

**Roll \_No: 50**

**Name: Habibullah**

**Course Title: Coputer organization and assembly language**

**Class: BSCS**

**Session: 2021-25**

**Assignment NO: 01**

**Submitted to: Mam Shafina**

**Date: 4-17-2022**

# **Assignment no 1**

**The following problem deals with translating from C to MIPS. Assume that the variables g, h, i and j are given and could be considered 32-bit integers declared in C program**

**a. f= g+h+i+j**

**b. f= g+ (h+5)**

**1.1 For the C statements above, what is the corresponding MIPS assembly code ? Use a minimal number of MIPS assembly instructions.**

**1.2 If the variables f, g, h, i and j have values 1, 2, 3, 4 and 5 respectively, what is the end value of f?**

**1.3 How many MIPS instructions are required to run these statement**

MIPS assembly code for the given C statements:

a.

lw $t0, g

lw $t1, h

lw $t2, i

lw $t3, j

add $t4, $t0, $t1

add $t5, $t4, $t2

add $t6, $t5, $t3

sw $t6, f

b.

lw $t0, g

lw $t1, h

addi $t2, $t1, 5

add $t3, $t0, $t2

sw $t3, f

1.2 End value of f: a. f = 1 + 2 + 3 + 4 + 5 = 15 b. f = 2 + (3 + 5) = 10

1.3The number of MIPS instructions required to run these statements are:

a.There are 7 MIPs instructions required to run these statements

b. There are 4 MIPs instructions required to run these statements

**Q2:**

**The following problem deals with translating from MIPS to C. Assume that the variables f, g, h, i and j are assigned to registers $s0, $s1, $s2, $s3 and $s4 respectively. Assume that the base address of the arrays A and B are in registers $s6 and $s7, respectively,**

**a. add $s0,$s0,$s1**

**add $s0,$s0,$s2**

**add $s0,$s0,$s3**

**add $s0,$s0,$s4**

**b. lw $s0, 4($s6)**

**2.1 For the MIPS assembly instruction above, what is the corresponding C statement?**

**2.2 For the MIPS assembly instructions, rewrite the code to minimize the number of instructions (if possible) needed to carry out the same functions.**

**Answer:**

2.1

a. C statement: f = g + h + i + j;

b. C statement: f = A[1];

2.2

a. The code can be rewritten to minimize the number of instructions needed by using a single add instruction with immediate values: add $s0, $s1, $s2, $s3, $s4

b. The code cannot be further minimized since it is already a single instruction.