UNIVERSITY OF MORATUWA

FACULTY OF ENGINEERING

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

BSc Engineering Honours Degree
2016 Semester 3 Examination

CS2032: Principles of Computer Communication

Time allowed: 2 Hours   Held in June 2018

ADDITIONAL MATERIAL: *None*

INSTRUCTIONS TO CANDIDATES:

1. This paper consists of **6** questions in **3** pages.

2. Answer **any five** questions. All questions have equal marks.

3. The maximum attainable mark for each section is given in brackets.

4. This examination accounts for 60% of the module assessment and is marked out of 100.

5. This is a closed book examination.

   NB: It is an offence to be in possession of unauthorised material during the examination.

6. Only calculators approved and labelled by the Faculty of Engineering are permitted.

7. Assume reasonable values for any data not given in or with the examination paper. Clearly state such assumptions made on the script.

8. In case of any doubt as to the interpretation of the wording of a question, make suitable assumptions and clearly state them on the script.

Q1 Introduction

a) Which layer of the OSI Model provides a service for network based applications to use? How is this layer implemented in the Internet network model? [3]

b) What are the *four* main properties of a periodic signal, and what are the relationships among them? [7]

c) What is meant by *filtering* a signal? Explain, using a suitable diagram, why filtering is important when receiving an FM radio signal where other stations share the same band using different carrier frequencies. [6]

d) An audio signal contains frequencies in the range 20 Hz – 12 kHz. The signal is *sampled* and *quantised* using *Pulse Code Modulation* (PCM).

What sampling rate and quantisation levels do you recommend? Please state any assumptions you make. [4]

Q2 Encoding and Modulation, Transmission

a) A digital signal of 1 Mb/s is to be modulated on a carrier signal of 100MHz at 500k symbols per second. Show, using suitable diagrams, how this may be done using:

  i. Amplitude Shift Keying (ASK) and

  ii. Phase Shift Keying (PSK) [8]

b) Briefly explain how Quadrature Amplitude Modulation (QAM) may be used to send the above signal at a rate of 250k symbols/sec. [5]

c) Name an application for which *synchronous* data transmission is suitable. Show, using a suitable diagram, the components of a typical synchronous data frame, and give the function of each field in the frame. [7]

Q3 LAN and Wireless

a) "Some *local-area networks* (LANs) are *unswitched."*

Give *two* examples of unswitched network types, and explain why they are not switched. [4]

b) One issue in networks is i*ndicating to whom the communication is intended.* How is this handled in Ethernet? [3]

c) In shared media networks, multiple devices need to access the medium.

Name, and briefly explain, *two* methods by which multiple devices may access a shared medium. [8]

d) Briefly describe the structure of a *cellular mobile communication network* and explain how it can handle million of users. [5]

Q4   Network, Transport and Application layers

a)   A host has an IP address of 203.143.15.56.

    i. Name *three* other ways in which this address may be represented (you do not need to show the representations).   [2]

    ii. If there are 10 devices in the network containing this host, how many bits may we allocate for the *network part* of the address? Explain.   [4]

    iii. Give a possible IP address of *another* host in the same network.   [2]

b)   Give an example of a *connectionless, not-reliable* transport protocol. Explain, using a suitable example, why such a protocol is needed.   [6]

c)   Why do many Internet application-layer protocols use *half-duplex* data exchange?   [3]

d)   Show an example of a *command* and a *response* in an application-layer protocol.
                                                                                                                                        [3]

Q5   Web

a)   i. Name one HTTP status code and explain its meaning.   [3]

    ii. Name a common HTTP header and explain what it does.   [3]

b)   "It is not possible to run an Internet server on a mobile phone."

Do you agree with this statement? Explain, considering the principles of the client-server model.   [5]

c)   i. What are the main components of the w*orld-wide web* (WWW)?   [3]

    ii. Briefly explain how a web hyperlink works.   [3]

    iii. What is the difference between a web page and a web resource?   [3]

Q6   File Storage, P2P

a)   What are the main features of and differences between a LAN-based *network file system* (also called network attached storage) and *internet storage?*   [6]

b)   Name *two* ways by which a user could access and manipulate files stored on the Internet, and compare how they work.   [6]

c)   What are the differences between an a*uthoritative DNS name server* and a *local name server?*   [4]

d)   Name *one* function of the DNS in addition to Name-to-address resolution.   [2]

e)   Name one *advantage* and one *disadvantage* of peer-to-peer compared with client-server systems.   [2]