

23VLSI1401: Microcontroller & Computer Architecture

8051 Microcontroller Interfacing and programming for 7 segment display

(QA Based Learning)

A presentation by

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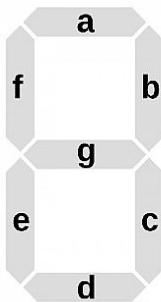
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Session objectives and Expected Session Outcomes

- **Session Objective:** To envisage the concept of Interfacing and programming for LCD with 8051 Microcontroller, through the innovative practice in T/L named “QA based learning”
- **Session Outcomes:** At the end of this session, the students will learn
 - 7-segment Display
 - Address Decoding table for BCD to 7 segment code
 - Interfacing of 7-segment LCD display with 8051
 - Programming examples

7-segment Display



7 Segment Display

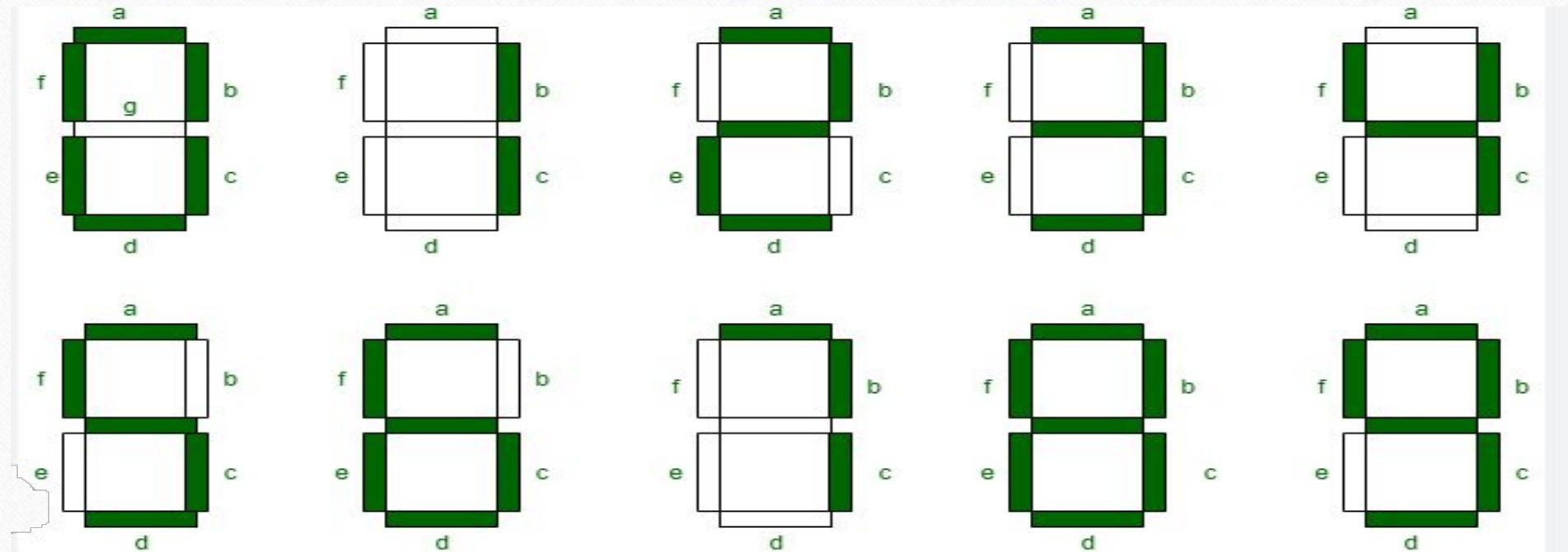


Q.1: What is a 7-segment display?

Ans: Seven Segment display is an electronic device which consists of seven Light Emitting Diodes (LEDs) / Liquid Crystal Display (LCD) arranged in definite pattern (common cathode or common anode type), which is used to display Hexadecimal numerals(in this case decimal numbers, as input is BCD i.e., 0-9).



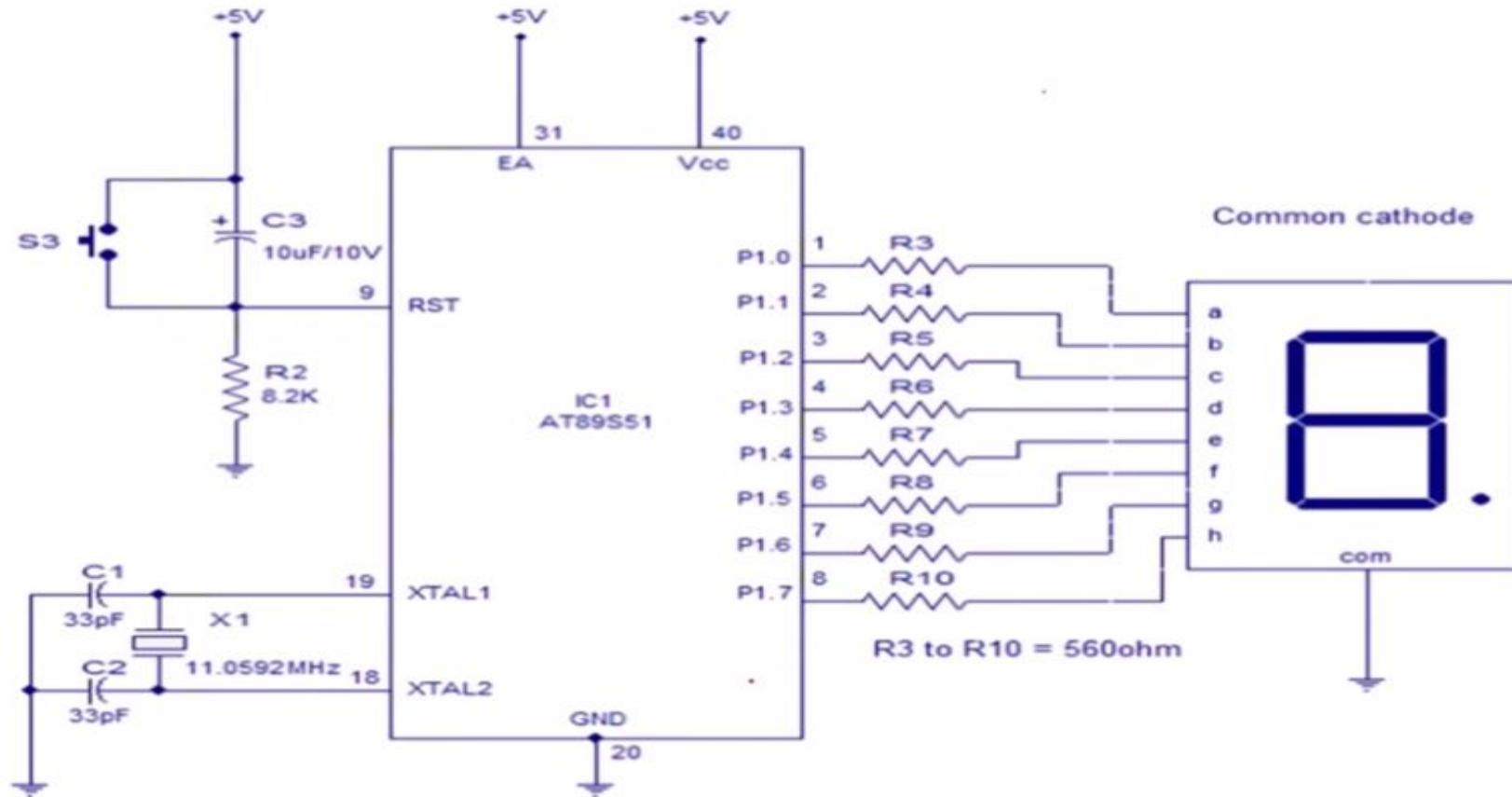
Display of numeric 0-9



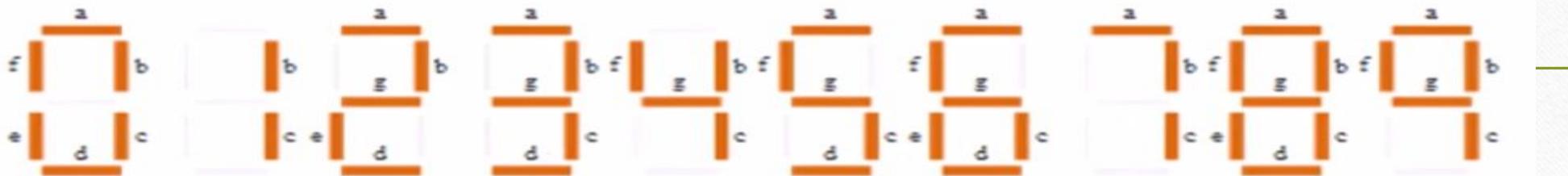
Q.2 Develop a BCD to 7-segment decoding table

Decimal Digit	Input lines				Output lines							Display pattern
	A	B	C	D	a	b	c	d	e	f	g	
0	0	0	0	0	1	1	1	1	1	1	0	0
1	0	0	0	1	0	1	1	0	0	0	0	1
2	0	0	1	0	1	1	0	1	1	0	1	2
3	0	0	1	1	1	1	1	1	0	0	1	3
4	0	1	0	0	0	1	1	0	0	1	1	4
5	0	1	0	1	1	0	1	1	0	1	1	5
6	0	1	1	0	1	0	1	1	1	1	1	6
7	0	1	1	1	1	1	1	0	0	0	0	7
8	1	0	0	0	1	1	1	1	1	1	1	8
9	1	0	0	1	1	1	1	1	0	1	1	9

Q.3: Interface LCD with 8051 Microcontroller at Port 1



Q.4: Write a program to display the digits from 0-9 continuously on 7-segment display



Digit	H (DOT)	g	f	e	d	c	b	a	Code
0	0	0	1	1	1	1	1	1	3F
1	0	0	0	0	0	1	1	0	06
2	0	1	0	1	1	0	1	1	5B
3	0	1	0	0	1	1	1	1	4F
4	0	1	1	0	0	1	1	0	66
5	0	1	1	0	1	1	0	1	6D
6	0	1	1	1	1	1	0	1	7D
7	0	0	0	0	0	1	1	1	07
8	0	1	1	1	1	1	1	1	7F
9	0	1	1	0	1	1	1	1	6F

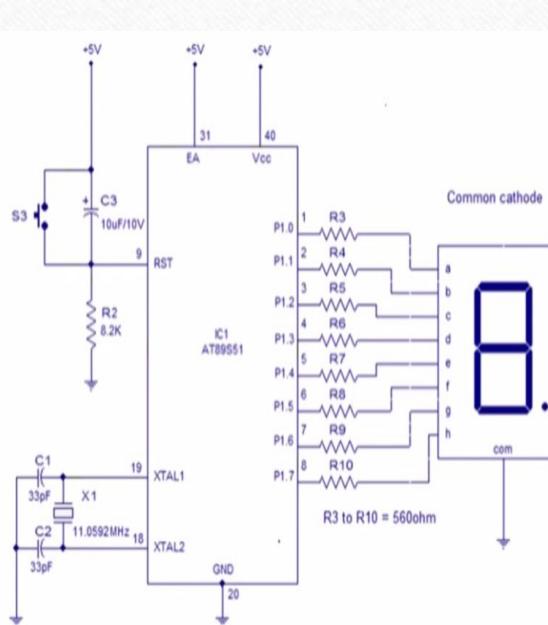
Code memory Read only Data moves

Mnemonic	Operation
MOVC A,@A + DPTR	Copy the code byte, found at the ROM address formed by adding A and the DPTR, to A
MOVC A,@A + PC	Copy the code byte, found at the ROM address formed by adding A and the PC, to A

Programming Example

Q.4: Write a program to display the digits from 0-9 continuously on 7-segment display

Digit	H (DOT)	g	f	e	d	c	b	a	Code
0	0	0	1	1	1	1	1	1	3F
1	0	0	0	0	0	1	1	0	06
2	0	1	0	1	1	0	1	1	5B
3	0	1	0	0	1	1	1	1	4F
4	0	1	1	0	0	1	1	0	66
5	0	1	1	0	1	1	0	1	6D
6	0	1	1	1	1	1	0	1	7D
7	0	0	0	0	0	1	1	1	07
8	0	1	1	1	1	1	1	1	7F
9	0	1	1	0	1	1	1	1	6F



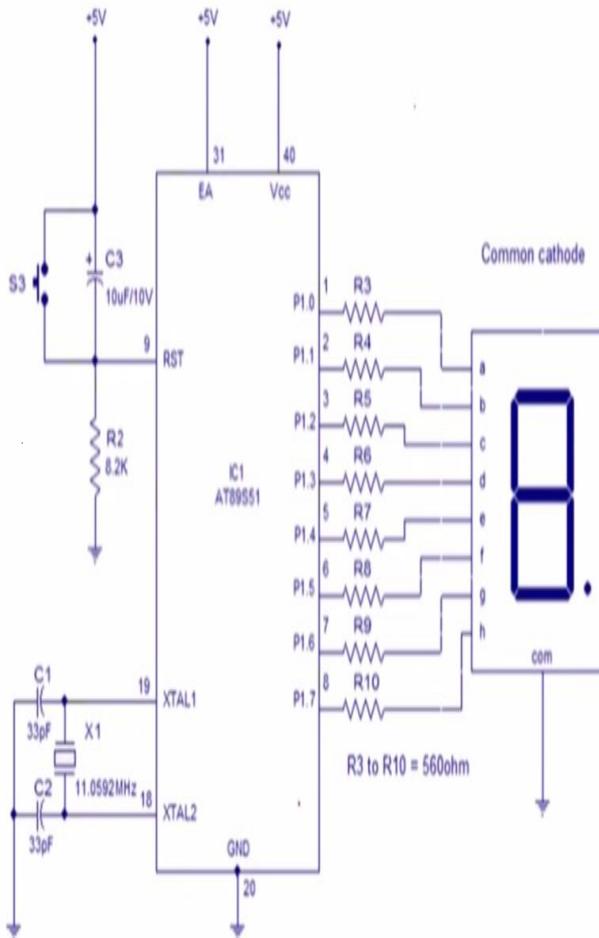
- ORG 0000H
- L1: MOV R0,#0AH
- MOV DPTR,#STRING
- BACK: MOV A,#00H
- L2: MOVC A,@A+DPTR
- MOV P1,A
- ACALL DELAY
- INC DPTR
- DJNZ R0, BACK
- SJMP L1
- STRING: DB 3FH,06H,5BH,4FH,66H,6DH,7DH,07H,7 FH,6FH

Example on Programming

Q.4: Write a program to display the digits from 0-9 continuously on 7-segment display

Look up table

Memory address7	Data
6000	3F (0)
6001	06 (1)
6002	5B (2)
6003	4F (3)
6004	66 (4)
6005	6D (5)
6006	7D (6)
6007	07 (7)
6008	7F (8)
6009	6F (9)



ORG 0000H

L1: MOV R0,#0AH

MOV DPTR,#STRING

BACK: MOV A,#00H

L2: MOVC A,@A+DPTR

MOV P1,A

ACALL DELAY

INC DPTR

DJNZ R0, BACK

SJMP L1

STRING: DB

3FH,06H,5BH,4FH,66H,6DH,7DH,07H,7FH,6FH

Thank
you