DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

THAPAR INSTITUTE
OF ENGINEERING & TECHNOLOGY
(Deemed to be University)

EMBEDDED SYSTEMS

Experiment 10-12

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Experiment 10

Aim:

To write an ARM Assembly Language to find the factorial of a given 8-bit number.

Tool Used:

Keil uVision4

Theory:

The numbers in the memory location are repeatedly multiplied and subtracted in iterative manner.

Code:

```
        AREA PROGRAM, CODE, READONLY

 ENTRY
MAIN
        LDR R0, =0x00001000 ; memory location of input value
        LDRB R1,[R0], #1 ; loading into r1
        ADDS R1,R1,#0 ; checking if r1 is 0
        BEQ LOOP1 ; if 0 call subroutine
        MOV R2,R1 ; copy r1 to r2
        SUB R2,R2,#1 ; r2 = r2 - 1 for operand 2
LOOP2   MUL R7,R2,R1 ; multiply both operands
        MOV R1,R7 ; store back in r1
        SUBS R2,R2,#1 ; decrement r2
        BNE LOOP2 ; loop if not zero
        STRB R1,[R0] ; store result in memory
        B LOOP3 ; unconditional loop
LOOP1   MOV R8,#1 ; store 1 is r8
        STRB R8,[R0] ; store result in memory
LOOP3   B LOOP3
        END
```

Output:

```
Running with Code Size Limit: 32K
Load "C:\\Users\\User\\Documents\\Code-sync\\Keil\\ARM\\Experiment 10\\exp10.axf"

*** Restricted Version with 32768 Byte Code Size Limit
*** Currently used: 60 Bytes (0%)
```

For non Zero value:

```
0x00001000: 05 78 00 00 00 00 00 00 00 00 00 00 00 00 00 00
```

For Zero:

```
0x00001000: 00 01 00 00 00 00 00 00 00 00 00 00 00 00 00 00
```

Result:

The experiment on to find the factorial of a given 8 bit number has been performed and verified to be correct.