



**UNIVERSITI TUN HUSSEIN ONN MALAYSIA**

**FINAL EXAMINATION  
(ONLINE)  
SEMESTER I  
SESSION 2020/2021**

COURSE NAME : COMPUTER ARCHITECTURE  
COURSE CODE : BIT 20303  
PROGRAMME CODE : BIT  
EXAMINATION DATE : JANUARY / FEBRUARY 2021  
DURATION : 3 HOURS  
INSTRUCTION : 1. ANSWER ALL QUESTIONS.  
2. PLEASE MAKE SURE TO CLICK "SAVE ANSWER" BUTTON FOR SUBJECTIVE QUESTIONS. OBJECTIVE QUESTIONS ARE SAVED AUTOMATICALLY

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

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**Q1** (a) Convert the following hexadecimal numbers into binary representations. Show your calculations.

(i)  $14F'C_{16}$  (2 marks)

(ii)  $CA97_{16}$  (2 marks)

(iii)  $97BAD_{16}$  (2 marks)

(b) Perform the following arithmetic operations in two's-complement notations. Show your calculations.

(i)  $21_{10} - 35_{10}$  (2 marks)

(ii)  $12_{10} + 40_{10}$  (2 marks)

(c) Given a **NOR** gate and **NOT** gates, draw a logic diagram that will perform the three- Input **AND** function.

(4 marks)

(d) Given a Boolean function as below.

$$D = (\bar{A} + B) \cdot \bar{C} + (C + B)$$

Construct a Truth Table for function D.

(4 marks)

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

**Table Q2**

| <b>Opcode</b> | <b>Description</b>                                |
|---------------|---|
| 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) 1- Address machines (4 marks)
- (ii) 2 Address machines (3 marks)
- (iii) 3- Address machines (2 marks)

**Q3** (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, what would be the value of the following flags?

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

(5 marks)

(b) Repeat **Q3(a)** for the addition of -1 (twos complement) and +1.

(5 marks)

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- (c) In your opinion, which type of CPU is better for each of the following situations? Justify your answers.
- (i) A desktop computer for a first year student at the Faculty of Computer Science and Information Technology, Universiti Tun Hussein Onn Malaysia (UTHM) (4 marks)
  - (ii) A high end computer for processing multimedia applications such as rendering video clips and mining bit coins (4 marks)
- Q4** (a) For the Control Unit to perform 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.
- (i) Explain each of the inputs and each of the outputs involved. (5 marks)
  - (ii) Illustrate the design of a Control Unit. (6 marks)
- (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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