

PAN AFRICA CHRISTIAN UNIVERSITY

BACHELOR OF BUSINESS INFORMATION TECHNOLOGY AND BACHELOR OF SCIENCE IN INFORMATION TECHNOLOGY

END OF TERM EXAMINATION

DEPARTMENT: COMPUTING & INFORMATION TECHNOLOGY

COURSE CODE: BSIT 206

CAMPUS: ROYSAMBU

COURSE TITLE: COMPUTER ORGANIZATION AND ARCHITECTURE

EXAM DATE: TUESDAY 9TH ,DECEMBER ,2025

TIME: 2:00PM -5:00PM

INSTRUCTIONS

- This exam script has **TWO (2)** sections.
- Read all questions carefully before attempting.
- Answer All questions in Section **A** and any other THREE questions in Section **B**.
- Write only your **student number** on the answer booklet provided.

SECTION A (COMPULSORY)

QUESTION ONE (15 Marks) Compulsory

- a) Briefly explain the roles of the following in processor organization:
- i. Arithmetic Logic Unit (ALU)
 - ii. Processor registers
 - iii. Internal buses (6 marks)
- b) Explain **TWO** reasons why it is important in computer systems. (4 marks)
- c) With an example, describe how Algorithmic State Machines (ASM) are applied in digital system design. (2 marks)
- d) Discuss **THREE** differences between hardwired control and microprogrammed control in processor design. (3 marks)

SECTION B: (ANSWER ANY THREE (3) QUESTIONS IN THIS SECTION)
QUESTION TWO (15 marks)

A company is designing a new desktop computer system for office and multimedia applications.

- a) Explain the **THREE** types of system buses and explain their roles in communication within the system. (6 marks)
- b) The company must choose between interrupt-driven I/O and DMA for transferring data from an external device. Recommend the best approach for high-speed data transfer and justify your answer. (6 marks)
- c) Explore **THREE** advantages of using I/O channels and processors in a high-performance workstation. (3 marks)

QUESTION THREE (15 marks)

- a) Describe computer organization and computer architecture, clearly showing the distinction between them. (4 marks)
- b) Explore three milestones in the evolution of computers. (3 marks)
- c) With the help of a labeled diagram, describe the functional units of a computer system. (4 marks)
- d) Differentiate between main memory, cache memory, and external memory (3 marks)

marks)

e) Explain the significance of number systems in computer architecture (1 marks)

QUESTION FOUR (15 marks)

A software development team is optimizing a CPU design for faster execution of complex programs.

a) Explain the following with practical examples:

i. Instruction set (2 marks)

ii. Addressing modes (2 marks)

iii. Instruction cycle (2 marks)

b) The CPU uses cache memory to improve performance. Explain how cache memory affects execution speed (2 marks)

c) Compare semiconductor memory and external storage devices, recommending which is more suitable for temporary and permanent storage in a corporate server setup.

(4 marks)

d) Explain instruction pipelining in modern CPUs and discuss three practical challenges faced when executing pipelined instructions in real-world processors. (3 marks)

QUESTION FIVE (15 marks)

a) In CPU organization, explain the role of:

i. General purpose registers

ii. Instruction decoder

iii. Control unit

Provide examples of how each improves processor performance. (6 marks)

b) Convert the following

i. $(101101)_2$ to decimal (3 marks)

ii. $(347)_8$ to binary (3 marks)

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iii. $(AF)_{16}$ to binary
marks)

(3

QUESTION SIX (15 marks)

- a) Define Instruction Set Architecture (ISA) and explain its role as the interface between software and hardware. (2 marks)
- b) Differentiate between RISC and CISC instruction set architectures, giving TWO examples of each. (6 marks)
- c) Explain the differences between programmed I/O, interrupt-driven I/O, and Direct Memory Access (DMA). (6 marks)
- d) Discuss the main purpose of the Control Unit (CU) in processor organization. (1 marks)

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