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UNIVERSITI SAINS MALAYSIA

First Semester Examination  
Academic Session 2004/2005

October 2004

**CIT505 – Computer Systems and Networks**

Duration : 2 hours

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**INSTRUCTION TO CANDIDATE:**

- Please ensure that this examination paper contains **FOUR** questions in **FIVE** printed pages before you start the examination.
  - Answer **ALL** 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, multiply the numbers directly in their respective bases (without conversion to decimal). Show all the steps involved.
- Multiply  $111010_2$  with  $1011_2$ . Give your answer in binary.
  - Multiply  $375_8$  with  $46_8$ . Give your answer in octet.
  - Multiply  $2D9_{16}$  with  $3A_{16}$ . Give your answer in hexadecimal.
- (9/100)
- (b) What is the smallest and largest value (in decimal) that can be stored using 6 bits in:
- pure binary?
  - excess 25?
  - two's complement?
- (9/100)
- (c) Figure 1 shows a logic circuit diagram.
- If  $A=1, B=1, C=0$ , what is the value of  $X$  and  $Y$ ?
  - State the Boolean function for  $X$  and  $Y$  (in terms of  $A, B$  and  $C$ ).

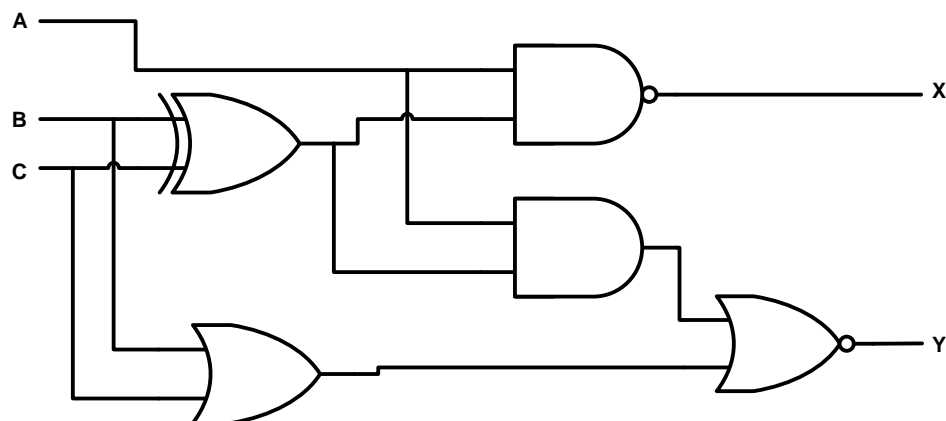


Figure 1

(7/100)

2. (a) Provide full definitions of the following acronyms:
- (i) ASCII,
  - (ii) SDRAM,
  - (iii) TCP/IP,
  - (iv) CSMA/CD,
  - (v) FDDI.

(10/100)

- (b) What is cache memory? How is it used by a computer system? (5/100)

- (c) Assume you have been asked to recommend computer systems for the following purposes:

- (i) A university student needs to do assignments and homework at home.
- (ii) A database server catering for 100 users in an organization.

List the specifications of the recommended computer system for each case above.

(10/100)

3. (a) Assume you have to download a webpage from the Internet using a laptop computer in the office. This laptop computer comes only with a built-in wireless network card. You are supposed to use your company's local area network to access the Internet. By using a diagram, explain how this can be done. List all the steps involved in this operation.

(7/100)

- (b) Assume we need to send the bit pattern  $00110101_2$  using:

- (i) amplitude shift keying,
- (ii) frequency shift keying,
- (iii) phase shift keying.

Show/Draw the equivalent analog sine-wave pattern for each scheme above. Indicate all assumptions made.

(9/100)

- (c) The three most commonly used cables in a network are unshielded twisted pair, coaxial cable and fiber optic. Arrange these cables according to:
- (i) data transmission speed (from slowest to fastest),
  - (ii) data transmission noise (from least noisy to very noisy),
  - (iii) security (from least secure to most secure).
- (9/100)
4. (a) Suppose we need to send one thousand (1000) seven-bit characters of data on a network. Calculate the total bits that need to be transmitted using:
- (i) asynchronous transmission,
  - (ii) synchronous transmission (assume all 1000 characters can fit into a single frame).
- Explain your answer. Indicate all assumptions made.
- (6/100)
- (b) Packet collisions occur quite often in local area networks based on bus topology.
- (i) How/Why does it happen?
  - (ii) What are the consequences/effects?
  - (iii) Can they be eliminated? Explain.
- (10/100)

- (c) Figure 2 shows a network that has 2 devices (X and Y) interconnecting three computers (PC1, PC2 and PC3) and a server (S1).

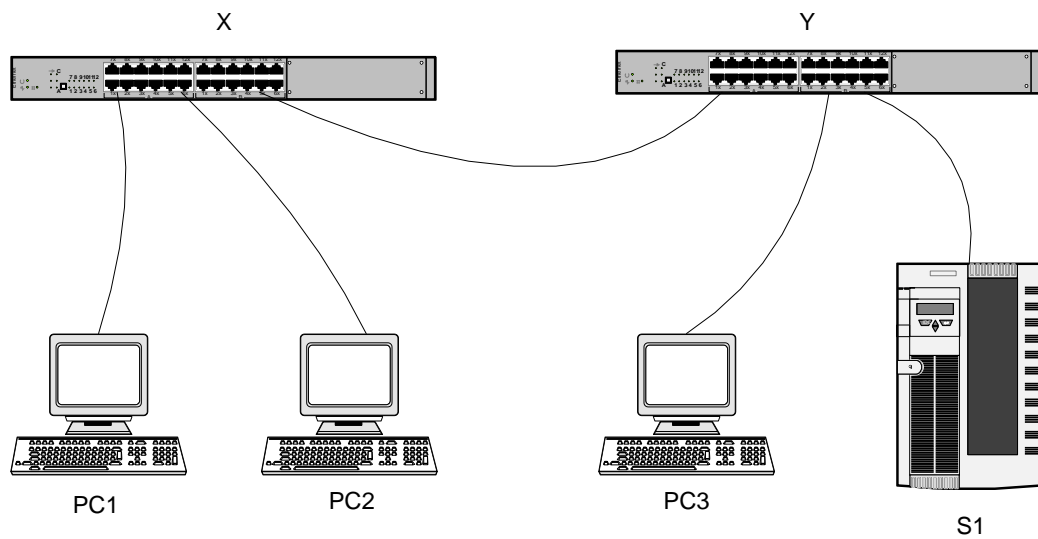


Figure 2

State which computers or server will receive a copy of a packet when:

- PC1 sends a message to PC2,
  - PC2 sends a message to S1,
  - S1 sends a message to PC3,
- (i) if both X and Y are hubs,
- (ii) if both X and Y are switches,
- (iii) if X is a hub and Y is a switch.

(9/100)