer and the physical layer

C the application layer and the transport layer

D the transport layer and the network layer

29. Suppose a web page consists of a base HTML file, 5 JEPG images and a java applet, and also suppose HTTP uses persistent connection without pipelining, the total response time is ( ).

A 2RTT B 8RTT C 12 RTT D 14RTT

30. The time it takes for a small packet to travel from client to server and then back to the client is ( )

A round-travel time B next-hop time

C round-trip time D prefix-matching time

31. A network entity that satisfies HTTP requests on the behalf of an origin web server is ( ).

A server farm B server stack

C proxy server D edge server

32. What is the length of a TCP header? ( )

A. 4 bytes B. 6 bytes C. 14 bytes D. 20 bytes

33. Which of the following services does not the transport layer provide for the application layer?( )

A. In-order delivery of data segments between processes

B. Best effort delivery of data segments between communicating hosts

C. Multiplexing and demultiplexing of transport layer segments

D. Congestion control

34. If the status code in HTTP response message is 404, it means ( )

A Request succeeded.

B The requested document doesn’t exit on this server.

C This is a generic error code indicating that the request could not be understood by the server.

D Requested object has been permanently mover.

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

A HTTPB SMTPC FTP D IMAP

36. In the four following options, which application is organized as hybrid of C/S and P2P architecture? ( )

A E-mail B QQC File transfer D Web application

37. A process sends messages into, and receives messages from, the network through its ( ).

A socket B program C client D peer

38. In the header lines of HTTP request message, if the field of Connection is close, it specifies ( ).

A the host on which object resides

B what type of the user agent

C that the browser wants the server to close the connection after sending the requested object

D which language can the browser receive

39. In the following four options, which one is not the part of cookie technology? ( )

A Cookie header lines in the HTTP response message and request message.

B One cookie header file kept on the user’s end system and managed by the user’s browser.

C A network entity that satisfies HTTP requests on the behalf of an origin Web server.

D A back-end database at the Web site

40. Processing delay does not include the time to ( ).

A examine the packet’s header

B wait to transmit the packet onto the link

C determine where to direct the packet

D check bit-error in the packet

答案

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Q | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| A | C | C | A | B | A | A | D | D | B | B | D | A | B | B | D |

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Q | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 |
| A | D | A | B | B | C | D | C | C | C | C | B | B |
| 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 |
| C | B | C | C | B | B | B | A | B | A | C | C | B |

PART Ⅱ: True / False

Instructions: Mark the symbol “T” if the statement is correct,and “F” if the statement is incorrect.

1. The job of delivering the data in a transport-layer segment to the correct socket is called multiplexing.

2. Before sending a packet into a datagram network, the source must determine all of the links that packet will traverse between source and destination.

3. A web cache is both a client and a server at the same time.

4.Layer four of the Internet protocol stackis implemented in the end systems but not in the routers in the network core.

5. The main task of the Internet’s Domain Name System (DNS) is toTranslate host names to IP addresses.

6. Protocols define format,order of messages sent and received among network entities, and actions taken on message transmission,receipt.

7. Consider a computer network consisting of several interconnected 10BaseT hubs, but it does not include any bridge or router. Then this network has only one collision domain.

8. Routing is the method of moving packets from router’s input ports to appropriate router’s output ports.

9. Queuing can occur at both the input ports and the output ports of a router. Queuing occurs at the output port when the arriving rate of packets to the outgoing link exceeds the link capacity. Queue occurs at an input port when the arriving rate of packets exceeds the switch capacity.

10. The length of IPV6 address is 32 bits.

**答案**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Q** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** |
| **A** | **F** | **F** | **T** | **T** | **T** | **T** | **T** | **F** | **T** | **F** |

PART Ⅲ: Answer the questionsbriefly.

1.Explain the difference betweenTCP service and UDP service. **(5 pts)**

2. Ethernet follows a CSMA/CD protocol scheme. Explain how this scheme works. **(5 pts)**

3. LAN is created by a switch and several PCs as shown in the figure below. The switch table is also shown as below. Now A will send LAN segment to B and then B will reply to A. Explain how switch and PCs work. **(5 pts)**



**A**

**C**

**1**

**3**

**2**

**B**



**E**

**4**

**D**

|  |  |  |
| --- | --- | --- |
| MAC address | Interface | TTL |
| A | 1 | 60 |

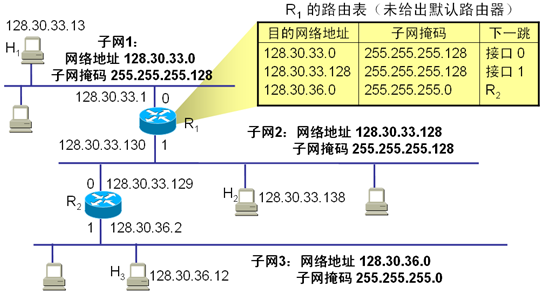
4. Explain the difference between go-back-N and selective repeat.**(5 pts)**

5. Briefly explain**①**the main functions of Hub, switch and router, and**②**each of them stays in which layer of the TCP/IP model.**③**If all of them have 4 interfaces, please list the number of collision domains and broadcast domains. **(8 pts)**

6.Suppose there is exactly one packet switch between a sending host and a receiving host. The transmission rates between the sending host and the switch and between the switch and the receiving host are R1 and R2, respectively. Assuming that the switch uses store-and-forward packet switching, what is the total end-to-end delay to send a packet of length L? (Ignore queuing delay, propagation delay, and processing delay.)

7. Draw the “3-way handshaking” figure, including SYN, ACK flags and seq#, ack#. **(6 pts)**

8. In the figure below, please brieflydescribe how H1 sends packets to H2. (Note: you should describe that ① How H1 knows that H2 is not in the same network, and ② How router R1 check its routing table.) **(8 pts)**



9. Select the best corresponding definition or concepts for the term list below.

**(8 pts)**

**Term list:**

1. SYN,ACK ( )
2. Repeater ( )
3. IETF ( )
4. VLSM,CIDR ( )
5. Connectionless ( )
6. Full-duplex ( )
7. UDP ( )
8. Optical fiber cabling ( )

**Definition or concepts list for selected:**

1. A OSI reference model layer 4 protocol
2. One of their primary jobs involves RFCs
3. Techniques to efficiently use IP addresses
4. This model lacks a setup and tear down phase
5. Something you might find in the 3-way handshake
6. An example of a wire link technology
7. The ability to talk and listen at the same time
8. This device moves bits from one data link network to another without inspecting the frame’s contents

10．(3points)What is the difference between a host and end system? List the types of end systems. Is a Web Server an end system?

11．(3points)Please briefly describe the function of the five layers in TCP/IP architecture (NOTE: include the protocol data unit)

12.(3points) Where can queuing occur in a router? Briefly explain the conditions that lead to such queuing.

13.(2points) What is the difference between routing and forwarding?

**答案**

1.Explain the difference betweenTCP service and UDP service.**(5 pts)**

**答：**

TCP：

handshaking: setup (prepare for) data transfer ahead of time

Hello, hello back human protocol

set up “state” in two communicating hosts

TCP - Transmission Control Protocol

Internet’s connection-oriented service

reliable, in-order byte-stream data transfer

loss: acknowledgements and retransmissions

flow control:

sender won’t overwhelm receiver

congestion control:

senders “slow down sending rate” when network congested

UDP:

unreliable data transfer

no flow control

no congestion control

2. Ethernet follows a CSMA/CD protocol scheme. Explain how this scheme works. **(5pts)**

答：CSMA/CD stands for Carrier Sense Multiple Access with Collision Detection. This means that when a node wants to transmit data, it (1) senses the carrier until no transmissions are detected, (2) starts transmission, and (3) continues to check for a collision. If a collision happens, the node stops and waits a random period before starting with step (1) again.

3. LAN is created by a switch and several PCs as shown in the figure below. The switch table is also shown as below. Now A will send LAN segment to B and then B will reply to A. Explain how switch and PCs work.**(5 pts)**

**答：**

(1) Host A sends frame to switch. The switch checks the frame and know the destination MAC address is B.

(2) The switch checks the switch table, but can not know the interface of B, so flood.

(3) Host B receives the frame and replies to host A.

(4) The switch receives the frame from B and records MAC address of B and the interface 2 in the switch table.

(5) The switch learns the destination of the frame is A and the interface of MAC address of A through the switch table and then sends the frame to interface 1.

4. Explain the difference between go-back-N and selective repeat.**(5 pts)**

答：With go-back-N, whenever a receiver detects a missing or damaged frame k, all frames succeeding k are ignored and the sender is forced to start retransmission at frame k. With selective repeat, it is possible to retransmit only frame k; the receiver buffers successive frames.

5.答：

HUB功能：对信号放大、整形、扩大网络的覆盖范围；工作在物理层。

交换机功能：基于MAC地址转发/过滤数据帧、逻辑上划分网络、隔离冲突域；工作在链路层。

路由器功能：基于路由表交换、路由IP数据包、路径的选择、隔离冲突、广播；工作在网络层。

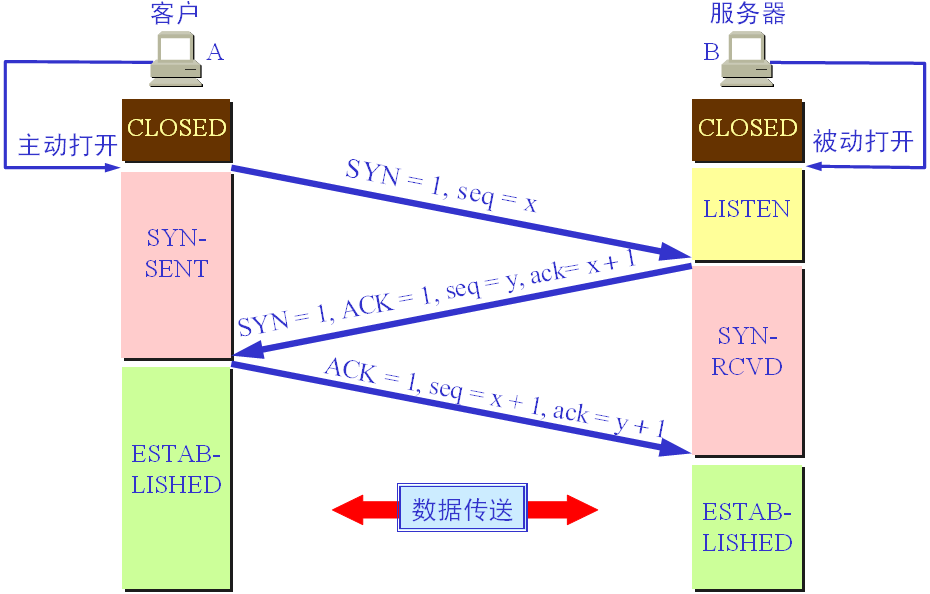
HUB 交换机路由器

冲突域 1 4 4

广播域1 1 4

6. L/R1＋L/R2

7. 答：



8、答：

主机 H1 首先将本子网的子网掩码 255.255.255.128与分组的 IP 地址 128.30.33.138 逐比特相“与”(AND 操作) ，得到128.30.33.128，与H1的网络地址不一致。即H2不与H1在同一个子网中。

因此 H1 必须把分组传送到路由器 R1，然后逐项查找路由表。

只有255.255.255.128 AND 128.30.33.138 = 128.30.33.128 匹配! 这表明子网 2 就是收到的分组所要寻找的目的网络。直接交付即可。

9. Select the best corresponding definition or concepts for the terms list below.

Term list:

1. SYN,ACK ( E )
2. Repeater ( H )
3. IETF ( B )
4. VLSM,CIDR ( C )
5. Connectionless ( D )
6. Full-duplex ( G )
7. UDP ( A )
8. Optical fiber cabling ( F )

10．(3points)What is the difference between a host and end system? List the types of end systems. Is a Web Server an end system?

答：There is no difference. Throughout this text, the words “host” and “end system” areused interchangeably. End systems include PCs, workstations, Web servers, mailservers, Internet-connected PDAs, WebTVs, etc.

11．(3points)Please briefly describe the function of the five layers in TCP/IP architecture

(NOTE: include the protocol data unit)

答：

1．应用层，提供各种网络应用，运行网络应用程序。Message。

2．运输层，提供端到端进程之间的数据传输。Segment。

3．网络层，主机到主机的传输。Datagram

4．链路层，相邻节电数据传输，frame

5．物理层，透明传输比特流，bit stream.

12.(3points) Where can queuing occur in a router? Briefly explain the conditions that lead to such queuing.

答：Queuing can occur at both the input ports and the output ports of a router. Queuing occurs at the output port when the arriving rate of packets to the outgoing link exceeds the link capacity. Queue occurs on an input port when the arriving rate of packets exceeds the switch capacity; head-of-the-line blocking can also cause queuing at the input ports.

13.(2points) What is the difference between routing and forwarding?

答：Forwarding is about moving a packet from a router’s input link to the appropriate output link. Routing is about determining the end-to-routes between sources and destinations.

PART IV: Answer the following questions.

1. Consider the following plot of TCP window size as a function of time. Assuming TCP Reno is the protocol experiencing the behavior, answer the following questions.**(10 pts)**

Transmission round

Congestion window size (segments)

6

16

22

26

1



Q1. Identify the intervals of time when TCP slow start is operating.

Q2. Identify the intervals of time when TCP congestion avoidance is operating.

Q3. After the 16th transmission round, is segment loss detected by a triple duplicate ACK or by a timeout?

Q4. After the 22nd transmission round, is segment loss detected by a triple duplicate ACK or by a timeout?

Q5. What is the initial value of Threshold at the first transmission round?

Q6. What is the value of Threshold at the 18th transmission round?

Q7. What is the value of Threshold at the 24th transmission round?

Q8. During what transmission round is the 70th segment sent?

Q9. 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?

Q10. Assuming a packet loss is detected after the 26th round by the receipt of a triple duplicate ACK, what will be the values of Threshold?

2. According to the following network’s topology with the indicated link costs, use Dijkstra’s shortest-path algorithm to compute the shortest path from **x** to all other nodes. While selecting the next node, if several nodes have the same min cost, select the one with lowest id, (e.g., if A and B have the same min cost, then select A).**(10 pts)**

3

1

3

1

6

10

2

4

9

3

2

1

4

1

Q1. Complete the routing table of node x.

|  |  |  |
| --- | --- | --- |
| **Destination** | **Next Node** | **Cost** |
| **s** | **w** | **7** |
| **t** |  |  |
| **u** |  |  |
| **v** |  |  |
| **w** | **w** | **1** |
| **y** |  |  |
| **z** |  |  |

Q2. Consider sending a 1500-bytes datagram into a link that has an MTU of 500 bytes.Suppose the original datagram is stamped with the identification (ID)numberX(Hint: The IPv4 header is 20bytes long). How many fragments are generated? What are the values of the fragmentation-related fields in the generated IP datagram(s)?

3.The following transcript is a mail transfer session between hosts A and B using TCP/IP. According to the session, answer the questions. **(10 pts)**

A: 220 nankai.edu.cn simple mail transfer service ready

B: HELO tjut.edu.cn

A: 250 nankai.edu.cn Hello tjut.edu.cn, please to meet you

B: MAIL FROM: <sunny@tjut.edu.cn>

A: 250 mail accepted

B: RCPT TO: <bob@nankai.edu.cn>

A: 250 recipient accepted

B: RCPT TO: <tom@nankai.edu.cn>

A: 550 no such user here

B: RCPT TO: <alice@nankai.edu.cn>

A: 250 recipient accepted

B: DATA

A: 354 start mail input; end with <CR><LF>.<CR><LF>

B: Date: Sat 14 June 2003 13:26:31 BJ

B: From: sunny@tjut.edu.cn

B: . . . . . .

B: . . . . . .

B: .

A: 250 OK

B: QUIT

A: 221 nankai.edu.cn service closing transmission channel.

Q1. What is the whole name of the sender’s host?

Q2. What is the user name of the sender?

Q3. What is the whole name of the receiver’s host?

Q4. How many users does the sender want to send the E-mail?

Q5. Which user can not receive the E-mail?

Q6. How can we know the beginning and the end of the E-mail text?

Q7. Which protocol is used to transfer E-mail ?

Q8. Which protocol can be used to receiveE-mail ?

Q9. For receiving the mail, what is the port number waiting for the connection on the receiver host?

Q10. What is the name of the transport layer protocol according to E-mail transfer service?

4. The figure below shows a network with three routers and 7 hosts.

**R1**

**R2**

**R3**

Q1. The administrator of the network has assigned three subnet masks 192.168.1.0/30,192.168.2.0/30and 192.168.3.0/30 to the Router 1, two subnet masks 192.168.2.0/30and 192.168.4.0/30 to Router 2, two subnet masks 192.168.3.0/30 and 192.168.5.0/30 to Router 3. Please assign IP addresses (all hosts and all routers interfaces). Write your answer in the figure.

Q2. Write the functions of the following commands for assigning R1 on the lines.

<H3C>system-view

System View: return to User View with Ctrl+Z.

[H3C]sysname R1

[R1]interface e0/0

[R1-Ethernet0/0]ip address 192.168.1.1 255.255.255.252

----------------------------------------------------------------------------------------

[R1-Ethernet0/0]interface s1/0

[R1-Serial1/0]ip address 192.168.2.1 255.255.255.252

----------------------------------------------------------------------------------------

[R1-Serial1/0]ping 192.168.1.1

----------------------------------------------------------------------------------------

[R1-Serial1/0]quit

[R1]interface s2/0

[R1-Serial2/0]ip address 192.168.3.1 255.255.255.252

[R1-Serial2/0]ping 192.168.2.1

[R1-Serial2/0]quit

[R1]ip route-static 192.168.1.0 255.255.255.252. 192.168.2.1

----------------------------------------------------------------------------------------

[R1]ip route-static 192.168.3.0 255.255.255.252. 192.168.2.1

----------------------------------------------------------------------------------------

5. Please①assign the IP address (MUST use the prefix 192.168.x.x) for all routers and hosts in the topology, and② writeall the commands for assigning R1’s IP addresses and static routes. **(11 pts)**

**Bridge**

**R1**

**LAN3**



**R2**

**R3**

6．(10points)Consider the following network. With the indicated link costs, use Dijkstra’s shortest-path algorithm to compute the shortest path from x to all network node. While selecting the next node, if several nodes have the same min cost, select the one with lowest id, (e.g., if x and y have the same min cost, then select x).

1

1

3

1

6

14

2

4

9

3

2

1

4

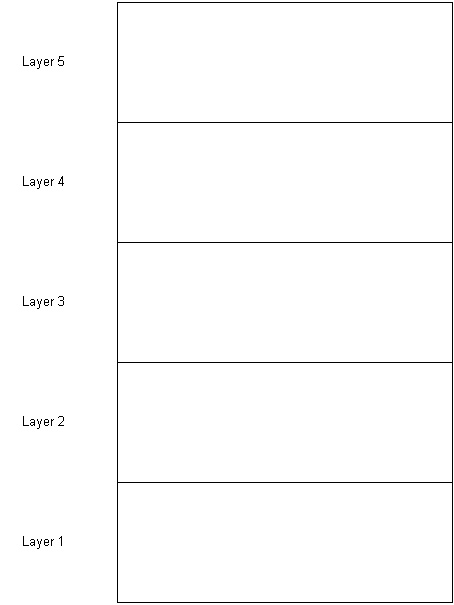
1

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Step** | **N’** | **D(s),p(s)** | **D(t),p(t)** | **D(u),p(u)** | **D(v),p(v)** | **D(w),p(w)** | **D(y),p(y)** | **D(z),p(z)** |
| 0 |  |  |  |  |  |  |  |  |
| 1 |  |  |  |  |  |  |  |  |
| 2 |  |  |  |  |  |  |  |  |
| 3 |  |  |  |  |  |  |  |  |
| 4 |  |  |  |  |  |  |  |  |
| 5 |  |  |  |  |  |  |  |  |
| 6 |  |  |  |  |  |  |  |  |

To complete the routing table of node x

|  |  |  |
| --- | --- | --- |
| **Destination** | **Next Node** | **Cost** |
| s | **w** | **6** |
| t |  |  |
| u |  |  |
| v |  |  |
| w |  |  |
| y |  |  |
| z |  |  |

7. *(5 points)* The diagram below depicts the 5-layer TCP/IP model we've used in class. Put the name of each layer inside each box.



*(5 points)*Using the layers from the above diagram, label each technology item below with the best associated layer it fits into (use the layer number from above) (1 point for each):

User Datagram Protocol (UDP)

Medium Access Control (MAC)

HTTP (web browser)

Internet Protocol (IP)

Distance vector routing algorithms (e.g. RIP)

Chatting with friends(QQ)

Transmission Control Protocol (TCP)

答案

PART IV: Answer the following questions. (*Total: 30pts*)．

1. Consider the following plot of TCP window size as a function of time.Assuming TCP Reno is the protocol experiencing the behavior, answer the following questions.**(8pts)**

Q1.答：**[1,6] [23,26] (1 pts)**

Q2.答：**[6,16] [17,22] (1 pts)**

Q3.答：**3ACKs(1 pts)**

Q4. 答：**timeout (1 pts)**

Q5.答：**32 (1 pts)**

Q6.答：**21(1 pts)**

Q7.答：**13 (1 pts)**

Q8.答：**7th(1 pts)**

Q9.答：**4(1 pts)**

Q10.答：**4 (1 pts)**

2. According to the following network’s topology with the indicated link costs, use Dijkstra’s shortest-path algorithm to compute the shortest path from **x** to all other nodes. While selecting the next node, if several nodes have the same min cost, select the one with lowest id, (e.g., if A and B have the same min cost, then select A).**(8pts)**

Q1. Complete the routing table of node x.**(4pts)**

|  |  |  |
| --- | --- | --- |
| **Destination** | **Next Node** | **Cost** |
| **s** | **w** | **7** |
| **t** | **w** | **6** |
| **u** | **w** | **4** |
| **v** | **w** | **2** |
| **w** | **w** | **1** |
| **y** | **w** | **3** |
| **z** | **w** | **8** |

Q2. Consider sending a 1500-bytes datagram into a link that has an MTU of 500 bytes.Suppose the original datagram is stamped with the identification (ID)numberX(Hint: The IPv4 header is 20bytes long). How many fragments are generated? What are the values of the fragmentation-related fields in the generated IP datagram(s)?**(4pts)**

答：The maximum size of the data field in each fragment = 480 (because there are 20 bytes IPheader). Thus the number of required

**fragments =（1500-20）/480= 4**.

Each fragment will have an identical identification number. Each fragment except the last onewill be of size 500 bytes (including the IP header). The last datagram will be of size 60 bytes. The **offsets** of the 4 fragments will be **0, 60, 120, 180**. The**fragflags** of the 4 fragments will be**1, 1,1, 0.**

3.The following transcript is a mail transfer session between hosts A and B using TCP/IP. According to the session, answer the questions. **(10pts)**

Q1. 答：**tjut.edu.cn(1pts)**

Q2. 答：**sunny(1pts)**

Q3. 答：**nankai.edu.cn(1pts)**

Q4. 答：**3(1pts)**

Q5.答：**tom(1pts)**

Q6.答：**The E-mail text if from “DATA” to “.”.(1pts)**

Q7.答：**Simple Mail Transfer Protocol（SMTP）(1pts)**

Q8. 答：**POP3 (1pts)**

Q9. 答：**25(1pts)**

Q10. 答：**TCP(1pts)**

4. The figure below shows a network with three routers and 7 hosts.Answer the following questions.  **(7pts)**

Q1. The administrator of the network has assigned three subnet masks 192.168.1.0/30,192.168.2.0/30and 192.168.3.0/30 to the Router 1, two subnet masks 192.168.2.0/30and 192.168.4.0/30 to Router 2, two subnet masks 192.168.3.0/30 and 192.168.5.0/30 toRouter 3. Please assign IP addresses (all hosts and all routers interfaces). Write your answer in the figure.**(4pts)**

Q2. Writethe functions of the following commands for assigning R1 on the lines.

<H3C>system-view

System View: return to User View with Ctrl+Z.

[H3C]sysname R1

[R1]interface e0/0

[R1-Ethernet0/0]ip address 192.168.1.1 255.255.255.252

**把R1的局域网端口e0/0的IP地址规划为192.168.1.1 ，子网掩码为255.255.255.252(1 pts)**

----------------------------------------------------------------------------------------

[R1-Ethernet0/0]interface s1/0

[R1-Serial1/0]ip address 192.168.2.1 255.255.255.252

[R1-Serial1/0]ping 192.168.1.1

**测试R1的广域网端口S1/0至局域网端口E0/0的连通性(1 pts)**

----------------------------------------------------------------------------------------

[R1-Serial1/0]quit

[R1]interface s2/0

[R1-Serial2/0]ip address 192.168.3.1 255.255.255.252

[R1-Serial2/0]ping 192.168.2.1

[R1-Serial2/0]quit

[R1]ip route-static 192.168.1.0 255.255.255.252. 192.168.2.1

[R1]ip route-static 192.168.3.0 255.255.255.252. 192.168.2.1

**设置静态路由，子网192.168.3.0发出的数据都转发至S2/0端口(1 pts)**

----------------------------------------------------------------------------------------

5.

**Bridge**

**R1**

**LAN3**

**N3**



**R2**

**R3**

192.168.1.1/24 e0

192.168.1.2/24

192.168.1.3/24

192.168.1.4/24

192.168.2.1/24

192.168.2.2/24

192.168.2.3/24

192.168.3.1/24

192.168.3.2/24

192.168.3.3/24

192.168.3.4/24

192.168.3.5/24

192.168.4.1/24 s1

192.168.4.2/24

192.168.5.1/24 s2

192.168.5.2/24

R1的路由命令

Interface e0

Ip address 192.168.1.1 24

Quit

Interface s1

Ip address 192.168.4.1 24

Quit

Interface s2

Ip address 192.168.5.1 24

Quit

Ip route-static 192.168.2.0 255.255.255.0 192.168.4.2

Ip route-static 192.168.3.0 255.255.255.0 192.168.5.2

6．答：



|  |  |  |
| --- | --- | --- |
| Destination | Next Node | Cost |
| s | w | 6 |
| t | w | 5 |
| u | w | 3 |
| v | w | 2 |
| w | w | 1 |
| y | w | 3 |
| z | w | 7 |

7. *(5 points)* The diagram below depicts the 5-layer TCP/IP model we've used in class. Put the name of each layer inside each box.

答：Application Layer, Transport Layer, Network Layer, Link Layer, Physical Layer

*(5 points)*Using the layers from the above diagram, label each technology item below with the best associated layer it fits into (use the layer number from above) (1 point for each):

User Datagram Protocol (UDP) Layer4

Medium Access Control (MAC) Layer2

HTTP (web browser) Layer5

Internet Protocol (IP) Layer3

Distance vector routing algorithms (e.g. RIP) Layer3

Chatting with friends(QQ) Layer5

Transmission Control Protocol (TCP) Layer4