**Lab 2: Experiments in XPO86 kit**

Task 1: Study and the following programs and answer the following questions.

Q. Write an ALP in XPO86 kit to read two digits(0-F in hexa) from the keyboard , add them and display the results in the display of the kit.

ANS:-

MOV AH,08

INT A1

MOV BL,AL

INT A1

ADD AL,BL

SUB AL,30

MOV DL,AL

MOV AH,02

INT A2

INT A5

INPUT:3,4

OUTPUT:7

INTPUT :4,5

OUTPUT:9

Q.2, Write an ALP in XPO86 kit that accepts a hexadecimal number and convert to its equivalent gray code. Display the same on the Display.

Ans:

1000:0100 DB 00,01,03,02,06,07,05,04,00,01,02,03,04,05,06,07

MOV BX,1000

MOV DS,BX

MOV BX,0100

MOV AH,08

INT A1

SUB AL,30

XLAT

ADD AL,30

MOV DL,AL

MOV AH,02

INT A2

INT A5

Task 2: Familiarization of Hyper terminal

To display a message on the LCD of a microcomputer using monitor calls.

**ALGORITHM:**

1. Initialize the data segment and the message to be displayed.

2. Set function value for display.

3. Point to the message and run the interrupt to display the message in the CRT.

**PROGRAM:**

0000 DISP SEGMENT

ASSUME CS: DISP DS:DISP, ES:DISP

0100 ORG 0100H

0100 EB 0F 90 STRT: JMP SKIP\_DATA

0103 47 4F 4F 44 20 4D MSG1: DB "GOOD MORNING ",03H

4F 52 4E 49 4E 47

20 03

0111 B8 10FF SKIP\_DATA: MOV AX,10FFH ; INIT OF SP FOR KIT

0114 8B E0 MOV SP, AX ; MOV AX, AX ON PC

0116 0E PUSH CS ; INIT FOR DS

0117 1F POP DS ; LOAD KIT INTS

(A0- BF) IN PC USING

0118 B8 0000 MOV AX, 0000H ; ES is used as SCPD to

011B 8E C0 MOV ES,AX ; STORE DATA.

011D CD AC INT 0ACH ; Clear to new line

011F BB 0103 R MOV BX, OFFSET MSG1 ; Pointer to message table

Ending in ETX

0122 CD AF INT 0AFH ; Display massage.

0124 DISP ENDS

END

**RESULT:**

A message is displayed on the LCD of a microcomputer using MONITOR calls

**PROGRAM: Arrange The Set Of Arrays In Ascending Order**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **SRC SEGM :ADDR** | **OP-CODE** | **LABEL** | **MNEMONICS** | **OPERAND** | **COMMENT** |
| 1000:0100 | B9 05 00 |  | MOV | CX,0005 | Get the count value CX=05h |
| 1000:0103 | 49 |  | DEC | CX | Decrementing the CX value by 1 |
| 1000:0104 | 89 CA |  | MOV | DX,CX | Move the content of CX to DX |
| 1000:0106 | BF 00 11 |  | MOV | DI,1100 | Initialize DI to 1100H |
| 1000:0109 | 8A 05 | LOOP1: | MOV | AL,[DI] | Move the content of DI to AL |
| 1000:010B | 47 |  | INC | DI | Increment DI register |
| 1000:010C | 8A 1D |  | MOV | BL,[DI] | Get the second value & move it to BL |
| 1000:010E | 38 D8 |  | CMP | AL,BL | Compare AL and BL |
| 1000:0110 | 73 06 |  | JC | LOOP2(0118) | If AL is greater than BL then go to label location |
| 1000:0112 | 4F |  | DEC | DI | Decrement the DI value |
| 1000:0113 | 88 1D |  | MOV | [DI],BL | Move the content of BL to DI |
| 1000:0115 | 47 |  | INC | DI | Increment the DI value |
| 1000:0116 | 88 05 |  | MOV | [DI],AL | Move the AL value to DI |
| 1000:0118 | E2 EF | LOOP2 | LOOP | LOOP1(0109) | Decrement the count value by 1 and check whether it is zero or not |
| 1000:011A | 89 D1 |  | MOV | CX,DX | Reload the count value |
| 1000:011C | E2 E6 |  | LOOP | 0104 | Decrement the count value and check whether it is zero or not |
| 1000:011E | CD A5 |  | INT | A5 | Return to command mode |

**OBSERVATION :-**

|  |  |  |  |
| --- | --- | --- | --- |
| **INPUT** | | **OUTPUT** | |
| **SRC SEGM :ADDR** | **DATA** | **SRC SEGM :ADDR** | **DATA** |
| 0000:1100 | 22 | 0000:1100 | 11 |
| 0000:1101 | 55 | 0000:1101 | 22 |
| 0000:1102 | 44 | 0000:1102 | 44 |
| 0000:1103 | 11 | 0000:1103 | 55 |
| 0000:1104 | 66 | 0000:1104 | 66 |

**PROGRAM: CONVERT 8 BIT DECIMAL VALUE TO ASCII VALUE**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **SRC SEGM :ADDR** | **OP-CODE** | **MNEMONICS** | **OPERAND** | **COMMENT** |
| 1000:0100 | BF 00 11 | MOV | DI,1100 | Initialize DI to 1100H |
| 1000:0103 | 8A 05 | MOV | AL,[DI] | Get the value to be converted |
| 1000:0105 | 04 30 | ADD | AL,30 | To convert the decimal value into ASCII we have to add 30H with the content of AL |
| 1000:0107 | 3C 3A | CMP | AL,3A | Finding whether the added value is less than 3A(or)not |
| 1000:0109 | 72 0A | JC | 0115 | If it is so then the control will be transferred to the address location |
| 1000:010B | 3C 40 | CMP | AL,40 | If it is not so then the added value will be compared with 40H |
| 1000:010D | 73 04 | JNC | 0113 | If carry=0 then the control will be transferred to address location |
| 1000:010F | 04 07 | ADD | AL,07 | If carry=1 then the AL value will be added with value of 07H |
| 1000:0111 | EB 02 | JMP | 0115 | After the addition the control will be transferred to address location |
| 1000:0113 | B0 FF | MOV | AL,FFH | Move the value FFH to AL |
| 1000:0115 | 47 | INC | DI | Increment DI register |
| 1000:0116 | 89 05 | MOV | [DI],AL | Move the content of AL to DI |
| 1000:0118 | CD A5 | INT | A5 | Return to command mode |

**OBSERVATION :-**

|  |  |  |  |
| --- | --- | --- | --- |
| **INPUT** | | **OUTPUT** | |
| **SRC SEGM :ADDR** | **DATA** | **SRC SEGM :ADDR** | **DATA** |
| 0000:1100 | 00 | 0000:1101 | 30 |
| 0000:1100 | 07 | 0000:1101 | 37 |
| 0000:1100 | 40 | 0000:1101 | FF |

**Assignment**

Q1: Display your name on the LCD of a microcomputer using MONITOR calls

Q2: Find largest number among 10 nos stored in memory specific memory location.

Q3: Convert 8 bit ASCII value to Decimal value.

Q4: Select three small problems of your own and write three assembly language program and test in XPO86 kit

***Due on 10th August ( 5 PM- Hardware Lab, submit handwritten copy)***