UTHM
Universiti Tun Hussein Onn Malaysia

UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION
(ONLINE)
SEMESTER II
SESSION 2019/2020

COURSE NAME	:	COMPUTER ARCHITECTURE
COURSE CODE	:	BIT 20303
PROGRAMME CODE	:	BIT
EXAMINATION DATE	:	JULY 2020
DURATION	:	2 HOURS 30 MINUTES
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 **FIVE (5)** PAGES

Q1 (a) Show the 2's complement signed magnitude 8 bits representation of the following:

(i) $+54_{10}$

(3 marks)

(ii) -43_{10}

(4 marks)

(b) Compute the following binary pairs and show your calculation.

(i) 1100 0100 + 0011 0110

(2 marks)

(ii) 1110 x 1010

(3 marks)

(iii) 0111 1111 ÷ 11

(4 marks)

(c) Complete the truth table in Table **Q1(c)** for the following logic circuit in the Figure **Q1(c).**

(4 marks)

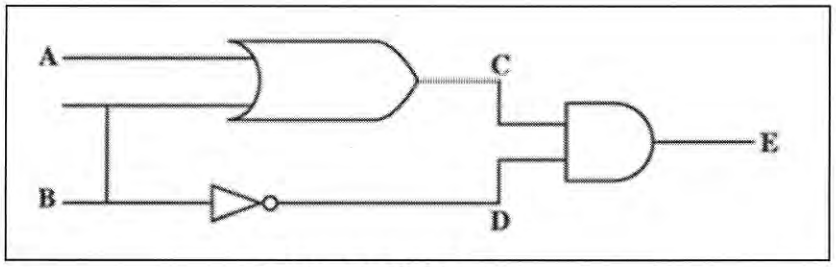

FIGURE Q1(c)

TABLE Q1(c)

A	B	C	D	E
0	0			
0	1			
1	0			
1	1			

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

ADD	Add
SUB	Subtract
MPY	Multiply
DIV	Divide
MOVE	Move data

Figure Q2

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

(a) 3-address machines

(4 marks)

(b) 2-address machines

(5 marks)

(c) 1-address machines

(6 marks)

(d) Based on answers in **Q2(a)**, **Q2(b)**, and **Q2(c)**, analyze the impact of having fewer addresses per instruction.

(5 marks)

Q3 (a) Explain **FIVE (5)** processor tasks to form a complete instruction cycle.

(10 marks)

(b) A processor is designed with a Memory Address Register (MAR), a Memory Buffer Register (MBR), a Program Counter (PC) and an Instruction Register (IR). It is required to run a machine instruction as below.

```
ADD R1, R0, 1
```

Based on the above statement, illustrate and explain the fetch cycle.

(5 marks)

(c) **Figure Q3(c)** shows the execution of nine instructions in pipeline.

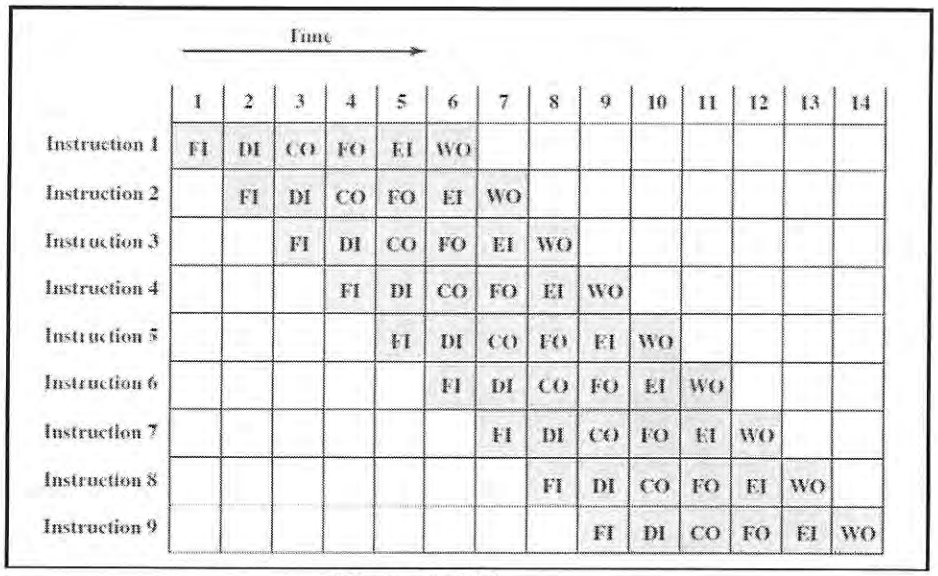

Figure Q3(c)

Illustrate a two-stage pipeline consisting fetch operation and execute operation to run four instructions.

(5 marks)

Q4 (a) Suggest **ONE (1)** suitable method in designing control unit for a computer that uses Graphics Processing Unit (GPU).

(2 marks)

(b) Give **FOUR (4)** reasons of your suggestion in **Q4(a)**.

(8 marks)

(c) **Figure Q4(c)** shows a block diagram of the Control Unit. Explain its **FOUR (4)** inputs and its **TWO (2)** outputs.

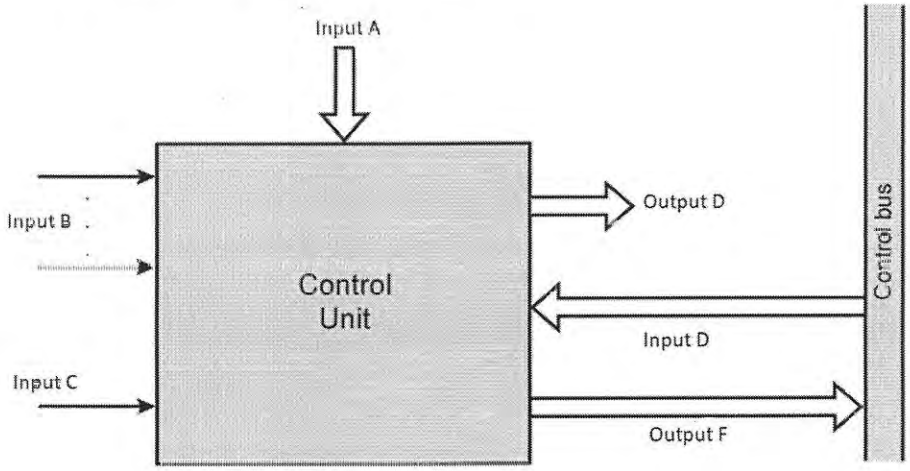

Figure Q4(c)

(10 marks)

- END OF QUESTIONS -