**The Open University of Sri Lanka**
**B.Sc. Degree Programme – Level 05**
**Department of Computer Science**
**CSU 5310 – Computer Architecture**
**Final Examination 2023/2024**
**Duration: Two hours only (2 hours)**

**Date: 19.04.2024** **Time: .02.00 p.m. – 04.00 p.m.**

**ANSWER FOUR (4) QUESTIONS ONLY.**

(1)

i. Define the terms '**structure**' and '**functions**' related to a **computer system**.
ii. Briefly define the **major structural components** of **CPU**.
iii. State the functions of the below registers.
    a. Instruction Buffer Register (IBR)
    b. Memory Address Register (MAR)
    c. Program Counter (PC)
iv. Describe four (4) special features of **cache memory**. (25 marks)

(2)

i. Represent the basic structure of the **von Neumann model** using a diagram.
ii. Briefly describe the function of the below components.
    a. Central Processing Unit (CPU)
    b. Arithmetic and Logic Unit (ALU)
    c. Buses
iii. Describe the term 'Von Neumann Bottleneck'.
iv. What is referred to as 'software'? (25 marks)

(3)

i. Actions performed in the **fetch cycle** can be categorized into four categories. Mention those four (4) categories and describe them briefly.

ii. Draw a diagram to represent the **instruction cycle with interrupts.**

iii. The **interconnection structure** of a computer supports five (5) types of transfers. What are they?

iv. **Quick Path Interconnect** (QPI) is defined as a four-layer protocol architecture. List and briefly define those four (4) layers. (25 marks)

(4)

i. Three types of **numerical data** are common in computers. What are they?

ii. Describe the nature of **finite state machines** by using a real-world example.

iii. Briefly describe five (5) services provided by an **operating system**.

iv. The **ARM** architecture provides a large collection of operation types. Briefly explain three (3) out of them. (25 marks)

(5)

i. Mention five (5) advantages of **solid-state drives** over a **hard disk drive**.

ii. The **registers in the processor** perform two (2) roles. What are they?

iii. Explain the three (3) techniques of **I/O operations**.

iv. Briefly define the seven (7) **RAID** levels. (25 marks)

(6)

i. What are the three (3) types of **data hazards**?

ii. State the function of **virtual memory**.

iii. Compare **volatile** memory and **non-volatile** memory.

iv. To increase the **processor speed** there are three (3) approaches to achieve. Briefly describe them.

(25 marks)