Information for Candidates

1. This examination paper contains 4 questions totaling 20 marks.
2. The marks for the questions are: Question 1 (8 marks), Question 2 (7 marks), Question 3 (1.5 marks), Question 4 (3.5 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 basic concepts of IA-32 Processor Architecture, Assembly Language Fundamentals: Instructions, Directives, Identifiers, Defining Data, Symbolic Constants, Data Transfers, Addressing, and Arithmetic instructions.

Question 1 Multiple Choices

Identify the choice that best completes the statement or answers the question. (8 marks)

1) If ES = D321H, then the range of physical addresses for the extra segment is:
   a) 00000H – 0D321H
   b) D3210H – D321FH
   c) D3210H – E320FH
   d) 0D321H – 1D320H

2) The BX register is used in multiplication operation to hold the upper 16-bits of the result.
   a) True
   b) False

3) What is the largest signed integer that may be stored in 32 bits?
   a) $2^{32} - 1$
   b) $2^{32}$
   c) $2^{31} - 1$
   d) $2^{31}$

4) The -------------- allows the program to single step (execute one instruction at a time).
   a) Carry Flag
   b) Direction Flag
   c) Trap Flag
   d) Parity Flag

5) The output of the MASM is stored in a file with the extension --------------
   a) .asm
   b) .obj
   c) .lnk
   d) .exe

6) Which of the following will generate assembly errors?
   a) var1 BYTE 1101b, 22, 35
   b) var2 BYTE "ABCDE", 18
   c) var4 BYTE 256, 19, 40
   d) None of the above

7) Which of the following variables uses the most amount of RAM?
   a) X DB 300 dup(‘A’)
   b) Y DQ 255
   c) Z DD 40 dup(0)
   d) W DW 200 dup(0)

8) To reserve 32-bits in memory ___ directive is used.
   a) db
   b) dw
   c) dn
   d) dd
**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 IA-32 Processor Architecture, Assembly Language Fundamentals: Instructions, Directives, Identifiers, Defining Data, Symbolic Constants, Data Transfers, Addressing, and Arithmetic instructions.

**Question 2**

<table>
<thead>
<tr>
<th>mark</th>
<th>Question</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>a) What is the differences between <strong>8086</strong> and <strong>8087</strong> microprocessor?</td>
<td>(1 mark)</td>
</tr>
<tr>
<td></td>
<td>b) Why you use <strong>Memory Segmentation</strong> in 8086 Microprocessor?</td>
<td>(1 mark)</td>
</tr>
<tr>
<td></td>
<td>c) What is the usage of the <strong>parity flag</strong> in 8086 Microprocessor?</td>
<td>(1 mark)</td>
</tr>
<tr>
<td></td>
<td>d) List the <strong>Advantages</strong> of microprocessor <strong>8086</strong> over <strong>8085</strong>?</td>
<td>(2 marks)</td>
</tr>
<tr>
<td></td>
<td>e) List two differences between <strong>=</strong> and <strong>EQU</strong> directives that can be used to declare the symbolic constants.</td>
<td>(2 marks)</td>
</tr>
</tbody>
</table>
**Question 3**

Write an assembly code that:

- Declares a symbolic constant named `COUNT` that equals 25.
- Uses `COUNT` (from the previous section) in a data definition statement that creates an uninitialized array of 32-bit unsigned integers named `myArray`.
- Declares a constant declaration named `ArraySize` that automatically calculates the size of the array `myArray` (number of items):

<table>
<thead>
<tr>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

**Question 4**

Write a complete assembly language program that:

- Declares `uninitialized` variables: Signed word integers `J`, `K` and `L`
- Declares `uninitialized` variables: Unsigned word integers `U1`, `U3` and `U3`
- Initializes the following variables with values: `J=3;` `K= -2;` `U1= 254;` `U2= 22` (In code segment)
- Compute `L = J+K` and `U3 = U1+U2`

<table>
<thead>
<tr>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

*Good Luck*