FITNALS
Examination Paper

(COVER PAGE)

Session : April 2014

Programme : Diploma In Information And Communication Technology (DICTN)

Course : ICT2101 : Computer Organisation

Date of Examination : July 25, 2014

Time : 8:00am – 10:00am Reading Time: Nil

Duration : 2 Hours

Special Instructions :

Answer any FOUR (4) questions.

Materials permitted : Nil

Materials provided : Nil

Examiner(s) : Mr. Ang Chee Huei, Steven Khoo.

Moderator : Mr. Mohammad Faizal Bin Alias

This paper consists of 5 printed pages, including the cover page.
INSTITUTIONAL COLLEGE SUBANG

DIPLOMA IN INFORMATION AND COMMUNICATIONS TECHNOLOGY
PROGRAMME (DICITN)
ICT2101: COMPUTER ORGANISATION
FINAL EXAMINATION: APRIL 2014 SESSION

Instructions: This paper consists of SIX (6) questions. Answer any FOUR (4) questions in the answer booklet provided. All questions carry equal marks.

QUESTION 1

(a) Comment on the error if any, in the following assembly language mnemonics. Otherwise explain the outcome of the operation.

i. SUB DL, [EX]
ii. OUT 4F8H, BL
iii. MUL BH
iv. MOV [95H], [7B8H]
v. JCXZ LOOP

(10 marks)

(b) Why memory protection is needed? How memory protection is implemented in memory paging system?

(5 marks)

(c) The following is output from the -r DEBUG commands after a certain 8086 program has run with a breakpoint set. All values are in hexadecimal.

```
AX=C145 BX=E03F CX=0050 DX=0102 SP=0215 BP=0403 SI=7000 DI=8000
DS=2617 ES=12E4 SS=5487 CS=5B4A IP=010D NV UP EI PL NZ NA PO NC
5B4A:010D 29C3 AND EX, AX
```

Answers the following questions:

i. The logical address of the next instruction to be executed.

(1 mark)

ii. The physical address of the next instruction to be executed.

(3 marks)

iii. Identify the next instruction. Find the value of register BX and IP after the next instruction has been executed.

(6 marks)
QUESTION 2

Study and analyze the Assembly Language Codes given below and answer the following questions.

<table>
<thead>
<tr>
<th>Line</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>TITLE SAMPLE PROGRAM</td>
</tr>
<tr>
<td>2</td>
<td>.MODEL SMALL</td>
</tr>
<tr>
<td>3</td>
<td>.STACK 64</td>
</tr>
<tr>
<td>4</td>
<td>.CODE</td>
</tr>
<tr>
<td>5</td>
<td>.DATA</td>
</tr>
<tr>
<td>6</td>
<td>MYCODE PROC</td>
</tr>
<tr>
<td>7</td>
<td>MOV AX, 04</td>
</tr>
<tr>
<td>8</td>
<td>MOV BX, 0212</td>
</tr>
<tr>
<td>9</td>
<td>CMP AX, BX</td>
</tr>
<tr>
<td>10</td>
<td>JG action1</td>
</tr>
<tr>
<td>11</td>
<td>JLE action2</td>
</tr>
<tr>
<td>12</td>
<td>action1:</td>
</tr>
<tr>
<td>13</td>
<td>ADD AL, 30</td>
</tr>
<tr>
<td>14</td>
<td>JMP exit</td>
</tr>
<tr>
<td>15</td>
<td>action2:</td>
</tr>
<tr>
<td>16</td>
<td>ADD BL, 20</td>
</tr>
<tr>
<td>17</td>
<td>JMP exitt</td>
</tr>
<tr>
<td>18</td>
<td>exit:</td>
</tr>
<tr>
<td>19</td>
<td>MOV AX, 4CH</td>
</tr>
<tr>
<td>20</td>
<td>INT 21H</td>
</tr>
<tr>
<td>21</td>
<td>MYCODE ENDP</td>
</tr>
<tr>
<td>22</td>
<td>END MYCODE</td>
</tr>
</tbody>
</table>

(a) Identify THREE (3) errors in the above instructions. Briefly explain why it is incorrect and write the correct codes according to the Assembly Language. (9 marks)

(b) What is the meaning of the instruction at Line 10 and 11? Can these instructions be reduced? (6 marks)

(c) What is the meaning of the combined instructions at lines 18, 19 and 20? (6 marks)

(d) Based on the assumption that all lines of codes are corrected, what is the final outcome of the above program? (4 marks)
QUESTION 3

(a) The initial contents of the 8086 registers are as shown.

\[
\begin{align*}
AX &= 56A8_{H}, \\
BX &= 24A8_{H}, \\
CX &= A205_{H}, \\
DX &= 0100_{H}, \\
SI &= 8900_{H}, \\
DS &= 4000_{H}, \\
SS &= 5000_{H}, \\
BP &= 4567_{H}, \\
SP &= 0108_{H}, \\
DI &= 1234_{H}
\end{align*}
\]

Perform the following operations and indicate the contents of the registers involved before and after the execution of the respective instructions. The operations are independent of each other. Assume CF = 1

i. \ OR \ AX, \ BX \quad (4 \text{ marks})

ii. \ SHL \ BX, \ CL \quad (4 \text{ marks})

(b) Briefly describe the function of each of the THREE (3) system bus. \quad (6 \text{ marks})

(c) Show the 16-bit 2's complement binary representation of the following decimals:

i. \ 128 \quad (3 \text{ marks})

ii. \ -4096 \quad (4 \text{ marks})

iii. \ 65,535 \quad (4 \text{ marks})

QUESTION 4

(a) Show all workings clearly for the following:

(i) \ Convert \ 59_{10} \ to \ binary \quad (3 \text{ marks})

(ii) \ Convert \ 1080_{10} \ to \ hexadecimal \quad (3 \text{ marks})

(iii) \ Convert \ 95_{H} \ to \ BCD \ (Binary \ Coded \ Decimal) \quad (3 \text{ marks})

(b) Explain the differences between a near procedure call and a far procedure call in the microprocessor's point of view. \quad (8 \text{ marks})

(c) Explain the working principle of interrupt-driven I/O. \quad (8 \text{ marks})
QUESTION 5

(a) Discuss THREE (3) types of hazards that can happen in a pipelined processor.

(12 marks)

(b) Assume the following register conditions:
AX=AB00H  BX=200CH  CX=300FH  DX=DEEFFH

Determine the status of the Carry flag, Parity flag, Auxiliary Carry flag, Sign flag and Overflow flag after the below instruction being executed.

MOV BX, 3Fh
ADD BL, 45H

(5 marks)

(c) What are the advantages and disadvantages of having
i. large register size

(4 marks)

ii. small register size

(4 marks)

QUESTION 6

(a) 8086 microprocessor was designed to have two separate working unit: Execution Unit (EU) and Bus Interface Unit (BIU), so that both unit can work concurrently and increase the efficiency of the processor. Describe THREE (3) situations in which either of the unit is forced to be idle waiting for the other unit.

(9 marks)

(b) List out any SEVEN addressing modes with example used in 8086 microprocessor programming.

(7 marks)

(c) The register content for an 8086 microprocessor is as follows:
CS=1000H  DS=2000H  SS=3000H  SI=4000H  DI=5000H
BX=6080H  BP=7000H  AX=25FFH  CX=8791H  DX=1299H

Calculate the physical address of the memory where the operand is stored and the contents of the memory locations in each of the addresses shown below. The operations are independent of each other.

(i) MOV [DI], AH

(4 marks)

(ii) MOV [SI+BX-8H], CX

(5 marks)

- The End -
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