Mid-Term Exam

Due Jul 12 at 9:30am **Points** 100 **Questions** 30
Available Jul 12 at 8am - Jul 12 at 9:30am 1 hour and 30 minutes
Time Limit 90 Minutes

Instructions

Exam 1 consists of 30 questions.

This is a CLOSED note exam. Using your e-book, notes or textbook is NOT ALLOWED. You may use two sheets of scratch paper. You are also allowed to use a scientific calculator. You must remain in front of your computer for the duration of the exam. NO BATHROOM BREAKS. Cell phones, tablets, laptops, smart watches, and any other electronic devices are NOT PERMITTED. Failing to follow these instructions could result in a violation.

This quiz is no longer available as the course has been concluded.

Attempt History

	Attempt	Time	Score
LATEST	Attempt 1	41 minutes	94 out of 100

Correct answers are no longer available.

Score for this quiz: **94** out of 100
Submitted Jul 12 at 8:43am
This attempt took 41 minutes.

Question 1 — 2 / 2 pts

The five layers in the Internet protocol stack are: the application layer, the transport layer, the session layer, the network layer, and the physical layer.

True

False

Question 2

2 / 2 pts

In the TCP/IP model, the network layer provides functionalities for reliable data transfer, congestion control, flow control and connection management.

True

False

Incorrect

Question 3

0 / 2 pts

In the OSI model, the network layer only provides functionalities for reliable data transfer.

True

False

Question 4

2 / 2 pts

In general, circuit switching performs well for bursty data.

- True
- False

Question 5

2 / 2 pts

The main difference between virus and worms is that virus can be self-replicated, no human interaction is required.

- True
- False

Question 6

2 / 2 pts

Packet “sniffing” is a security attack where the attacker sends packets with false source addresses.

- True
- False

Question 7

2 / 2 pts

Consider an application that transmits data at a steady rate (for example, the sender repeatedly generates an N-bit unit of data every k time units, where k is small and fixed). Also, when such an application starts, it will continue running for a relatively long period of time. A packet-switched network would be more appropriate for this application.

- ○ True
- ◉ False

Question 8

2 / 2 pts

Modularization simplifies the design and implementation of network systems by separating the interface from implementation.

- ◉ True
- ○ False

Question 9

2 / 2 pts

One of the main reasons for packet loss in the network is when the buffer in a router is full

- ◉ True
- ○ False

Incorrect

Question 10

0 / 2 pts

Consider a circuit-switched network shown in Figure 1, showing four channels/circuits in each of the links. There may be many hosts connected to each router.

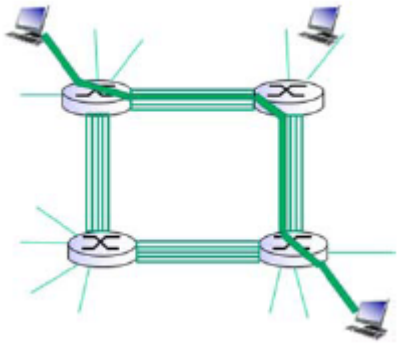

Figure 1.

The maximum number of simultaneous connections that can be in progress at any time is 8.

- (●) True
- ( ) False

Question 11

4 / 4 pts

Suppose there are N routers from source to destination. Let *L* denotes the number of bits in a packet, *R* denotes the transmission rate of each link. What is the total end-to-end delay in sending one packet from source to destination?

- (selected) $\frac{N \times L}{R}$
- N
- $\frac{L}{R}$
- $\frac{2N \times L}{R}$

Answer Question 12 and 13 using the following information. Suppose there are 15 users who want to use a 240 Mbps link. Also suppose each user requires a bandwidth of 40 Mbps when transmitting, but each user transmits only 20 percent of the time.

Question 12

4 / 4 pts

Suppose **circuit switching** is used, what is the maximum number of users that can be supported?

- 8
- (selected) 6
- 12
- 15

Question 13

4 / 4 pts

Suppose **packet switching** is used, what is the probability that exactly one user is transmitting, if there are 15 users?

- 0.031
- 0.13
- 0.38
- 0.7

Answer Questions 14 to 18 using the following information:

When a packet is being forwarded by a router to another router in a network, there are often some delays. Let *L* denotes packet length (bits), *R* denotes link bandwidth(bps), *x* denotes length of a physical link, *s* denotes propagation speed in medium, *n* denotes number of packets in the queue, *k* denotes number of bits in the packet that has currently been transmit.

Question 14

4 / 4 pts

Consider all the delay components when sending a packet from a source host to a destination host over a fixed route. Which of these delays is variable?

- Transmission delays
- (selected) Queuing delays
- Propagation delays
- Processing delays

Question 15

4 / 4 pts

How is **transmission delay** calculated or estimated?

- Normally less than 1 msec
- Time waiting at output link for transmission. $d = \frac{(L-k)+n \times L}{R}$
- $d = \frac{x}{s}$
- (selected) $\boldsymbol{d = \frac{L}{R}}$

Question 16

4 / 4 pts

How is **queuing delay** calculated or estimated?

- (selected) Time waiting at output link for transmission. $\boldsymbol{d = \frac{(L-k)+n \times L}{R}}$
- $d = \frac{L}{R}$

- $d = \frac{x}{s}$
- Normally less than 1 msec

Question 17

4 / 4 pts

How is **processing delay** calculated or estimated?

- $d = \frac{L}{R}$
- Time waiting at output link for transmission. $d = \frac{(L-k)+n \times L}{R}$
- $d = \frac{x}{s}$
- Normally less than 1 msec

Question 18

4 / 4 pts

How is **propagation delay** calculated or estimated?

- Normally less than 1 msec
- $d = \frac{x}{s}$
- Time waiting at output link for transmission. $d = \frac{(L-k)+n \times L}{R}$
- $d = \frac{L}{R}$

Question 19

4 / 4 pts

What are the two key functions of the network layer in the Internet?

- Time and Space
- Encapsulation and Segmentation
- Routing and Forwarding
- Reliability and Connectivity

Question 20

4 / 4 pts

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, propagation delay, and processing delay.)

- $\frac{L}{R1+R2}$
- $\frac{2L}{R1+R2}$
- $\frac{L}{R2}$
- $\frac{L}{R1} + \frac{L}{R2}$

Incorrect

Question 21

0 / 4 pts

Again, suppose as in the previous question that 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 both *R*. Assuming that the switch uses store-and-forward packet switching, what is the total end-to-end delay to send **five** packets of length L each? (Ignore queuing, propagation delay, and processing delay.)

- $\frac{6L}{R}$
- $\frac{5L}{2R}$
- $\frac{5L}{R}$
- $\frac{10L}{R}$

Answer Questions 22 to 24 using the following information:

Consider the scenario shown below, where there are 3 connections between the client and the server. Each connection consists of 5 links with transmission rates as shown in Figure 2. All connections use a shared link R, whose capacity of 120 Mbps is shared equally among the 3 connections.

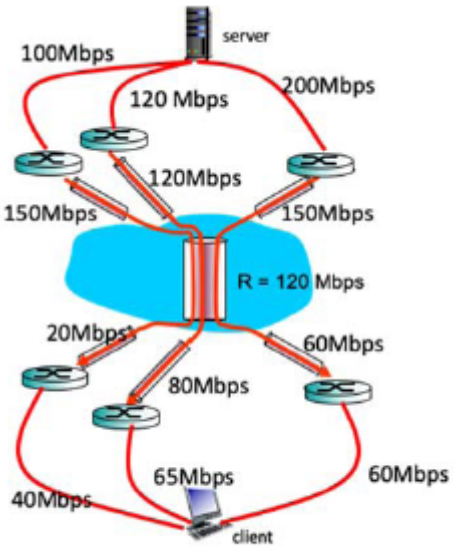

Figure 2

Question 22

4 / 4 pts

What is the maximum achievable end-to-end throughput for the client and the server if only one connection can be used?

- (●) 40 Mbps
- ( ) 20 Mbps
- ( ) 200 Mbps
- ( ) 120 Mbps

Question 23

4 / 4 pts

If the server can use all 3 parallel connections to send data, what is the maximum throughput that the server can achieve?

- 350 Mbps
- 120 Mbps
- 140 Mbps
- 100 Mbps

Question 24

4 / 4 pts

Assuming that the server is sending at the maximum rate possible, what is the link utilization for the shared link R? (The server can use all 3 parallel connections to send data.)

- 83%
- 48%
- 50%
- 100%

Question 25

4 / 4 pts

Suppose there is a router that is transmitting packets. Each packet has a length of 12000 bits and is transmitted over a single link with a

transmission rate of 1 Mbps to another router at the other end of the link. What is the maximum number of packets per second that can be transmitted by this link?

- 0.12 packet/sec
- 83 packets/sec
- 41 packets/sec
- 166 packets/sec

Question 26

4 / 4 pts

The following are the Internetworking principles that are used for successfully developing the Internet:

i. Stateless routers

ii. Reliable connections

iii. Decentralized control

iv. Minimalism and autonomy

- i, ii and iv only
- All of those mentioned
- i, iii and iv only
- ii, iii and iv only

Question 27

4 / 4 pts

What is the main reason for using layering principle for organizing the different modules of a complex network system?

- It enables minimal interaction between the modules
- It makes network access more efficient
- Each layer is autonomous
- (selected) It prevents deadlocks

Question 28

4 / 4 pts

To simplify development of complex network systems, we break the system into simpler modules, where each module consist of two parts: (1) interface which is well-known and accessible by users, and (2) implementation which is hidden from users. What is the main purpose for hiding the implementation?

- Prevents information in the implementation from being revealed to the users
- It prevents dependency and deadlock
- (selected) The implementation can be modified without modifying the user programs
- So that users will not damage the implementation

Question 29

4 / 4 pts

What is the main reason why the client-server model is used more widely for developing network applications than the peer-to-peer model?

- The client-server model is more flexible than the peer-to-peer model
- Each network application requires autonomous client and server processes
- In the client-server model, the server can provide many different types of data
- (selected) The client-server model is simpler and recovers from failure easily

Question 30

4 / 4 pts

Why are most network applications in the Internet based on **stateless** client-server model, e.g. stateless HTTP protocol?

- There are other more efficient reliability algorithms
- State information can be lost or corrupted
- (selected) It is difficult to maintain states of the server and client that are consistent with each other

It is inefficient to maintaining state information and store them in persistent storage

Quiz Score: **94** out of 100

This quiz score has been manually adjusted by +2.0 points.