



**UNIVERSITY EXAMINATIONS**

**EXAMINATION FOR SEPTEMBER/DECEMBER 2019/2020 FOR BACHELOR OF  
SCIENCE IN COMPUTER SCIENCE AND BACHELOR OF BUSINESS  
INFORMATION TECHNOLOGY**

**RCS 203: COMPUTER ARCHITECTURE**

**DATE: 13TH DECEMBER 2019**

**TIME: 2 HOURS**

**GENERAL INSTRUCTIONS:**

Students are NOT permitted to write on the examination paper during examination time.

This is a closed book examination. Text book/Reference books/notes are not permitted.

**SPECIAL INSTRUCTIONS:**

This examination paper consists Questions in Section A followed by section B.

Answer **Question 1 and any Other Two** questions.

QUESTIONS in ALL Sections should be answered in answer booklet(s).

- 1. PLEASE start the answer to EACH question on a NEW PAGE.**
- 2. Keep your phone(s) switched off at the front of the examination room.**
- 3. Keep ALL bags and caps at the front of the examination room and DO NOT refer to ANY unauthorized material before or during the course of the examination.**
- 4. ALWAYS show your working.**
- 5. Marks indicated in parenthesis i.e. ( ) will be awarded for clear and logical answers.**
- 6. Write your REGISTRATION No. clearly on the answer booklet(s).**
- 7. For the Questions, write the number of the question on the answer booklet(s) in the order you answered them.**
- 8. DO NOT use your PHONE as a CALCULATOR.**
- 9. YOU are ONLY ALLOWED to leave the exam room 30minutes to the end of the Exam.**
- 10. DO NOT write on the QUESTION PAPER. Use the back of your BOOKLET for any calculations or rough work.**

## SECTION A.

### QUESTION ONE

- a) By defining the terms computer architecture and computer organization, explain the difference between the two. **(4 marks).**
- b) Briefly describe four basic functions of a computer. **(4 marks)**
- c) Which register specifies the address in memory for the next read or write?  
**(2 marks)**
- d) If you were working as a computer memory designer, explain three main computer memory characteristics you would pay attention to, considering your target market (customers) **(6 marks)**
- e) From your study of computer architecture, what dilemma does the hierarchical memory organization best solve? **(3 marks)**
- f) We can broadly classify external (I/O) devices into three categories: briefly discuss each. **(3 marks)**
- g) Identify the main stages of an instruction cycle. **(3 marks)**
- h) The Von Newman model refers to a programmable machine with three additional specifications. State and explain each of them. **(5 marks)**

## SECTION B

### QUESTION TWO

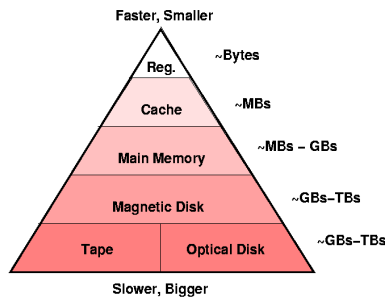
- (a) Under the classical CPU organization, certain components are very central to CPU performance. Discuss in details the roles and structure of each of the following components. Give an example where applicable.
  - i. Data storage registers. **(4 marks)**
  - ii. ALU. **(6 marks)**
  - iii. CU **(6 marks)**
  - iv. Internal bus **(4 marks)**

### QUESTION THREE

- (a) With the aid of a well labelled diagram, describe the computer bus structure. **(8 marks)**
- (b) Discuss the computer bus protocol and explain how the computer bus works **(12 marks)**

## QUESTION FOUR

- (a) Explain the difference between internal computer memory and external computer memory. **(4 marks)**
- (b) The following diagram summarizes the concept of hierarchical computer memory organization. Discuss each of the components and explain why the diagram has a pyramidal shape. **(8 marks)**



- (c) Explain the justification for hierarchical memory organization. **(5 marks)**
- (d) Modify the diagram to demonstrate the influence of cloud computing in hierarchical memory organization. **(3 marks)**

## QUESTION FIVE

- (a) Describe the following parallel processing approaches, giving examples of computer systems where each approach has been applied.
- Uniform memory access (NUMA) **(4 marks)**
  - Non-Uniform memory access (NUMA) **(4 marks)**
  - Single instruction single data (SISD) stream. **(4 marks)**
  - Single instruction, multiple data (SIMD) stream. **(4 marks)**
  - Multiple instruction, multiple data (MIMD) stream. **(4 marks)**