



UNIVERSITI TUN HUSSEIN ONN MALAYSIA

**FINAL EXAMINATION
SEMESTER II
SESSION 2023/2024**

- COURSE NAME : COMPUTER ARCHITECTURE
- COURSE CODE : BIT 20303
- PROGRAMME CODE : BIT
- EXAMINATION DATE : JULY 2024
- DURATION : 3 HOURS
- INSTRUCTIONS :
1. ANSWER ALL QUESTIONS
 2. THIS FINAL EXAMINATION IS CONDUCTED VIA
 - Open book
 - Closed book
 3. STUDENTS ARE **PROHIBITED** TO CONSULT THEIR OWN MATERIAL OR ANY EXTERNAL RESOURCES DURING THE EXAMINATION CONDUCTED VIA CLOSED BOOK

THIS QUESTION PAPER CONSISTS OF **FOUR (4)** PAGES

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- Q1** (a) Show your conversion for the following representations into number systems.
- (i) 10000100001000100_2 into base 16 (2 marks)
 - (ii) $FBDA867_{16}$ into base 10 and base 2 (4 marks)
 - (iii) 45692375_{10} into base 8 and base 16 (4 marks)
- (b) Show your calculations for the following arithmetic operations in two's-complement notations.
- (i) $-37_{10} - 21_{10}$ (2 marks)
 - (ii) $47_{10} - 12_{10}$ (2 marks)
- (c) Given a Boolean function as below.
- $$D = (C + B) + (\bar{A} + B). \bar{C}$$
- Show a Truth Table for function D. (9 marks)

Q2 Table Q2.1 shows a list of opcodes, each with its description.

Table Q2.1 Opcode

Opcode	Description
ADD	Compute sum of two operands
SUB	Compute difference of two operands
MUL	Compute product of two operands
DIV	Compute quotient of two operands
MOVE	Transfer word or block from source to destination
STORE	Transfer word from processor to memory
LOAD	Transfer word from memory to processor

Write a machine-language program in symbolic form to compute:
 $X = ((A+B) \times C) - (D/E)$ for each the following machines.

- (i) 3- Address machines (2 marks)
- (ii) 2- Address machines (3 marks)
- (iii) 1- Address machines (4 marks)

Q3 Answer the following questions.

(a) If the last operation performed on a computer with an 8-bit word was an addition in which the two operands were 00000010 and 00000011. Determine the value of the following flags.

- (i) Carry
- (ii) Zero
- (iii) Overflow
- (iv) Sign
- (v) Even Parity

(5 marks)

(b) In your opinion, which type of microprocessor is better for each of the following situations? Justify your answers.

- (i) A desktop computer using Celeron for a first year student at a university. (4 marks)
- (ii) A high-end computer using dual-core processor for processing multimedia applications such as rendering video clips and mining bit coins. (4 marks)

(4 marks)

Q4 (a) When the Control Unit performs its function, it must have inputs that allow it to determine the state of the system and outputs that allow it to control the behavior of the system. Explain each of the inputs and each of the outputs involved.

(11 marks)

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(b) Construct the micro-operations for the following cycles. You may either describe the steps or write symbolically.

(i) Fetch cycle

(2 marks)

(ii) Execute cycle

(2 marks)

- END OF QUESTIONS -

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