Shri Vile Parle Kelavani Mandal's
DWARKADAS J. SANGHVI COLLEGE OF ENGINEERING
(Autonomous College Affiliated to the University of Mumbai)
NAAC Accredited with "A" Grade (CGPA : 3.18)

Department of Electronics & Telecommunication Engineering

Experiment No.: THREE

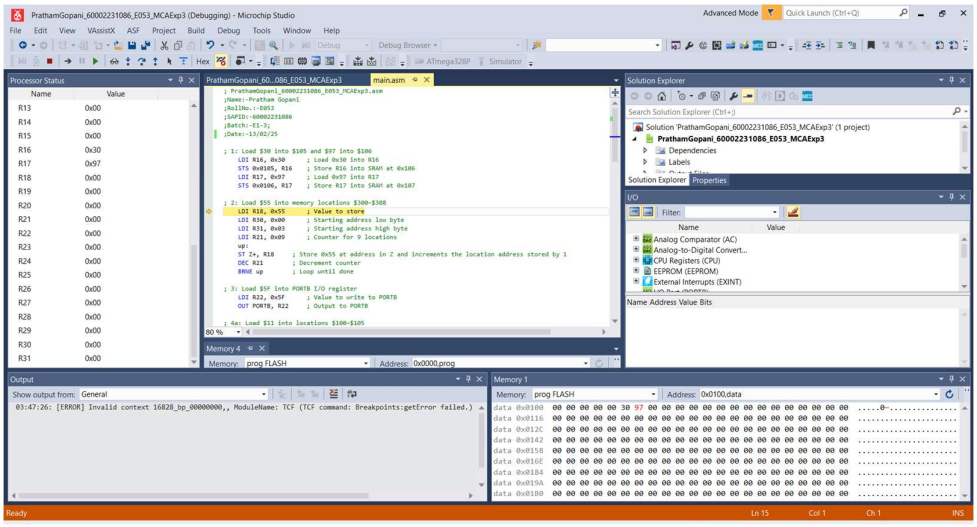
Microcontroller & Applications

Name: **Batch/Rollno:**

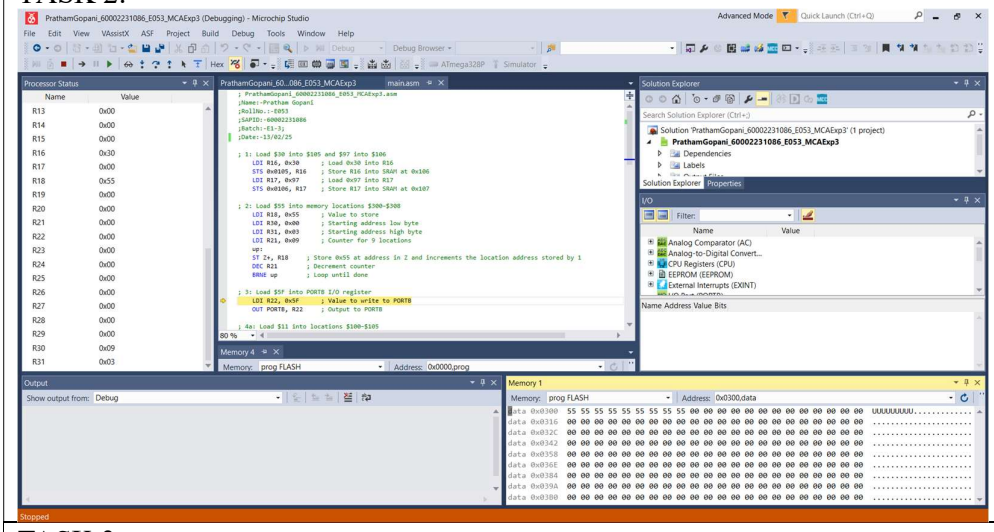
SAP ID: **Date:**

Objective:	Assembly language programming in simulation environment for AVR's microcontroller ATmega328p
Outcome:	Programs that demonstrate the understanding and use of instructions: LDS, STS, ADD, SUB, INC and DEC
Tasks/Problem Statement:	• Write a simple code to load values $30 and $97 into locations $105 and $106, respectively. • Write a simple code to load the value $55 into locations $300–$308. • Write a simple code to load the value $5F into the PORTB I/O register. • Write a simple code to (a) load the value $11 into locations $100–$105, and (b) add the values together and place the result in R20 as they are added. • Repeat the above task, except place the result in location $105 after the addition is done. • Write a simple code to (a) load the value $15 into location $100, and (b) add it to R19 five times and place the result in R19 as the values are added. R19 should be zero before the addition starts. • Repeat the above task except place the result in location $100. • Write a simple code to complement the contents of location $109 and place the result in R27. • Write a simple code to copy data from location $110 to PORTC using R19
Programs, comments, brief explanation and output:	CODE AND OUTPUT:-

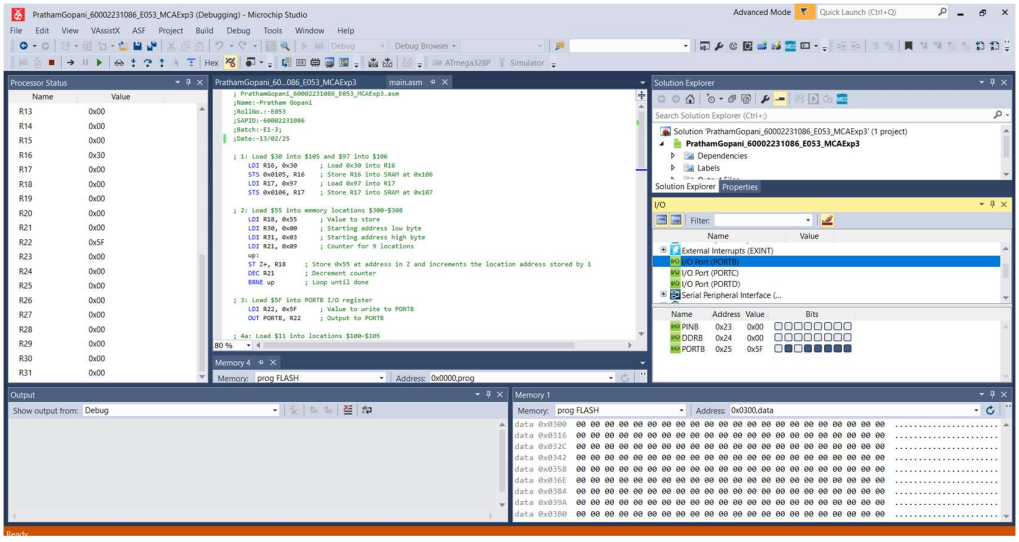
TASK 1:-



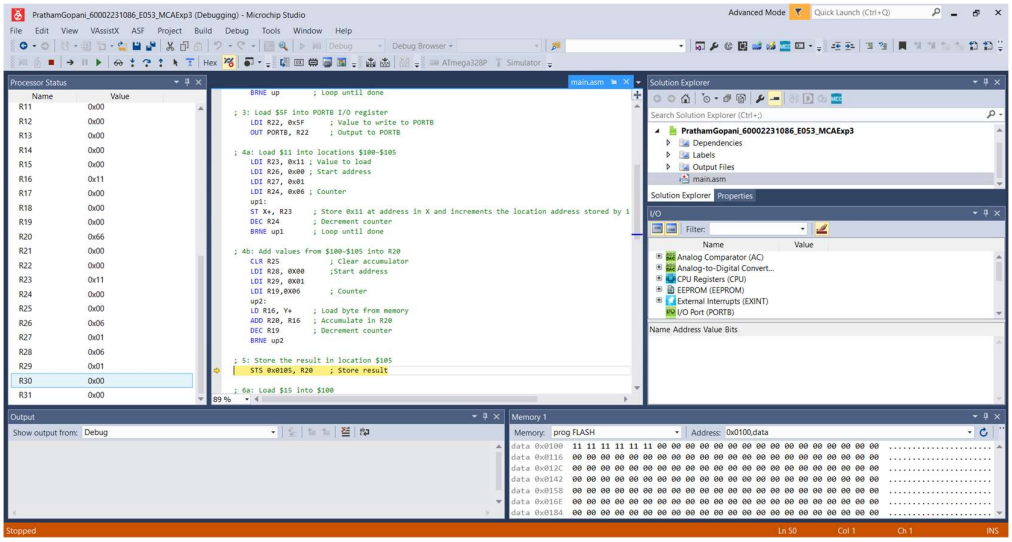
TASK 2:-



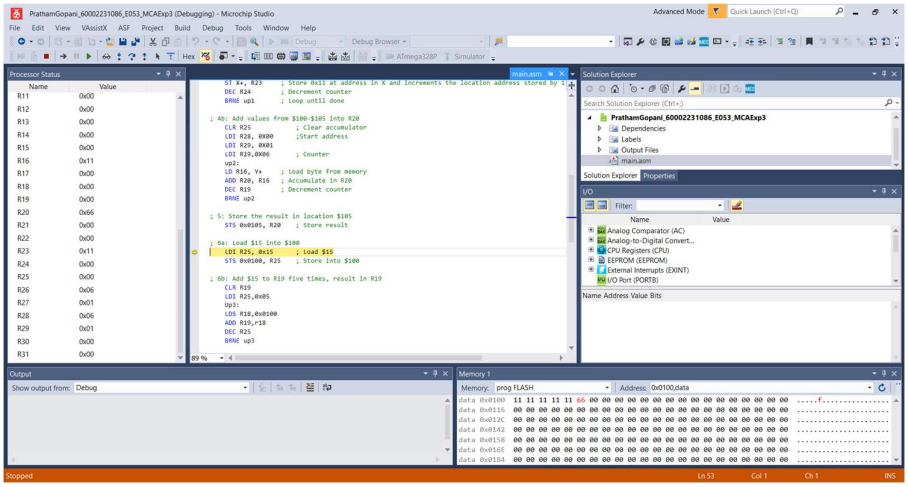
TASK 3:-



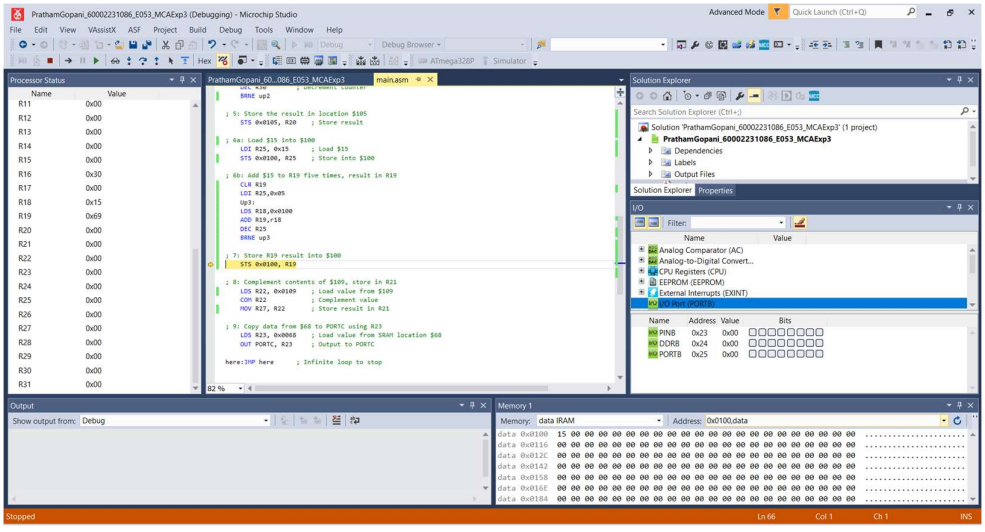
TASK 4:-



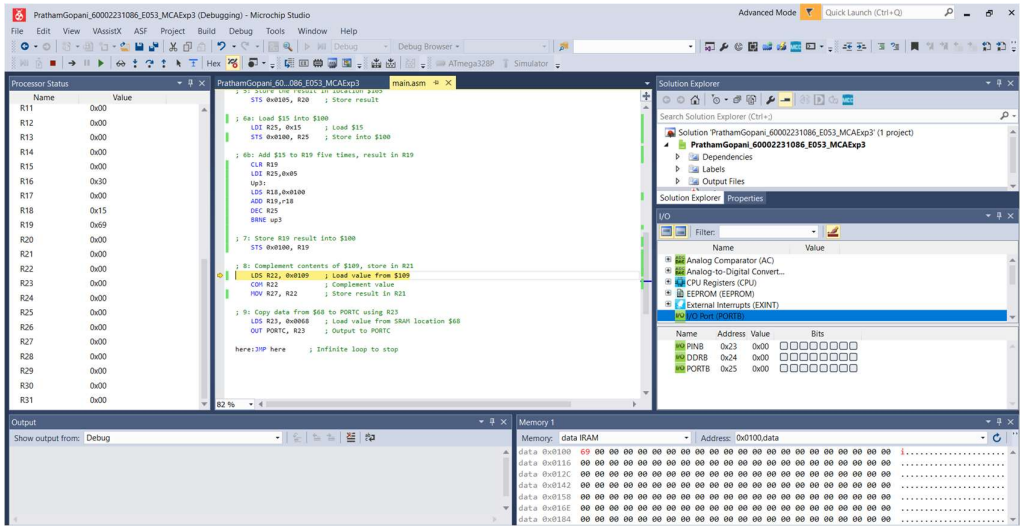
TASK 5:-



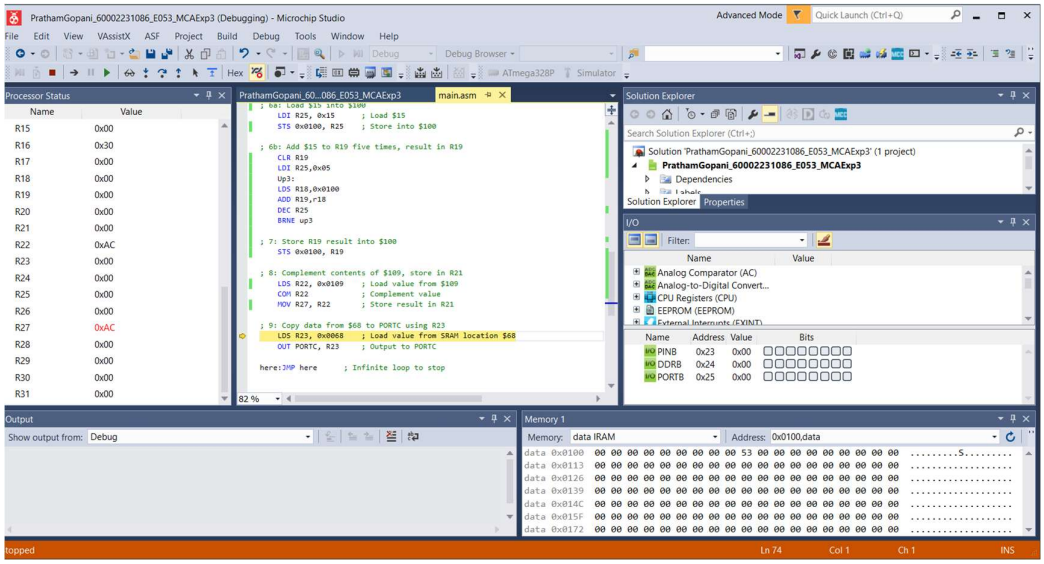
TASK 6:-



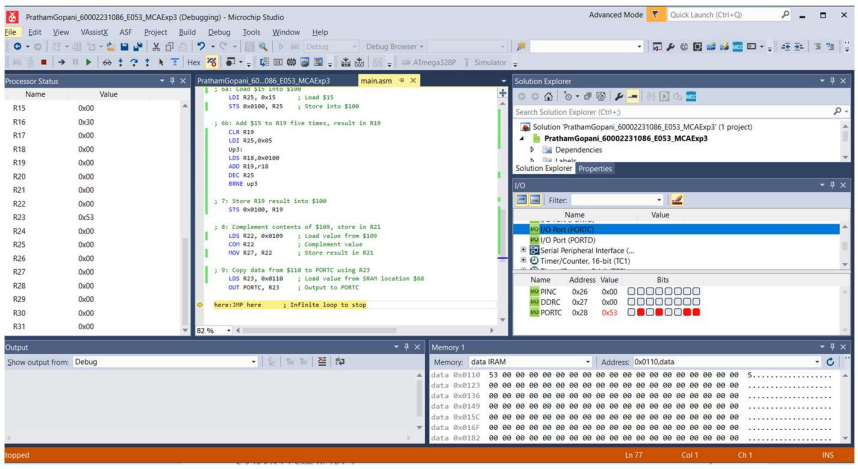
TASK 7:-



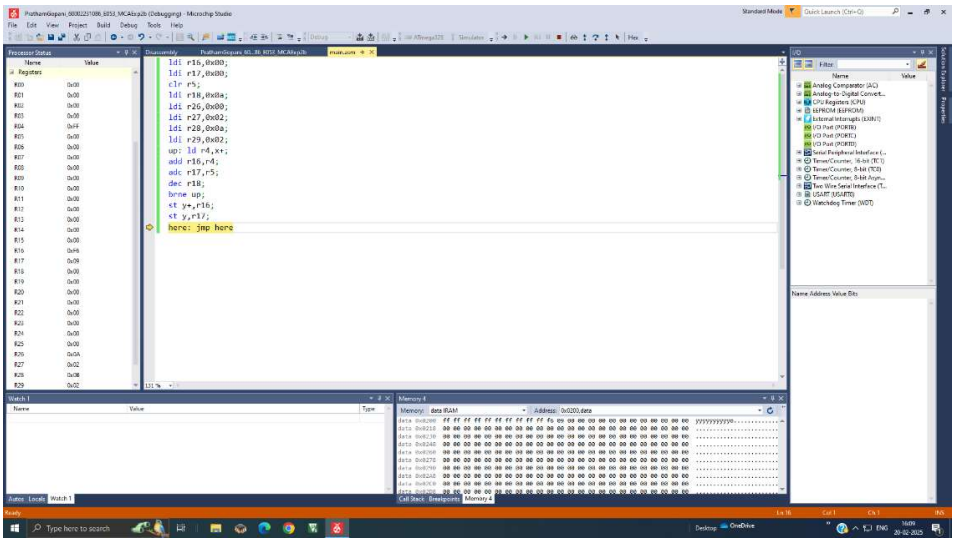
TASK 8:-



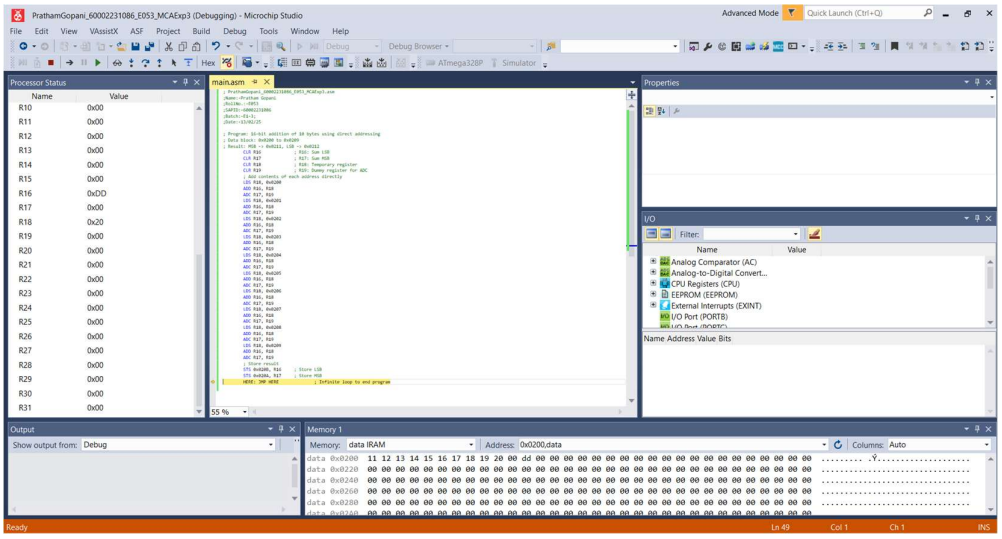
TASK 9:-



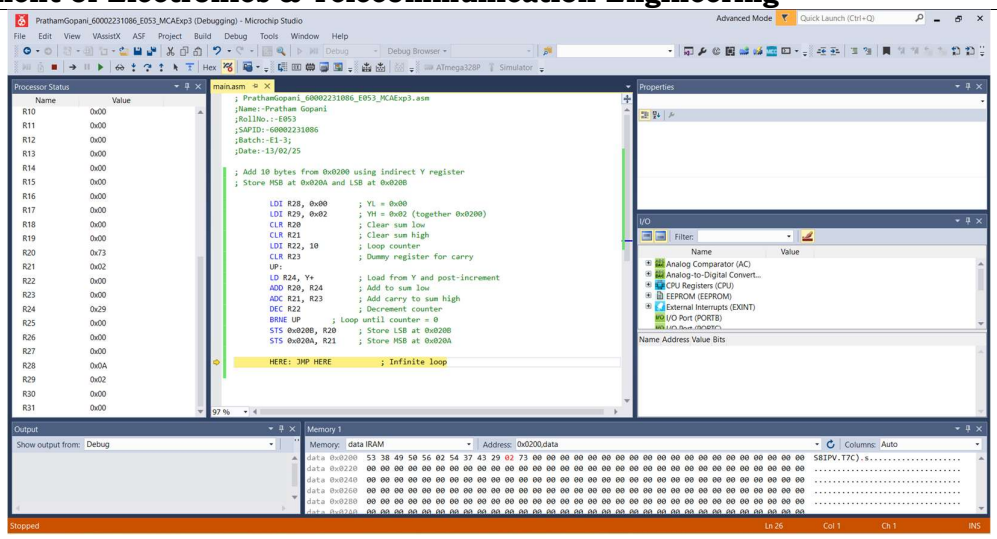
1) Write a assembly language program to 16 bit addition of elements in a data block of 10 bytes using indirect addressing mode . The data block is starting from memory address 0x0200. Store the higher bit of the result in memory address 0x020A and lower bit on memory address 0x020B.



2) Write a assembly language program to 16 bit addition of elements in a data block of 10 bytes using direct addressing mode . The data block is starting from memory address 0x0200. Store the higher bit of the result in memory address 0x020A and lower bit on memory address 0x020B.



3)Write a assembly level program to add the contents of a data block of 10 bytes . Data block starts from memory location 0x0200. Store the result in memory loction 0x020A and 0x020B

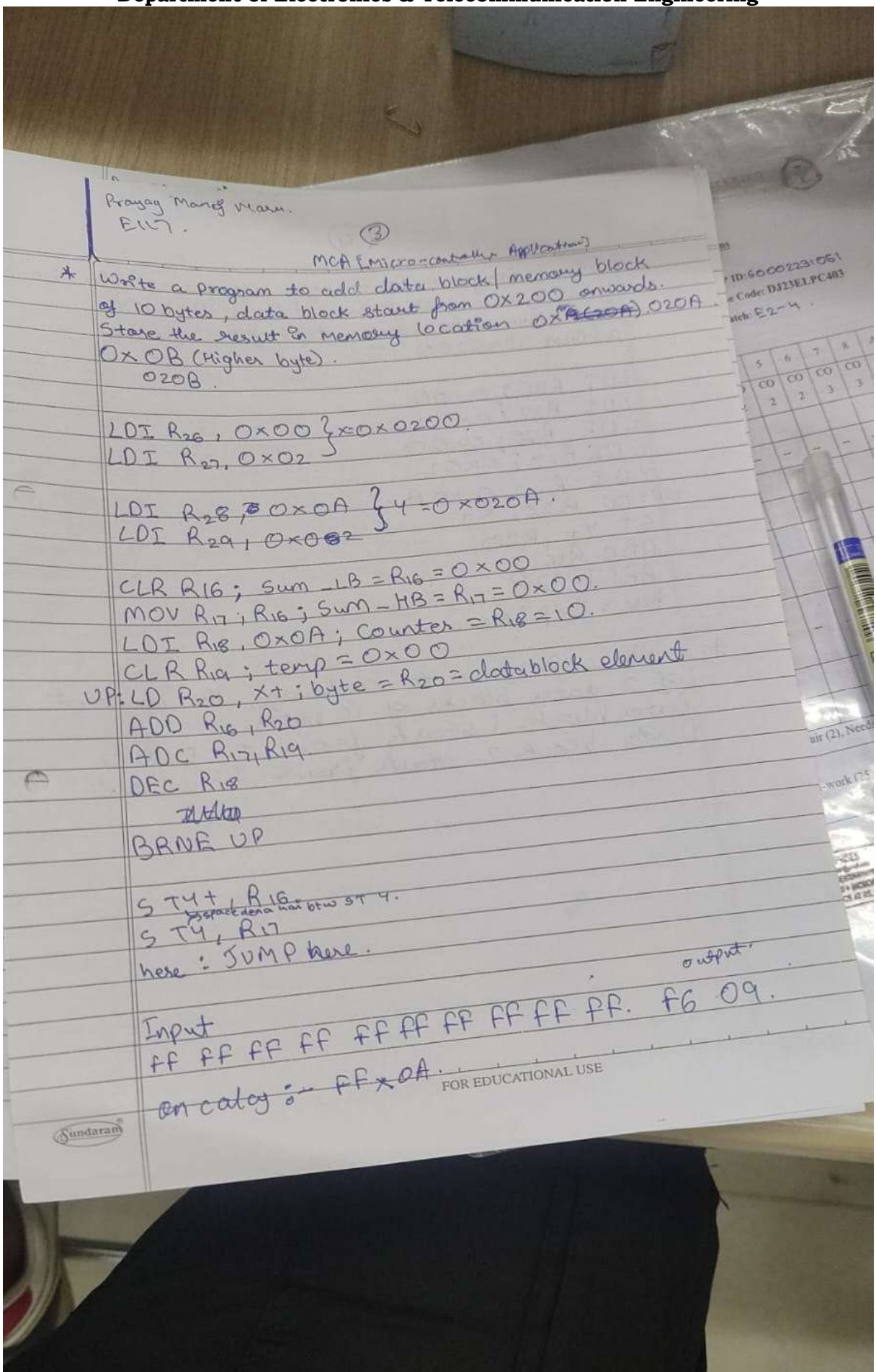


Attach screen shots of the output

NOTE: *Each code output should display student SAP id as well as Name of student along with date of performance.*

Conclusion :

This experiment helped demonstrate low-level memory handling and register operations on AVR microcontrollers using key instructions like LDS, STS, ADD, INC, DEC, and OUT. It deepens understanding of how data is moved, manipulated, and interfaced with I/O in real-world embedded systems.



Prayag Mangi Ram.
E117.

(3)

MCA [Micro-controller Application]

* Write a program to add data block/ memory block of 10 bytes, data block start from 0x200 onwards. Store the result in memory location 0x~~(020A)~~020A. 0x0B (Higher byte).
020B.

```
LDI R26, 0x00 } x=0x0200.
LDI R27, 0x02

LDI R28, 0x0A } 4 = 0x020A.
LDI R29, 0x02

CLR R16; Sum_LB = R16 = 0x00
MOV R17; R16; Sum_HB = R17 = 0x00.
LDI R18, 0x0A; Counter = R18 = 10.
CLR R19; temp = 0x00
UP: LD R20, X+; byte = R20 = data block element
ADD R16, R20
ADC R17, R19
DEC R18
BRNE UP

STY+, R16
STY, R17
here: JUMP here.
```

Input
ff ff ff ff ff ff ff ff ff ff.

output.
f6 09.

encoding :- ff x 0A.