

Some problems are taken from the text *Computer Networking A Top-Down Approach (6th Edition)* by James F. Kurose and Keith W. Ross. Publisher: Addison-Wesley, 2012.

- 1) Explain the difference between instantaneous and average throughput. **[3 marks]**
- 2) Briefly describe how cookies are used to maintain user state. **[4 marks]**
- 3) Interpret the meaning of the following DNS resource records. **[4 marks]**

NAME	VALUE	TYPE	TTL
Relay1.bar.foo.com	145.37.93.126	A	86400 (secs)
foo.com	relay1.bar.foo.com	CNAME	86400 (secs)

- 4) Compare the scalability of client-server networks to P2P networks . **[6 marks]**
- 5) Discuss how demultiplexing is carried out using TCP and UDP. **[5 marks]**
- 6) A client wants to retrieve a Web document at a URL but it does not know the IP address of the HTTP server. In addition to HTTP, what protocols does the client need to use? Identify what layers the protocols in your answer belong to (i.e., application layer, transport layer etc.) **[4 marks]**
- 7) Show all working for this question.
 - a) Suppose you have the following 2 bytes: 01011100 and 01100101.
What is the 1s complement of the sum of these 2 bytes? **[2 marks]**
 - b) Suppose you have the following 2 bytes: 11011010 and 01100101.
What is the 1s complement of the sum of these 2 bytes? **[2 marks]**
 - c) For the bytes in part (a), give an example where one bit is flipped in each of the 2 bytes and yet the 1s complement doesn't change. **[2 marks]**
- 8) Can the receiver of UDP packet be absolutely sure that no errors have occurred? Explain your answer. **[5 marks]**
- 9) Suppose a POP email client is configured to operate in download-and-delete mode. Determine the two missing parts of the transaction below. **[3 marks]**

C: list

S: 1 576

S: 2 311

S: .
 C: retr 1
 S: *blah blah ...*
 S:blah
 S: .
 ?
 ?
 ?

10) Suppose a POP email client is configured to operate in download-and-keep mode.

Determine the two missing parts of the transaction below.

[2 marks]

C: list
 S: 1 576
 S: 2 311
 S: .
 C: retr 1
 S: *blah blah ...*
 S:blah
 S: .
 ?
 ?

11) Consider the email client from question 10, that is configured to operate in download-and-keep mode. Assume that the transaction from question 10 occurred 10 minutes ago. If no new messages have arrived at the email server, give the transcript of the second POP session between the email client and the server. This second session accesses all the emails from the server.

[4 marks]

12) Suppose two hosts, one located at Fyzabad and the other at Toco are connected by a channel with a 1 Gbps transmission rate and a RTT of 30 milliseconds. Assume the size of a packet (including both header fields and data) is 2700 bytes. How big must the window size be to get achieve a utilization larger than 90%?

[6 marks]

Instructions

- **Individual Assignment**
- Type your answer or write **legibly**
- **Show all working**
- Include a cover page with your **name, ID, Course code and Assignment number**
- Your submission **must include** a completed and **signed plagiarism declaration form**. Submissions without this form will **not** be marked.
- Upload a single .pdf file and the signed plagiarism .pdf file to the submission link for Assignment 1. For example the student with ID number 29384090 will upload **29384090.pdf** and **29384090-Plagiarism.pdf** to the submission link
- **Absolutely NO late assignments**