Answer all three questions. All three questions carry equal marks.

1(a). Find the address of Port A, Port B, Port C and the Control Reg. of the following 8255 interface to 8088 Microprocessor. Put your answer in Hex in the specified box below.

**Remember to use 0's for don't cares address pins.**
1(b). If the circuit of question 1(a) is operating in **Mode-0** of Isolated I/O interface, write a program to:

- (a) **Input** data Byte using “Port-B”
- (b) Inverted Least Significant Nibble of the inputted data and **Output** them via Port C-Upper

**Note:** unused ports are configured as output-ports AND don’t care address pins ➔ 0

---

**Write the Program within the given lines.**

```
TITLE  "Question 1(b)"
.MODEL  SMALL
.STACK  032H
.DATA
.CODE
    MOV AX, @DATA
    MOV DS, AX

    ___________________________
    ___________________________
    ___________________________
    ___________________________
    ___________________________
    ___________________________
    ___________________________

    MOV AX, 4C00H
    INT 21h

END
```
2(a). Execute the following program and find the contents of the required registers and the memory contents of the stack segment. (Assume \textit{L1}=4351_{16})

```
Title "Major \\
.MODEL small \\
.STACK 32 \\
.DATA \\
   VAR1  DW  0506H, 0708H, 080AH \\
   VAR3  DB   B1H, C2H, D0H \\
.CODE \\
   MOV     AX,@DATA \\
   MOV     DS,AX \\
   MOV     SP,00FD \\
   H \\
   LEA      SI,VAR1 \\
   MOV     BX,wordptr [SI] \\
   PUSH    BX \\
   LEA       BX, VAR3 \\
   XOR      AX,AX \\
   JC \textit{L1} \\
   XLAT \\
   PUSH    AX \\
   CALL    SUB1 \\
\textit{L1} : \\
   POP      BX \\
   POP       DX \\
   MOV     AX,4C00H \\
   INT \textit{21}\_H \\
   SUB1   PROC NEAR \\
   MOV    CX,SP \\
   PUSH   CX \\
   ADD     SP,02_H \\
   RET \\
   ENDP \\
END
```

Write the appropriate values:

<table>
<thead>
<tr>
<th>Stack Segment</th>
</tr>
</thead>
<tbody>
<tr>
<td>SS:00FF_H</td>
</tr>
<tr>
<td>SS:00FD_H</td>
</tr>
<tr>
<td>SS:00FB_H</td>
</tr>
<tr>
<td>SS:00F9_H</td>
</tr>
<tr>
<td>SS:00F7_H</td>
</tr>
<tr>
<td>SS:00F5_H</td>
</tr>
</tbody>
</table>

After the program execution find:

- BX = \_\_\_\_\_\_\_\_H \\
- DX = \_\_\_\_\_\_\_\_H \\

2(b). Write a program that will use \textit{“String Instruction”} and \textit{“REP”} prefix to initialize Fifteen byte-wide memory locations, starting from 1230_{16}, with an initial value of 78_{16}. \textit{Assume} that the CPU registers are already initialized as: DS=ES=SS=8000_{16} and all flags=‘0’. Use \textbf{maximum 4-line} of program code

```
TITLE “question 2b” \\
.MODEL SMALL \\
.STACK 032H \\
.CODE \\
   MOV AX,4C00H \\
   INT 21h \\
END
```
3(a). Write approximate **steps** required to complete **output bus-cycle** of **Port B** operating in **Mode 1**. The timing diagram is also given below.

3(b). Write one difference between Minimum & Maximum mode of operation: