COMP 2601

Tutorial 3

1 (a) State **four** major issues considered in designing an instruction set.

(b) Write generic instructions to compute F= *a + b (a -b/(x-a))* using a processor that supports:

(i) 3-address instructions

(ii) 2-address instructions

(iii) 1-address instructions

(iv) a zero-address instruction on a stack-based processor.

You may assume operations in the following table where x,y,z are registers; A is a memory

address.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **3-address** | **meaning** | **2-address** | **meaning** | **1-address** | **0-address** |
| add x,y,z | x←y+z | add x,y | x←x+y | add A | push A |
| sub x,y,z | x←y-z | sub x,y | x←x-y | sub A | pop A |
| mul x,y,z | x←y\*z | mul x,y | x←x\*y | mul A | add |
| div x,y,z | x←y/z | div x,y | x←x/y | div A | mul |
| load x,A | x←A | load x,A |  | load A | div |
| store A,x | A←x | store A,x |  | store A | sub |

2. (a) Write the following expression in postfix notation: *x = a - b + d\*e*

(b) (A - B) \* (((C - D \* E)/F)/G) \* H

3. Convert the following to infix notation:

(a) AB + C + D \*

(b) ABCDE + F/ + G - H/ \* +

4. (a) Write down the result of performing a 4-bit right circular shift on 101001.

(b) Write down the result of performing a 4-bit right arithmetic shift on 101001.

(c) Give the mask and the logical operation needed to

(i) complement an 8-bit pattern

(ii) put 1s in all but the most significant bit of an 8-bit pattern without disturbing the most

significant bit.