UNIVERSITY COLLEGE TATI

UNIVERSITY COLLEGE TATI (UCTATI)

FINAL EXAMINATION QUESTION BOOKLET	
COURSE CODE	: BMT 2083 / BET 2083
COURSE TITLE	: MICROCONTROLLER AND APPLICATION
SEMESTER/SESSION	: 2-2023/2024
DURATION	: 3 HOURS

Instructions:

1. This booklet contains **4** questions. Answer **all** questions.
2. All answers should be written in the answer booklet.
3. Write legibly and draw sketches wherever required.
4. If in doubt, raise your hands and ask the invigilator.

DO NOT OPEN THIS BOOKLET UNTIL YOU ARE TOLD TO DO SO

THIS BOOKLET CONTAINS 7 PRINTED PAGES INCLUDING COVER PAGE

QUESTION 1

a) Describe **three (3)** factors which are considered for using microcontroller in specific application.

(6 marks)

b) In microcontroller architecture, there are components called ROM and RAM.

i) State the meaning of ROM and RAM.

(2 marks)

ii) List two (2) characteristics which make these components different from each other.

(2 marks)

c) Describe the differences between microcontroller and general-purpose microprocessor by giving **five (5)** characteristics which make these two devices **different**.

(10 marks)

QUESTION 2

a) State the basic structure of C language program for 8051 programming using keil Uvision 3.

(5 marks)

b) The program below contains ten (10) syntax errors.

i. Identify the ten (10) syntax errors.

(10 marks)

ii. Produce the correct syntax so the program can compile correctly.

(5 marks)

```
#include<reg51.h>
#define ledbar P1 //declare ledbar at p1
void delay(unsigned int i)      //subprogram list
sbit led1=P0'0;          //declare led1
sbit led2=P0^1
sbit led3=P0*2;

void main()
{ unsigned char z'i;
  while(1)
  {       z==0x7f;
          for(i==8;i>0;i--)
          {       ledbar=z;
                  delay(20000)
                  z=(z>>1)+0x80;
          }
  }
}

void delay(unsigned int i);    //delay subprogram
{ for(   ;i>0;i---);
}
```

QUESTION 3

a) By analyzing to the program below, resolve the value of P2 for each case if the value of P1^0 and P1^1 are given below:

i) P1^0=1 and P1^1=1 (2 marks)

ii) P1^0=0 and P1^1=0 (2 marks)

iii) P1^0=0 and P1^1=1 (2 marks)

iv) P1^0=1 and P1^1=0 (2 marks)

```
#include<reg51.h>
#define output P2     // p2 connected as output
sbit sw1=P1^0; // P1.0 as input
sbit sw2=P1^1; // P1.1 as input
void main()
{       sw1=1; // set sw as input
        sw2=1;
        while(1)
        {
                if(sw1==1||sw2!=1)
                {       output=0xf0;
                }
                else if(sw2==1&&sw1!=1)
                {       output=0x0f;
                }
                else if(sw2!=1&&sw1!=1)
                {       output=0xaa;
                }
                else
                {       output=0x55;
                }
        }
}
```

b) An application needs to toggle all bits of P0, P1 and P2 continuously by sending value 0x55 and 0xAA to these ports. Produce a suitable program for this purpose.

(6 marks)

c) An application needs to read from P2 and test it for the value aah. According to the test results, output produced to port pins as follows:

If P2 = 0xAA then P0^0 = 1, P0^1 = 1
If P2 < 0xAA then P0^0 = 1, P0^1 = 0
If P2 > 0xAA then P0^0 = 0, P0^1 = 1

Produce a suitable program for this purpose.

(8 marks)

QUESTION 4

a) State the function of a 7-segment display unit and identify types of 7 segment display unit by describing the difference of these display types.

(5 marks)

b) Based on schematic given in figure 1 below which use one unit 7 segment, 74164 shift register and 7447 decoders, an application displays **counts** from 0 to 9 with a delay between counts.

i) Resolve a subprogram for display function which has shift register to make the display functioning correctly by analyzing the figure 1 diagram.

(10 marks)

ii) Resolve a full program for this application including delay subprogram.

(11 marks)

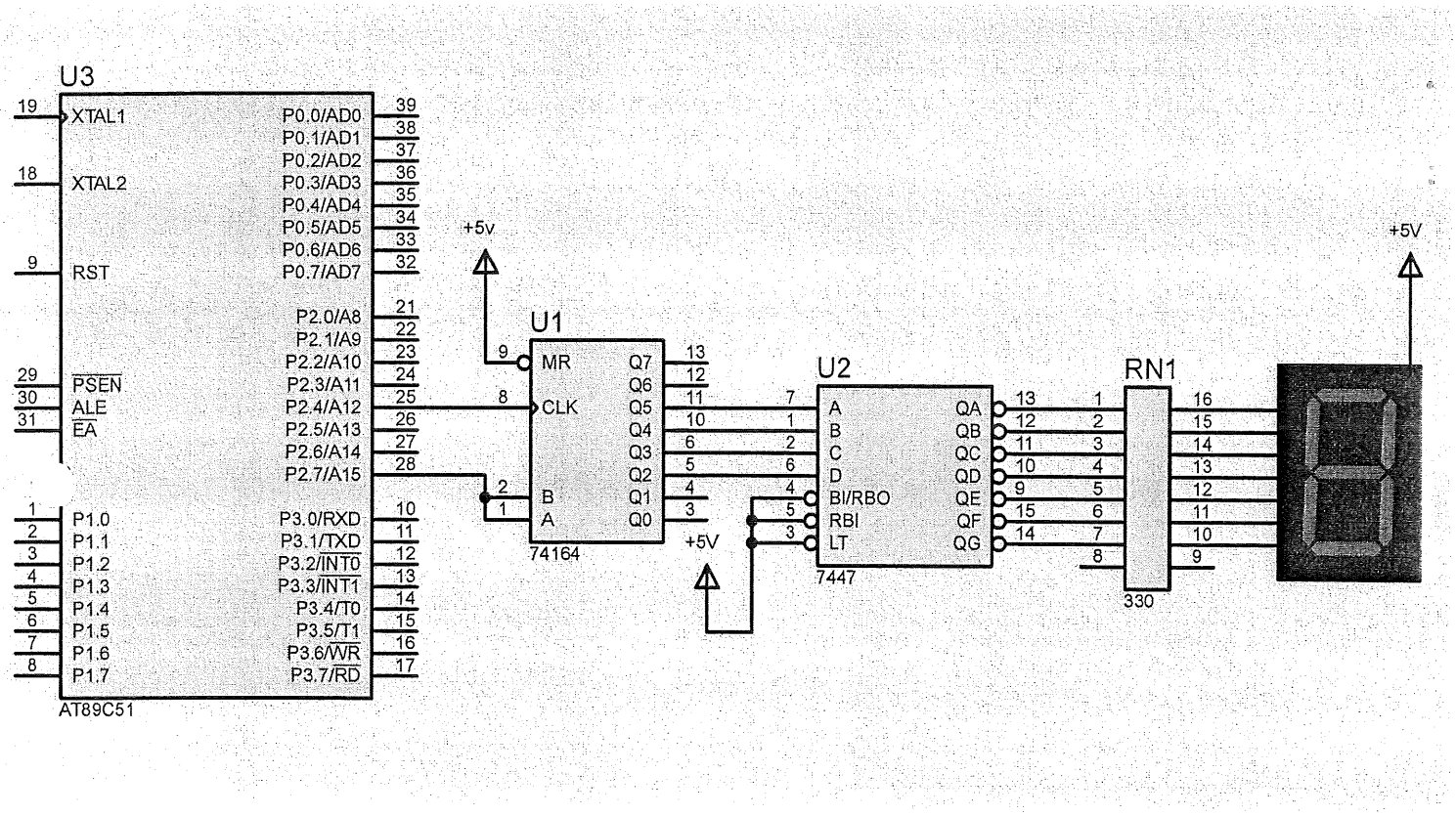

Figure 1: 7 segment application

c) Referring to the program below, investigate the value in decimal for data1, data2, data3 and data4 if the value of P2 and P3 are given below:

i) P2=20 and P3=40

(4 marks)

ii) P2=0x20 and P3=0x40

(4 marks)

iii) P2=50 and P3=0x10

(4 marks)

```
#include<reg51.h>  //special function register
#define number1 P2  // declare input at P2
#define number2 P3
long data1=2500;
long data2=13;
long data3;
short data4=234;
sbit led=P1^0;                  //led as pinout
void main()     //main program
{       led=0;
        led=1;
        while(1)                //main loop
        {       data1=(number1+number2)/16;
                data2=number1-number2;
                data3= number1 / number2 ;
                data4=number1+data1;  //
        }
}
```

----------End of question----------