



**INDIAN INSTITUTE OF INFORMATION TECHNOLOGY,  
NAGPUR**  
**Department of Electronics and Communication Engineering**  
Academic Session: July to December 2024 (Odd Semester)  
**Embedded System Design LAB (ECL-322)**  
V Semester ECE-IoT

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Date: 28/08/2024

*Experiment No. 1(A)*

Name of Student: JJATEEN GUNDEHSA

Registration No.: BT22ECI002

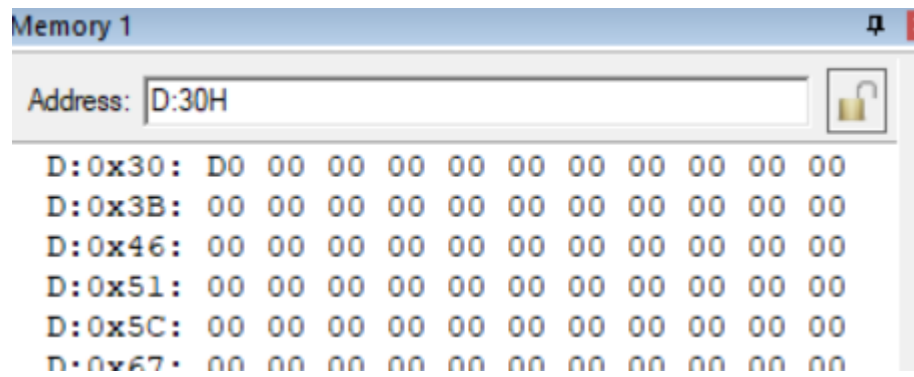
**Aim:** Write a program to add two numbers which are stored in the internal memory.

**Requirements:** Keil

**Program Code:**

```
1 ORG 00H
2     SJMP START
3     ORG 30H
4     START:
5     MOV A, #30H
6     MOV R0, #0A0H
7     ADD A, R0
8     MOV R1, A
9     END
```

**Output:**



### **Result/ Conclusion:**

The program efficiently adds two numbers stored in internal memory using the 8051 microcontroller's registers and instructions.

(Dr. S. S. Motdhare)



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**Experiment No. 1(B)**

Name of Student: JJATEEN GUNDEHSA

Registration No.: BT22ECI002


**Aim:** Write a program to add two numbers where the numbers are stored in external memory.

**Requirements:** Keil

**Program Code:**

```
EXP1_B.ASM
1 ORG 00H
2 SJMP START
3
4 ORG 30H
5 START:
6   MOV DPTR, #4000H
7   MOV A, #15H
8   MOVX @DPTR, A
9
10  MOV DPTR, #4001H
11  MOV A, #25H
12  MOVX @DPTR, A
13
14  MOV DPTR, #4000H
15  MOVX A, @DPTR
16  MOV R1, A
17
18  INC DPTR
19  MOVX A, @DPTR
20
21  ADD A, R1
22
23  MOV DPTR, #4002H
24  MOVX @DPTR, A
25
26  END
```

## Output:

Memory 1										
Address: X:0x4000										
X:0x004000:	15	25	3A	00	00	00	00	00	00	00
X:0x00400A:	00	00	00	00	00	00	00	00	00	00
X:0x004014:	00	00	00	00	00	00	00	00	00	00
X:0x00401E:	00	00	00	00	00	00	00	00	00	00
X:0x004028:	00	00	00	00	00	00	00	00	00	00
X:0x004032:	00	00	00	00	00	00	00	00	00	00

## Result/ Conclusion:

The program efficiently adds two numbers stored in external memory using the 8051 microcontroller's registers and instructions.

(Dr. S. S. Motdhare)



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Date: 28/08/2024

## Experiment No. 1(C)

Name of Student: JJATEEN GUNDEHSA

Registration No.: BT22ECI002

**Aim:** Write a program to add first 10 natural numbers where the numbers are stored in internal memory.

**Requirements:** Keil

**Program Code:**

```
LAB1.ASM  LAB3.ASM
1  ORG 00H
2  SJMP START
3
4  ORG 30H
5  MOV 30H, #01H
6  MOV 31H, #02H
7  MOV 32H, #03H
8  MOV 33H, #04H
9  MOV 34H, #05H
10 MOV 35H, #06H
11 MOV 36H, #07H
12 MOV 37H, #08H
13 MOV 38H, #09H
14 MOV 39H, #0AH
15
16 START:
17     MOV R0, #30H
18     MOV R2, #0AH
19     MOV A, #00H
20
21 ADD_LOOP:
22     ADD A, @R0
```

```

14 MOV 39H, #0AH
15
16 START:
17     MOV R0, #30H
18     MOV R2, #0AH
19     MOV A, #00H
20
21 ADD_LOOP:
22     ADD A, @R0
23     INC R0
24     DJNZ R2, ADD_LOOP
25
26     MOV 40H, A
27
28 END
29

```

### Output:

Memory 1									
Address: 0x40									
C:0x0040:	35	06	75	36	07	75	37	08	75
C:0x0056:	DA	FC	F5	40	00	00	00	00	00
C:0x006C:	00	00	00	00	00	00	00	00	00
C:0x0082:	00	00	00	00	00	00	00	00	00

### Result/ Conclusion:

The program efficiently adds first 10 natural numbers stored in internal memory using the 8051 microcontroller's registers and instructions.



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Date:04/09/2024

**Experiment No. 2**

**Name of Student: JJATEEN GUNDEHSA**

**Registration No.: BT22ECI002**

**Aim:** Write an assembly language program to find the factorial of a number using microcontroller 8051.

**Requirements:** Keil

**Program Code:**

```
LAB2.ASM
1  ORG 00H
2
3  MOV R2, #05H
4  MOV A, #01H
5
6  LOOP: MOV B, R2
7         MUL AB
8         DJNZ R2, LOOP
9         MOV 51H, A
10        MOV A, B
11        MOV 52H, A
12        END
13
```

### Output:

Memory 1												
Address: D:51h												
D:0x51:	78	00	00	00	00	00	00	00	00	00	00	00
D:0x5C:	00	00	00	00	00	00	00	00	00	00	00	00
D:0x67:	00	00	00	00	00	00	00	00	00	00	00	00
D:0x72:	00	00	00	00	00	00	00	00	00	00	00	00
D:0x7D:	00	00	00	FF	07	00	00	00	00	00	00	00
D:0x88:	00	00	00	00	00	00	00	00	FF	00	00	00

### Result/ Conclusion:

The program efficiently finds the factorial using the 8051 microcontroller's registers and instructions.





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Date:04/09/2024

**Experiment No. 3**

Name of Student: JJATEEN GUNDEHSA

Registration No.: BT22ECI002

**Aim:** Write an assembly language program to find count of odd and even numbers in an array.

**Requirements:** Keil


**Program Code:**

```


5    MOV R0, #ARRAY
6    MOV R2, #05H
7    MOV A, #00H
8    MOV B, #00H
9    MOV R1, #00H
10
11  UPPER_LOOP:
12    MOV A, @R0
13    ANL A, #01H
14    JZ EVEN
15
16    INC B
17    SJMP NEXT_ELEMENT
18  EVEN:
19    INC R1
20
21  NEXT_ELEMENT:
22    INC R0
23    DJNZ R2, UPPER_LOOP
24
25    MOV 400H, B
26    MOV 401H, R1
27
28  END
29

```

## Output:

Memory 1												
Address: D:400H												
D04:0x00:	02	03	00	00	00	00	00	00	00	00	00	00
D04:0x0B:	00	00	00	00	00	00	00	00	00	00	00	00
D04:0x16:	00	00	00	00	00	00	00	00	00	00	00	00

Memory 1												
Address: D:401H												
D04:0x01:	03	00	00	00	00	00	00	00	00	00	00	00
D04:0x0C:	00	00	00	00	00	00	00	00	00	00	00	00
D04:0x17:	00	00	00	00	00	00	00	00	00	00	00	00

## Result/ Conclusion:

The program efficiently found the number of odds and evens in the give array of numbers using the 8051 microcontroller's registers and instructions.

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Date:11/09/2024

**Experiment No. 4**

**Name of Student: JJATEEN GUNDEHSA**

**Registration No.: BT22ECI002**

**Aim:** Write an assembly language program to sort the array of numbers in ascending order.

**Requirements:** Keil

**Program Code:**

```

EXPERIMENT 3.ASM
1 ORG 00H
2 MOV R7,#04H
3 MAIN:
4   MOV R0,#30H
5   MOV R6,#04H
6 UP:
7   MOV A,@R0
8   INC R0
9   MOV B,@R0
10  CJNE A,B,NEXT
11 NEXT:
12  JC NOEXCHANGE
13  MOV @R0,A
14  DEC R0
15  MOV @R0,B
16  INC R0
17 NOEXCHANGE:
18  DJNZ R6,UP
19  DJNZ R7,MAIN
20  END
21
22

```

**Output:**

Memory 1												
Address: D:30H												
D:0x30:	04	06	01	07	03	00	00	00	00	00	00	00
D:0x3B:	00	00	00	00	00	00	00	00	00	00	00	00

Memory 1												
Address: D:30H												
D:0x30:	01	03	04	06	07	00	00	00	00	00	00	00
D:0x3B:	00	00	00	00	00	00	00	00	00	00	00	00

### Result/ Conclusion:

The program efficiently sort the give array of numbers in ascending order using the 8051 microcontroller's registers and instructions.

(Dr. S. S. Motdhare)



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**Experiment No. 5**

**Name of Student: JJATEEN GUNDEHSA**

**Registration No.: BT22ECI002**

**Aim:** Write an assembly language program to sort the array of numbers in descending order.

**Requirements:** Keil

**Program Code:**

```

1  ORG 00H
2  MOV R7, #04H
3  MAIN:
4  MOV R0, #30H
5  MOV R6, #04H
6  UP:
7  MOV A, @R0
8  INC R0
9  MOV B, @R0
10 CJNE A, B, NEXT
11 NEXT:
12 JNC NOEXCHANGE
13 MOV @R0, A
14 DEC R0
15 MOV @R0, B
16 INC R0
17 NOEXCHANGE:
18 DJNZ R6, UP
19 DJNZ R7, MAIN
20 END
21
22

```

**Output:**

Memory 1									
Address: D:30H									
D:0x30:	01	06	03	09	07	00	00	00	00
D:0x4B:	00	00	00	00	00	00	00	00	00

Memory 1									
Address: D:30H									
D:0x30:	09	07	06	03	01	00	00	00	00
D:0x4B:	00	00	00	00	00	00	00	00	00

### Result/ Conclusion:

The program efficiently sort the give array of numbers in descending order using the 8051 microcontroller's registers and instructions.

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Date:11/09/2024

**Experiment No. 6**

**Name of Student: JJATEEN GUNDEHSA**

**Registration No.: BT22ECI002**

**Aim:** Write an assembly language program to create Fibonacci Series of 10 numbers.

**Requirements:** Keil

**Program Code:**

```

EXPERIMENT_5.ASM
1  ORG 00H
2  START:
3      MOV R2, 32H
4      MOV A, #00H
5      MOV 33H, A
6      DEC R2
7      MOV A, R2
8      JZ START
9      MOV A, #01H
10     MOV 34H, A
11     DEC R2
12     MOV A, R2
13     JZ START
14     MOV R0, #33H
15     MOV R1, #34H
16 L4:
17     MOV A, @R1
18     ADD A, @R0
19     INC R0
20     INC R1
21     MOV @R1, A
22     DJNZ R2, L4
23     SJMP START
24     END
25

```

## Output:

Memory 1												
Address: D:34H												
D:0x34:	01	01	02	03	05	08	0D	15	22	37	5	
D:0x4F:	73	B5	28	DD	05	E2	E7	C9	B0	79	2	
D:0x6A:	AD	F5	A2	97	39	D0	09	D9	F2	BB	6	

## Result/ Conclusion:

The program efficiently gives the output of the desired number of Fibonacci Series. order using the 8051 microcontroller's registers and instructions.

(Dr. S. S. Motdhare)