



United International University

Department of Computer Science and Engineering

CSE 313: Computer Architecture

Mid Term Examination Set: A Time: 1 Hour 45 Minutes

1. (a) The clock rate of a processor P is 4.0 GHz and its CPI required is 2.2. If it executes a code C in 10 seconds, find the number of cycles and the number of instructions. [4]
- (b) Suppose we are trying to reduce the execution time of the code C by 30% but this leads to an increase of 20% in the CPI. What should be the clock rate of the processor P to get this time reduction? [3]
- (c) What is the difference between response time and throughput? [1]
2. (a) Convert the following C code to its equivalent MIPS code. Assume necessary registers. [4]

```
MAX_SIZE=10;
n=3;
found=0;
index=-1;
for(i=0; i< MAX_SIZE; i++)
{
    if(arr_search[i]==n)
    {
        found=1;
        index=i;
    }
}
```

- (b) Convert the following C code to its equivalent MIPS code. Assume necessary registers. [3]

```
int add (int n)
{
    if(n<=0) return 0;
    else return n+add(n-1);
}
```

- (c) Convert the following C code to its equivalent MIPS code. Assume necessary registers. [5]

```
if(a>=0 && b>=0)
    c=a+b;
else if(a>=0 && b<0)
    c=a-b;
else if(a<0 && b>=0)
    c=b-a;
else
    c=0;
a=0;
b=0;
```

- (d) Convert the following C code to corresponding machine code in binary. Assume necessary registers. Hint: convert to MIPS first and then calculate the corresponding machine code from the resulting MIPS code instruction by instruction. [5]

```
c=b<<3;  
a-=3;  
A[3]=B[3]+a;
```

3. (a) Simulate the General Multiplication Algorithm with detailed calculations for the following multiplication: 10100×101 . [3]
- (b) Depict the division algorithm with a flow chart. [2]