Vietnam National University, Hanoi
University of E&T

Course: Computer Architecture (ELT3047E)
Semester 1, 2022
Midterm exam
Duration: 45 mins

Question 1 (3 pts): Design an encoding structure in 16-bit instruction format for the following ISA:

- 7 instructions with two addresses and one register number.
- 16 instructions with one address and one register number.
- 10 instructions with no address and one register number.

Suppose that an address takes up 5 bits and a register number takes 3 bits.

Question 2 (3 pts): What assembly instructions could a compiler use to implement the following code if only `beq` instruction is available for branching?

```
        bne $s3, $s4, Else
        add $s0, $s1, $s2
        j   Exit
Else:   sub $s0, $s1, $s2
Exit:
```

Question 3 (2 pts): Complete the below table showing how an MIPS ALU performs the *division* for two unsigned integer 1000_2 / 0100_2

Iteration	HI	LO	Divisor	Difference
0	0000	1000	0100	
1	0001	0000	0100	
2				
3				
4				

Question 4 (2 pts): What is the binary values of the signals Read register 1, Read register 2, Write register, RegDst when the instruction `addi $22, $21, -10` is processed in the below datapath? Explain your answers.