LCD-VFD 05-fri18-12

1] Eg12.1………..

```
* AVRAssembler1.asm
 * Based on example 12.1 in MAZIDI'S AVR MICROCONTROLLER
 *  Created: 5/16/2012 2:18:28 PM
 *     SUCCESSFUL BUILD!!!
 */

.EQU   PORTA   = 0X1B              ; addition to 12.1
.EQU   DDRA     = 0X1A             ; addition to 12.1
.EQU   PINA    = 0X19              ; addition to 12.1
.EQU   LCD_DPRT = PORTA
.EQU   LCD_DDDR = DDRA
.EQU   LCD_DPIN = PINA
.EQU   LCD_CPRT = PORTB
.EQU   LCD_CDDR = DDRB
.EQU   LCD_CPIN = PINB
.EQU   LCD_RS = 0
.EQU   LCD_RW = 1
.EQU   LCD_EN = 2

       LDI    R21,HIGH(RAMEND)
       OUT    SPH,R21
       LDI    R21,LOW(RAMEND)
       OUT    SPL,R21

       LDI     R21,0xFF;
       OUT  LCD_DDDR, R21
       OUT  LCD_CDDR, R21
       LDI     R16,0x33
       CALL CMNDWRT
       CALL DELAY_2ms
       LDI     R16,0x32
       CALL CMNDWRT
       CALL DELAY_2ms
       LDI     R16,0x28
       CALL CMNDWRT
       CALL DELAY_2ms
       LDI     R16,0x0E
       CALL CMNDWRT
       LDI     R16,0x01
       CALL CMNDWRT
       CALL DELAY_2ms
       LDI     R16,0x06
       CALL CMNDWRT
       LDI     R16,'H'
       CALL DATAWRT
       LDI     R16,'i'
       CALL DATAWRT
HERE: JMP HERE
;--------------------------------------------------------
CMNDWRT:
       MOV     R27,R16
       ANDI R27,0xF0
       OUT  LCD_DPRT,R27
       CBI     LCD_CPRT,LCD_RS
       CBI     LCD_CPRT,LCD_RW
       SBI     LCD_CPRT,LCD_EN
       CALL SDELAY
       CBI     LCD_CPRT,LCD_EN
       CALL DELAY_100us

       MOV     R27,R16
       SWAP R27
       ANDI R27,0xF0
       OUT  LCD_DPRT,R27
       SBI     LCD_CPRT,LCD_EN
       CALL SDELAY
       CBI     LCD_CPRT,LCD_EN
       CALL DELAY_100us
       RET
;-------------------------------------------------------
DATAWRT:
       MOV    R27,R16
       ANDI R27,0xF0
       OUT  LCD_DPRT,R27
       SBI     LCD_CPRT,LCD_RS
       CBI     LCD_CPRT,LCD_RW
       SBI     LCD_CPRT,LCD_EN
       CALL SDELAY
       CBI     LCD_CPRT,LCD_EN

       MOV     R27,R16
       SWAP R27
       ANDI R27,0xF0
       OUT  LCD_DPRT,R27
       SBI     LCD_CPRT,LCD_EN
       CALL SDELAY
       CBI     LCD_CPRT,LCD_EN

       CALL DELAY_100us
       RET

;-------------------------------------------------------
SDELAY:       NOP
       NOP
       RET
;-------------------------------------------------------
DELAY_100us:
       PUSH R17
       LDI     R17,60
DR0:
       CALL SDELAY
       DEC     R17
       BRNE DR0
       POP     R17
       RET
;-------------------------------------------------------
DELAY_2ms:
       PUSH R17
       LDI     R17,20
LDR0:
       CALL DELAY_100US
       DEC     R17
       BRNE LDR0
       POP     R17
       RET
```

2] Eg12.6…………

```
#include <avr/io.h>

#define F_CPU 7372800UL
#include <util/delay.h>

#define LCD_DPRT  PORTC
#define LCD_DDDR  DDRC
#define LCD_DPIN  PINC
#define LCD_CPRT  PORTC
#define LCD_CDDR  DDRC
#define LCD_CPIN  PINC
#define LCD_RS  0
#define LCD_RW  1
#define LCD_EN  2

void delay_us(int d)
{
  _delay_us(d);
}

void lcdCommand( unsigned char cmnd )
{
  LCD_DPRT = (LCD_DPRT&0x0F)|(cmnd & 0xF0);
  LCD_CPRT &= ~ (1<<LCD_RS);
  LCD_CPRT &= ~ (1<<LCD_RW);
  LCD_CPRT |= (1<<LCD_EN);
  delay_us(1);
  LCD_CPRT &= ~ (1<<LCD_EN);
  delay_us(100);
  LCD_DPRT = (LCD_DPRT&0x0F)|(cmnd<<4);
  LCD_CPRT |= (1<<LCD_EN);
  delay_us(1);
  LCD_CPRT &= ~ (1<<LCD_EN);
  delay_us(100);
}

void lcdData( unsigned char data )
{
  LCD_DPRT = (LCD_DPRT&0x0F)|(data & 0xF0);
  LCD_CPRT |= (1<<LCD_RS);
  LCD_CPRT &= ~ (1<<LCD_RW);
  LCD_CPRT |= (1<<LCD_EN);
  delay_us(1);
  LCD_CPRT &= ~ (1<<LCD_EN);
  LCD_DPRT = (LCD_DPRT&0x0F)|(data<<4);
  LCD_CPRT |= (1<<LCD_EN);
  delay_us(1);
  LCD_CPRT &= ~ (1<<LCD_EN);
  delay_us(100);
}

void lcd_init()
{
  LCD_DDDR = 0xFF;
  LCD_CDDR = 0xFF;
  LCD_CPRT &=~(1<<LCD_EN);
  lcdCommand(0x33);
  lcdCommand(0x32);
  lcdCommand(0x28);
  lcdCommand(0x0e);
  lcdCommand(0x01);
  delay_us(2000);
  lcdCommand(0x06);
}

void lcd_gotoxy(unsigned char x, unsigned char y)
{
  unsigned char firstCharAdr[]={0x80,0xC0,0x94,0xD4} ;

  lcdCommand(firstCharAdr[y-1] + x - 1);
  delay_us(100);
}

void lcd_print(char * str )
{
  unsigned char i = 0 ;

  while(str[i]!=0)
  {
    lcdData(str[i]);
    i++ ;
  }
}

int main(void)
{
  lcd_init();
  lcd_gotoxy(1,1);
  lcd_print("The world is but");
  lcd_gotoxy(1,2);
  lcd_print("one country");

  while(1);

  return 0;
}
```

12.7]………….

```
// different from the text.

#define F_CPU 8000000UL
#include <avr/io.h>
#include <util/delay.h>
#define LCD_PRT  PORTC // ONCE AGAIN, program runs only with PORTS B and C
#define LCD_DDR  DDRC // and not PORT A!!!
#define LCD_PIN  PINC
#define LCD_RS  0
#define LCD_RW  1
#define LCD_EN  2

void delay_us(int d)
{
  _delay_us(d);
}

void delay_ms(int d)
{
  _delay_ms(d);
}

void lcdCommand( unsigned char cmnd ){
  LCD_PRT = (LCD_PRT & 0x0F) | (cmnd & 0xF0);
  LCD_PRT &= ~ (1<<LCD_RS);
  LCD_PRT &= ~ (1<<LCD_RW);
  LCD_PRT |= (1<<LCD_EN);
  delay_us(1);
  LCD_PRT &= ~ (1<<LCD_EN);

  delay_us(20);

  LCD_PRT = (LCD_PRT & 0x0F) | (cmnd << 4);
  LCD_PRT |= (1<<LCD_EN);
  delay_us(1);
  LCD_PRT &= ~ (1<<LCD_EN);
}

void lcdData( unsigned char data )
{
  LCD_PRT = (LCD_PRT & 0x0F) | (data & 0xF0);
  LCD_PRT |= (1<<LCD_RS);
  LCD_PRT &= ~ (1<<LCD_RW);
  LCD_PRT |= (1<<LCD_EN);
  delay_us(1);
  LCD_PRT &= ~ (1<<LCD_EN);

  LCD_PRT = (LCD_PRT & 0x0F) | (data << 4);
  LCD_PRT |= (1<<LCD_EN);
  delay_us(1);
  LCD_PRT &= ~ (1<<LCD_EN);
}

void lcd_init(){
  LCD_DDR = 0xFF;

  LCD_PRT &=~(1<<LCD_EN);
  delay_us(2000);
  lcdCommand(0x33);
  delay_us(100);
  lcdCommand(0x32);
  delay_us(100);
  lcdCommand(0x28);
  delay_us(100);
  lcdCommand(0x0e);
  delay_us(100);
  lcdCommand(0x01);
  delay_us(2000);
  lcdCommand(0x06);
  delay_us(100);
}

void lcd_gotoxy(unsigned char x, unsigned char y)
{  //table 12-5
  unsigned char firstCharAdr[] = {0x80, 0xC0, 0x94, 0xD4};

  lcdCommand(firstCharAdr[y-1] + x - 1);
  delay_us(100);
}

void lcd_print( char * str )
{
  unsigned char i = 0 ;

  while(str[i]!=0)
  {
    lcdData(str[i]);
    i++ ;
  }
}

int main(void)
{
  lcd_init();
  while(1)
  {
            lcd_gotoxy(1,1);
            lcd_print("The world is but");
            lcd_gotoxy(1,2);
            lcd_print("one country     ");
            delay_ms(1000);
            lcd_gotoxy(1,1);
            lcd_print("and mankind its ");
            lcd_gotoxy(1,2);
            lcd_print("citizens        ");
            delay_ms(1000);
  }
  return 0;
}
```