UNIVERSITY COLLEGE TATI

UNIVERSITY COLLEGE TATI (UC TATI)

FINAL EXAMINATION QUESTION BOOKLET	
COURSE CODE	: DMT3073
COURSE	: APPLICATION OF MICROCONTROLLER
SEMESTER (SESSION)	: 1 – 2024/2025
DURATION	: 3 HOURS

Instructions:

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

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

THIS BOOKLET CONTAINS 9 PRINTED PAGES INCLUDING COVER PAGE

QUESTION 1

a) List TWO (2) application of Timer registers in microcontroller. (2 marks)

b) Describe the difference between microcontroller and general-purpose microprocessor by giving FOUR (4) characteristics which differentiate these two devices. (4 marks)

c) Programming the 8051 microcontroller by using C language, describe the used of header file "REG51.H" in relationship with all accessible internal registers. (4 marks)

QUESTION 2

a) Describe the definition for the followings:

i. Baud rate. (2 marks)

ii. Half duplex. (2 marks)

iii. Full duplex. (2 marks)

b) Sketch the schematic for interfacing MAX232 to the 89C2051 microcontroller. (6 marks)

c) Produce a program in C language for SFRs initialization for setup the serial port for 1200 baud rate for 16 MHz crystal. (8 marks)

QUESTION 3

a) Describe the definition for the followings:

i) On-chips I/O ports. (2 marks)

ii) Memory-map I/O. (2 marks)

b) Describe the operation of the contact bounce eliminator. (4 marks)

c) An embedded system application turns ON eight LEDs according to the following cases as shown by Table 1.

i) Sketch a schematic diagram for the LEDs connection with 89C2051 microcontroller at Port 1. (6 marks)

ii) Produce a suitable program in C language for this application. (10 marks)

Step	Description
1	Turn ON all LEDs.
2	Blink two sets of LEDs alternately. 4 LEDs on the right and 4 LEDs on the left.
3	Blink all of 8 LEDs.

Table 1

d) Refer to the circuit in Figure 1, answer the following questions:

i. State TWO (2) types of 7 segment display unit. (2 marks)

ii. Produce a program in C to display counting digit from 0 till 9 continuously. (10 marks)

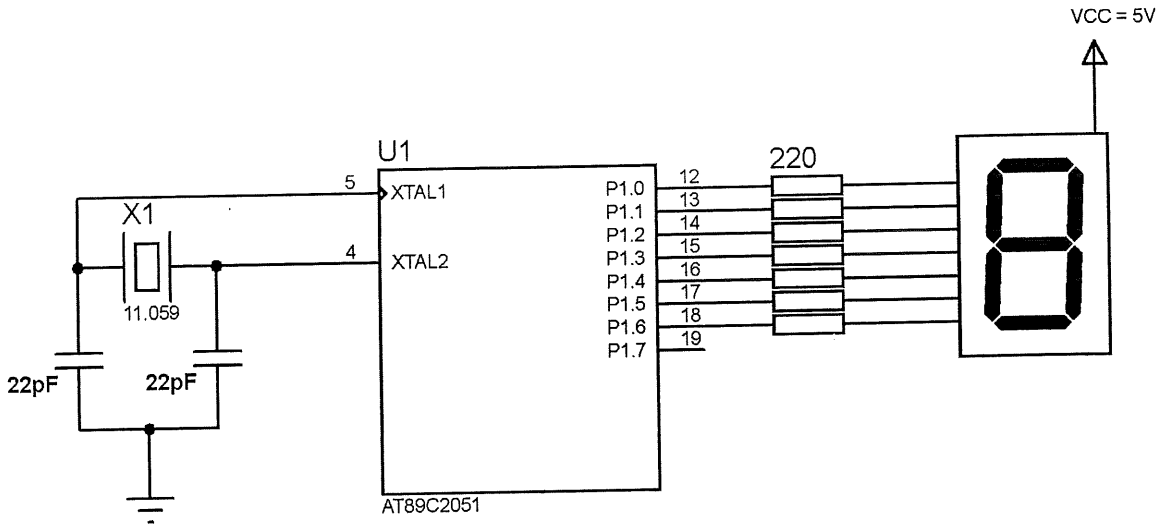


Figure 1

QUESTION 4

a) List FOUR (4) types input device. (4 marks)

b) List FOUR (4) types of DC motor. (4 marks)

c) Describe basic level to TTL interface. (2 marks)

d) Power transistor is required as a driver for providing enough current to drive a DC motor.

i. Sketch TWO (2) type one-direction DC motor driver. (4 marks)

ii. Produce a schematic diagram for interface DC motor with 89C2051 microcontroller using L293. (5 marks)

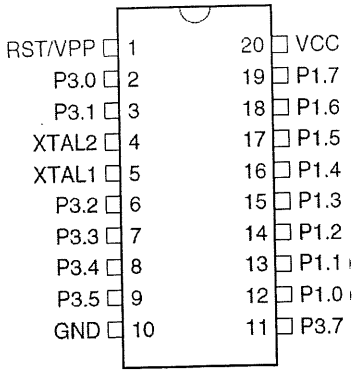
e) Produce the schematic diagram for interface an LCD with 89C2051. (5 marks)

f) Create a program in C language for display "DMT3073" on an LCD. Refer to the attachment section for an LCD basic program for reference. (10 marks)

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

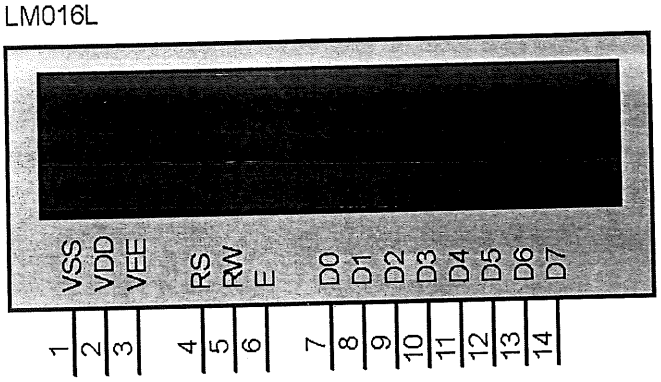
Attachment

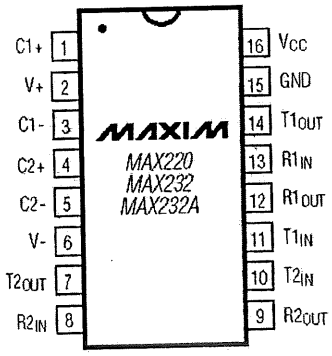
```
#include <reg51.h>
;Global Definition
//define port 1 for data line.
//define port 3 for LCD control
sbit    e       = P3^3;
sbit    rs      = P3^2;
sbit    rw      = P3^4;

;-------------------------------------------------------------------------------
;Delay routine
delay(unsigned  int x)}                 //no of loop depend on x value
int     j;
        while(x--  >0)
        {       for(j=0;j<50000;j++);
        }
}
;-------------------------------------------------------------------------------
LCD_cmd_write(unsigned char dbyte)
{
        rw = 1;                         //write data to LCD
        rs = 0;                         //allow LCD accept LCD command
        e  = 1;                         //enable LCD
        P1 = (dbyte);                   //send 8-bit data to LCD
        e  = 0;                         //disable LCD
}
;-------------------------------------------------------------------------------
LCD_data_write(unsigned char dbyte)
{
        rw = 1;                         //write data to LCD
        rs = 1;                         //allow LCD accept data
        e  = 1;                         //enable LCD
        P1 = (dbyte);                   //send 8-bit data to LCD
        e  = 0;                         //disable LCD
}
;-------------------------------------------------------------------------------
void    LCD_start()
{       LCD_cmd_write(0x38);            //interface data mode 8bit, 1-line, 5x7
        LCD_cmd_write write(0x0C);      //display on, cursor off, no blink
        LCD_cmd_write (0x06);           //entry mode
        LCD_cmd_write write(0x01);      //clear display
}
```

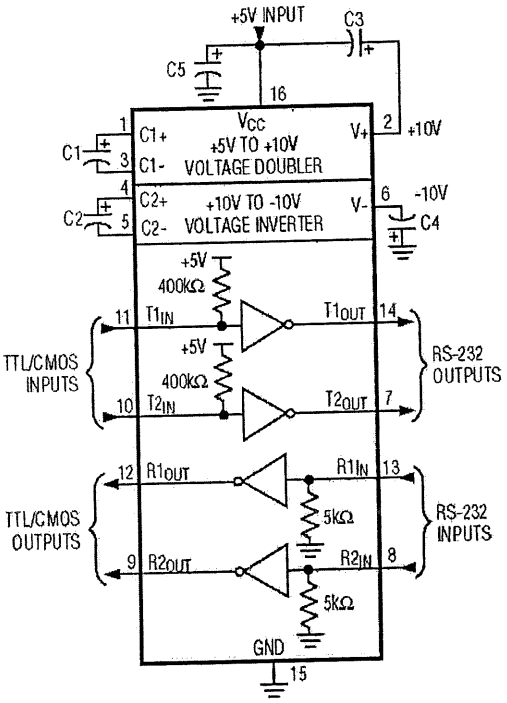


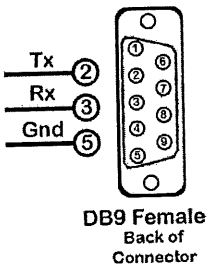
89C2051

LM016L









DB9 Female
Back of Connector

ASCII TABLE

Decimal	Hex	Char	Decimal	Hex	Char	Decimal	Hex	Char	Decimal	Hex	Char
0	0	[NULL]	32	20	[SPACE]	64	40	@	96	60	`
1	1	[START OF HEADING]	33	21	!	65	41	A	97	61	a
2	2	[START OF TEXT]	34	22	"	66	42	B	98	62	b
3	3	[END OF TEXT]	35	23	#	67	43	C	99	63	c
4	4	[END OF TRANSMISSION]	36	24	$	68	44	D	100	64	d
5	5	[ENQUIRY]	37	25	%	69	45	E	101	65	e
6	6	[ACKNOWLEDGE]	38	26	&	70	46	F	102	66	f
7	7	[BELL]	39	27	'	71	47	G	103	67	g
8	8	[BACKSPACE]	40	28	(	72	48	H	104	68	h
9	9	[HORIZONTAL TAB]	41	29	)	73	49	I	105	69	i
10	A	[LINE FEED]	42	2A	*	74	4A	J	106	6A	j
11	B	[VERTICAL TAB]	43	2B	+	75	4B	K	107	6B	k
12	C	[FORM FEED]	44	2C	,	76	4C	L	108	6C	l
13	D	[CARRIAGE RETURN]	45	2D	-	77	4D	M	109	6D	m
14	E	[SHIFT OUT]	46	2E	.	78	4E	N	110	6E	n
15	F	[SHIFT IN]	47	2F	/	79	4F	O	111	6F	o
16	10	[DATA LINK ESCAPE]	48	30	0	80	50	P	112	70	p
17	11	[DEVICE CONTROL 1]	49	31	1	81	51	Q	113	71	q
18	12	[DEVICE CONTROL 2]	50	32	2	82	52	R	114	72	r
19	13	[DEVICE CONTROL 3]	51	33	3	83	53	S	115	73	s
20	14	[DEVICE CONTROL 4]	52	34	4	84	54	T	116	74	t
21	15	[NEGATIVE ACKNOWLEDGE]	53	35	5	85	55	U	117	75	u
22	16	[SYNCHRONOUS IDLE]	54	36	6	86	56	V	118	76	v
23	17	[END OF TRANS. BLOCK]	55	37	7	87	57	W	119	77	w
24	18	[CANCEL]	56	38	8	88	58	X	120	78	x
25	19	[END OF MEDIUM]	57	39	9	89	59	Y	121	79	y
26	1A	[SUBSTITUTE]	58	3A	:	90	5A	Z	122	7A	z
27	1B	[ESCAPE]	59	3B	;	91	5B	[	123	7B	{
28	1C	[FILE SEPARATOR]	60	3C	<	92	5C	\	124	7C	|
29	1D	[GROUP SEPARATOR]	61	3D	=	93	5D	]	125	7D	}
30	1E	[RECORD SEPARATOR]	62	3E	>	94	5E	^	126	7E	~
31	1F	[UNIT SEPARATOR]	63	3F	?	95	5F	_	127	7F	[DEL]