Computer Engineering Department
King Fahd University of Petroleum and Minerals

COE 344: Computer Networks

First Major Exam
Date: October 25th, 2007

Time: 7:00PM – 8:30PM

Instructor: Dr. Uthman Baroudi

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

	Max	Earned
Problem 1	35	
Problem 2	30	
Problem 3	35	
Total	100	

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 marks)

1. *(7 points)* Suppose you are developing the standard for a new type of packet-switched network. You need to decide whether your network will use Virtual-Circuits (VCs) or datagram routing. What are the pros and cons for using VCs?

Pros	**Cons**

2. *(4 points)* Consider a bursty application (the application is not active all the time. For example it transmits 15% of the time on average and the rest is ideal). Would a packet-switched network or circuit-switched network be more appropriate for this application? Why?

3. *(4 points)* What are the key distinguishing differences between tier-1 ISP and tire-2 ISP?

4. *(4 points)* What are the advantages (state two only) of using a hierarchal architecture network? **Justify your answer**.

    a.

b.

5. *(5 points)* One well known reference model is the TCP/IP network architecture. Name the layers in this model in the correct order (top-down).

6. *(6 points)* In one sentence, describe what work was developed by the following researchers that had played an important role in the Internet history:
   c. Leonard Kleinrock
   d. Metcalf
   e. Berners-Lee

7. *(5 points)* Consider the following sent e-mail, explain the information presented below the subject line.

```
From: Omar@kfupm.edu.sa
To: Ali@ksu.edu.sa
Subject: Picture of KFUPM Campus.
MIME-Version: 1.0
Content-Transfer-Encoding: base64
Content-Type: image/jpeg

base64 encoded data .....
.........................
......base64 encoded data
```

Problem # 2 (30 marks)

Suppose within your web browser you click on a link to obtain a web page hosted by the Web server A. Suppose that the IP address for the server is cached in your local host. Further suppose that web page associated with the link contains exactly three objects, 942 ***Bytes*** of HTML text, and one image of 2M Bytes. The web server segments the file into segments of *942**Byte**s* each and adds 58 ***Bytes*** of headers to each segment, forming packets of *L = 1000* ***Bytes.***

Consider the network shown below, **how much time elapses** before your agent (e.g. Internet Explorer) display the page successfully and completely using **Non Persistent HTTP**? Show all details. **State your assumptions**

Problem # 3 (35 marks)

1) *(10 points)* **True or False (if False correct/justify your answer)**

a) Suppose a user sends an e-mail that consists of some text and two images. For this e-mail, the client will send one request message and receive three response messages?

b) Three distinct Web pages (e.g., www.coe.ccse.kfupm.edu.sa/research.html, www.ics.kfupm.edu.sa/funnystudents.html and www.kfupm.edu.sa/students.html) can be sent over the same persistent connection?

c) With non-persistent connections between browser and origin server, it is NOT possible for a single TCP segment to carry two distinct HTTP request messages?

d) With SMTP, it is not possible to send multiple mail messages over the same TCP connection.

e) Hybrid Fiber Coaxial cable (HFC) technology for network access provides a dedicated medium connection between the home and the ISP.

2) *(25 points; 1 point each)* **Fill in the blanks:**

a) Packet switching improvement is based on the natural _____ _____ among the active users.

b) The traffic traversing packet-switched network is suffering from several types of delay: _____delay, _____delay, _____delay and propagation delay.

c) SMTP stands for _____ _____ Transfer Protocol. It uses _____ protocol to carry out its transactions between mail servers. Each mail server must have at least two components: 1) _____ for each recipient to manage and maintain the messages sent to the recipient and 2) _____ to hold the messages in and attempt to transfer later.

d) When processes within a host such as DNS and HTTP communicate with each other they use _____ communication. On the hand, when these processes are communicating between hosts they use _____ _____ protocol.

e) For a proper communication between any two peers over the internet, at least three types of addresses are required: 1) _____2) _____ 3) _____.

f) Protocols are vital for any computer network. The protocol defines the following key issues: _____, _____ and _____.

g) To ensure a proper operation, the cookie technology has four components: _____, _____, _____, and _____.

h) Reliable data transfer means that an application can rely on the connection to deliver all of its data without _____ and _____.