Lab Assignment-1

[Weightage - 10%]

Assignment Instructions:

1. Assignment should be solved individually.
2. No marks will be awarded if plagiarism is detected.
3. Questions can be performed in simulation mode.
4. Please take some suitable screen shots of the KEIL IDE-in debug mode to demonstrate the desired output. Ensure that the screenshot captures **system time & day**.

Submission instructions:

Upload a single zipped folder named based on your BITS-ID number and name (**ID-No_Full-Name**) containing the following on Course Website (http://taxila-aws.bits-pilani.ac.in) during 21st August 2022 to 14th Sept 2022.

1. One PDF document should consist of answer of questions and relevant snapshots.
2. Separate folder for each code.

Q.1. Assembly Language Programs (ALP) for an ARMv4T processor to implement the following IF-ELSE statement are given below:

```
if ( a<b)
{
        x=5
        y=c+d
}
else
        y=c-d
```

Code-1:

```
        AREA RESET, CODE, READONLY
        ENTRY
START
        ADR R4,SRC
        LDR R5,=DST
        BL SUB1
STOP    B STOP
SUB1    LDR R0,[R4],#4
        LDR R1,[R4],#4
        CMP R0,R1
        BGE    FB1
        LDR R0,[R4],#4
        LDR R1,[R4],#4
        ADD R0,R0,R1
        MOV R2,#5
        STR R2,[R5],#4
        STR R0,[R5]
        B AFT
FB1     LDR R0,[R4],#4
```

```
        LDR R1,[R4]
        SUB R0,R0,R1
        STR R0,[R5,#4]
AFT     MOV PC,LR
SRC     DCD 0x20, 0x40, 0x30, 0x10
        AREA RESULT, DATA, READWRITE
DST     DCD 0, 0
        END
```

Code-2:

```
        AREA RESET, CODE, READONLY
        ENTRY
START
        ADR R4,SRC
        LDR R5,=DST
        BL SUB1
STOP    B STOP
SUB1    LDR R0,[R4],#4
        LDR R1,[R4],#4
        CMP R0,R1
        LDR R0,[R4],#4
        LDR R1,[R4]
        MOVLT R2,#5
        STRLT R2,[R5]
        ADDLT R0, R0, R1
        SUBGE R0, R0, R1
        STR R0,[R5,#4]

AFT     MOV PC,LR
SRC     DCD 0x20, 0x40, 0x30, 0x10
        AREA RESULT, DATA, READWRITE
DST     DCD 0, 0
        END
```

Simulate the above given Code-1 and Code-2 using Keil uVision5 software and answer the following questions.

a) On reset what is the ARM7TDMI processor's mode of operation? [1 Mark]
b) How many states are taken for the execution of an Arithmetic instruction, Load and Store instruction respectively? [1 Mark]
c) Are the number of states taken for completion same for BGE instruction if the branch – (1) is taken (2) not taken? [1 Mark]
d) Measure the performance of code-1 and code-2 for the following conditions [1 Mark]

Condition	Code-1- States	Code-2- States
a<b		
a>b		
a=b		

Q.2. Write an assembly language program (ALP) in Keil uV5 for STM-32 to find the largest integer from a collection of 10 signed integers stored in consecutive memory locations in ROM and store the result in RAM.
Also take a suitable snapshot of the KEIL IDE in the debug mode to demonstrate the desired output (Register window, Memory window for RAM/ROM). Ensure that the screenshot captures system time & day. Comment your code. [6 Marks]