



United International University

Department of Computer Science and Engineering

CSE 313: Computer Architecture

Mid Term Examination Time: 1 Hour 45 Minutes Summer 2017

Answer any 5 (five) questions out of 6 (six) questions

1. (a) Describe the major functionalities of **Instruction Set Architecture**. [2]
(b) Identify if an overflow has occurred for the following arithmetic operations- (Assume 5 bit architecture) [2]
i) $8+9$ ii) $15-(-10)$ iii) $-16-5$ iv) $6-12$
(c) Identify the major differences between **Stack** and **General Purpose Register**. [2]

2. (a) Write down MIPS code for the following C code- [3]

```
if(a==b)
    a=a&5;
else if(a!=c)
    a=a<<5;
else
    a=a-5;
```

- (b) Write down the machine encodings for the following instructions. Put down different fields like opcode, rs, etc. in separate box and show the final hexadecimal encoding. [3]
i) srl \$8,\$9,15 ii) lw \$16, 400(\$12)

Instructions	Funct	Opcode
srl	0x000000	0x100000
lw	0x000000	0x110000

3. (a) Write down the MIPS code for the following C code- [4.5]
Assume base register of A is \$S6

```
while(i<j)
{
    j=i;
    while(j>0)
    {
        A[j]=A[j]+i;
        j--;
    }
    i++;
}
```

- (b) Place 0x4F3BA71 in the memory by using both **Big Endian** and **Little Endian** method. [1.5]
Assume your memory is byte addressable.

4. (a) Describe the usage of following MIPS registers during procedure calls- **\$a0-\$a3**, **\$v0-\$v1** and **\$ra** [2]
- (b) What are the six steps taken by MIPS processor during a procedure call? [2]
- (c) Write a MIPS code for a procedure that takes an input n in register **\$s0** and returns the value of $2 + 4 + 6 + \dots + 2n$ [2]
5. (a) Draw the block diagram for hardwares used to implement **modified** multiplication algorithm [2]
- (b) What are the advantages of **modified** multiplication algorithm over **general** multiplication algorithm [1]
- (c) Show the simulation of **general** multiplication algorithm where the multiplicand = 1001 and multiplier is 101 [2]
- (d) Convert the following C code into corresponding MIPS code [1]


```

int ping(int a){
    return pong(a + 1);
}

int pong(int b){
    return b;
}

```
6. (a) Draw the double precision representation of floating point number in MIPS [2]
- (b) Draw the block diagram of hardwares used for division algorithm [2]
- (c) Show the simulation of division algorithm where dividend = 1110 and divisor = 11 [2]