

University of Swaziland

Department of Computer Science

Examination

2016/17

Title of Paper: Computer Architecture and Organizations I

Course Number: CS241/CSC222

Time Allowed: Three (3) hours

*Instructions: Answer only **four** questions*

You are not allowed to open this paper until you have been told to do so by the invigilator.

CSC 222/CS241 COMPUTER ARCHITECTURE AND ORGANIZATION I
ANSWER ANY FOUR QUESTIONS
TIME ALLOWED: 3HOURS

QUESTION ONE

- A. General Knowledge of Computer Architecture, choose True or False for each
- Register is implemented inside the main memory on computer board
 - Von Neumann architecture has data and instructions in the same memory space.
 - Static RAM is typically used to implement Cache
 - Dynamic RAM is faster than Static RAM in access time.
 - In modern computers, CPU and Memory are connected by BUS
 - Direct Mapping in Cache system is more complex in implementation than Set Associative Mapping
 - Floating point data points are uniformly represented on the real line.
 - Unsigned integer data points are uniformly represented on the real line.
 - Read and write operations can be performed on EPROM devices
 - The density of data on the hard disk does not affect data access speed.

[1 mark each]

10marks

B. A memory system has 16MB. The memory is organized into blocks of 64bit/8 bytes each, and the cache has total 512KB, organized into cache lines of 8 bytes each: How many bits are needed to address all bytes?

5marks

C.

- List and briefly explain three differences between RISC and CISC 8marks
- Name one RISC and CISC processors. 2marks

QUESTION TWO

- One of the potential problems which Moore raises and dismisses is heat. Justify Moore's conclusions. 10marks
- Briefly explain five differences between single-core microprocessors and modern multi-core processor. 10marks
- List five features of the first microprocessor 5marks

QUESTION THREE

- Briefly explain the three methods for handling the synchronization of the CPU with I/O devices 6marks
- Write short note on the taxonomy of computer organization 12marks
- A student's computing note consists of 5notebooks, each notebook has 60leaves and each leaf has 48lines and each line on the average contains 32characters including special symbols. If the student wishes to word process his/her note, what percentage of the 750MB DVD will be free? 7marks

QUESTION FOUR

- A. Briefly explain the three most commonly used controller (parallel or serial device) 9marks
- B.
- What is the difference between computer architecture and computer organization? 4marks
 - Briefly explain three reasons why computer students need to study computer architecture 6marks
- C. Use arithmetic left shift operation on the bit pattern 11011001.
- What is the original number in base ten? 3marks
 - What is the new number in base ten? 3marks

QUESTION FIVE

- A. List two differences between DRAM and SRAM 4marks
- B. Draw a truth table to represent the Boolean expression below
 $Y = \text{NOT} ((A \text{ OR } B) \text{ AND } (C \text{ XOR } D))$ 13marks
- C.
- List two reasons that make the PCI bus one of the fastest I/O bus used today. 4marks
 - List two advantages of the PCI over ISA 2marks
 - List two advantages of the ISA over PCI 2marks

QUESTION SIX

- A. List and explain the layers of abstraction of computer organization with the support of a diagram 9marks
- B. Solve a system of linear equations using levels of abstraction 9marks
- C. Subtract B from A using two complement
A=00011000 B=11101111 7marks