Universiti Tun Hussein Onn Malaysia

UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION
(ONLINE)
SEMESTER I
SESSION 2020/2021

COURSE NAME	:	COMPUTER ARCHITECTURE
COURSE CODE	:	BIC 10503
PROGRAMME CODE	:	BIS / BIP/ BIW/ BIM
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

THIS QUESTION PAPER CONSISTS OF **FIVE (5)** PAGES

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

(i) $14FC_{16}$

(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 Boolean function as below. Answer the following questions.

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

(i) Construct a Truth Table for function D.

(8 marks)

(ii) Construct a Karnaugh Map from the equation and the Truth Table in **Q1(c)(i)**

(4 marks)

(iii) Generate the simplest equation for function D from the Karnaugh Map.

(3 marks)

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

Table Q2(b)

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

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

(i) 1- Address machines

(8 marks)

(ii) 2 Address machines

(7 marks)

(iii) 3 Address machines

(4 marks)

Q3 (a) Discuss **TWO (2)** features of the following Central Processing Unit (CPU) from these manufacturers.

(i) Advanced Micro Devices (AMD) Inc.

(5 marks)

(ii) Intel Corporation

(5 marks)

(b) Sort the following CPU based on their production time; earliest to latest.

Intel Pentium I, Intel Pentium II, Intel Pentium III, Intel 80286, Xeon Platinum 8380HL, AMD Ryzen 9590X, ENIAC CPU, IAS CPU, CYRIX CX486DRx

(4 marks)

(c) Describe the relation between the following CPU terminologies.

(i) Core and Thread

(2 marks)

(ii) L1, L2 and L3 Cache

(2 marks)

(iii) Frequency (Hz) and Speed (bps)

(2 marks)

(d) 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).

(2 marks)

(ii) A high-end computer for processing multimedia applications such as rendering video clips and mining bit coins.

(3 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.

(6 marks)

(ii) Illustrate the design of a Control Unit

(3 marks)

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

(i) Fetch cycle

(4 marks)

(ii) Interrupt cycle

(4 marks)

(iii) Execute cycle

(4 marks)

- END OF QUESTIONS -