



**National University of Computer & Emerging Sciences, Karachi**  
**Spring-2018 CS-Department**



MidTerm 1

**26<sup>th</sup> February 2018, 9:00 am – 10:00 am**

|                     |   |
|---------------------|---|
| Course Code: CS-307 | Course Name: Computer Networks                  |
| Instructor Names:   | Sufian Hameed, Faraz Idris Khan and Shoaib Raza |
| Student Roll No:    | Section No:                                     |

**Instructions:**

- Return the question paper.
  - Be precise and to the point while answering the questions. Unnecessary details or wrong details will result in negative marking.
  - All the answers must be solved according to the sequence given in the question paper.

**Time:** 60 minutes.

**Max Marks: 40 points**

**Question 1:** Suppose Alice, with a Web-based e-mail account (such as Hotmail or gmail), sends a message to Bob, who accesses his mail from his mail server using POP3. Discuss how the message gets from Alice's host to Bob's host. Be sure to list the series of application-layer protocols that are used to move the message between the two hosts. [5 Points]

**[5 Points]**

**Question 2:** Is it possible for an organization's Web server and mail server to have exactly the same alias for a hostname (for example, foo.com)? What would be the type for the RR that contains the hostname of the mail server? [3 Points]

[3 Points]

**Question 3:** The text below shows the reply sent from the server in response to the HTTP GET message. Answer the following questions, indicating where in the message below you find the answer. [8 Points]

HTTP/1.1 200 OK<br></f>Date: Tue, 07 Mar 2008 12:39:45 GMT<br></f>Server: Apache/2.0.52 (Fedora)<br></f>Last-Modified: Sat, 10 Dec 2005 18:27:46 GMT<br></f>ETag: "526c3-f228a4c80"<br></f>Accept-Ranges: bytes<br></f>Content-Length: 3874<br></f>Keep-Alive: timeout=max=100<br></f>Connection: Keep-Alive<br></f>Content-Type: text/html; charset=ISO-8859-1<br></f><br></f><!DOCTYPE html public "-//w3c//dtd html 4.0 transitional//en"><br></f><html><br></f><head><br></f><meta http-equiv="Content-Type" content="text/html; charset=iso-8859-1"><br></f><metaname="GENERATOR" content="Mozilla/4.79 [en] (Windows NT5.0; U) Netscape"><br></f><title>CMPSCI 453 / 591 / NTU-ST550A Spring 2005 homepage</title><br></f></head><br></f><much more document text following here (not shown)>

- a) Was the server able to successfully find the document or not? What time was the document reply provided?
  - b) When the document was last modified?
  - c) How many bytes are there in the document being returned?
  - d) What are the first 5 bytes of the document being returned? Did the server agree to a persistent connection?

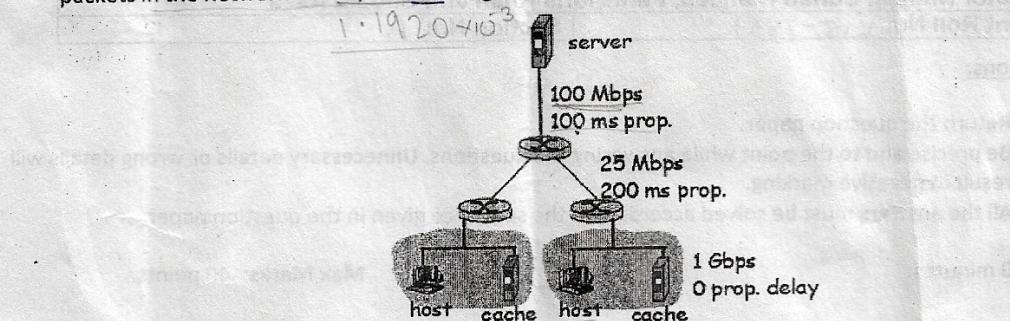
**Question 4:** itsecuritylabs.com is registered and hosted with Dreamhost. Both the webserver and mailserver of itsecuritylabs.com are associated with 111.112.113.114 and 111.112.113.115 respectively. The primary authoritative name server of Dreamhost is dns1.dreamhost.com which is mapped to 192.1.1.4. List down all the resource records (RRs) that will be inserted into the authoritative name server and .com's TLD (top level domain) server. [6 Points]

[6 Points]

**Question 5:** Consider a new peer Alice that joins BitTorrent without possessing any chunks. Without any chunks, she cannot become a top-four uploader for any of the other peers, since she has nothing to upload. How then will Alice get her first chunk? [3 Points]

Question 6: Consider the scenario in the figure below in which a server is connected to a router by a 100 Mbps link, with a 100 ms propagation delay. That router in turn is connected to two routers, each over a 25 Mbps link with a 200 ms propagation delay. A Gbps link connects a host and a cache (when present) to each of these routers; this link, being a local area network, has a propagation delay that is essentially zero. All packets in the network are 10,000 bits long.

[15 Points]



- What is the end-to-end delay from when a packet is transmitted by the server to when it is received at a host? Assume that there are no caches, that there is no queueing delay at a link, and that the node (router) packet-processing delays are also zero.
- First assume that client hosts send requests for files directly to the server (i.e., the caches are off). What is the maximum rate at which the server can deliver data to a single client, assuming no other clients are making requests.
- Again assume that only one client is active, but now suppose the caches are HTTP caches and are turned on. A client HTTP GET is always first directed to its local cache. 50% of the requests can be satisfied by the local cache. What is the maximum rate at which this client can receive data in this scenario?
- Now suppose that the clients in both LANs are active and the HTTP caches are on, as in c) above. 50% of the requests can be satisfied by the local cache. What is the maximum rate at which each client can receive data, in this scenario?
- Now suppose the 100 Mbps link is replaced by a 25 Mbps link. Repeat question d) above in this new scenario.

**BEST OF LUCK!**