

SULIT



BAHAGIAN PEPERIKSAAN DAN PENILAIAN  
JABATAN PENDIDIKAN POLITEKNIK  
KEMENTERIAN PENDIDIKAN MALAYSIA

JABATAN KEJURUTERAAN ELEKTRIK

PEPERIKSAAN AKHIR  
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**EC304: MICROPROCESSOR FUNDAMENTAL**

**TARIKH : 22 APRIL 2015**  
**MASA : 8.30 PG – 10.30 PG (2 JAM)**

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Kertas ini mengandungi **SEMBILAN BELAS (19)** halaman bercetak.

Bahagian A: Objektif (20 soalan)

Bahagian B: Struktur (10 soalan)

Bahagian C: Esei (2 soalan)

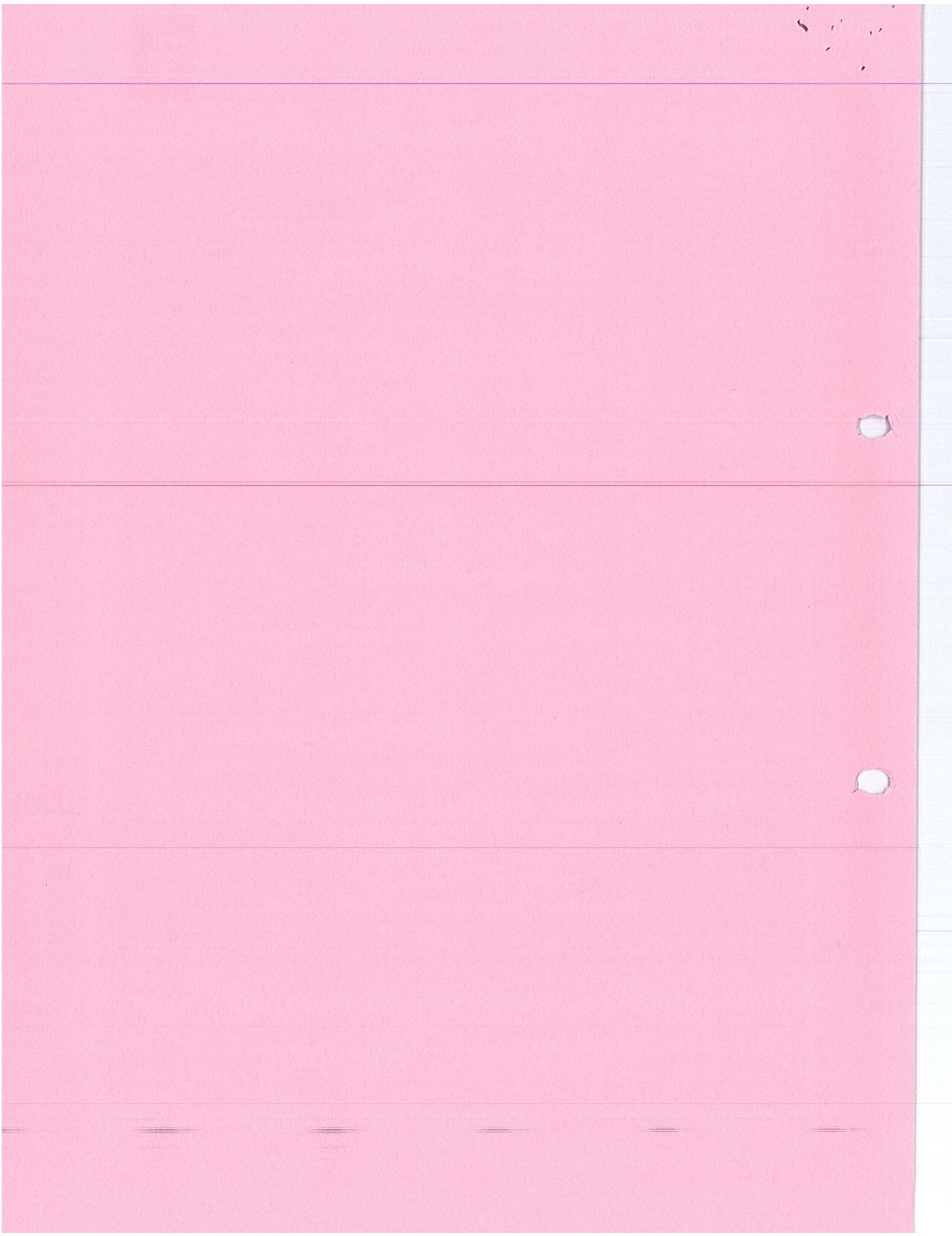
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**JANGAN BUKA KERTAS SOALANINI SEHINGGA DIARAHKAN**

(CLO yang tertera hanya sebagai rujukan)

SULIT



**SECTION A : 20 MARKS****BAHAGIAN A : 20 MARKAH****INSTRUCTION:**

This section consists of **TWENTY (20)** objective questions. Mark your answers in the OMR form provided.

**ARAHAN :**

Bahagian ini mengandungi **DUA PULUH (20)** soalan objektif. Tandakan jawapan anda di dalam borang OMR yang disediakan.

CLO1  
C1

1. Identify **THREE (3)** basic components of microprocessor-based systems.

- Pilih **TIGA (3)** komponen asas dari sistem berdasarkan mikropemproses.*
- A. Arithmetic logic unit (ALU), memory and input / output  
*Aritmetik logic unit (ALU), ingatan dan masukan/keluaran*
  - B. Control unit, register and arithmetic logic unit (ALU)  
*Unit kawalan, pendaftar dan aritmetik logic unit (ALU)*
  - C. Microprocessor, memory and input / output  
*Mikropemproses, ingatan dan masukan/keluaran*
  - D. Control unit, register and memory  
*Unit kawalan, pendaftar dan ingatan*

CLO1  
C3

2. 7 gigabyte is equivalent to :

*7 gigabait adalah setara dengan :*

- A.  $7 \times 1024$  Byte  
 *$7 \times 1024$  Bait*
- B.  $7 \times 1024$  Kilobyte  
 *$7 \times 1024$  KiloBait*
- C.  $7 \times 1024$  Megabyte  
 *$7 \times 1024$  MegaBait*
- D.  $7 \times 1024$  Terabyte  
 *$7 \times 1024$  TeraBait*

- CLO1 C2 3. Which of the following are the **THREE (3)** basic sections of a microprocessor unit?

*Antara berikut yang mana adalah **TIGA (3)** bahagian asas unit pemproses mikro?*

- A. Operand, register, and arithmetic / logic unit (ALU)  
*Kendalian, daftar dan unit arithmatik / logic (ALU)*
- B. Control and timing, register, and arithmetic/logic unit (ALU)  
*Kawalan dan masa, daftar, dan unit aritmetik / logik (ALU)*
- C. Control and timing, register, and memory  
*Kawalan dan masa, daftar, dan memori*
- D. Arithmetic/logic unit (ALU), memory, and input/output  
*Aritmetik / unit logik (ALU), memori, dan input / output*

- CLO1 C1 4. Microprocessor is the \_\_\_\_\_ of the computer and it perform all the computational tasks

*Mikropemproses ialah \_\_\_\_\_ komputer dan ia melaksanakan semua tugas pengiraan*

- A. main  
*utama*
- C. important  
*penting*
- B. heart  
*jantung*
- D. simple  
*mudah*

- CLO3 C1 5. The process of finding and correcting error within a program is called :

*Proses mencari dan memperbaiki kesalahan di dalam aturcara dikenali sebagai:*

- A. assembling  
*'assembling'*
- B. compiling  
*'compiling'*
- C. debugging  
*'debugging'*
- D. linking  
*'linking'*

CLO3  
C4

6. Choose only **ONE (1)** question. (Either Motorola **OR** Intel)

*Pilih **SATU(1)** soalan sahaja. (Sama ada Motorola ATAU Intel)*

Motorola:	<p>The instruction “<b>SUB,W D0,\$2000</b>” will subtract the data word held in :</p> <p><i>Arahan “SUB.W D0,\$2000” bermaksud menolak ‘word’ data berada dalam :</i></p>
Intel:	<p>The instruction “<b>SUB [2000],BX</b>” will subtract the data word held in :</p> <p><i>Arahan “SUB [2000],BX” bermaksud menolak ‘word’ data berada dalam :</i></p>

Motorola

- A. D0 from location  $00002000_H$ .  
*D0 dari lokasi  $00002000_H$ .*
- B. D0 from location  $20000000_H$ .  
*D0 dari lokasi  $20000000_H$ .*
- C. location  $00002000_H$  from D0  
*lokasi  $00002000_H$  dari D0*
- D. location  $20000000_H$  from D0  
*lokasi  $20000000_H$  dari D0*

Intel

- A. register BX from location  $00002000_H$ .  
*daftar BX dari lokasi  $00002000_H$ .*
- B. register BX from location  $20000000_H$ .  
*daftar BX dari lokasi  $20000000_H$ .*
- C. location  $00002000_H$  from register BX  
*lokasi  $00002000_H$  dari daftar BX.*
- D. location  $20000000_H$  from register BX.  
*lokasi  $20000000_H$  dari daftar BX.*

CLO3  
C4

7. The Assembly Language program in table A5 below will execute :

*Aturcara bahasa himpunan di dalam Jadual A5 akan melaksanakan :*

Table A5/Jadual A5

Motorola	Intel
<b>MOVE.W</b> \$2000,D0	<b>MOV BX,[2000]</b>
<b>ADD.W</b> \$2100,D0	<b>ADD BX,[2100]</b>
<b>MOVE.W</b> D0,\$2200	<b>MOV [2200],BX</b>

- A. add the values  $2000_H$  and  $2100_H$ , placing the result in location  $2200_H$   
*Tambahkan nilai  $2000_H$  dan  $2100_H$ , letakkan hasil di lokasi  $2200_H$*
- B. add the contents of locations  $2000_H$  and  $2100_H$ , placing the result in location  $2200_H$   
*tambahkan kandungan dalam lokasi  $2000_H$  dan  $2100_H$ , letakkan hasil di lokasi  $2200_H$*
- C. copy the contents of D0/BX into locations  $2000_H$ ,  $2100_H$  and  $2200_H$   
*salin kandungan daftar data 0 kepada lokasi  $2000_H$ ,  $2100_H$  dan  $2200_H$*
- D. copy the contents of D0/BX into locations  $2000_H$  and  $2100_H$ , then load D0/BX from location  $2200_H$   
*salin kandungan daftar data 0 kepada lokasi  $00002000_H$  dan  $00002100_H$ , seterusnya pindahkan daftar data 0 dari lokasi  $00002200_H$*

CLO3  
C2

8. The type of BRANCH which allow the microprocessor to make decisions are called :

*Cabang yang membenarkan mikropemproses untuk melakukan pertimbangan dikenali sebagai :*

- |  |  |
|--|--|
| A. conditional branch<br><i>cabang bersyarat</i> | C. indirect branch<br><i>cabang tidak terus</i>          |
| B. direct branch<br><i>cabang terus</i>          | D. unconditional branch<br><i>cabang tidak bersyarat</i> |

CLO3

C4

9. Choose only **ONE (1)** question. (Either Motorola **OR** Intel).

*Pilih SATU(1) soalan sahaja (sama ada Motorola ATAU Intel).*

Motorola:	After the 68000 has added together the words $FFFF_H$ and $0001_H$ , the Zero (Z) and Carry (C) Flags will display : <i>Selepas 68000 menambah data 'words' <math>FFFF_H</math> dan <math>0001_H</math>, bendera Zero (Z) and Carry (C) akan menunjukkan :</i>
Intel:	After the 8086 has added together the words $FFFF_H$ and $0001_H$ , the Zero (Z) and Carry (C) Flags will display : <i>Selepas 68000 menambah data 'words' <math>FFFF_H</math> dan <math>0001_H</math>, bendera Zero (Z) and Carry (C) akan menunjukkan :</i>

CLO3  
C2

10. A sequence of instructions which appear once but may be used several times is called a :

*Urutan arahan yang dipaparkan sekali tapi boleh digunakan beberapa kali dikenali sebagai :*

- A. return  
*'return'*
- B. stack  
*tindan*
- C. main program  
*aturcara utama*
- D. subroutine  
*subrutin*

Motorola

A. C=0, Z=0

B. C=0, Z=1

C. C=1, Z=0

D. C=1, Z=1

Intel

A. CF=0, ZF=0

B. CF=0, ZF=1

C. CF=1, ZF=0

D. CF=1, ZF=1

CLO3

C2

11. The last stack location used is defined by the contents of the :

- Kandungan lokasi tindanan yang terakhir ditunjukkan melalui :*
- A. flag register  
*daftar bendera*
  - B. program counter register  
*daftar pembilang aturcara*
  - C. stack pointer register  
*daftar pembilang tindan*
  - D. alternative register  
*'alternative register'*

CLO3

C4

12. Choose only **ONE (1)** question (either Motorola **OR** Intel).

*Pilih SATU(1) soalan sahaja (sama ada Motorola ATAU Intel).*

Motorola:	Determine the content of D4 after MC68000 executes instruction <b>AND.B D0,D4</b> if D0=\$AAAA0012 and D4=\$FFFFE00. <i>Nyatakan kandungan D4 selepas MC68000 melaksanakan arahan AND.B D0,D4 jika D0=\$AAAA0012 dan D4=\$FFFFE00.</i>
Intel:	Determine the content of BX after 8086 executes instruction <b>AND BH,CL</b> if BX=1234h and CL=FE00h. <i>Nyatakan kandungan BX selepas 8086 melaksanakan arahan AND BH,CL jika BX=1234h dan D4=FE00h.</i>

Motorola

- A. AAAA 1200
- B. FFFF 1200
- C. FFFF FE00
- D. AAAA FE00

Intel

- A. FE12
- B. 1200
- C. 0034
- D. FE34

CLO2

C1

13. During a program execution, where are the program instructions and data stored in a microcomputer?

*Di manakah data dan arahan program disimpan dalam mikrokomputer sewaktu perlaksanaan program?*

- A. ALU/Dalam ALU
- B. MPU/Dalam MPU
- C. RAM/Dalam RAM
- D. data bus/Dalam bus data

- CLO2 C2 14. Dynamic RAM storage cells are accessed using a technique called:  
*Sel-sel penyimpanan dalam Dinamik RAM boleh dicapai dengan menggunakan teknik yang dikenali sebagai:*
- A. address decoding/*alamat penyahkod*
  - B. address multiplexing/*alamat multipleks*
  - C. address demultiplexing/*alamat demultipleks*
  - D. address strobing/*alamat strob.*
- CLO2 C4 15. What is the organization of a memory chip that has 16 address pins and 8 data pins?  
*Apakah organisasi peranti ingatan yang mempunyai 16 pin alamat dan 8 pin data?*
- A. 64K x 4
  - B. 64K x 8
  - C. 8K x 64
  - D. 64k x 64
- CLO2 C2 16. The read-only memory that stores data permanently in the system and does not change when power supply is disconnected is often called as:  
*Ingatan baca sahaja yang menyimpan data, kekal dalam sistem dan kandungannya tidak berubah apabila bekalan diputuskan dikenali sebagai:*
- A. permanent memory/*ingatan kekal*
  - B. volatile memory/ *ingatan meruap*
  - C. erasable memory/*ingatan mudah padam*
  - D. non-volatile memori/*ingatan tidak meruap*

CLO4  
C2

17. Which of the following is **FALSE** regarding serial data transfer?

- Antara berikut, yang manakah **TIDAK BENAR** untuk pemindahan data siri?*
- A. Data is transferred in a single line, in a sequential manner  
*Data dipindahkan dalam satu talian, secara berturutan*
  - B. Preferred choice for long distance data transfer as it is cheaper  
*Pilihan yang dipilih data jarak jauh memindahkan kerana ia lebih murah*
  - C. Data is sent through asynchronous or synchronous transfer  
*Data di hantar melalui pemindahan tidak segerak atau segerak*
  - D. Faster rate of data transfer  
*Kadar pemindahan data lebih cepat*

CLO4  
C1

18. Two types of series interface chips commonly used are the

*Asynchronous Receiver Transmitter (UART) and the Asynchronous Communication Interface Adapter (ACIA).*

*Dua jenis cip antara muka siri biasa digunakan adalah yang  
Asynchronous Receiver Transmitter (UART) dan Asynchronous Communication Interface Adapter (ACIA).*

- A. Unidirectional  
*Satu hala*
- B. Unichip  
*Satu Cip*
- C. Universal  
*Pelbagai*
- D. Used  
*Berguna*

CLO4  
C3

19. "In this transfer of data, there is an exchange of control signal between the microprocessor and slower peripheral". The above statement is best suited for:

*"Dalam pemindahan data ini, terdapat pertukaran isyarat kawalan antara mikropemproses dan perisian berkelajuan perlahan". Kenyataan di atas adalah paling sesuai untuk:*

- A. hand-shaking  
*jabat tangan*
- B. direct memory access (DMA)  
*capaian ingatan terus*
- C. interrupt  
*sampukan*
- D. programmed I/O (polling).  
*I/O program*

CLO4  
C2

20. Which method of data transfer bypasses the CPU ?

*Manakah satu kaedah penghantaran data tanpa melalui CPU ?*

- A. Software Interrupt  
*Sampukan perisian*
- B. Hand-Shaking  
*Jabat Tangan*
- C. Programmed I/O (polling).  
*I/O deprogram*
- D. Direct Memory Access (DMA)  
*Capaian Ingatan Terus*

**SECTION B : 30 MARKS****BAHAGIAN B : 30 MARKAH****INSTRUCTION:**

This section consists of **TEN (10)** structured questions. Answer **ALL** questions.

**ARAHAN:**

Bahagian ini mengandungi **SEPULUH (10)** soalan berstruktur. Jawab semua soalan.

CLO1  
C4**QUESTION 1**

Differentiate between a microprocessor and microprocessor-based system.

**SOALAN 1**

*Perbezaan di antara pemproses mikro dan sistem berdasarkan pemproses mikro.*

[3 marks]

[3 markah]

CLO1  
C1**QUESTION 2**

Give **THREE (3)** differences between microprocessor and microcontroller?

**SOALAN 2**

*Berikan **TIGA (3)** perbezaan antara mikropemproses dan mikropengawal?*

[3 marks]

[3 markah]



For question 3-6, Choose only **ONE (1)** microprocessor (either Motorola **OR** Intel).

*Bagi Soalan 3-6, Pilih **SATU(1)** mikropemproses sahaja (sama ada Motorola **ATAU** Intel).*

CLO3

C4

### QUESTION 3

Apply 68000 **OR** 8086 assembly language to build a program using the statements given in Table B3 :

#### SOALAN 3

*Dengan menggunakan bahasa himpunan 68000 **ATAU** 8086, bina aturcara dengan menggunakan kenyataan-kenyataan yang diberikan di dalam Jadual B3 :*

Table B3/Jadual B3

Motorola	Intel
i) start program at address 1000. <i>mulakan aturcara pada alamat 1000.</i>	i) start program at address 1000. <i>mulakan aturcara pada alamat 1000.</i>
ii) transfer 8 bit data from register D0 to D1. <i>pindahkan 8 bit data dari daftar D0 ke D1.</i>	ii) transfer 8 bit data from accumulator to BL. <i>pindahkan 8 bit data dari akumulator ke BL.</i>
iii) divide unsigned data D1 with D0 and stored data at data register D1. <i>bahagikan data D1 ‘unsigned’ dengan D0 dan simpan pada daftar data D1.</i>	iii) divide unsigned words in accumulator by byte in BL and store result at accumulator <i>bahagikan ‘unsigned words’ dalam akumulator dengan byte dalam BL dan simpan di akumulator</i>
iv) end program. <i>tamatkan aturcara.</i>	iv) end program. <i>tamatkan aturcara.</i>

[3 marks]

[3 markah]

CLO3

C4

**QUESTION 4**

Identify the values of register in MC68000/Intel 8086 after executes the instructions below.

**SOALAN 4**

Dapatkan nilai daftar dalam MC68000/Intel 8086 selepas melaksanakan arahan di bawah.

Motorola:	Register D1	44556677	Address 00002300	Memory
	D2	8899AABB		1122
	A1	00002302		3344
				5566
Intel:	Register AX	6677	Address 00002300	7788
	BX	2302		99AA
	CX	AABB		

## Motorola

a) **MOVE.W #\\$2304,D1**

D1 : .....

## Intel

a) **MOV AX,2304h**

AX : .....

b) **MOVE.B (A1),D2**

D1 : .....

A1 : .....

b) **MOV AX,[BX]**

AX : .....

BX : .....

[3 marks]

[3 markah]

CLO3

C4

**QUESTION 5**

Identify the status of flag register (SR) after microprocessor executes instruction in Table B5.

**SOALAN 5**

Dapatkan status daftar bendera (SR) selepas mikropemproses melaksanakan arahan dalam Jadual B5.

Table B5/Jadual B5

Motorola	Intel
<ul style="list-style-type: none"> <li>The initial data D2=667788FF <i>Data awal D2 = 667788FF</i></li> <li>MC68000 executes instruction <b>ADDI.W #\$FFFF,D2.</b> <i>MC68000 melaksanakan arahan ADDI.W #\$FFFF,D2</i></li> </ul>	<ul style="list-style-type: none"> <li>The initial data AX=88FF <i>Data awal AX = 88FF</i></li> <li>8086 executes instruction <b>ADD AX,FFFFh.</b> <i>8086 melaksanakan arahan ADD AX,FFFFh</i></li> </ul>

## Motorola

- a) N : .....  
b) Z : .....  
c) C : .....

## Intel

- a) SF : .....  
b) ZF : .....  
c) CF : .....

[3 marks]

[3 markah]

CLO3

C4

**QUESTION 6**

Motorola: Determine the value of **D1** after executing instruction **AND.W D0,D1** where  $D0=3795AC57$  and  $D1=B6D34B9D$ . Show your calculation.

*Nyatakan nilai **D1** selepas melaksanakan arahan **AND.W D0,D1** dimana  $D0=3795AC57$  dan  $D1=B6D34B9D$ . Tunjukkan pengiraan anda.*

**OR**

Intel: Determine the value of **BX** after executing instruction **AND BX,CX** where  $CX=AC57$  and  $BX=4B9D$ . Show your calculation.

*Nyatakan nilai **BX** selepas melaksanakan arahan **AND BX,CX** dimana  $CX=AC57$  dan  $BX=4B9D$ . Tunjukkan pengiraan anda.*

[3 marks]

[3 markah]

CLO2

C1

**QUESTION 7**

Give **THREE (3)** significant differences between DRAM and SRAM?

**SOALAN 7**

*Beri **TIGA (3)** perbezaan ketara di antara ingatan DRAM dan SRAM?*

[3 marks]

[3 markah]

CLO2

C4

**QUESTION 8**

A microprocessor system contains a  $32K \times 8$  capacity of RAM. Identify the range of address in hexadecimal.

**SOALAN 8**

*Satu sistem mikropemproses mengandungi  $32K \times 8$  kapasiti RAM. Kenalpasti julat alamat dalam heksadesimal.*

[3 marks]

[3 markah]

CLO4

C2

**QUESTION 9**

There are two techniques of sending data. One of the techniques is parallel sending data. Explain **THREE (3)** features to identify this technique.

**SOALAN 9**

*Terdapat dua jenis teknik pemindahan data. Satu daripada teknik pemindahan data adalah secara selari. Terangkan **TIGA (3)** ciri bagi mengenal pasti teknik ini.*

[3 marks]

[3 markah]

CLO4

C2

**QUESTION 10**

Name and describe **TWO (2)** types of interrupt.

**SOALAN 10**

*Senarai dan terangkan **DUA (2)** jenis sampaikan.*

[3 marks]

[3 markah]

**SECTION C : 50 MARKS****BAHAGIAN C : 50 MARKAH****INSTRUCTION:**

This section consists of **TWO (2)** essay questions. Answer **ALL** the questions.

**ARAHAN :**

*Bahagian ini mengandungi **DUA (2)** soalan ese. Jawab **SEMUA** soalan.*

**QUESTION 1****SOALAN 1**CLO3  
C4

- (a) The function of assembler is to translate the assembly program into object code before it can be executed. Differentiate between single line assembler and cross-assembler.

*Penghimpun berfungsi untuk menterjemahkan Bahasa Penghimpun kepada kod objek sebelum dilaksanakan. Bezakan antara "single line assembler" dan "cross-assembler".*

[4 marks]

[4 markah]

CLO3  
C4

- (b) The microprocessor contains several group of instructions designed to write source code. Explain briefly the groups of instruction below with the related example.

*Mikropemproses mengandungi beberapa kumpulan suruhan yang direkabentuk bagi menulis aturcara. Terangkan dengan ringkas kumpulan suruhan di bawah dengan contoh yang sesuai.*

- i. Arithmetic Instruction

*Suruhan arithmetik*

- ii. Data transfer/movement

*Pindahan/pergerakan data*

## iii. Logical Instruction

*Suruhan Logik*

[9 marks]

[9 markah]

- (c) Referring to Table C1, answer the questions below:

Table C1/ Jadual C1: The description of program

Motorola	Intel
1. Transfer 8 bit data of \$000000AB into register D1 <i>8 bit data \$000000AB ke dalam pendaftar D1</i>	1. Transfer 8 bit data of ABH into accumulator A <i>8 bit data ABH ke dalam akumulator A</i>
2. Transfer 16 bit data of \$00005678 into register D3 <i>16 bit data \$00005678 ke dalam pendaftar D3</i>	2. Transfer 16 bit data of 5678H into accumulator C <i>16 bit data 5678H ke dalam akumulator C</i>
3. Transfer 8 bit data of D3 into register D2 <i>8 bit data D3 ke dalam D2</i>	3. Transfer 16 bit data C to accumulator B <i>16 bit data C ke akumulator B</i>

CLO3  
C4

- i. Transform each statement on table C1 to assembly language instruction.

*Tukarkan setiap pernyataan pada Jadual C1 kepada arahan bahasa himpunan.*

[6 marks]

[6 markah]

CLO3  
C4

- ii. Identify the new values of the destination after the instructions in c(i) are executed:

*Kenalpasti nilai destinasi yang terbaru selepas arahan pada soalan c(i) dilaksanakan.*

[6 marks]

[6 markah]

**QUESTION 2****SOALAN 2**CLO2  
C2

- (a) Describe the characteristic of ROM (Read Only Memory).

*Jelaskan ciri bagi ROM (ingatan baca sahaja)*

[3 marks]

[3 markah]

CLO2  
C3

- (b) If given a memory chip with the capacity of
- $2k \times 4$
- , calculate the number of chips required to design a memory of
- $16k \times 8$
- .

*Sekiranya diberi satu cip memori berkapasiti  $2k \times 4$ , hitungkan bilangan cip diperlukan untuk merekabentuk memori berkapasiti  $16k \times 8$ .*

[3 marks]

[3 markah]

CLO2  
C4

- (c) Based on the capacity and the start address given, complete table C2 and develop a memory map if the memory system has 16 address lines and 8 data lines.

*Dengan kapasiti dan alamat permulaan yang diberi, lengkapkan jadual C2 dan bina sistem memori jika satu mikropemproses mempunyai 16 talian alamat dan 8 talian data telah disambungkan ke sistem ingatan tersebut.*

Table C2/ Jadual C2

Device Peranti	Size Saiz	Address Assignment Penempatan Alamat	
		Start Permulaan	Ending Akhir
Microprocessor <i>Mikropemproses</i>	64K byte	\$0000	\$FFFF
RAM <i>Ingatan Capaian Rawak</i>	12K byte	\$B000	
ROM <i>Ingatan Baca Sahaja</i>	4K byte	\$0000	
Input/ Output <i>Masukan/ Keluaran</i>	8K byte	\$E000	
Unused <i>Tidak Diguna</i>		\$1000	

[19 marks]

[19 markah]

**SOALAN TAMAT**