The Open University of Sri Lanka
Faculty of Engineering Technology
Department of Electrical and Computer Engineering

Study Programme	: Bachelor of Technology Honours in Engineering
Name of the Examination	: Final Examination
Course Code and Title	**: EEX6236 – Advanced Computer Architecture**
Academic Year	: 2021/22
Date	: 03rd February 2023
Time	: 1400-1700hrs
Duration	: **3 hours**

General Instructions

1. Read all instructions carefully before answering the questions.
2. This question paper contains four (4) questions on two (2) pages.
3. Answer ALL questions.
4. The answer to each question should commence from a new page.
5. This is a Closed Book Test (CBT).
6. Answers should be in clear handwriting.
7. Do not use Red colour pen, and clearly state your assumptions, if any

Answer ALL questions.

1)

a) Briefly describe what Short Vector Instructions (SVI) are. Give three examples of applications where SVI can be used.

b) You can find the transcendental function **sin(x)** using the following Tailor series.

$$\sin x = x - \frac{x^3}{3!} + \frac{x^5}{5!} - \frac{x^7}{7!} + \cdots$$

Assume there are four Processing Elements (PEs) in the computer system, and PEs can be organized to any architecture according to Flynn's classification.

(i) Design two different methods of doing this problem in parallel for MIMD and SIMD architectures.

(ii) Estimate the execution time in number of steps for each method given in (i) and compare both methods you designed.

(40 marks)

2)

a) Some people think that functional programming is the future of software development. What are the advantages and disadvantages of functional programming?

b) How can today's microprocessors support execution of programmes written in functional programming?

c) Briefly describe what logical clocks and physical clocks are in distributed systems. Give examples of how they are implemented.

(20 marks)

3)

a) Briefly describe what On-chip interconnect network is. What are the significant differences between on-die and off-die networks?

b) What are the challenges in implementing interconnection networks on a chip? Briefly describe three of them.

c) What is heterogeneous computing architecture? What are the advantages of heterogeneous architecture?

(20 marks)

4)

a) Data Processing Units (DPUs) are one of the emerging data storage technologies. Briefly describe the concept of DPUs and their application areas.

b) What are the challenges of DPU implementation? Describe them briefly.

c) Briefly describe how errors in memory systems arise.

(20 marks)