00635

THE OPEN UNIVERSITY OF SRI LANKA

B.Sc (IT) DEGREE PROGRAMME

LEVEL 03

COU3300 – Computer Organization and Communication

Final Examination Paper: 2024/2025

Duration: Two hours only (02 hours)

Date: 13.06.2025 Time: 9.30 am – 11.30 am

INSTRUCTIONS TO CANDIDATES

- **Duration** of the examination is **two (02)** hours.
- This paper contains **Six (06)** questions and **Four (04)** pages.
- The students should answer **any four (04)** Questions Only.
- All the questions carry equal marks.
- Write your **index number** clearly on the **cover of the answer book** and on **all extra sheets used.**
- Clearly indicate the **question numbers** you are attempting in your answer script.
- **Begin** each answer on a **new page.**
- All answers **must be written in English.**
- **Do not use red pens**. Only **blue** or **black** pens are allowed for writing answers.
- **Tie all additional sheets** securely to your main answer script before handing it in.
- **This is a closed-book examination. No reference materials, textbooks, or electronic devices are allowed.**
- Candidates are reminded to maintain **academic integrity**. Any form of **cheating or misconduct will result in disciplinary action.**

Answer FOUR Questions ONLY.

Question 01

a) Define the term *"EEPROM"*. [02 Marks]

b) List three (03) examples of secondary storage devices. [03 Marks]

c) What are the three (03) types of operations performed by an Arithmetic Logic Unit (ALU)? [03 Marks]

d) What are the five (05) distinct categories of Microcomputers? [05 Marks]

e) Briefly explain major classes of computer software. [06 Marks]

f) Sketch the basic architecture of a computer. [06 Marks]

Question 02

a) What are the two (02) main types of Finite Automata? [03 Marks]

b) What is a Finite State Transducer (FST), and write two (02) application areas are FSTs commonly used? [05 Marks]

c) Briefly describe the term "*Network Protocol*". [03 Marks]

d) Which communication model does TCP/IP follow, and what are the four (04) layers contained in the TCP/IP model? [06 Marks]

e) Represent how the equation $f(x) = 2x^2 + 5x - 6$ proceed in computing machines using diagrams, if the value of x = 3. [08 Marks]

Question 03

a) What are the main applications of D flip-flops? [02 Marks]

b) Draw the Block diagram of PIPO shift register. [05 Marks]

c) What are the four (04) types of clocks used in digital circuits? [04 Marks]

d) Explain the two (02) methods of scaling. [06 Marks]

e) Simplify the following Boolean expression using Boolean laws.

$\overline{CD}\,(\bar{C} + D)(\bar{D} + D)$ [08 Marks]

Question 04

a) What is the *radix* of the octal number system? [02 Marks]

b) Mention MSB and LSB of following number 10001011001_2? [02 Marks]

c) Convert hexadecimal number "$6B2_{16}$" into a binary number? [05 Marks]

d) State the term "**Asynchronous sequential circuit**". [03 Marks]

e) Draw the block diagram of sequential logic circuit. [05 Marks]

f) Draw the logic diagram symbol and complete the given truth table of the "**Exclusive-OR**" gate. ***Note:*** *Copy the truth table into your answer script and complete it.*

Truth Table:

A (Input)	B (Input)	Y (Output)
0	0	
0	1	
1	0	
1	1	

[08 Marks]

Question 05

a) What are the two (02) main types of instruction set architectures used in computers? [02 Marks]

b) Differentiate between analog signals and digital signals using three (03) key points. [06 Marks]

c) How do single-threaded and multi-threaded processes differ from each other, briefly explain it with the aid of diagrams. [06 Marks]

d) Simplify following Boolean expression using K-map?

$F = \bar{A}\bar{B}\bar{C}\bar{D} + \bar{A}B\bar{C}D + ABCD + A\bar{B}C\bar{D} + \bar{A}B\bar{C}\bar{D} + \bar{A}\bar{B}\bar{C}D$ [11 Marks]

Question 06

a) What are the two (02) main types of Control Units in computer architecture? [02 Marks]

b) Define the term ***"Virtual memory".*** [03 Marks]

c) What are the three (03) options for designing a memory system to support coaches? [03 Marks]

d) What is the difference between sequential processing and parallel processing?

[05 Marks]

e) Why are multiprocessor systems used? Briefly explain three (03) advantages.

[06 Marks]

f) Briefly explain UMA and NUMA multiprocessors. [06 Marks]