
UNIVERSITI SAINS MALAYSIA

First Semester Examination
Academic Session 2003/2004

September/October 2003

CIT505 – Computer Systems and Networks

Duration : 3 hours

INSTRUCTION TO CANDIDATE:

- Please ensure that this examination paper contains **FOUR** questions in **FOUR** printed pages before you start the examination.
 - Answer **ALL FOUR (4)** questions.
 - You can choose to answer either in Bahasa Malaysia or English.
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ENGLISH VERSION OF THE QUESTION PAPER

1. (a) For each of the following, show all the steps involved:

(i) Convert 108.3125_{10} into binary.

(ii) Convert 2635_8 into hexadecimal.

(6/100)

(b) Assume the IEEE 32-bit binary floating point format is as follows:

SEEEEEEEEMMMMMMMMMMMMMMMMMMMMMMMMMMMMM

It consists of:

- 1 sign bit (S) for mantissa (0=positive, 1=negative).
- 8-bit exponent (E) in excess 127 notation.
- 23-bit mantissa (M); mantissa is preceded by binary point and begins with 1 (e.g. 1.MMMMMM).

Find the actual value (in binary) of the following numbers represented using the above IEEE format:

(i) 01000101000001011101001100000000

(ii) 10111101011010111100000000000000

(6/100)

(c) What is the actual value (in decimal) of 101011 if it is represented as:

(i) Pure binary?

(ii) Excess 25?

(iii) Two's complement?

(6/100)

(d) Briefly describe the following terms:

(i) Opcode

(ii) Operand

(iii) Instruction set

(iv) Instruction length

(v) Instruction register

(vi) Instruction pointer

(vii) Clock pulse

(7/100)

2. (a) Explain any **two (2)** functions performed by a device controller. (4/100)
- (b) Show how the following are different from one another:
- (i) Primary memory
 - (ii) Secondary memory
 - (iii) Cache memory
 - (iv) Virtual memory
- (8/100)
- (c) Describe the structure of a hierarchical directory. What are the advantages and disadvantages as compared to graph-structure directories? (6/100)
- (d) Data compression techniques can be divided into "lossless" or "lossy".
- (i) What is meant by data compression?
 - (ii) What are the main differences between these techniques?
 - (iv) For each technique, which data format/type is more suitable for compression?
- (7/100)
3. (a) Draw in chart form the voltage representation of the bit pattern 11010010 for the following digital encoding schemes:
- (i) NRZ-L
 - (ii) NRZ-I
 - (iii) Manchester
 - (iv) Differential Manchester
- (8/100)
- (b) Indicate which OSI layer is responsible for each of the functions below:
- (i) Packets arrive in correct sequence.
 - (ii) Packets arrive free from errors.
 - (iii) Packets know how to travel from source to destination.
 - (iv) Packets transmitted over twisted pair cable.
 - (v) Packets transmitted using CSMA/CD.
- (5/100)

- (c) A local cable TV company is considering removing all coaxial cables and replacing it with fiber optic cables. List the advantages and disadvantages of this plan.
(4/100)
- (d) Multiplexing is a common technique used during data transmission.
- (i) What is meant by multiplexing?
 - (ii) What are the benefits?
 - (iii) Describe any **one (1)** multiplexing technique. Use appropriate example.
- (8/100)
4. (a) Explain how the following occurs and ways to overcome them:
- (i) White noise
 - (ii) Impulse noise
 - (iii) Crosstalk
- (6/100)
- (b) List the advantages of using:
- (i) Contention-based protocols
 - (ii) Round robin protocols
- Give **one (1)** example for each type of protocol.
(8/100)
- (c) Briefly describe some of the criteria that can be used to differentiate local area networks (LAN) from wide area networks (WAN).
(5/100)
- (d) What type of interconnection device is used to perform the following tasks?
- (i) To extend a thin Ethernet bus from 200m to 300m.
 - (ii) To connect a CSMA/CD LAN to a Token Ring LAN.
 - (iii) To connect a coaxial cable to a fiber optic cable (of the same LAN).
 - (iv) To connect a mainframe to LAN.
 - (v) To isolate traffic from one LAN to another.
 - (vi) To connect LAN to WAN (either circuit or packet switching).
- (6/100)