Computer Engineering Department
King Fahd University of Petroleum and Minerals

COE 344: Computer Networks

Second Major Exam
Date: January 5th, 2008

Time: 7:00PM – 8:30PM

Instructor: Dr. Uthman Baroudi

Student Name:---------------
Student ID:------------------

	Max	Earned
Problem 1	35	
Problem 2	60	
Problem 3	40	
Problem 4		
Total	135	

Notes:

Be a smart exam taker:
If you get stuck on one problem go on to another problem.
Don't waste your time giving irrelevant (or not requested) details.
Go over all questions and start with what you know first.
Read, think, state all your assumptions, and then answer.

General
Problem # 1 *(35 Points)*

- *(2 point each)* **Multiple choice: Choose only one answer that is the most correct.**

1. Timeout value for receiving the acknowledgement of a segment sent over a TCP connection is determined
   a) By the Application layer mechanism implemented in a user-defined algorithm
   b) Is based on the size of the segment
   c) Based on TCP slow-start algorithm
   d) Based on multiple of round-trip time estimate

2. In routing among ASs, which of the following issues dominate(s):
   a) current congestion levels in the ASs
   b) number of ASs traversed
   c) policy
   d) geographical distance between ASs
   e) all of the above
   f) none of the above

3. **RIP is**
   a) an intra-AS protocol
   b) an inter-AS protocol
   c) based on Distance Vector Routing
   d) allows multiple same cost paths
   e) Both [A] and [C]
   f) Both [B] and [C]
   g) [A], [C] and [D]
   h) j) None of [A]—[D]

3. **OSPF is**
   a) an intra-AS protocol
   b) has security features
   c) can route packets differently based on type of service
   d) based on distance vector routing
   e) A & B
   f) A & C
   g) A, B & C
   h) B, C, & D
   i) All of A—D
   j) None of A—D

4. Connection-Oriented (CO) service**:**
a) Requires setup & disconnect phase
b) Can provide reliable service
c) Requires state information in switches
d) Higher startup time than connectionless
e) Both [A] and [B]
f) Both [B] and [C]
g) Both [C] and [D]
h) Both [A] and [C]
i) All of [A]—[D]
j) None of [A]—[D]

5. Connection-Less (CL)
a) No setup or disconnect phase (every packet has address)
b) Provides best effort service
c) Does NOT require state information in switches
d) Works better than CO if some nodes fail
e) Both [A] and [B]
f) Both [B] and [C]
g) Both [C] and [D]
h) Both [A] and [C]
i) All of [A]—[D]
j) None of [A]—[D]

- (*10 points*) For each statement below, tell if it is true or false. **If false, please explain why!**

    a) The transport layer and higher up layers implement end-to-end and process-to process delivery

    b) "Due to its high overheads TCP is not suitable for client-server applications."

    c) IP protocol decides the amount of data to send Congestion Window and the Advertised Window.

    d) A fragment is like any other IP packet

    e) Fragmentation occurs when a router discovers that the next network is congested.

6. *(3 points each)* In TWO sentence, define the following:

  a) Dijkstra's algorithm

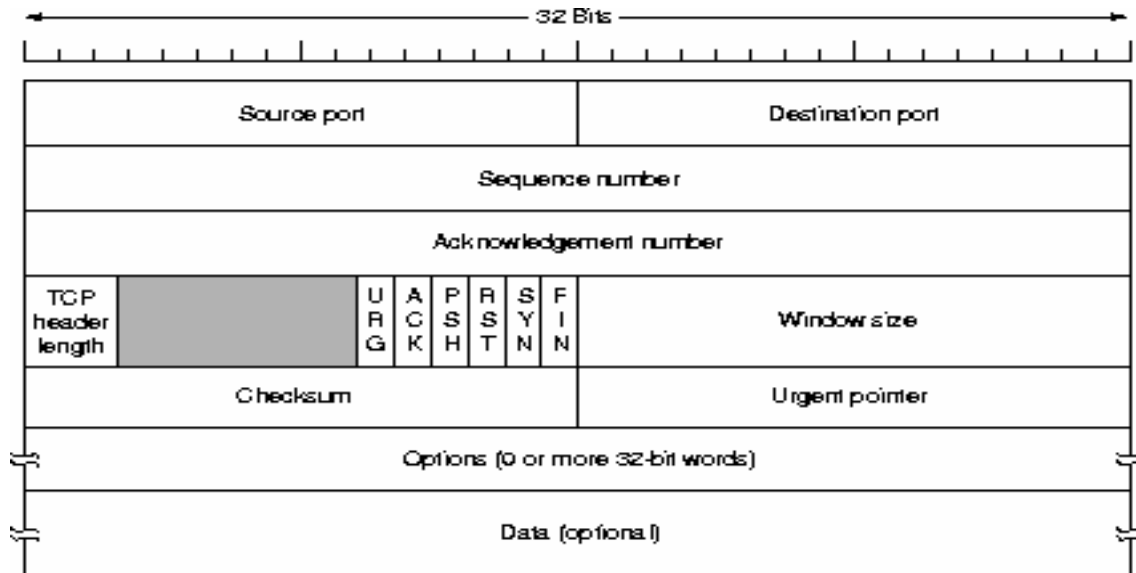 b) Go-back-N sliding window algorithm

  c) Congestion control

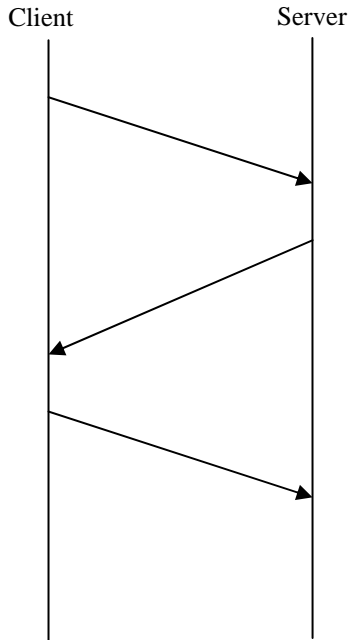 d) Link State Packet (LSP)

  e) BGP:

Transport Layer
Problem #1 (45 marks)

1) (*15 points*) The diagram below illustrates the TCP header. Describe how the relevant fields help in ensuring reliable data transfer for TCP connections.
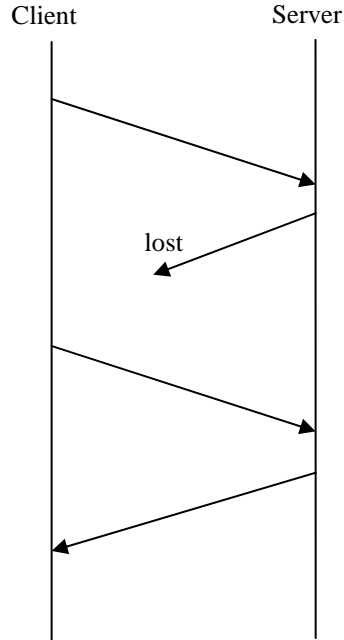
2) (*15 points*) Complete the following time-message diagrams TCP phases; identifying the important entries in the TCP segment header.
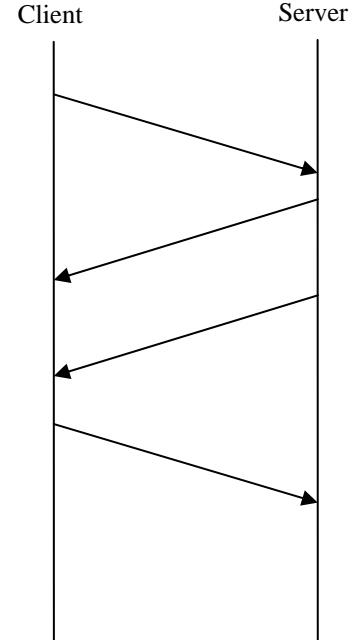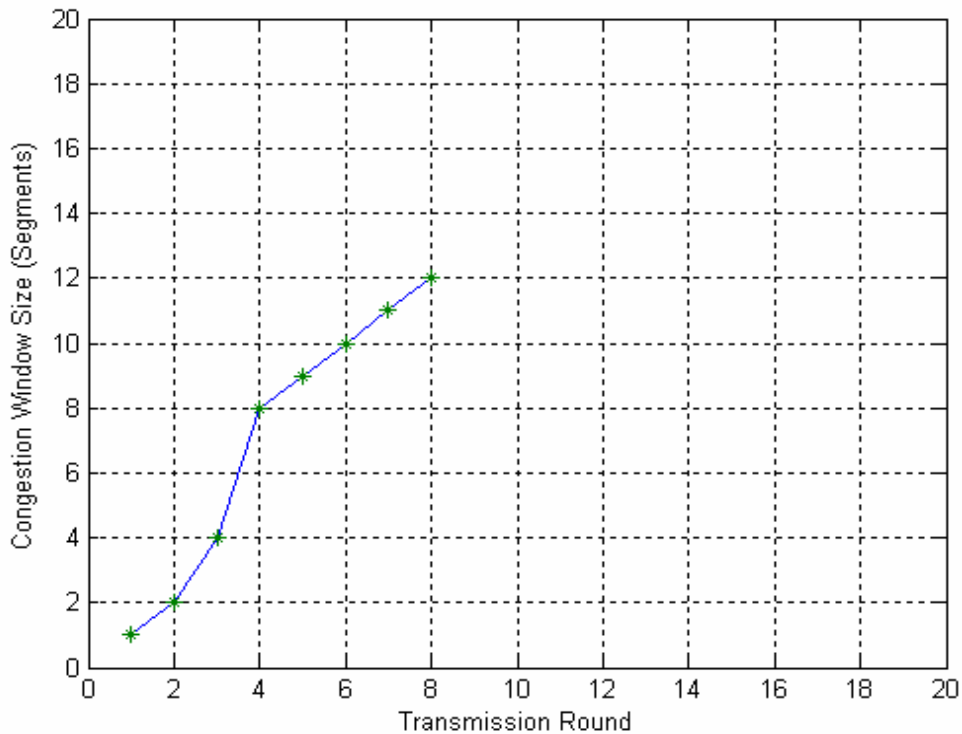
Connection establishment	**Transmission scenario**	**Typical connection release**

Client   Server   Client   Server   Client   Server

lost

3) (*15 points*) Assuming TCP Taho is the protocol experiencing the behavior shown below, answer the following questions. **In all cases, you should provide a short discussion justifying your answer.**

a. Identify the interval (s) of time when TCP slow start is operating.

b. Identify the interval (s) of time when TCP congestion avoidance is operating.

c. What is the initial value of threshold at the first round?

d. The network was experiencing one error every time its congestion window contains 12 segments. This error was recognized by receiving three-duplicate ACK. Graphically illustrate how Taho protocol will behave. Your answer should show the following:
   i. New threshold
   ii. New congestion window size

e. Assuming the propagation delay between the client and the web server is 100 ms, and the segment size is 1000 bytes, what is the transmission rate in the 18th round?

Network Layer

Problem # 2 (60 marks)

1) Suppose you are an Internet Service Provider and have been assigned 147.3.0.0/16

    a. (*2 points*) What should be the mask for your network?

    b. (*8 points*) Assume you want to create 50 subnets with 1000 host each; can this assigned above block satisfy the requirement?

2) (*12 points*) Discuss the difference between Link Sate routing protocol and Distance vector routing protocol form the following perspectives:

    a. **Robustness:**

    b. **Implementation:**

    c. **Computation Complexity:**

3) (*20 points*) Explain in details how Network Address Translation (NAT) works and how NAT helps in solving the shortage in IP addresses for IPv4. It is claimed that NAT can secure your network from external initiated access. do you agree ?why?

4) (*20 points*) Consider the network shown below; use the Dijkstra's algorithm to find the routing table built in Node C.
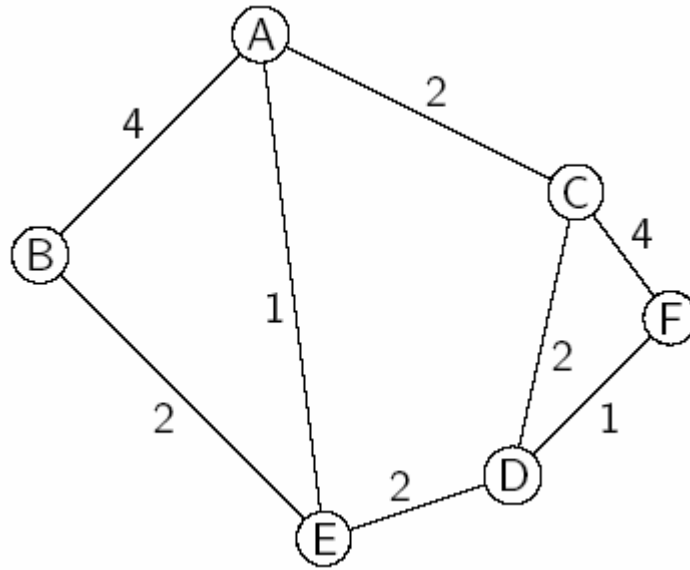
Step	N	B	C	D	E	F
0						
1						
2						
3						
4						
5						
6						
7						

Your Own Porblem

Problem # 4 (? marks)

Write your onw problem and solve it.