

Chapter 8

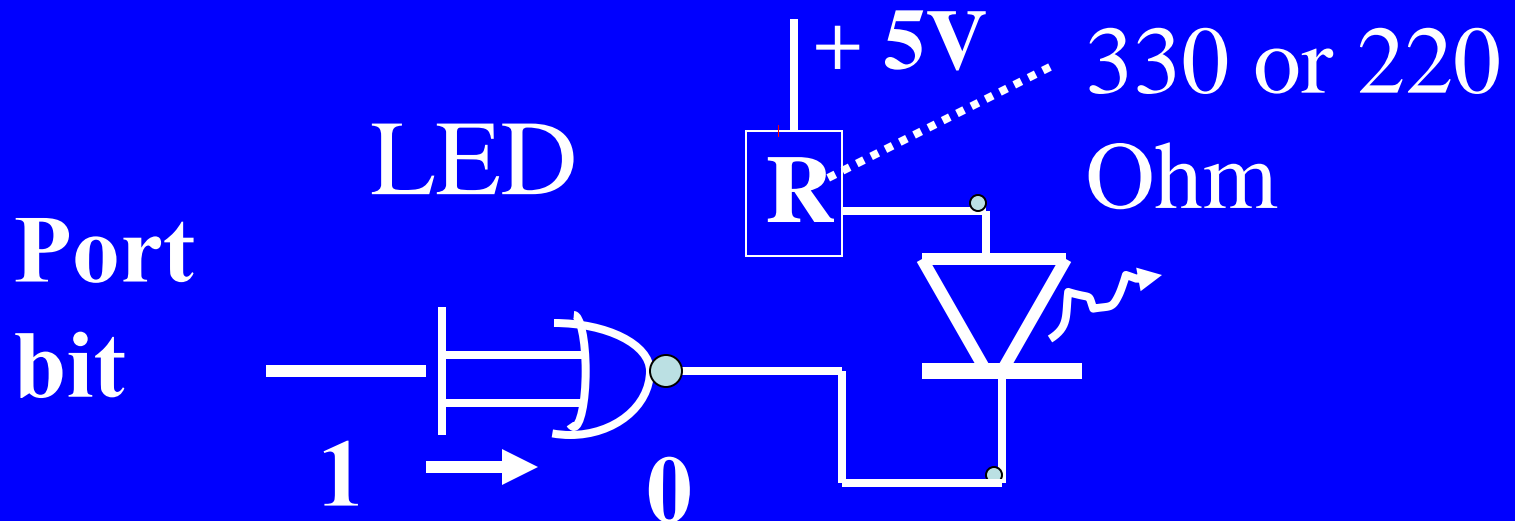
Digital and Analog Interfacing Methods

Lesson 2

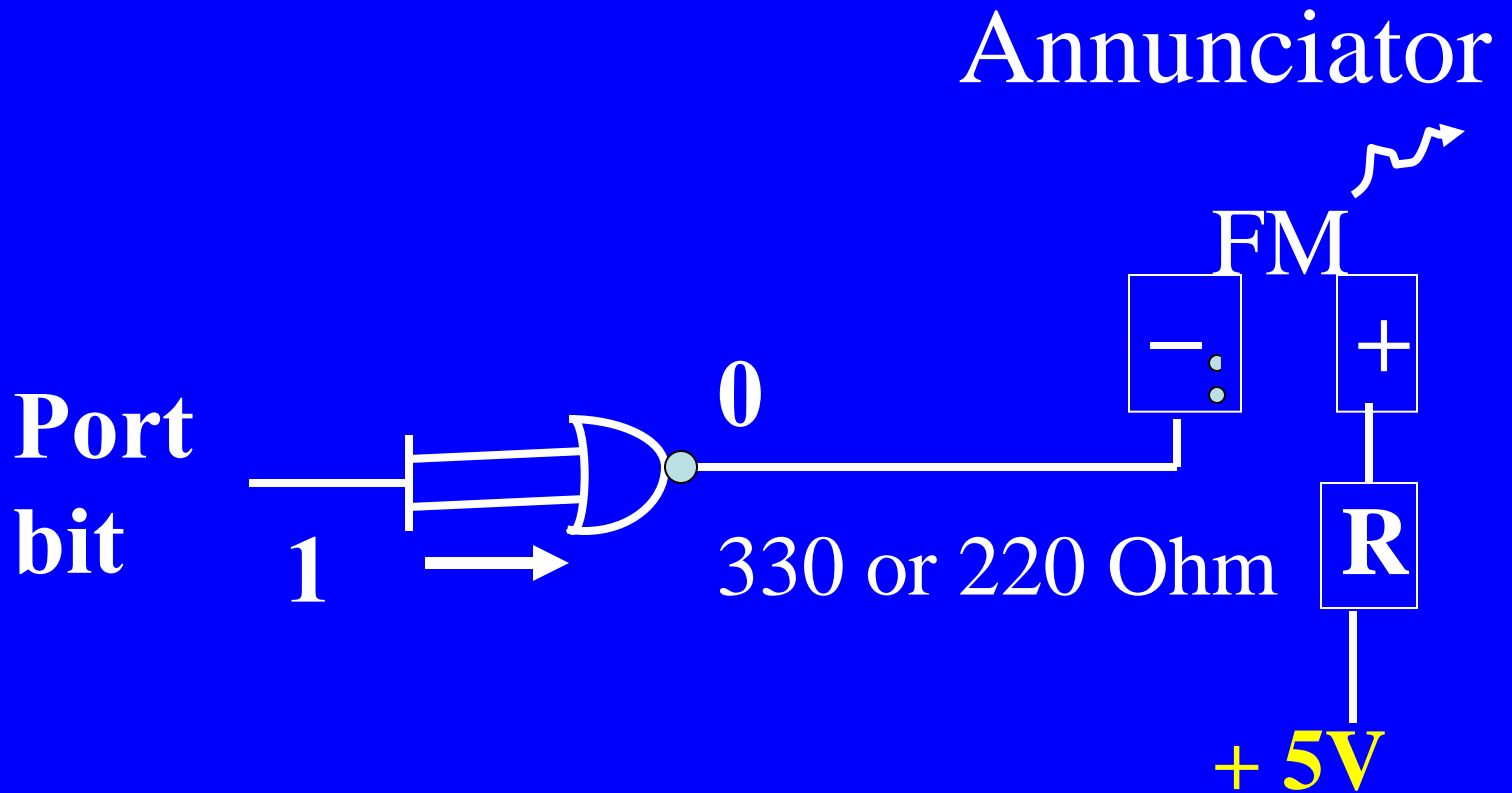
LEDs and LED Arrays

Single LED or an Annunciator Interface

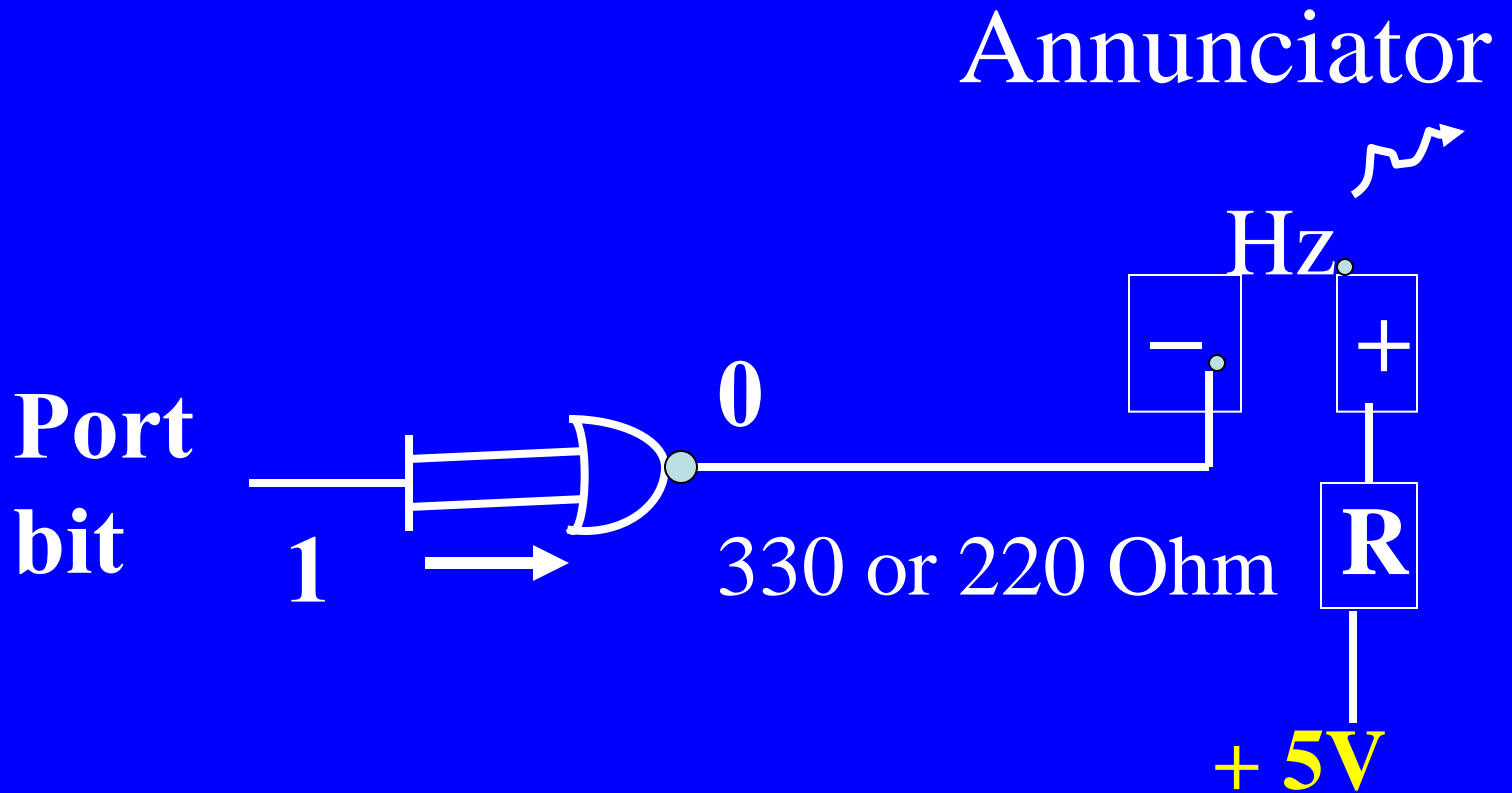
Single LED to a Port bit — LED in the shape of a thick dot



Single LED to a Port bit— LED in the shape of connected F and M



Single LED to a Port bit— LED in the shape of connected H and z



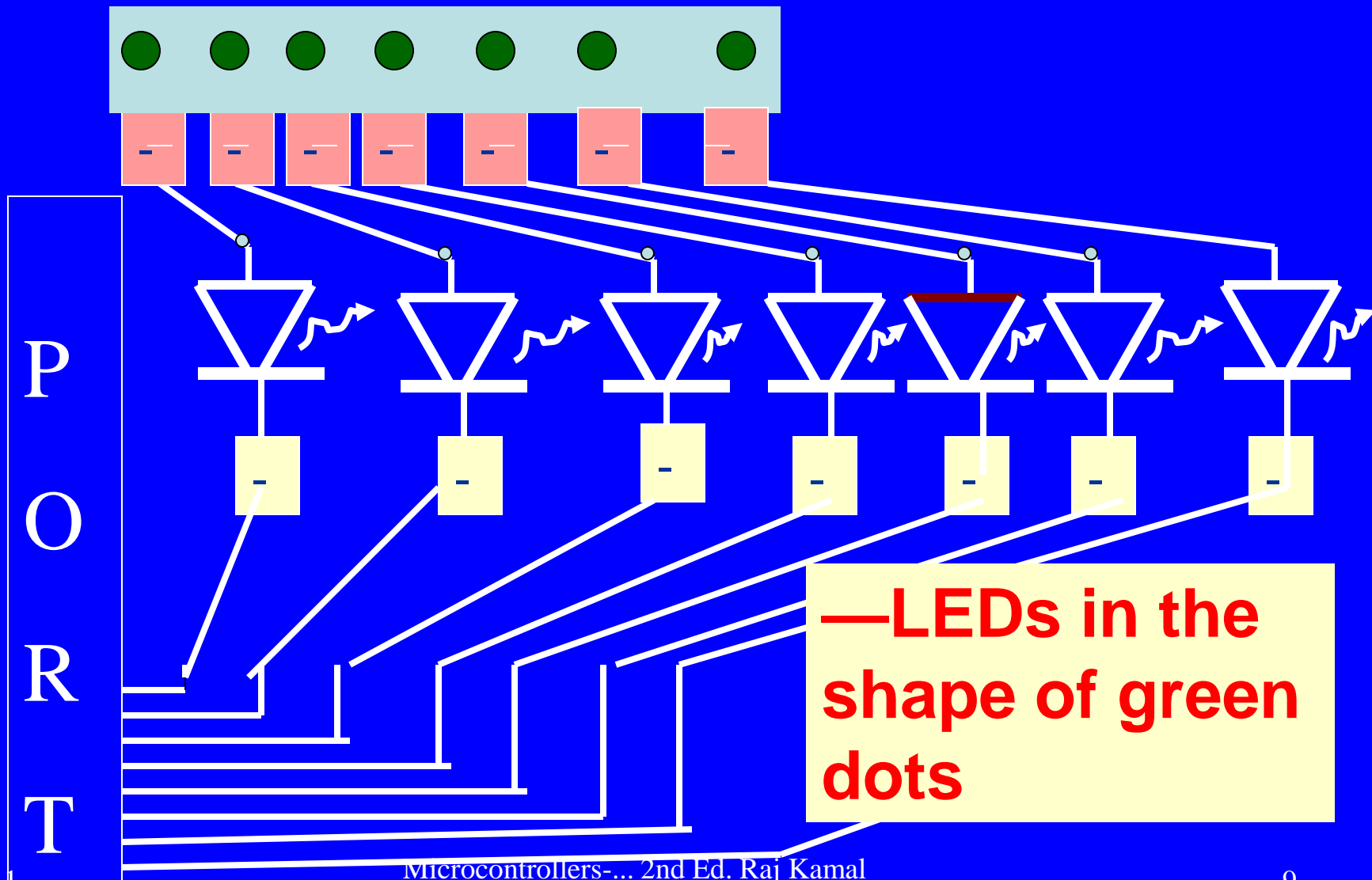
Program Example 8.2

```
LED_GLOW: CLR P1,0
```

```
LED_Off: SETB P1.0
```

LED Array Interface

LEDs or Annunciators Array

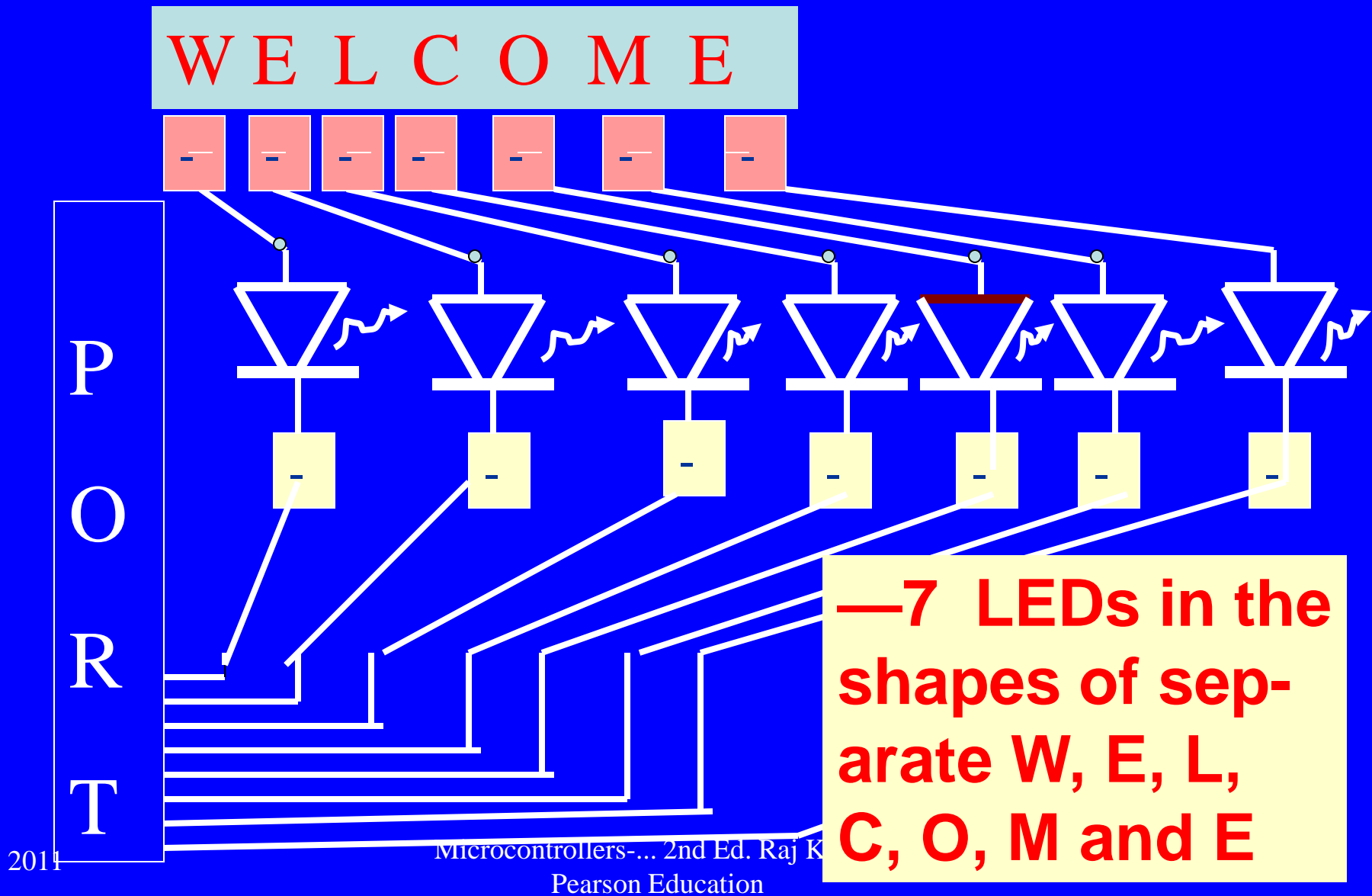


Program Example for first Four LEDs on and next three LEDs Off

```
LED_ARRAYGLOW: MOV P1, 0x70  
;
```

LED annunciators Array Interface

LEDs or Annunciators Array



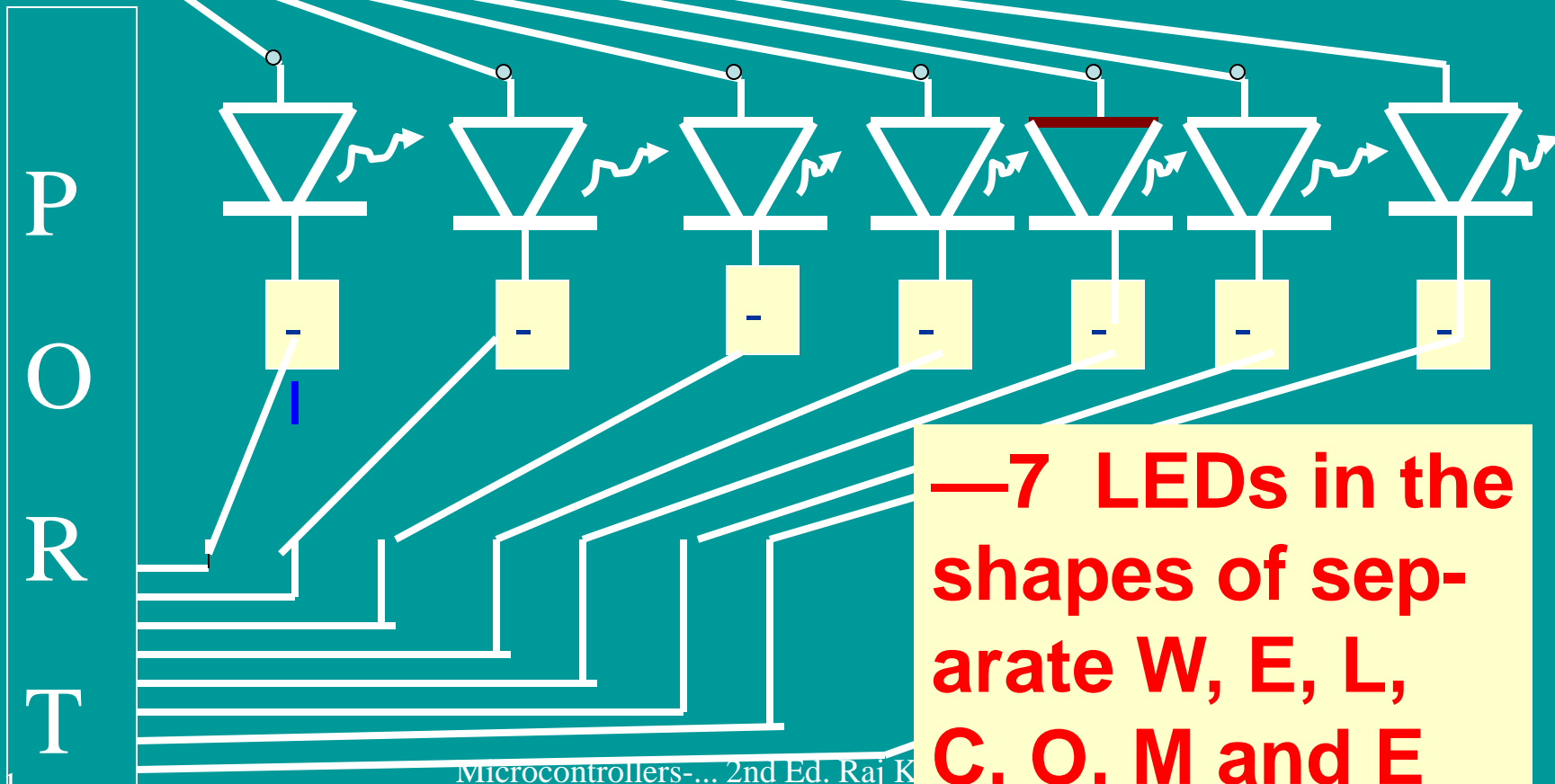
Program Example for first Four LEDs on and next three LEDs Off

```
WELCOME_OFF: MOV P1, 0xFF ;  
WELCOME_ON:  MOV P1, 0x80 ;
```

LED annunciators Array Interface

Array of Annunciators

W E L C O M E



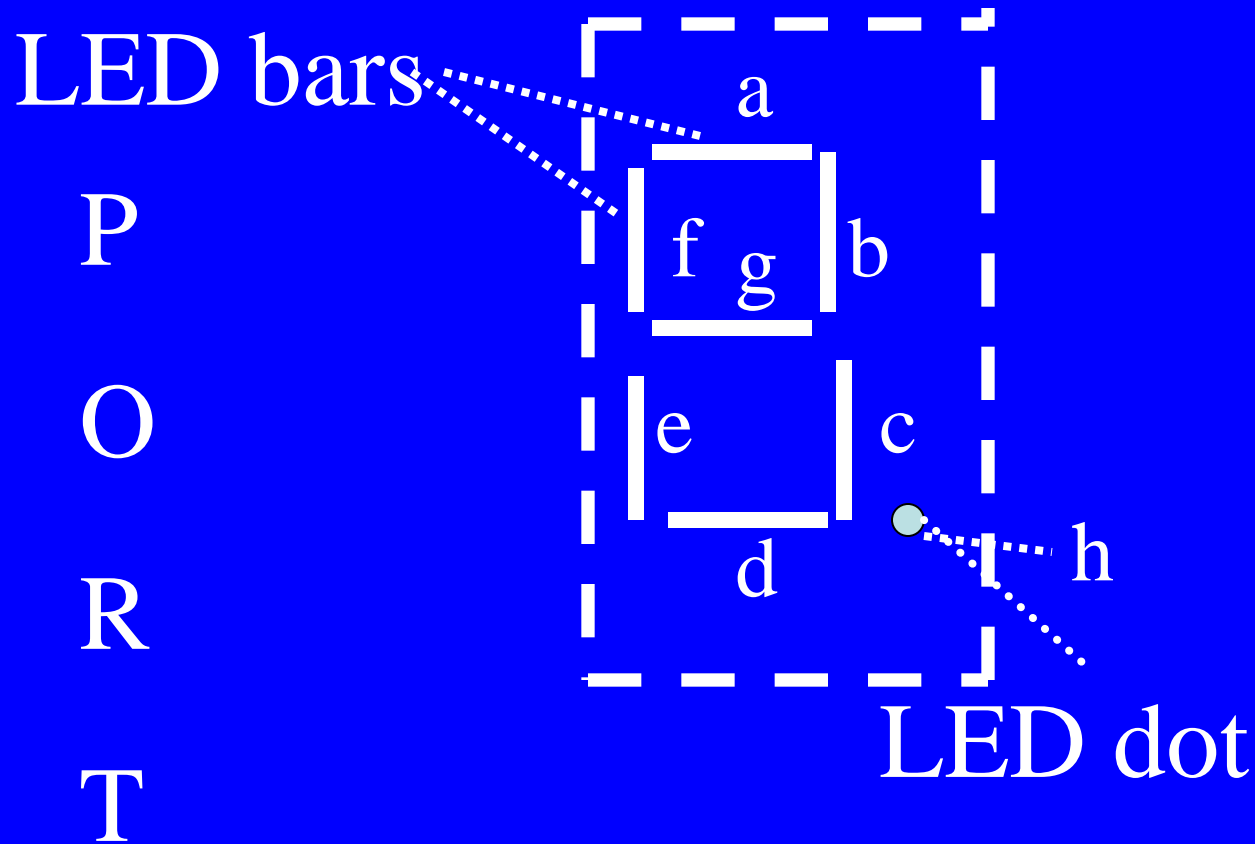
—7 LEDs in the shapes of separate W, E, L, C, O, M and E

Program Example for WELCOME Off and On

```
WELCOME_OFF: MOV P1, 0xFF ;  
WELCOME_ON:  MOV P1, 0x80 ;
```


Seven Segment Display

7-Segment Arrangement with 8th LED DOT



Multiplexed Multi digit display

Multiplexed Circuits

- **Figure 8.11 (a)**
- Four digits switched on at successive intervals ΔT by grounding common cathode at each (called- Display refresh cycle) within a period = $4 \Delta T$

Multiplexed Circuits

- 8- port bits sending time division multiplexed outputs at intervals ΔT in each display refresh cycle of period = $4 \Delta T$)

Multiplexed Circuits for 16-segment character displays

- Figure 8.11 (b)
- A timer and ring-counter counting at successive intervals ΔT by 1 at common anode at each display refresh cycle
- 4- port bits sending 4 R (return) lines and 4 bits to 4 L (LED) lines

Multiplexed Circuits for 16-segment character displays

- During successive intervals ΔT , four - port bits sending 4 R (return) lines and four - port bits send 4 L (LED) lines

Summary

We learnt

LED

- **Each LED or annunciator has a p- input from a +5 supply through R**
- **Each LED or annunciator has a n- input from a port bit**

We learnt

LED Array

- Each array LED has a p- input from a +5V supply through R
- Each LED or annunciator has a n- input from a port bit

We learnt

7-segment display

- Each segment a to g LED has a p- input from a supply and R
- Each LED or annunciater has a n- input from a port bit

We learnt

Multiplexing

- For Multi digit display
- For 16-segment characters display

End of Lesson 2

LEDs and LED Arrays