

Name, Surname : **ANSWERS**  
 Student ID :  
 CourseCode : 481000000001312  
 Title : COMPUTER ORGANIZATION  
 Assessment : ☐ Quiz ☒ Midterm ☐ Final  
 Date : 19.3.2018 13.00

Please ensure that your name appears on each booklet, together with the number of questions attempted.

(30p) Q1) Write MIPS code for the code segment.

```

int midterm( int x, int y )
{
    int k;

    if ( x != 0 )
    {
        if ( y != 0 )
            k = x + y;
        else
            k = x + 2;
    }
    k = k + y;
}

```

```

beq $a0, $zero, Label
beq $a1, $zero, Label-1
add $s0, $a0, $a1
j Label

```

Label-1: addi \$s0, \$a0, 2

Label: add \$s0, \$s0, \$a1

(25p) Q2) A program runs in T times on computer A with 20.000 instructions.

The same program runs in T/2 times on computer B with 7000 instructions.

Computer B has CPI = 4 and with Clock Rate 2 GHz, whereas Computer A has the following table for instruction set architecture.

What is the Clock Rate of computer A?

ALU	%50	2 CC
Memory	%30	3 CC
Branch	%20	1 CC

$$20000 \cdot 2.1 \cdot \frac{1}{x} = 2 \cdot 7000 \cdot 4 \cdot \frac{1}{2}$$

$$x = 1.5 \text{ GHz.}$$

$$0.5 \times 2 + 0.3 \times 3 + 0.2 \times 1 = 2.1 \text{ CPI.}$$

(45p) Q3) Based on the drawing, (LOOK VERY CAREFULLY TO THE LINES AND ARROWS!!!)

- Design arithmetic and memory-access instructions. (use addressing if needed!)
- Write instructions for executing the following statement.

$$A = (B + C) * (D + A)$$

load instruction needs addressing because we have 2 accumulators.

```

load Acc1, A
load Acc2, D
add A
load Acc1, C
load Acc2, B
add B
load Acc1, A
load Acc2, B
mul A

```

2 Accumulators  
1 ALU, 1 Mem.

