KOLEJ YAYASAN PELAJARAN JOHOR

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FINAL EXAMINATION

COURSE NAME	:	**MICROCONTROLLER**
COURSE CODE	:	**DKE 3033**
SESSION	:	**DECEMBER 2022**
DURATION	:	**2 HOURS 30 MINUTES**

INSTRUCTION TO CANDIDATES /
ARAHAN KEPADA CALON

1. This examination paper consists of **ONE (1)** part :/ PART A (100 Marks) /
   *Kertas soalan ini mengandungi **SATU (1)** bahagian:* *BAHAGIAN A (100 Markah)*

2. Candidates are not allowed to bring any material to examination room except with the permission from the invigilator. The formula was attached at the back question paper. /
   Calon tidak dibenarkan untuk membawa sebarang bahan/nota ke bilik peperiksaan tanpa arahan/kebenaran daripada pengawas.

3. Please check to make sure that this examination pack consists of: /
   Pastikan kertas soalan peperiksaan ini mengandungi:
   i. Question Paper. /
      Kertas Soalan.
   ii. Answering Booklet. /
      Buku Jawapan.

DO NOT TURN THIS PAGE UNTIL YOU ARE TOLD TO DO SO /
JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIBERITAHU

This examination paper consists of 8 printed pages including front page
Kertas soalan ini mengandungi 8 muka surat termasuk kulit hadapan

This part contains of **FOUR (4)** questions. Answer **FOUR (4)** questions in the Answering Booklet.

*Bahagian ini mempunyai **EMPAT (4)** soalan. Jawab **EMPAT (4)** soalan di dalam Buku Jawapan.*

QUESTION 1/ *SOALAN 1*

a) List **three (3)** types of system bus in the Microcontroller 8051.

(3 marks/ 3 *markah*)

b) Show the active register bank and address of R0 to R7 for the following instruction.

MOV PSW, # 0C8H

(10 marks/ 10 *markah*)

c) Based on schematic in **Figure 1**, show the address range for devices 2764 and 6264 below.

(12marks/ 12 *markah*)

*a) Senaraikan **tiga (3)** jenis bas sistem yang terdapat dalam Pengawal Mikro 8051.*

b) Tunjukkan daftar bank yang aktif dan alamat bagi R0 hingga R7 untuk arahan di bawah.

MOV PSW, # 0C8H

*c) Berdasarkan skematik dalam **Rajah 1**, tunjukkan julat alamat untuk peranti 2764 dan 6264 di bawah.*

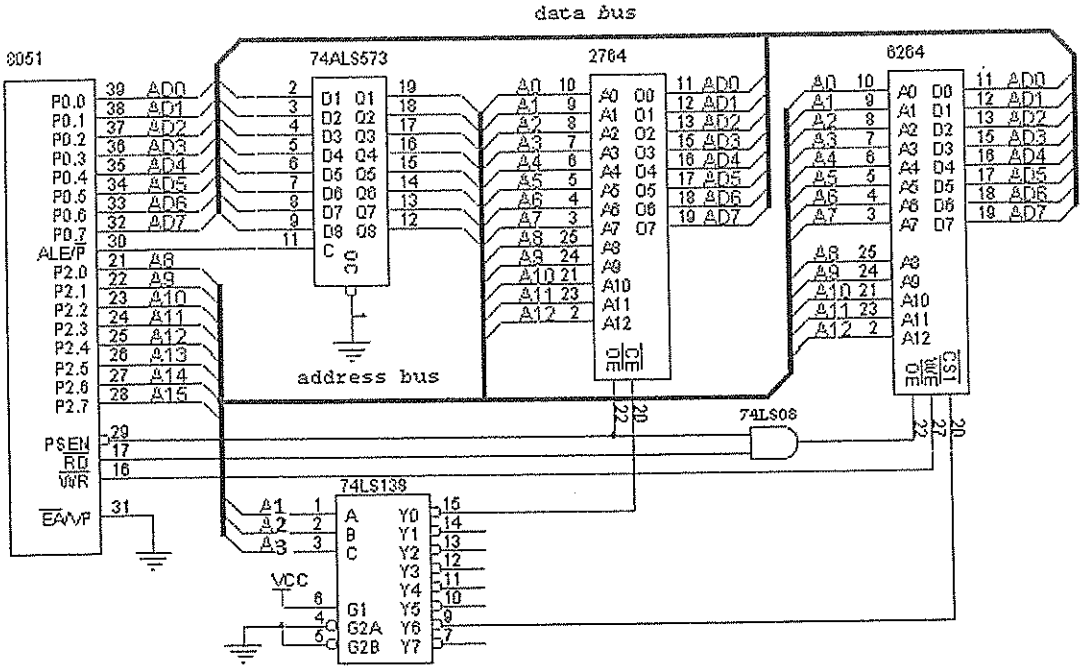

Figure 1/ *Rajah 1*

QUESTION 2/ *SOALAN 2*

a) Show the status of the CY, AC and P flags after the execution of the following arithmetic instructions

```
MOV   A,#156
ADD   A,#101
```

(5 marks/5 *markah*)

b) Describe the mnemonic instruction in 8051 Microcontroller below:

i. **SUBB** A,#data
ii. **DEC** Rn
iii. **MOVC** A,@A+DPTR
iv. **CJNE** A,#data,rel
v. **SJMP** rel

(5 marks/ *8 markah*)

c) Convert **Program Q2** into machine codes (hex codes)

Program Q2

```
        ORG     10H
ULANG:  MOV     DPTR,#0090H
        CLR     A
SEMULA: MOVC    A,@A+PC
        JZ      ULANG
        MOV     P2,A
        INC     DPTR
        SJMP    SEMULA
        END
```

(15marks/ 15 *markah*)

a) *Tunjukkan status bendera CY, AC dan P setelah perlaksanaan arahan arithmetic berikut.*

```
MOV     A,#156
ADD     A,#101
```

b) *Huraikan arahan mnemonik dalam Mikropengawal 8051 di bawah:*

i. SUBB A,#data

ii. DEC Rn

iii. MOVC A,@A+DPTR

iv. CJNE A,#data,rel

v. SJMP rel

c) *Tukarkan **Aturcara Q2** kepada kod mesin (kod heks).*

Aturcara Q2

```
        ORG     10H
ULANG:  MOV     DPTR,#0090H
        CLR     A
SEMULA: MOVC    A,@A+PC
        JNZ     ULANG
        MOV     P2,A
        INC     DPTR
        SJMP    SEMULA
        END
```

QUESTION 3/ *SOALAN 3*

a) State **two (2)** types of Timer/Counter in 8051 Microcontroller.

(2 marks/ 2 *markah*)

b) Build an assembly language program to output a 100kHz square wave on pin 1 of port 1 (P1.1) using Timer 1. Assuming a 12MHz oscillator is used with the duty cycle is 50%.

(13 marks/ 13 *markah*)

c) Based on **Program 3** below, shows the delay subroutine in the program. Assuming a 11.059 MHz oscillator is used.

Program 3

```
DELAY:   MOV   TMOD,#10H
         MOV   R0,#200
ULANG:   MOV   TH1,#9EH
         MOV   TL1,#58H
         SETB  TR1
LOOP:    JNB   TF1,LOOP
         CLR   TR1
         CLR   TF1
         DJNZ  R0,ULANG
         RET
```

(10marks/ 10 *markah*)

*a) Nyatakan **dua (2)** jenis Pemasa/Pembilang dalam Pengawal Mikro 8051.*

b) Bina aturcara bahasa mesin untuk keluaran 100kHz, menggunakan gelombang segi empat pada pin 1, menggunakan liang keluaran 1 (P1.1) dan menggunakan Pemasa 1. Anggapkan pengayun yang digunakan ialah 12MHz dengan kitaran tugas ialah 50%.

c) *Berdasarkan* ***Aturcara 3*** *di bawah, tunjukkan subrutin lengah yang digunakan dalam aturcara tersebut. Anggap pengayun 11.059 MHz digunakan.*

Aturcara 3

```
DELAY:  MOV   TMOD,#10H
        MOV   R0,#200
ULANG:  MOV   TH1,#9EH
        MOV   TL1,#58H
        SETB  TR1
LOOP:   JNB   TF1,LOOP
        CLR   TR1
        CLR   TF1
        DJNZ  R0,ULANG
        RET
```

QUESTION 4/ *SOALAN 4*

a) Build the instructions to enable the serial interrupt, Timer 0 interrupt and external interrupt 1 (INT1).

(2 marks/ 2 *markah*)

b) The following instruction is executed by an 8051 microcontroller. List the sequence in which the interrupts are serviced.

```
MOV  IP, #00001100B
```

(5 marks/ 5 *markah*)

c) Build the assembly language program that detects the condition (logic status) of switches and configures the LED lit pattern based on the **Table 4** and **Figure 4** below. If an external interrupt 1 (INT1) occurs by detecting a HIGH-to-LOW transition at P3.3, only one led will lit and blink 5 times.

Table 4

S4	S3	S2	S1	LEDS
0 (closed)	0 (closed)	0 (closed)	1 (opened)	4 LEDs lit(ON)
0 (closed)	0 (closed)	1 (opened)	0 (closed)	A single LED will lit and move from right to left
0 (closed)	1 (opened)	0 (closed)	0 (closed)	4 LEDs will blink continuously
Other Conditions				All LEDs will blink continuously

(18 marks/18 *markah*)

a) *Bina arahan-arahan untuk menghidupkan sampukan sesiri, sampukan Pemasa 0 dan sampukan luaran 1 (INT1).*

b) *Arahan berikut dilaksanakan oleh mikropengawal 8051. Senaraikan aturan jujukan dimana sampukan dilayan.*

MOV IP, #00001100B

c) *Bina aturcara bahasa himpunan yang mengesan keadaan (status logik)suis-suis berkenaan dan konfigurasi corak nyalaan LED berdasarkan **Jadual 4** dan **Rajah 4** di bawah. Jika sampukan luaran 1 (INT1) berlaku dengan pengesanan peralihan TINGGI-ke-RENDAH pada P3.3, hanya satu led menyala dan berkelip 5 kali.*

Jadual 4

S4	S3	S2	S1	LED
0 (Tutup)	0 (Tutup)	0 (Tutup)	1 (Buka)	*4 LED menyala(ON)*
0 (Tutup)	0 (Tutup)	1 (Buka)	0 (Tutup)	*Satu LED menyala dan bergerak dari kanan ke kiri*
0 (Tutup)	1 (Buka)	0 (Tutup)	0 (Tutup)	*4 LED berkelip secara berterusan*
Keadaan-keadaan Lain				*Semua LED berkelip secara berterusan*

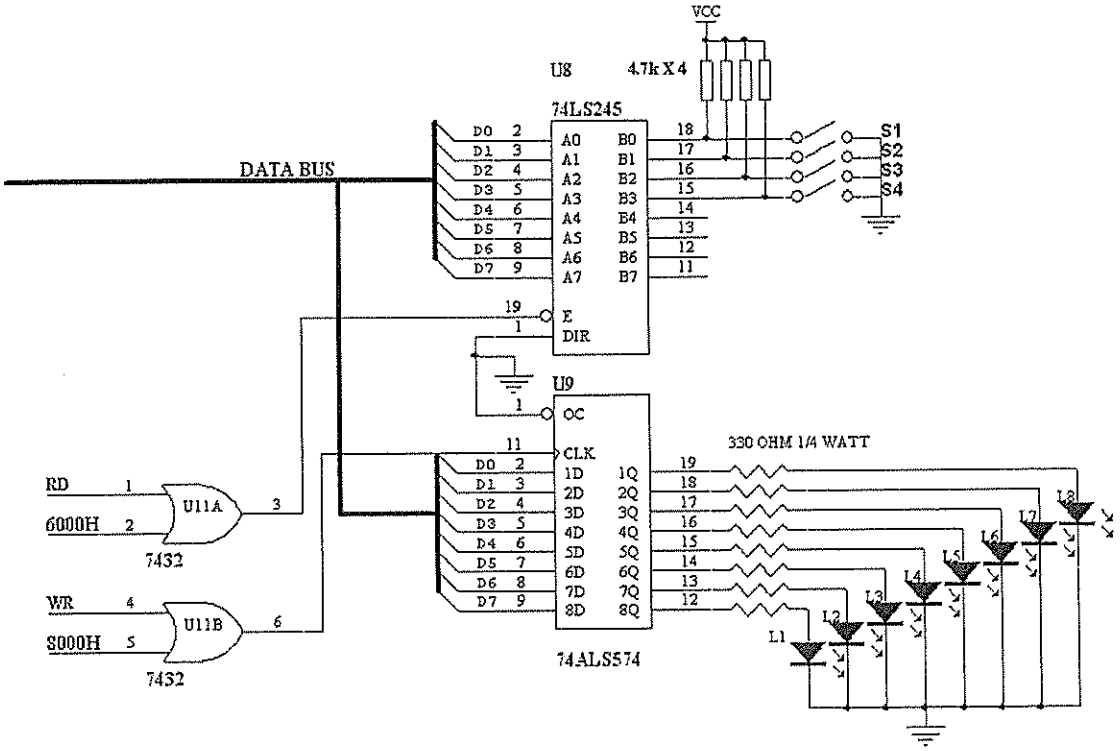

Figure 4/ *Rajah 4*

[100 MARKS/100 MARKAH]

END OF QUESTION PAPER/ *KERTAS SOALAN TAMAT*