Aim:

To interface a seven-segment display with the 8051 microcontroller and display digits 0 to 9 sequentially using an assembly language program in Keil and simulate it in Proteus.

Apparatus Required:

Laptop with Keil uVision software
Proteus Design Suite

Circuit Diagram Setup in Proteus:

1. Open Proteus and create a new project.
2. Add the following components from the library:
   8051 Microcontroller (AT89C51)
   Seven Segment Display (Common Anode/Cathode)
   Resistors (330Ω)
3. Connect:
   Seven Segment Display to Port P2 of the microcontroller.
   Power (VCC & GND) and appropriate resistors.
4. Save the design and proceed to programming in Keil.

Algorithm:

1. Load DPTR with the address of the lookup table containing seven-segment hex values.
2. Load R1 with 10 (loop counter for digits 0-9).
3. Fetch digit patterns from the lookup table and send them to P2.
4. Call a delay subroutine.
5. Increment DPTR to get the next digit pattern.
6. Repeat steps 3-5 until all 10 digits are displayed.
7. Repeat the process infinitely.

Program:

```
ORG 0000H    ; Start of program
```

```
L: MOV DPTR, #0100H   ; Load DPTR with lookup table address
   MOV R1, #0AH       ; Load counter for 10 digits

BACK: CLR A
      MOVC A, @A+DPTR  ; Fetch digit pattern from lookup table
      MOV P2, A        ; Send pattern to seven-segment display
      ACALL D          ; Call delay subroutine
      INC DPTR         ; Move to next pattern
      DJNZ R1, BACK    ; Repeat for all digits
      SJMP L           ; Repeat sequence infinitely

; Delay Subroutine
D: MOV R5, #05H
B2: MOV R3, #255
B1: MOV R4, #255
AG: DJNZ R4, AG
    DJNZ R3, B1
          DJNZ R5, B2
    RET
ORG 0100H    ; Lookup table for digits 0-9
DB 3FH, 06H, 5BH, 4FH, 66H, 6DH, 7DH, 07H, 7FH, 6FH
END
```

Explanation:

1.Lookup Table (0100H - 0109H): Stores hexadecimal values for displaying digits 0-9.

2.MOVC A, @A+DPTR: Retrieves the corresponding segment pattern for the digit.

3.MOV P2, A: Sends data to Port 2, which is connected to the seven-segment display.

4.ACALL D: Calls the delay subroutine to maintain visibility of each digit.

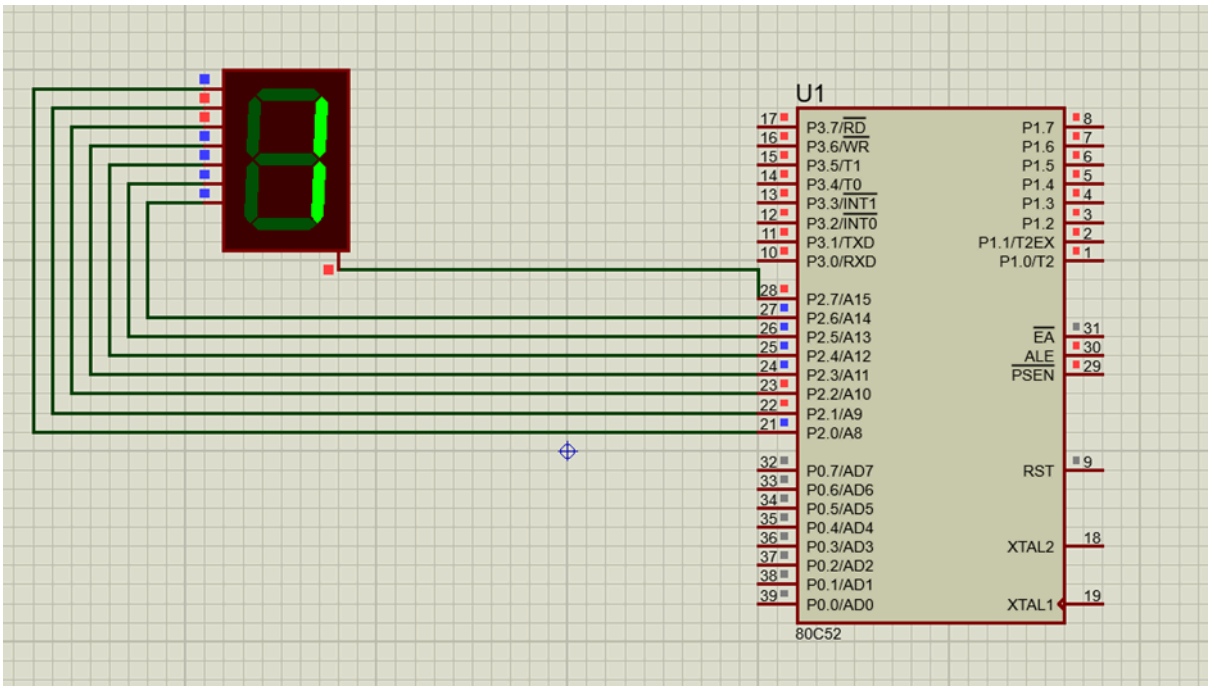
5.Delay Subroutine: Creates a time delay using nested loops.

6.SJMP L: Runs the digit display sequence in an infinite loop.

Simulation in Proteus:

1. Open Proteus and load the HEX file generated from Keil.
2. Connect P2 of the microcontroller to the seven-segment display.
3. Run the simulation and observe the digits 0 to 9 appearing sequentially.

Output:



The seven-segment display will show digits 0 to 9 sequentially with a delay between each digit.

Result:

The seven-segment display has been successfully interfaced with the 8051 microcontroller, and the digits 0 to 9 are displayed sequentially using Keil and Proteus.