



UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION SEMESTER II SESSION 2009/2010

SUBJECT NAME : FUNDAMENTAL OF COMPUTER ARCHITECTURE

KOD MATA PELAJARAN : DIT 1043

COURSE : 1 DIT / 2 DIT

EXAMINATION DATE : APRIL / MAY 2010

DURATION : 2 HOUR 30 MINUTES

INSTRUCTION : ANSWER ALL QUESTION.

THIS QUESTION PAPER CONTAINS NINE (9) PAGES

Instruction: Answer **ALL** questions.

Q1 (a) Based on **FIGURE Q1(a)**, answer the following questions;

		CD			
		00	01	11	10
AB	00	1	0	0	1
	01	1	0	0	1
	11	1	0	0	1
	10	1	1	1	1

FIGURE Q1(a)

- (i) Based on **FIGURE Q1(a)**, draw the appropriate circles for grouping them according to 4 variables K-Map. (2 marks)
- (ii) Make the simplest equation by using Aljabar Boolean Theorems for the given **FIGURE Q1(a)**. (8 marks)

(b) Based on **FIGURE Q1(b)**, answer the following questions;

$$F = (\overline{X}Z) + (\overline{XY + X}) + (X\overline{Y}Z)$$

$$R = (A\overline{B}C) + (\overline{B}C) + (\overline{A + C})$$

FIGURE Q1(b)

- (i) Construct truth table for the functions in **FIGURE Q1(b)**. (10 marks)
- (ii) Draw the appropriate circuit diagram for the functions in **FIGURE Q1(b)**. (10 marks)

- Q2 (a) Explain **SIX (6)** steps involve in a program execution based on **FIGURE Q2**. (8 marks)

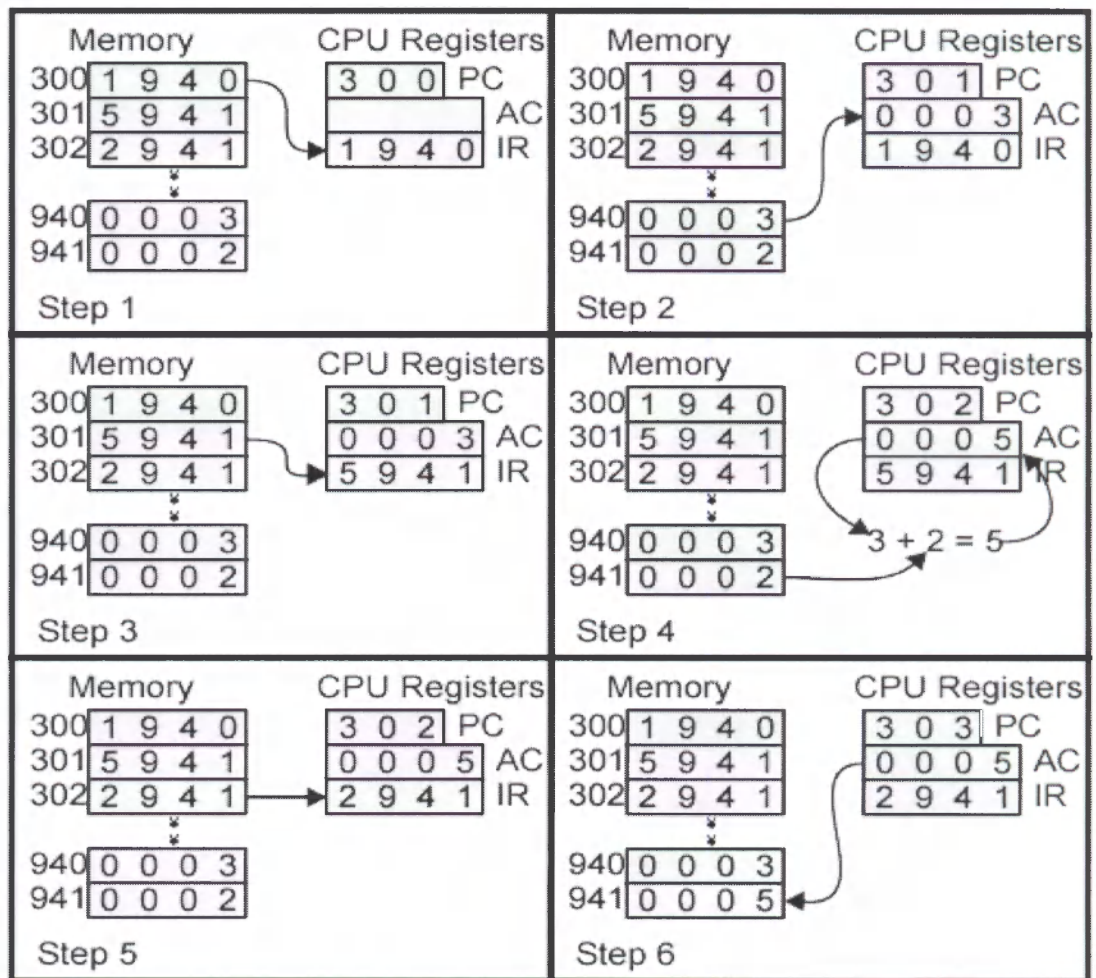


FIGURE Q2

- (b) Convert the following hexadecimal number into binary representation:

- (i) $12FDC_{16}$
 (ii) $CA57_{16}$
 (iii) $83BCD_{16}$

(6 marks)

- (c) Perform the following arithmetic operation in two's-complement notation:

- (i) $-20_{10} + 30_{10}$
 (ii) $-31_{10} - 19_{10}$

Note: Please use 6 bit.

(6 marks)

- Q3** (a) Define:
- (i) Access Time
 - (ii) Memory Cycle time
 - (iii) Transfer Rate
 - (iv) Seek Time
- (4 marks)
- (b) List **SIX (6)** steps in cache operation.
- (6 marks)
- (c) Describe **FOUR (4)** types of access methods.
- (8 marks)
- (d) Explain **THREE (3)** configurations of Direct Memory Access (DMA) with appropriate diagram.
- (12 marks)

- Q4 (a) Describe **THREE (3)** types of Input Output techniques. (6 marks)
- (b) Based on **FIGURE Q4**, three-word instruction is stored at memory location 500 and the address field of the instruction is at memory address 502. Based on the value given for memory and registers, find out the **Effective Address - EA** and **Operand** for each of the following addressing mode:
- Immediate Mode
 - Direct Mode
 - Indirect Addressing Mode
 - Relative Addressing Mode
 - Indexed Addressing Mode
 - Register Addressing Mode
 - Register Indirect Mode

PC	503
R2	605
XR	300
500	LOAD
501	MODE
502	700
700	900
605	910
900	445
910	800
1000	450
1203	650

FIGURE Q4

(14 marks)

Arahan: Jawab semua soalan.

S1 (a) Berdasarkan **RAJAH S1(a)** jawab soalan berikutnya:

		CD			
		00	01	11	10
AB	00	1	0	0	1
	01	1	0	0	1
	11	1	0	0	1
	10	1	1	1	1

RAJAH S1(a)

(i) Berdasarkan **RAJAH S1(a)**, lukiskan bulatan yang menunjukkan pengumpulan berdasarkan kepada K Map **EMPAT (4)** pembolehubah.

(2 markah)

(ii) Hasilkan persamaan termudah dengan menggunakan Teori Aljabar Boolean bagi **RAJAH S1(a)**.

(8 markah)

(b) Berdasarkan **RAJAH S1(b)**, jawab soalan-soalan berikutnya;

$$F = (\overline{XZ}) + (\overline{XY + X}) + (X \overline{YZ})$$

$$R = (A \overline{B} \overline{C}) + (\overline{B} C) + (\overline{A + C})$$

RAJAH S1(b)

(iii) Hasilkan jadual kebenaran bagi fungsi pada **RAJAH S1(b)**.

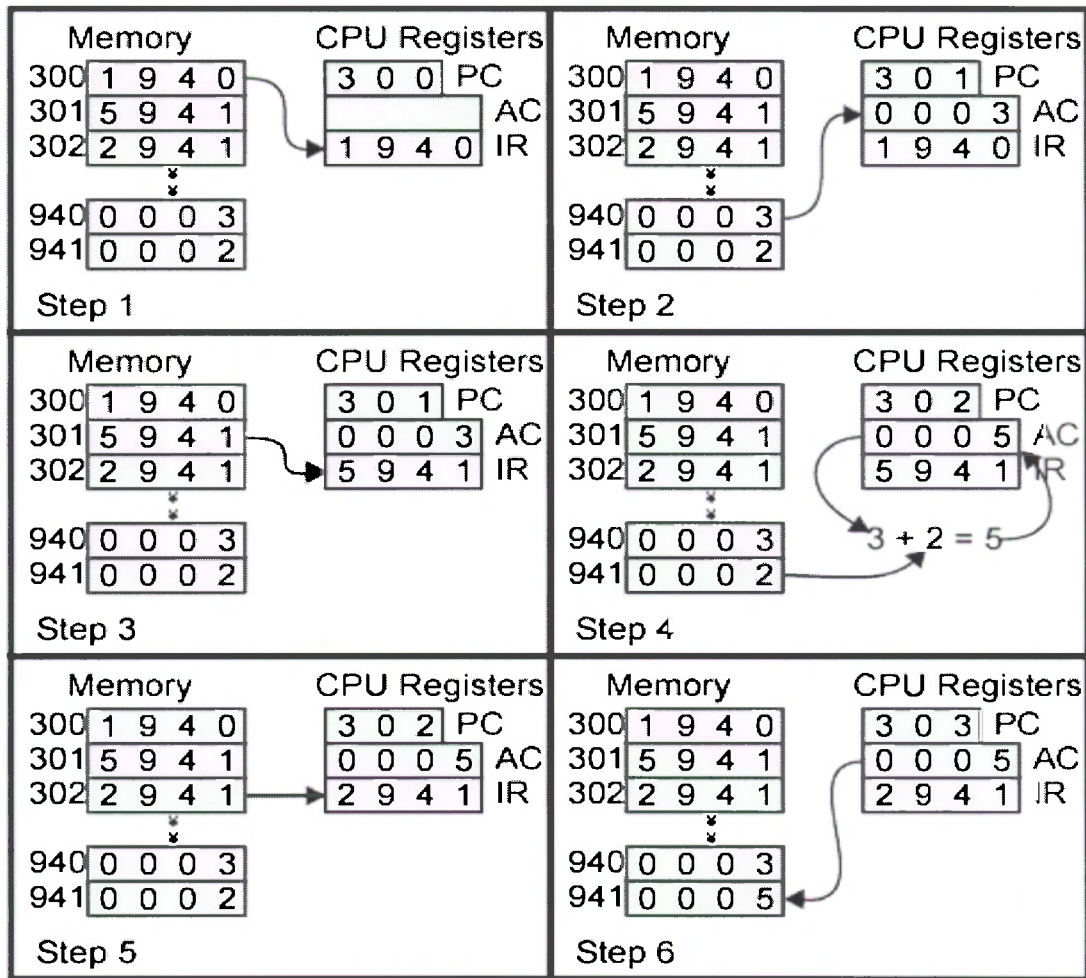
(10 markah)

(iv) Lukiskan gambarajah litar bagi fungsi pada **RAJAH S1(b)**.

(10 markah)

- S2 (a) Huraikan ENAM (6) langkah yang terlibat di dalam pelaksanaan program berdasarkan RAJAH S2.

(8 markah)



RAJAH S2

- (b) Tukarkan nombor perenambelasan berikut kepada nombor perduaan (asas dua):

- (i) $12FDC_{16}$
(ii) $CA57_{16}$
(iii) $83BCD_{16}$

(6 markah)

- (c) Selesaikan operasi aritmetik berikut dengan menggunakan pelengkap-2.

- (i) $-20_{10} + 30_{10}$
(ii) $-31_{10} - 19_{10}$

Nota: Sila gunakan 6 bit

(6 markah)

- S3 (a) Berikan definisi bagi istilah berikut:
- (i) *Access Time*
 - (ii) *Memory Cycle time*
 - (iii) *Transfer Rate*
 - (iv) *Seek Time*
- (4 markah)
- (b) Senaraikan **ENAM (6)** langkah di dalam operasi cache.
- (6 markah)
- (b) Terangkan **EMPAT (4)** jenis kaedah-kaedah capaian.
- (8 markah)
- (c) Huraikan **TIGA (3)** konfigurasi *Direct Memory Access (DMA)*. Huraian anda mestilah disokong dengan gambarajah yang bersesuaian.
- (12 markah)

S4 (a) Jelaskan **TIGA (3)** kategori teknik Input Output.

(6 markah)

(b) Berdasarkan **RAJAH S4**, arahan tiga-perkataan (*three-word instruction*) disimpan di dalam ingatan pada lokasi 500 dan medan alamat bagi arahan tersebut berada pada lokasi 502. Berdasarkan kandungan ingatan dan daftar yang diberikan, dapatkan nilai **Effective Address – EA** dan **Operand** bagi setiap mod pengalamatan berikut:

- (i) *Immediate Mode*
- (ii) *Direct Mode*
- (iii) *Indirect Addressing Mode*
- (iv) *Relative Addressing Mode*
- (v) *Indexed Addressing Mode*
- (vi) *Register Addressing Mode*
- (vii) *Register Indirect Mode*

PC	503
R2	605
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RAJAH S4

(14 markah)