



UNIVERSITY EXAMINATIONS

FIRST SEMESTER 2025/2026 ACADEMIC YEAR

**SECOND YEAR EXAMINATION FOR THE DEGREE OF
BACHELOR OF SCIENCE IN COMPUTER SCIENCE AND
BACHELOR OF SCIENCE IN INFORMATION
COMMUNICATION AND TECHNOLOGY**

COMP 213: COMPUTER ORGANIZATION AND ARCHITECTURE I

STREAM: R

TIME: 2 HRS

DAY: WEDNESDAY [14.30 16.30 P.M]

DATE: 04/02/2026

THIS QUESTION PAPER CONSISTS OF THREE (3) PAGES

PLEASE DO NOT OPEN UNTIL THE INVIGILATOR SAYS SO.

Instructions:

1. Answer question ONE (compulsory) and any other TWO
2. Begin each question on a new page

QUESTION ONE (30 MARKS)

- a) Using a labelled diagram, explain the Von Neumann Architecture and how it operates.
(6 Marks)
- b) Compare and contrast RISC and CISC architectures in terms of instruction complexity, performance, and hardware design.
(6 Marks)
- c) Explain the components of the system bus and describe the function of each (Data bus, Address bus, Control bus).
(6 Marks)
- d) Describe the procedure and importance of I/O addressing and control techniques when communicating with peripheral devices.
(8 Marks)
- e) Differentiate between polling and interrupt-driven I/O. State one advantage and one disadvantage of each.
(4 Marks)

QUESTION TWO (20 MARKS)

- a) Describe how cache memory is organized. Include a discussion of the following concepts:
i. Cache mapping techniques
ii. Cache replacement policies
(10 Marks)
- b) Identify and explain at least three factors that affect the performance of cache memory.
(6 Marks)
- c) What is meant by a memory hierarchy? Explain its role in improving system performance.
(4 Marks)

QUESTION THREE (20 MARKS)

- a) Describe in detail the phases of the instruction cycle as executed by the CPU. (8 Marks)
- b) Explain the concept of instruction pipelining and how it enhances processor performance. (6 Marks)
- c) Describe the main features of superscalar architecture and explain how it increases instruction throughput. (6 Marks)

QUESTION FOUR (20 MARKS)

- a) Differentiate between primary memory and secondary storage, and provide two examples of each. (6 Marks)
- b) Describe how RAID technology works. Discuss any three RAID levels, highlighting their advantages. (8 Marks)
- c) Compare the operation and performance of the following storage media:
- i. Hard Disk Drive (HDD)
 - ii. Solid State Drive (SSD)
 - iii. Optical Disc (6 Marks)

QUESTION FIVE (20 MARKS)

- a) Describe the structure of a layered system architecture. Use an example to illustrate how such architecture improves modularity. (5 Marks)
- b) What are the major steps in installing and configuring an operating system on a new machine ? (5 Marks)
- c) What is system partitioning and why is it important during system setup? (4 Marks)
- d) Discuss three reasons why system performance may degrade over time and suggest remedies for each. (6 Marks)