

THE OPEN UNIVERSITY OF SRI LANKA
B.SC. (IT) DEGREE PROGRAMME – 2026/2027
FINAL EXAMINATION
COU3300 – COMPUTER ORGANIZATION AND COMMUNICATION
DURATION: TWO HOURS ONLY (2 HOURS)



Date: 02.07.2026

Time: 09.30 a.m. – 11.30 a.m.

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

Q1.

- a) Define the term “abstraction” in computer systems. [02 Marks]
- b) Briefly explain the role of system software in abstraction layers. [03 Marks]
- c) What is a punch card? Briefly explain its purpose. [3.5 Marks]
- d) Briefly describe the following theories in computation:
 - i. Automata Theory
 - ii. Computability Theory
 - iii. Complexity Theory [7.5 Marks]
- e) Describe optical drives and their uses in modern computer systems. [04 Marks]
- f) Briefly explain the process of translating a high-level language program into binary machine language. [05 Marks]

Q2.

- a) Explain the binary number system and why it is used in computers. [2.5 Marks]
- b) Briefly describe the following Boolean theories:
 - i. Commutative Law
 - ii. De Morgan’s Theorem [05 Marks]
- c) Simplify the following Boolean expressions using Boolean algebra laws:
 - i. $AB + A(B + C)$
 - ii. $(A + B)(A + B')$ [7.5 Marks]
- d) Simplify following Boolean expression using K-map?
$$F(A, B, C, D) = \sum (0, 2, 8, 10)$$
 [10 Marks]

Q3.

- a) What is a thread in operating systems? [02 Marks]
- b) What is meant by data transmission? State three (03) factors that can affect the efficiency of data transmission. [05 Marks]
- c) Explain the two (02) methods of scaling. [05 Marks]
- d) What are the differences between sequential processing and parallel processing? Explain your answer with the aid of suitable diagrams. [06 Marks]
- e) What is meant by pipelining in computer architecture? List the five (05) stages of a pipeline in their correct sequence. [07 Marks]

Q4.

- a) Explain the operation of an SR flip-flop. [04 Marks]
- b) Draw the Block diagram of PISO shift register. [04 Marks]
- c) Define a combinational logic circuit and explain its main characteristics. [05 Marks]
- d) Differentiate between Synchronous and Asynchronous systems with respect to the following features:
 - i. Clock requirement
 - ii. State change behavior

Give suitable examples for each type of system. [06 Marks]

- e) Explain the concept of a register file and describe its structure in a CPU. [06 Marks]

Q5.

- a) Define a Finite State Machine (FSM). [03 Marks]
- b) State the four (04) layers of the TCP/IP model. [02 Marks]
- c) Discuss how network protocols ensure secure and reliable communication between devices using three (03) key points. [06 Marks]
- d) Briefly explain the term "Database Management system". [03 Marks]
- e) Briefly explain the two main types of instruction sets used in computers. [06 Marks]

f) Briefly explain the following types of clock systems used in digital systems:

i. Single-phase clock

ii. Two-phase clock

[05 Marks]

Q6.

a) Define a memory block in the memory hierarchy.

[03 Marks]

b) What are the three (03) options for designing a memory system to support caches?

[03 Marks]

c) Define a message-passing multiprocessor system.

[03 Marks]

d) Provide two (02) drawbacks of the "Traditional Synchronous Busses".

[04 Marks]

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

[06 Marks]

f) Briefly explain UMA and NUMA multiprocessors.

[06 Marks]

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