Computer orgaization & Assembly language

Assignment no # 06

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Section: A

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Problem # 01

- **Explain why overflow cannot occur when the MUL and one-opened IMUL instruction execute.**

Answer

- **The product is stored in registers that are twice the size of the multiplier and multiplicand. If you multiply OFFh by OFFh, for example, the Product (FE01h) easily fits within 16 bits.**

Problem # 02

- **How is the one-operand IMUL instruction different from MUL in the way it generates a multiplication product?**

Answer

- **When the product fits completely within the lower register of the product, IMUL sign extends the product into the upper product register . MUL, on the other hand zero-extends the product.**

Problem # 03

- **What has to happen in order for the one-operand IMUL to set the carry and overflow flogs?**

Answer

- **With IMUL, the Carry and overflow flags are set when the upper half of the product is not a sign extension of the lower half of the product.**

Problem # 04

- **When EBX is the operand in a DIV instruction, which register holds the quotient?**

Answer

- **EAX**

Problem # 05

- **When BX is the operand in a DIV instruction, which register holds the Quotient?**

Answer

- **AX**

Problem # 06

- **When BL is the operand in a MUL instruction, Which registers hold the product?**

Answer

- **AX**

Problem # 07

- **Show an example of sign extension before calling the IDIV instruction with a 16-bit operand.**

Answer

- **Code example:**

```
Mov ax , dividendlow
Cwd ; sign-extend dividend
Mov bx, divisor
Idiv bx
```

Problem # 08

- **What will be the contents of AX and DX after the following operation?**

```
Mov dx,0
mov ax,22h
mov cx,100h
mul cx
```

Answer

- **DX = 0002h, AX = 2200h.**

Problem # 09

- **What will be the contents of AX after the following operation?**

```
mov ax, 63h
mov bl,10h
div bl
```

Answer

- **AX = 0306h**

Problem # 10

- **What will be the contents of EAX and EDX after the following operation?**

```
mov eax, 123400h
mov edx, 0
mov ebx,10h
div ebx
```

Answer

- **EDX = 0, EAX = 00012340h.**

Problem # 11

- **What will be the contents of AX and DX after the following operation?**

```
mov ax, 4000h
mov dx, 500h
mov bx, 10h
div, bx
```

Answer

- The DIV will cause a divide overflow, so the value of AX and DX cannot be determined.

Problem # 12

- Write instruction that multiply -5 by 3 and store the result in a 16-bit variable Val 1.

Answer

- ```
  mov al 3
  mov bl, -5
  imul bl
  mov val1,ax ; product
  ```
  ```

Problem # 13

Write instruction that divide -276 by 10 and store the result in a 16-bit variable val1.

Answer

```
mov ax, -276
cwd ; sign-extend AX into DX
mov bx,10
idiv bx
mov val1,ax ; quotient
```

Problem # 14

- **Implement the following C++ expression in assembly language, using 32-bit unsigned operands: val1 (val2 * val3) / (val4)**

Answer

```
mov eax,val2
mul val3
mov ebx,val4
sub ebx,3
div ebx
mov val1,eax
```

Problem # 15

- **Implement the following C++ expression in assembly language, using 32-bit signed operands:**
  val1 (val2 / val3) * (val1 ——————————— val2) 7.5 Extended Addition and Subtraction
  Extended precision addition and subtraction is adding and subtracting numbers having

Answer

- **mov eax,val2**
  cdq
  idiv val3
  mov ebx,val1
  add ebx,val2
  imul ebx
  mov val1,eax