CCS 1552
Computer System Architecture
Model Questions

Question 01 **[25 Marks]**

A. Answer the following questions.

i. "A combinational circuit is a type of digital logic circuit where the output depends only on the current inputs" Do you agree with this statement.

ii. Briefly describe why NAND cate is considered as the universal gate.

iii. Briefly describe how Boolean function can be minimized using a Karnaugh map (K-map)

[3 x 3 Mark]

B. You are required to create a door unlock system that unlock a door only when a following specific 4-digit code is entered using switches or a keypad.

Code to unlock ABCD (0010, 1110, 1000, 1010)

i. Draw a truth table for the above-mentioned draw locker.

[3 Marks]

ii. Write the Boolean expression for the output (F) in Sum-of-Product (SoP) form.

[3 Marks]

iii. Simplify the written Boolean expression using K-MAP simplification method.

[4 Marks]

iv. Draw a circuit diagram for simplified Boolean expression using logic gates.

[3 Marks]

v. Draw a circuit diagram using NAND gates only

[3 Marks]

Question 02 **[25 Marks]**

A. Answer the following questions.

i. Write 3 ways to improve the performance of a computer.

ii. Different processors have different "pipeline depth" do you agree with this statements. Briefly describe.

iii. Write 3 advantages and disadvantages for BUS Technology in computers

iv. "Northbridge and Southbridge were two distinct chipsets on the motherboard that managed communication between the CPU, memory, and other components". Briefly descibe

[4 x 3 Marks]

B. State whether the following statements are **TRUE** or **FALSE**. If it is **FALSE**, justify your answer.

i. Intel 4004 is the world first single chip microprocessor, contained 46 instructions

ii. Most embedded systems employ an application processor. Intel PIII is the first x86 CPU to include a unique, retrievable, identification number.

iii. A Super I/O (SIO) chip is an integrated circuit on a computer motherboard that manages high-bandwidth input/output operations.

[2 x 3 Marks]

C.

You are required to assemble a personal computer (PC) capable of handling high-performance tasks such as digital image processing. Select suitable components for this PC and justify your choices for each component. Your answer should include at least the following components: CPU, GPU, RAM, Storage, Monitor and PORTS and Operating System

[7 Marks]

Question 03 **[25 Marks]**

A. Answer the following questions.

i. Write a short note for the following
   a. DDR5
   b. Magnetic Disk
   c. RAID

ii. With suitable diagram briefly describe "Memory Pyramid"

iii. Compare and contrast Solid-State Drive and Hard disk

iv. Briefly explain the importance of virtual memory.

[4 x 3 Marks]

B. State whether the following statements are **TRUE** or **FALSE.** If it is **FALSE**, justify your answer.

i. L1 cache is high speed, small memory than L2 cache

ii. Magnetic disks are a long-term, non-volatile storage, large and inexpensive.

iii. A sector is the smallest unit that can be read or written on a hard disk.

[2 x 3 Marks]

C. Answer the following questions.

i. Briefly describe a way to calculate "Disk Access Time" of the hard disk.

ii. Advertised average seek time of a disk is 5ms, transfer rate is 40 MB per second, and it rotates at 10,000 rpm controller overhead is 0.1 ms. Calculate the average time to read a 512 - byte sector.

[3 + 4 Marks]

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