Information for Candidates

1. This examination paper contains 5 questions totaling 20 marks.
2. The marks for the questions are: Question 1 (3 marks), Question 2 (3.5 marks), Question 3 (3 marks), Question 4 (3.5 marks), Question 5 (7 marks).

Advice to Candidates

1. You should attempt ALL requested parts.
2. You should write your answers clearly.

Basic notions: The aim of the questions in this part is to evaluate the required minimal student knowledge and skills. Answers in the pass category represent the minimum understanding of Assembly Language Fundamentals: Instructions, Directives, Addressing Modes, and Conditional and Unconditional instructions, Stack, Pointers, Arrays and Procedures.

**Question 1** Multiple Choices (3 marks)

Identify the choice that best completes the statement or answers the question.

1) The **far** jump modifies __________
   a) CS register only  
   b) CS and IP registers  
   c) The FLAGS register  
   d) IP register only

2) Assuming that AX, BX hold unsigned numbers, the condition “**jump to label HELP if AX is LESS than BX**” can be written in assembly as:
   a) CMP AX, BX  
   b) CMP AX, BX  
   c) CMP AX, BX  
   d) CMP AX, BX
   
   
   JBE HELP  
   JL HELP  
   JBE HELP  
   JO HELP

3) The instruction **XOR AL, 0C0H** will:
   a) Invert the leftmost two bits of AL  
   b) Clear the leftmost two bits of AL  
   c) Set the rightmost two bits of AL  
   d) Invert the rightmost two bits of AL

**Question 2** Suppose we have declared (3.5 marks)

<table>
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<tr>
<th>N</th>
<th>WORD 5</th>
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<tbody>
<tr>
<td>CArray</td>
<td>Byte 'Intel 80X86'</td>
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<tr>
<td>WArray</td>
<td>WORD 4, -15, 33, 87, 2, -11</td>
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What will the contents of AX or AL be after executing each of the following code groups?

```
mov bx, 3
mov al, [CArray + bx] ; al = -------
mov bx, N
mov al, [CArray + bx] ; al = -------
mov al, [CArray + 2 + bx] ; al = -------
mov bx, N
shl bx, 1
mov ax, [WArray + bx] ; ax = -------
mov ax, [WArray - 2 + bx] ; ax = -------
mov bx, OFFSET CArray
mov al, [bx] ; al = -------
mov al, [3 + bx] ; al = -------
```
Question 3  
(3 marks)  
“SomeBits” is a word (variable) assumed to contain various subfields. Write assembly language code to use or modify the fields of SomeBits in the following ways (recall that bits are numbered from the right, starting at 0).

a) Set bits 5-9 to all 0’s.

b) Set bits 5-9 to all 1’s.

c) Set bits 5-9 to all 11001b (whatever their previous contents).

d) Toggle bit 12- that is, turn it off if it was on, on if it was off.

e) If bit 3 is non-zero, jump to label ItsOn.

Familiar and Unfamiliar problems solving: the aim of the questions in this part is to evaluate that the student has some basic knowledge of the key aspects of the lecture material and can attempt to solve familiar and unfamiliar problems of Assembly Language Fundamentals: Instructions, Directives, Addressing Modes, Conditional and Unconditional instructions, Stack, Pointers, Arrays and Procedures.

Question 4  
(3.5 marks)  
Write an assembly language procedure “DecToHex” that reads in a decimal number from the keyboard and displays its representation in hex.

Hints:
- use suitable messages for the input and the output processes.
- Use Irvine32 library

Answer
Question 5
Write a complete assembly language program that calculates the following equation:

\[ \text{Result} = \text{FirstNumber} + \text{SecondNumber} - \text{GeneratedNumber} \]

In your code, you must

- Declare variables to store the input values for FirstNumber and SecondNumber.
- Declare variable to store the generated value (the generated value must be different and within -30 to +30).
- Use suitable messages before reading the values FirstNumber and SecondNumber from keyboard.
- Use suitable message to display the Result.
- Use Irvine.32 library’s procedures.

Answer

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Good Luck