Indian Institute of Technology Kharagpur

Department of Computer Science and Engineering

Class Test-1, Spring 2020-21

Computer Networks (CS31006)

Students: 155 **Date**: 30-January-2021

Full marks: 30 **Time**: 60 minutes

Credit: 20%

INSTRUCTIONS: This is an OPEN-BOOK, OPEN-NOTES test. Please submit a PDF file containing ONLY YOUR ANSWERS on Moodle. DO NOT FORGET TO WRITE YOUR NAME AND ROLL NUMBER AT THE TOP OF YOUR ANSWER SHEET. ANY DETECTED CASE OF PLAGIARISM WILL BE DEALT WITH STRICTLY, WITH ALL THE IMPLICATED STUDENTS RECEIVING ZERO IN THIS TEST. You may use calculators if required. This question paper contains two pages. ANSWER ALL QUESTIONS.

1. Assume that you want to run two different instances of HTTP servers, which will host two different sets of contents. What can be the problem if you run them on the same port address? Assuming that the two servers are hosted on ports 80 and 8080, respectively, and the domain name of your machine is `www.mypages.ac.in`; what will be the two complete URLs to access the two servers, assuming that you want to access the index.html web-page which is hosted in both the servers?

   [2 + 2 = 4]

2. Consider the following HTML code snippet for the page `mypage.html`:

   ```
   <!DOCTYPE html>
   <html>
   <head>
   This is a sample page for the CS31006 course
   </head>
   <body>
   <img src="network.gif" alt="HTML5 Icon" width="128">
   <img src="images/cs31006.gif" alt="HTML5 Icon" width="128">
   </body>
   </html>
   ```

   How many HTTP GET requests are required to render this page properly on a web browser? Write down those GET requests, assuming that the domain name is `www.mynetworkcourse.org` and you are using HTTP version 1.1. A sample GET request looks as follows:

   ```
   GET http://www.w3.org/pub/WWW/TheProject.html HTTP/1.1
   ```

   [1 + 2 = 3]

3. Why can't we use SMTP to retrieve emails from a mail transfer agent (MTA)? I design a modification of SMTP as follows: the MTA will poll for the user agents (UAs); whenever it will find out that a UA with a new email in its mailbox at the MTA is online, it will use SMTP to push the email to the client mailbox at the UA. Do you see any problem in this modification of the protocol?

   [1 + 2 = 3]

4. Both HTTP and FTP use a client-server model to transfer the files from the server to the clients on request. Then why do we need FTP as a separate protocol for file transfer – can't we use HTTP for large file transfers?

[2]

5. Why does FTP two separate channels: one each for command and data? Explain in what situation the "passive" mode of operation of FTP is useful.

[2 + 2 = 4]

6. How many transactions are usually observed between a client computer and a local name server, for any DNS name lookup, and why? In the context of your answer, do you see any performance bottleneck in a situation where a single local name server is handling many (say, thousands of) client computers?

[2 + 1 = 3]

7. Explain the significance of each field in the following DNS entry in a DNS Resource Record:

```
cse.iitkgp.ac.in   86400    IN     A   203.110.245.250
```

[3]

8. State whether each of the following statements is True or False, with a brief (1-2 sentence(s)) explanation in support of your answer:
   (a) All the devices in the network need to support all five layers of the protocol stack.
   (b) The Protocol Data Unit (PDU) length decreases as you go downwards along the protocol stack.
   (c) To ensure reliability, DNS uses an enhanced variant of UDP that provides reliable data delivery.
   (d) In the context of HTTP, a *persistent connection with pipelining* is more efficient than an ordinary *persistent connection*.

[2 + 2 +2 + 2 = 8]