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M&A Practical 6

Aim : **Introduction to Microcontroller Programming using Keil. Learning programs based on various Addressing modes of 8051.**

1. Demonstrate Assembly Language Program for microcontroller-8051 to store last two digits of your Registration Number (as 8-bit data) in R3 using all addressing modes.

Code :

```
MOV R3,#12H     // IMMEDIATE ADDRESSING MODE
MOV R3,#00H


MOV A,#12H      // REGISTER ADDRESSING MODE
MOV R3,A        //
MOV R3,#00H


MOV A,#12H      // DIRECT ADDRESSING MODE
MOV 03H,A       //
MOV R3,#00H


MOV A,#12H      // INDIRECT ADDRESSING MODE
MOV R0,#03H     //
MOV @R0,A       //
MOV R3,#00H


MOV A,#01H        // INDEXED ADDRESSING MODE
MOV DPTR,#0000H //
MOVC A,@A+DPTR //
MOV R3,A          //

END
```
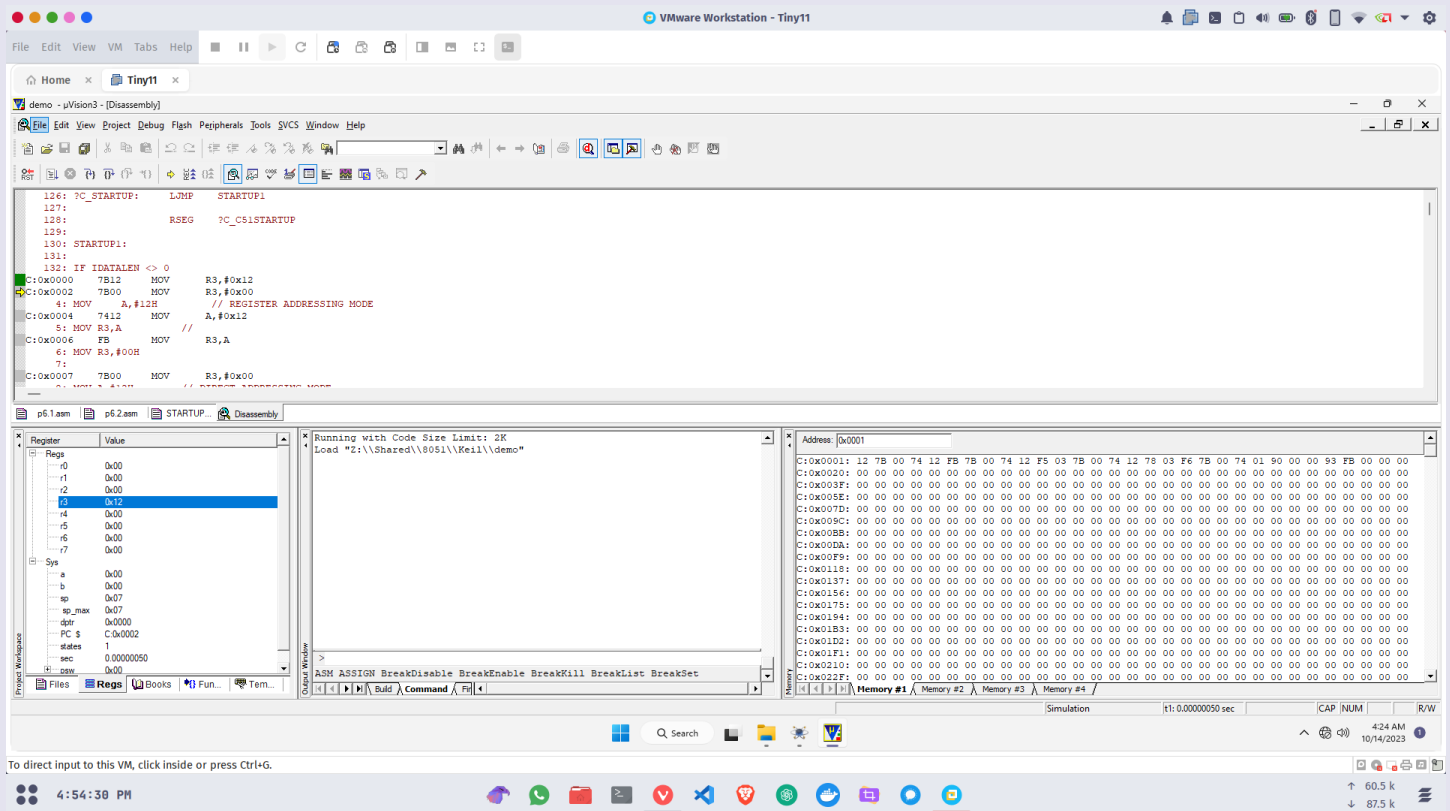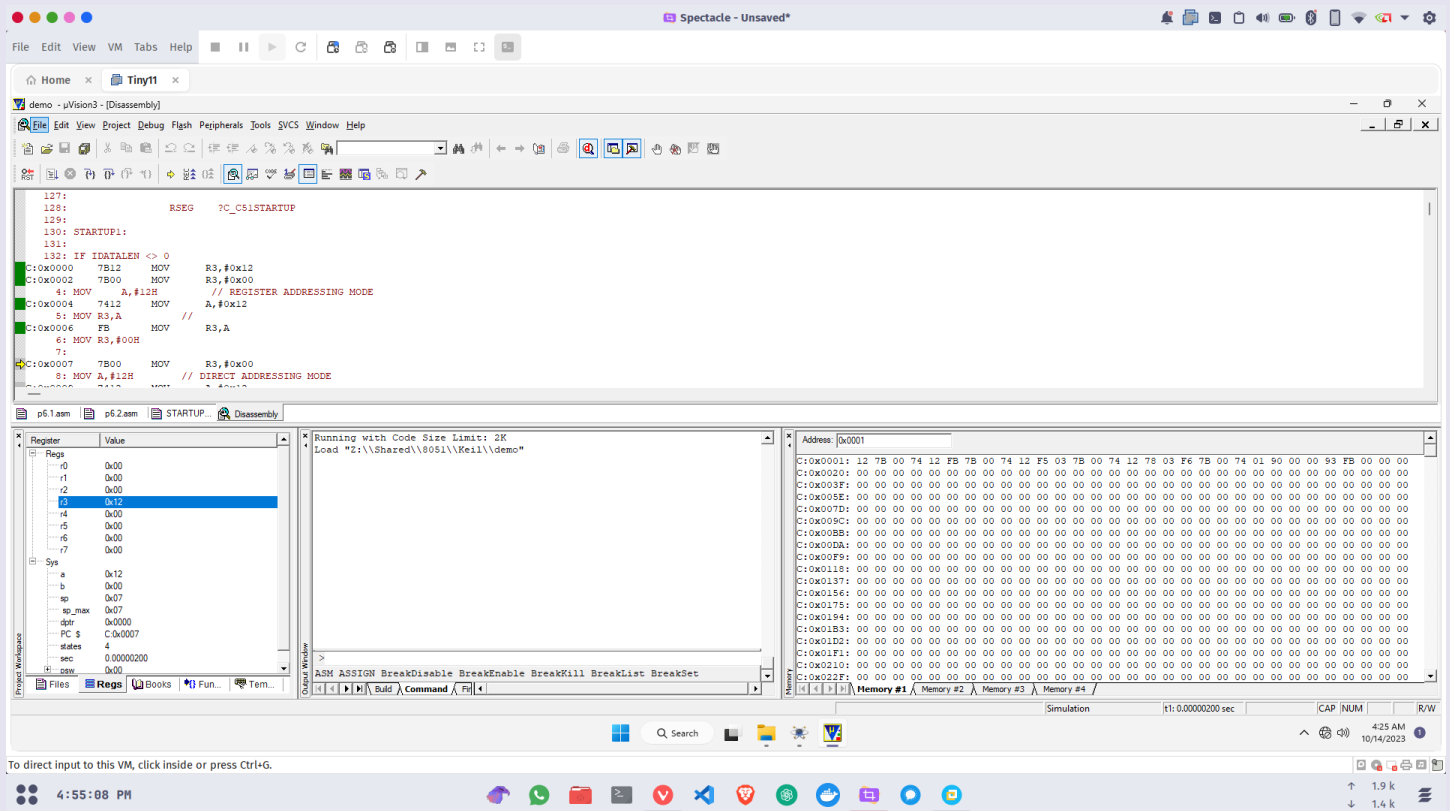
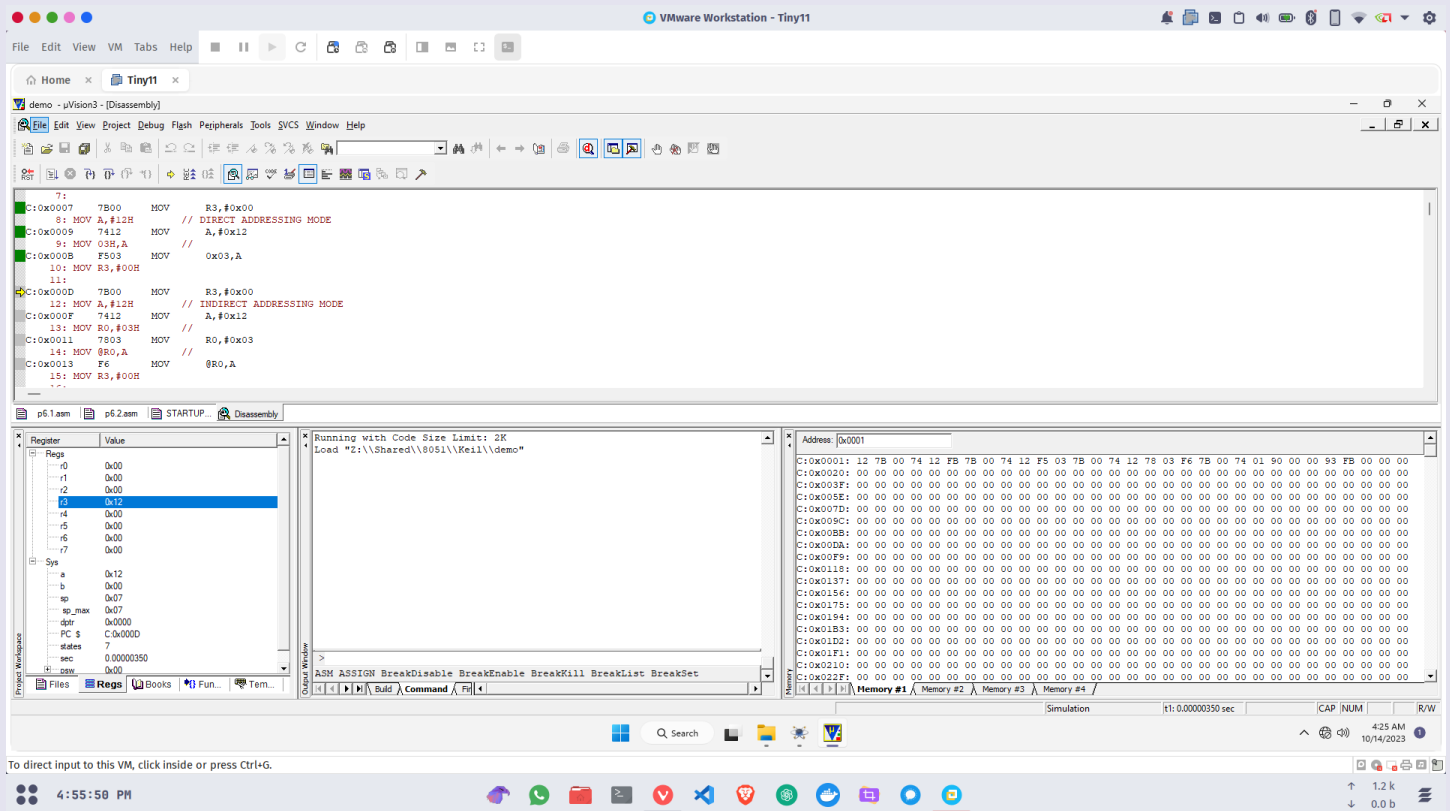a) Immediate addressing mode

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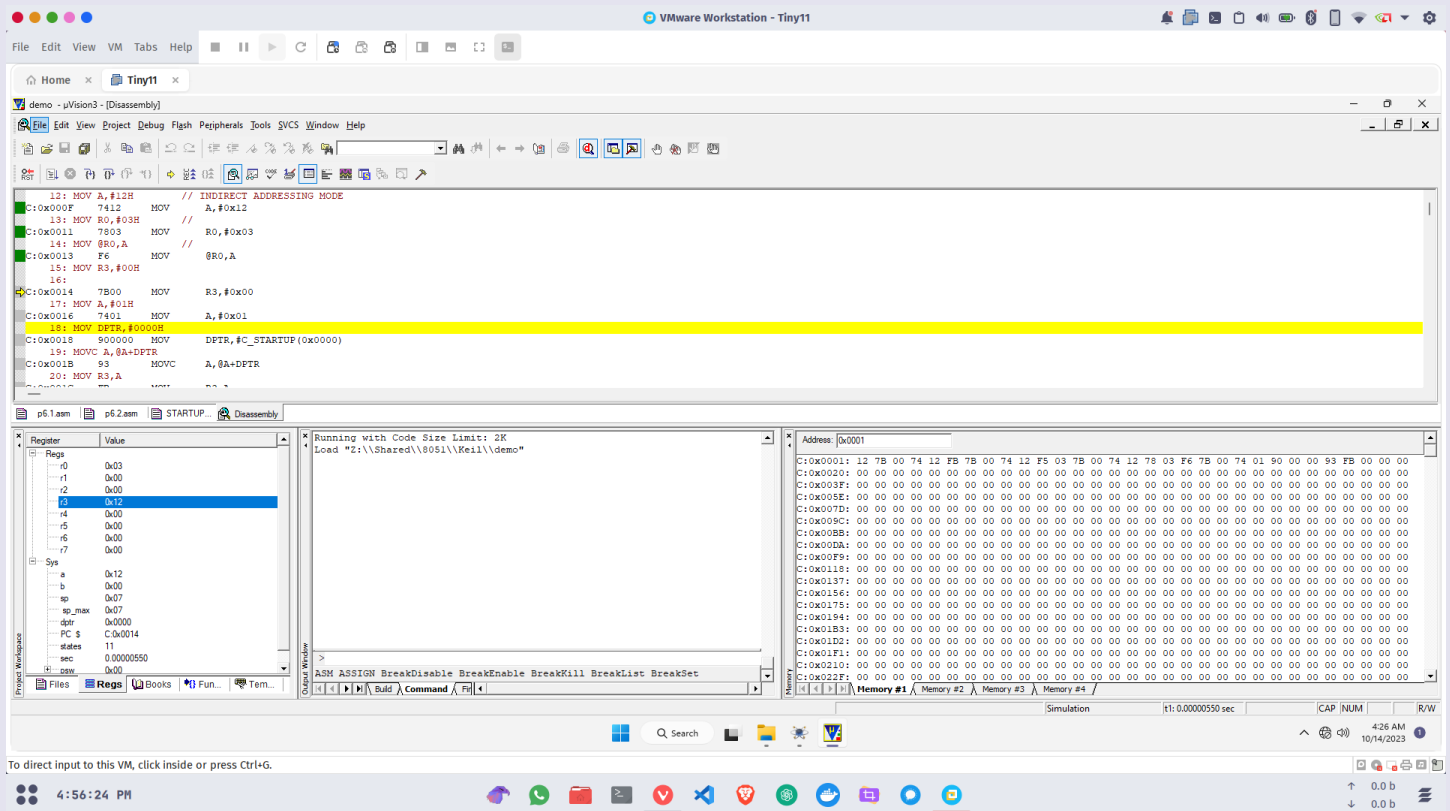
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b) Register addressing mode

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c) Direct addressing mode

d) Indirect addressing mode

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e) Indexed addressing mode

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2. Demonstrate swapping of value stored at Register R3 of Bank 1 with Register R3 of Bank 3

Code :

```
// LOADING DATA
MOV PSW,#08H // SWITCHING TO RB 1
MOV R3,#64H
MOV 1BH,#32H
MOV PSW,#18H // TO SHOW CONTENTS OF REGISTERS IN BANK 3 IN KEIL
REGISTERS TAB
MOV PSW,#08H // SWITCHING BACK TO RB 1

// SWAPPING
MOV A,R3
MOV R2,A
MOV A,1BH
MOV 1BH,0BH
MOV R3,A
// SWAPPING ENDS HERE

MOV PSW,#18H // TO SHOW CONTENTS OF REGISTERS IN BANK 3 IN KEIL
REGISTERS TAB
```

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Before swapping :

a) In Bank-1 :

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b) In Bank-3 :

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After swapping :

a) In Bank-1 :

b) In Bank-3 :
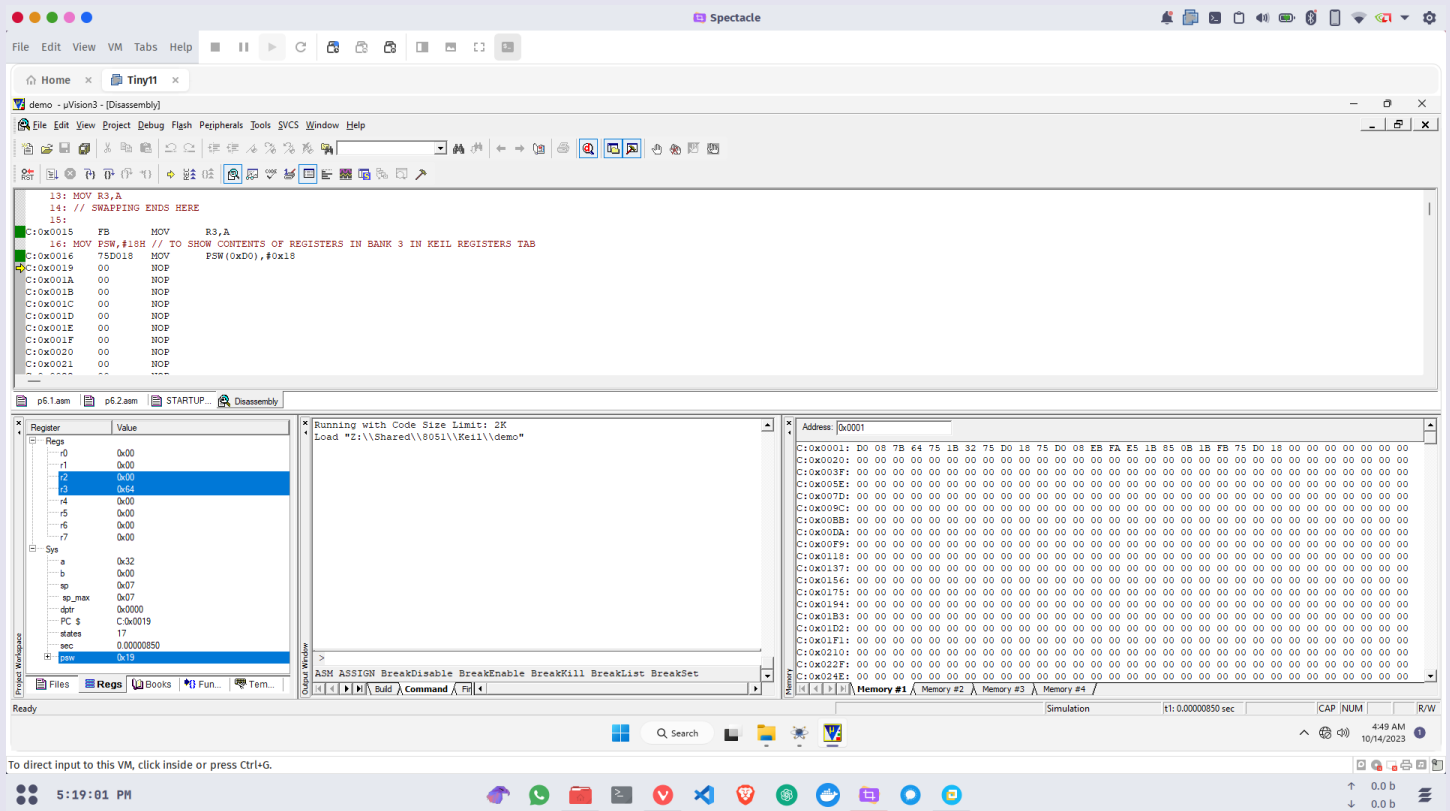
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Exercise: (Answer the following Questions)

1. Write down the differences between microprocessor and microcontroller.
ANS: Microprocessor is only a processing unit which needs additional peripheral devices for proper use. But, Microcontroller is an all-in-one package consisting of CPU, RAM, ROM, Clock/Timer, etc. which can also be attached to peripherals and external devices.

2. "Audi Q7 car is an example of an embedded system". State true/false with justification.
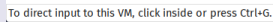**ANS:** True. The Audi Q7 uses a system built entirely for itself and nothing else, meaning there's a dedicated chip built for performing specific functions and those functions only. This exact system cannot be programmed to do something else that it was not supposed to do as is the case with 'embedded systems'.

3. Which microprocessor is used in latest Samsung and Nokia mobile phones.
ANS: Samsung uses 'Qualcomm Snapdragon 8 Gen 2' as their chipset in their latest flagships 'Samsung Galaxy S23 Ultra', 'Samsung Galaxy Z Fold 5', and 'Samsung Galaxy Z Flip 5'. Similarly, Nokia flagships like 'Nokia G60 5G' are using 'Qualcomm Snapdragon 695'.

4. Write down the major limitations of microprocessor-8085 to work as complete MPU. (Microprocessor Unit).
ANS:
-> It needs external peripherals to actually be useful.
-> No internal RAM/ROM
-> Needs external crystal oscillator for Clock

5. Why Intel 8051 is known as a "Computer on Chip"?
ANS: Microcontroller 8051, in general, is called a 'Computer on a Chip' because it contains many basic features on a single chip. It has internal RAM, ROM, Clock circuit, Timers, Interrupt, I/O Ports, Serial Ports, etc.