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B.Sc. Engg./HD CSE 5th Semester(58) 26 April 2012 (Morning)

# ISLAMIC UNIVERSITY OF TECHNOLOGY (IUT)
# ORGANISATION OF ISLAMIC COOPERATION (OIC)
## Department of Computer Science and Engineering (CSE)

**SEMESTER FINAL EXAMINATION** **WINTER SEMESTER, 2011-2012**

**DURATION: 3 Hours** **FULL MARKS: 150**

## CSE 4503: Microprocessors and Assembly Language

**Programmable calculators are not allowed. Do not write anything on the question paper.**

There are **8 (Eight)** questions. Answer any **6 (Six)** of them.

Figures in the right margin indicate marks.

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1. a) Briefly explain the different components in Bus Interface Unit of the Intel 8086 microprocessor. 10

   b) State the function of segment registers and discuss the necessity/significance of pointer and index registers. 8

   c) Write short notes on the followings: 7

      i. Status flags.

      ii. INT 21H instruction.

2. a) What is the purpose of DUP operator? Explain with example how DUP can be used for initializing values. 7

   b) Discuss on 'While' and 'Repeat' looping structures stating the differences between them. 10

   c) Use a CASE structure to code the following: 8

```
Read a character
If AL contains 1 or 3, display "O"
If AL contains 2 or 4, display "E"
Otherwise terminate the program
```

3. a) Mention the restriction on MOV and XCHG instructions. How can we get around this restriction? 8

   b) For each of the following instructions, give the new destination contents and the new setting of CF, SF, ZF, PF and OF. Suppose that the flags are initially 0. 10

      i. Assume BX =0009h, CX= 00FFh and AX= 00FFh.

```
CMP BX, CX
JNE Skip
INC AX
Skip :
```

      ii. Assume AX contains 8000h.

```
NEG AX
```

   c) What is the maximum range of conditional jump? Which instruction can be used to get around the range restriction of a conditional jump? Describe with example. 7

4. a) Write instructions to Multiply the value of BL by 10d. Assume overflow does not occur. [Hint: use shift instruction] 3

   b) Demonstrate the difference between ROL(rotate left) and RCL(Rotate carry left) instructions with proper illustrations. 7

   c) What is the function of TEST instruction? How does it work? How it is different from AND instruction? 7

   d) Suppose you have taken a binary number as input and stored in BX. Write some code instructions to output the contents of BX in binary. 8

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5. a) What is the necessity of using stack segment in assembly language programming? With suitable examples, demonstrate how you can perform push and pop operation in stack. 7

b) What is a Procedure? Explain Call and return mechanism for a near procedure and show how the IP (Instruction Pointer) and Stack are affected by procedure calls. 10

c) The algorithm given below multiplies two unsigned numbers A and B. Using the algorithm, write a procedure MULTIPLY to multiply two numbers A and B. Assume A and B are already stored in AX and BX. 8

```
Product = 0
REPEAT
    IF LSB of B is 1
    THEN
     Product = Product + A
    END_IF
    Shift left A
    Shift right B
UNTIL B = 0
```

6.a) Explain how MUL and DIV instructions work and their effects on the status flags. 8

b) In each of the program fragments below, determine whether multiplication/division overflow will occur or not. Also find the result in the destination operand(s). 12

i.
```
MOV AX , 10
MOV CX , FFD0h
IMUL CX
```

ii. Suppose VAR1 contains 2000H and VAR2 contains 0010H
```
MOV  AX ,  VAR1
MUL  VAR2
```

c) Write short notes on: 5

i. CWD

ii. CBW

7.a) What is an addressing mode? What are the different addressing modes? Explain Based Indexed Addressing Mode. 8

b) Write some instructions to replace each uppercase letter in the following string by its lower case equivalent. Use Based addressing mode. 7
```
MSG DB 'THIS IS A MESSAGE'
```

c) Suppose A is a word array of 10 elements. Write a procedure REVERSE that will reverse the contents of that array. Assume that the procedure is entered with SI pointing to the array and BX has the number of words. 10

8.a) What is the difference between STOSW and LODSW? Demonstrate with a simple example. 10

b) The following strings are declared: 8
```
STRING1 DB 'this is a message'
STRING2 DB 17 DUP (?)
```
Write necessary codes that will cause STRING1 to be copied into STRING2, but changing every lowercase letter into uppercase.

c) Suppose AL contains 7Ch, CF = 0 and CL contains 4.What are the values of AL and CF after the following instruction is executed? 7
```
RCR AL, CL
```