

23VLSI1401: Microcontroller & Computer Architecture

# 8051 Microcontroller Interfacing and programming for 7 segment display

(QA Based Learning)

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A presentation by

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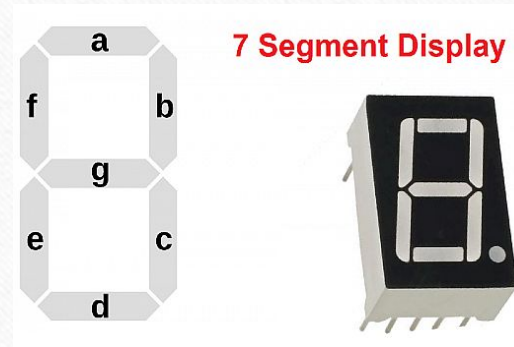
# Session objectives and Expected Session Outcomes

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- **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 example



# 7-segment Display

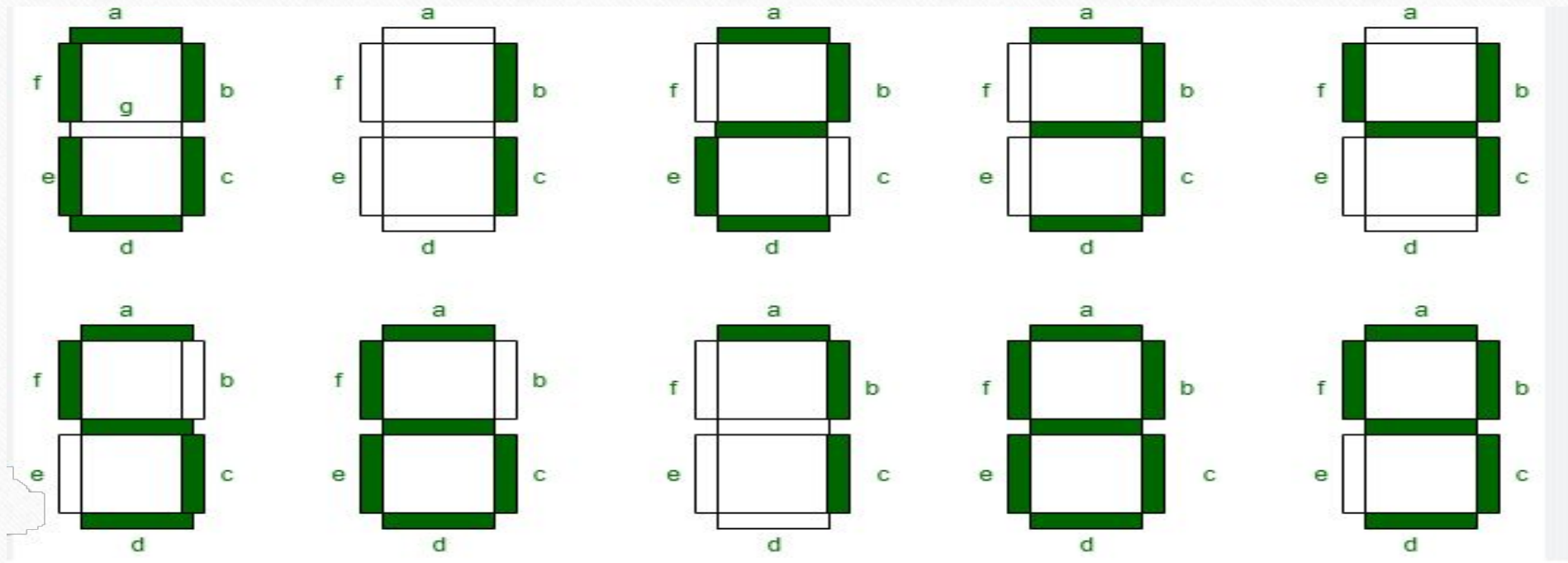


**Q.1: What is a 7-segment display?**

**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

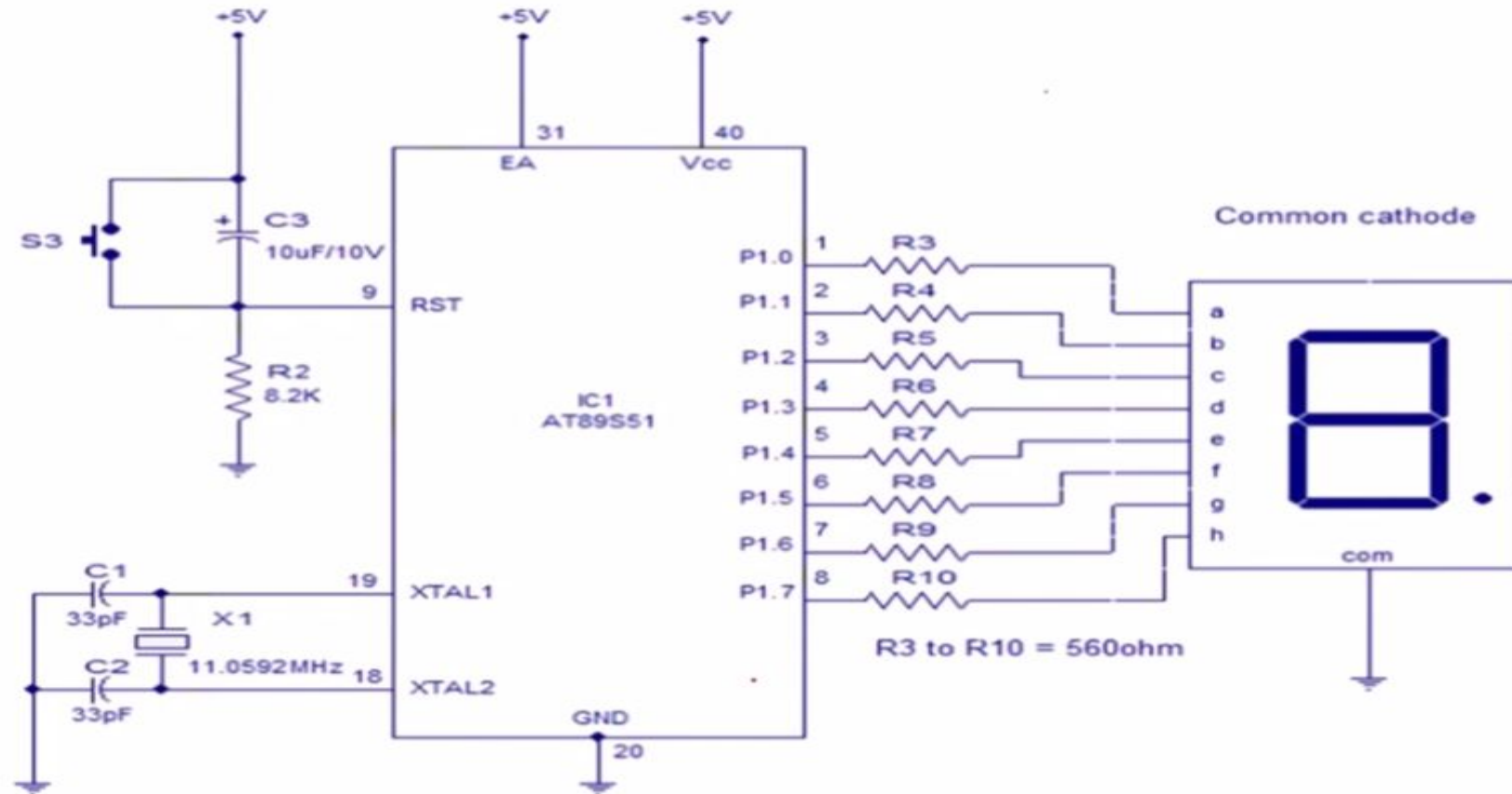




Q.2 Develop a BCD to 7-segment decoding table

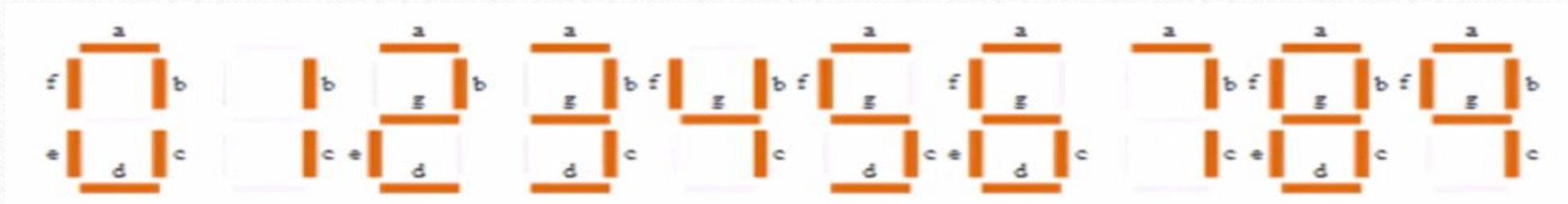
Decimal Digit	Input lines				Output lines							Display pattern
	A	B	C	D	a	b	c	d	e	f	g	
0	0	0	0	0	1	1	1	1	1	1	0	
1	0	0	0	1	0	1	1	0	0	0	0	
2	0	0	1	0	1	1	0	1	1	0	1	
3	0	0	1	1	1	1	1	1	0	0	1	
4	0	1	0	0	0	1	1	0	0	1	1	
5	0	1	0	1	1	0	1	1	0	1	1	
6	0	1	1	0	1	0	1	1	1	1	1	
7	0	1	1	1	1	1	1	0	0	0	0	
8	1	0	0	0	1	1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

# 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

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**Mnemonic**

MOVC A,@A+DPTR

MOVC A,@A+PC

**Operation**

Copy the code byte, found at the ROM address formed by adding A and the DPTR, to A

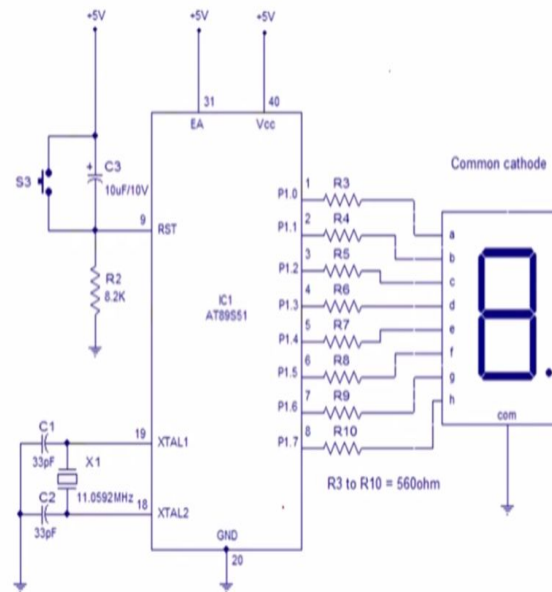
Copy the code byte, found at the ROM address formed by adding A and the PC, to A



# Programming Example

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

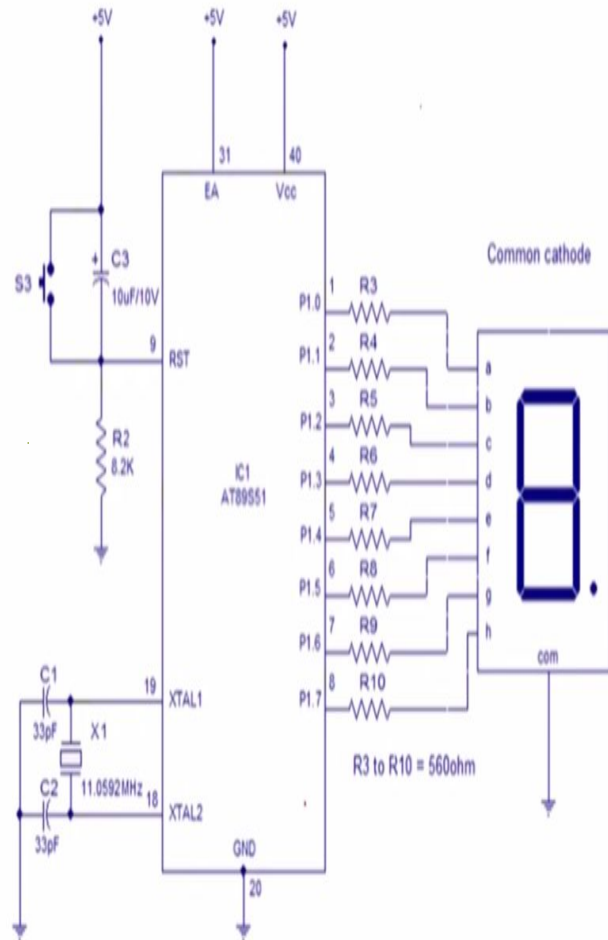
Digit	H (DOT)	g	f	e	d	c	b	a	Code
0	0	0	1	1	1	1	1	1	3F
1	0	0	0	0	0	1	1	0	06
2	0	1	0	1	1	0	1	1	5B
3	0	1	0	0	1	1	1	1	4F
4	0	1	1	0	0	1	1	0	66
5	0	1	1	0	1	1	0	1	6D
6	0	1	1	1	1	1	0	1	7D
7	0	0	0	0	0	1	1	1	07
8	0	1	1	1	1	1	1	1	7F
9	0	1	1	0	1	1	1	1	6F



- 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,7FH,6FH

# Example on Programming

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



```

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

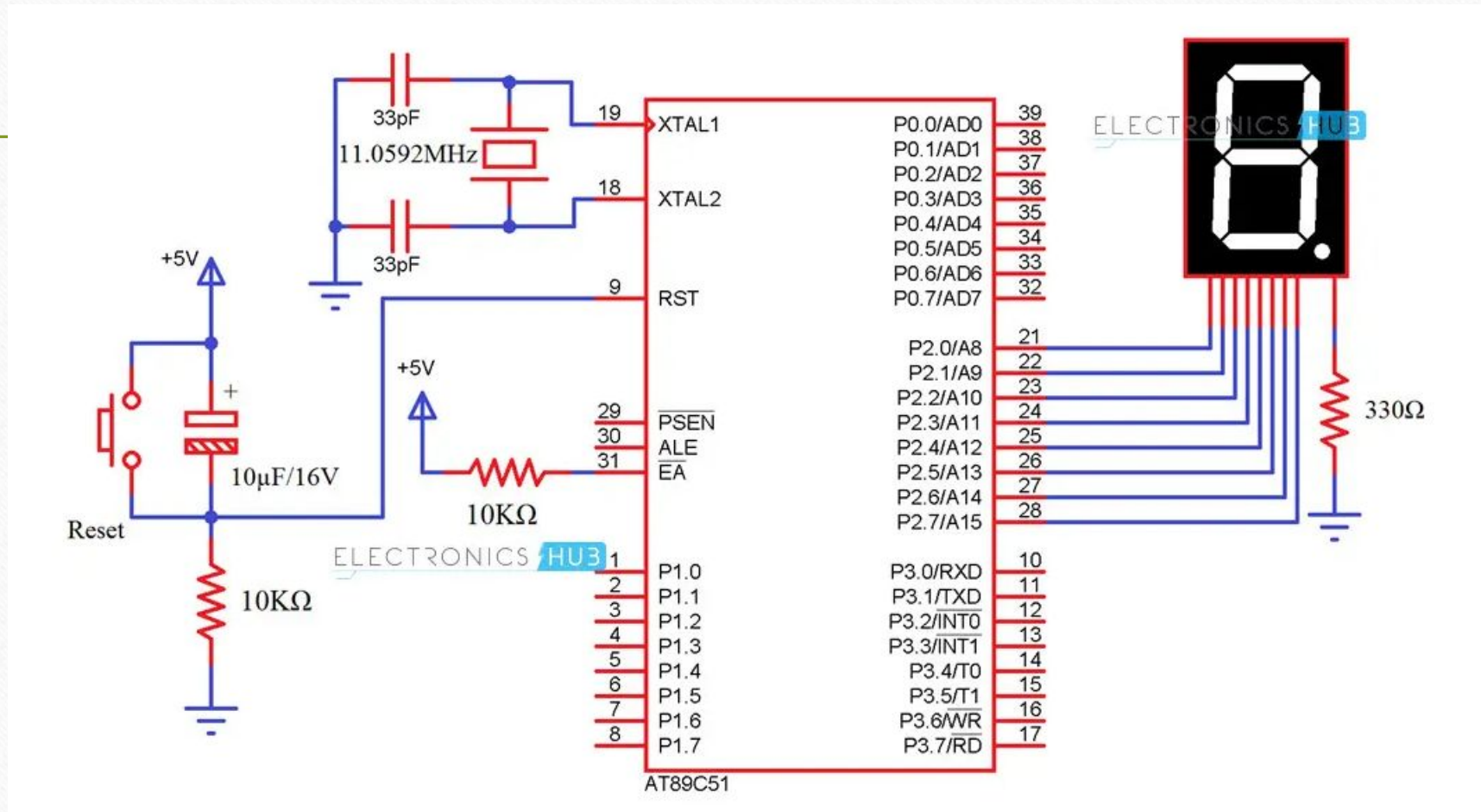
STRING: DB
3FH,06H,5BH,4FH,66H,6DH,7DH,07H,7
FH,6FH
    
```

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)



## Q.5: Draw the interfacing diagram for interfacing 7-segment LED at port 2



Thank  
you