BRAC University

Department of Computer Science and Engineering

CSE340: Computer Architecture

Midterm Examination, Spring 2016,

SET A

Name: _____ ID: _____

Section: _____

Instructions

- Answer all the questions
- You should answer within the space provided in the question paper
- You can use the provided exam script to do your rough work
- Return both your question and answer script after your exam
- **Please do not turnover the page until you are asked to do so**

Total Marks	Marks Obtain
30	
Time	**1 hour**

Good Luck

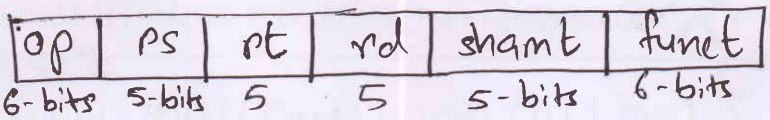
1. Define Compiler and Assembler? [3]

A compiler converts a high level language (for example: in C) to assembly language problem (for MIPS). and an assembler converts the assembly language program (for MIPS) to machine (object) code (for MIPS).

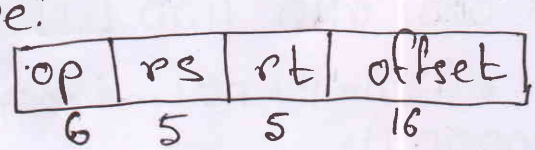
2. Give the instruction format of various instructions type available in MIPS. [3]

There are three types of MIPS instruction:

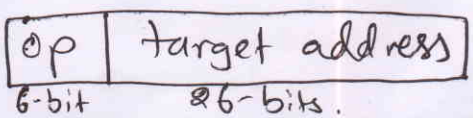
→ R-type:



→ I-type:



→ J-type:

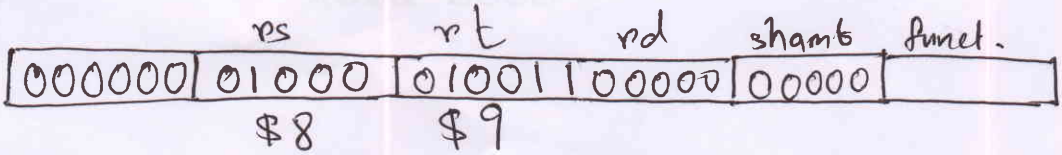


3. Encode the following MIPS instructions and identify their types? [5]

a. MULT $8,$9

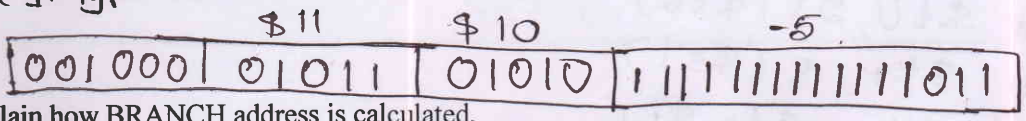
R_s R_t

(R-type).



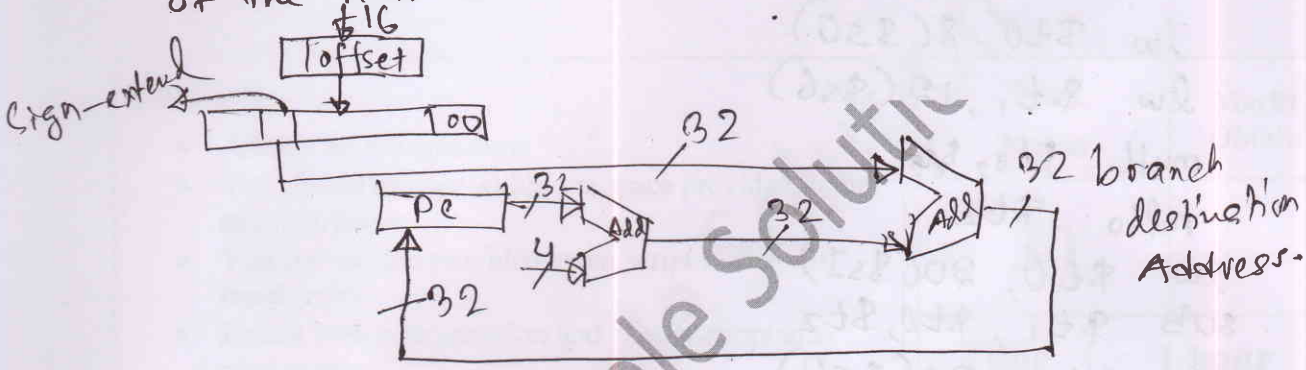
b. Li $10,100 No-format.

c. ADDI $10,$11,-5
(I-type format)

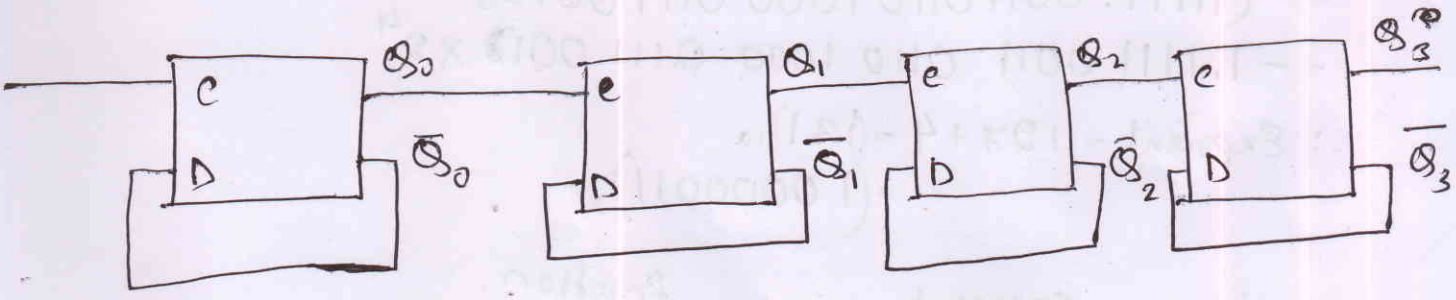


4. Explain how BRANCH address is calculated. [5]

A branch address is an (I-format). Instruction Address Register (the PC) - gets updated (PC+4) during the fetch cycle so that it holds the address of the next instruction.



5. Design a counter using T-FF that can count from 0 to 13. [5]



6. The following problems deal with translating from C to MIPS. Assume that the base address for arrays **f g and A** are assigned to registers **$s0** and **$s1**, **$s6** respectively. **[6]**

a. f[3]= g[2]+A[7];

f → $s0
g → $s1
A → $s6

```
lw  $t0, 28($s6)
lw  $t1, 8($s1)
add $t1, $t0, $t1
sw  $t1, 12($s0)
```

b. f[5]=g[5]-A[3]*f[2]; [use only mflo]

```
lw   $t0, 8($s0)
lw   $t1, 12($s6)
mult $t0, $t1
mflo $t2
lw   $t0, 20($s1)
sub  $t1, $t0, $t2
sw   $t1, 20($s0)
```

7. Convert -31.213 in to IEEE 754 floating Point representation? **[3]**

-31.213

$= -(11111.0011\,0110\,1000\,0111\,001)_2$

$= -1.1111\,0011\,0110\,1000\,0111\,001 \times 2^4$

$\therefore$ Exponent $= 127 + 4 = (131)_{10}$

$= (10000011)_2$

sign	exponent	fraction.
1	10000011	1111 0011 0110 1000 0111 001
1 bit	8-bit	23-bits.