CSE 3313, Section C

Full mark 20, Time-30 minutes

Q1. Consider a processor that goes through the following six stages while executing an instruction. The duration of each stage (in ps) is given underneath it:

Instruction Fetch	Instruction Decode	Register Read	ALU Operation	Memory Access	Register Write
250	50	150	300	250	150

(a) The values of s1, s2 and s3 registers are 5, 0, 2 respectively. Now, Consider the following code snippet:

```
Loop:
beq $s1, $zero, Exit
add $s2, $s2, $s3
addi $s3, $s3, 1
j Loop
Exit:
```

Calculate the time taken for the code snippet in case of single cycle execution.

(b) Also consider the following instruction snippet:

```
add $s0, $s1, $s2
add $s1, $s2, $s3
sub $t0, $s0, $s1
lw $t2, 20($t1)
add $s4, $t2, $t2
```

Calculate the execution time in case of

(i) Basic pipelining
(ii) Bypassing method
(iii) Code scheduling method.

Q2. Consider a cache with 64 blocks and also with 4 words/block. What will be the tag bit size if the address field of the cache contains 32 bits. Also, find out the words that will be copied to the block with index no 5.