

```
#include <LiquidCrystal.h>

float TARTn , TARTx , TVENx;

float QBx=300 ;

float UFR = 15;

float QA,RR;

int enter=27;

int up=38;

int down=40;

int wieght=70;

int LED585=44;

int LED875=42;

int sensor1=A0;

int sensor2=A1;

float pho585=0;

float pho875=0;

float sample1,sample1o;

float sample2,sample2o;

float pho585f;

float pho875f;

float ph585;

float ph875;

float ph5851,ph5852,ph5853,ph5854,ph5855,ph5856;

float ph8751,ph8752,ph8753,ph8754,ph8755,ph8756;

float pho585o,pho875o;

float Ifinger1,Ifinger2;
```

```
float TR585,TR875;
```

```
float HCT;
```

```
int MF=25;
```

```
float PV;
```

```
LiquidCrystal lcd(22,24,26,28,30,32);
```

```
void setup(){
```

```
  Serial.begin(9600);
```

```
  lcd.begin(16,4);
```

```
  for (int i=0;i<5;i++)
```

```
{
```

```
  lcd.setCursor(1,0);
```

```
  lcd.print("Hematocrite And");
```

```
  lcd.setCursor(1,1);
```

```
  lcd.print("Vascular Access");
```

```
  lcd.setCursor(2,2);
```

```
  lcd.print(" Blood Flow");
```

```
  lcd.setCursor(2,3);
```

```
lcd.print(" Monitoring");  
  
delay(500);  
  
lcd.clear();  
  
    delay(500);  
  
}
```

```
    pinMode(up,INPUT);  
    pinMode (down,INPUT);  
    pinMode (LED585,OUTPUT);  
    pinMode (LED875,OUTPUT);  
    pinMode (MF,INPUT);  
    pinMode (enter,INPUT);
```

```
}  
  
void loop(){  
  
    lcd.print("AR OR HCT?!");  
  
    delay(10000);  
  
    lcd.clear();  
  
    if (digitalRead (MF)==HIGH)  
  
    {  
  
        lcd.print("HCT Measurment");  
  
        delay (10000);  
  
        lcd.clear();
```

```
lcd.print("push your Finger");  
delay(10000);
```

```
lcd.clear();  
  
  lcd.print("Please Wait");  
digitalWrite(LED585,HIGH);  
digitalWrite(LED875,LOW);  
ph5851=analogRead(sensor1);  
delay(10000);  
ph5852=analogRead(sensor1);  
delay(10000);  
ph5853=analogRead(sensor1);  
delay (10000);  
ph5854=analogRead(sensor1);  
delay(10000);  
ph5855=analogRead(sensor1);  
delay(10000);  
ph5855=analogRead(sensor1);
```

```
pho585=(ph5851+ph5852+ph5853+ph5854+ph5855+ph5856)/6;
```

```
digitalWrite(LED875,LOW);  
digitalWrite(LED585,LOW);  
ph5851=analogRead(sensor1);
```

```
delay(10000);  
ph5852=analogRead(sensor1);  
delay(10000);  
ph5853=analogRead(sensor1);  
delay(10000);  
ph5854=analogRead(sensor1);  
delay(10000);  
ph5855=analogRead(sensor1);  
delay(10000);  
ph5855=analogRead(sensor1);  
  
pho585o=(ph5851+ph5852+ph5853+ph5854+ph5855+ph5856)/6;
```

```
digitalWrite(LED875,HIGH);  
digitalWrite(LED585,LOW);  
ph8751=analogRead(sensor2);  
delay(10000);  
ph8752=analogRead(sensor2);  
delay(10000);  
ph8753=analogRead(sensor2);  
delay(10000);  
ph8754=analogRead(sensor2);  
delay(10000);  
ph8755=analogRead(sensor2);
```

```
delay(10000);  
  
ph8756=analogRead(sensor2);  
  
pho875=(ph8751+ph8752+ph8753+ph8754+ph8755+ph8756)/6;
```

```
digitalWrite(LED875,LOW);  
  
digitalWrite(LED585,LOW);  
  
ph8751=analogRead(sensor2);  
  
delay(10000);  
  
ph8752=analogRead(sensor2);  
  
delay(10000);  
  
ph8753=analogRead(sensor2);  
  
delay(10000);  
  
ph8754=analogRead(sensor2);  
  
delay(10000);  
  
ph8755=analogRead(sensor2);  
  
delay(10000);  
  
ph8756=analogRead(sensor2);  
  
delay(10000);
```

```
sample1=pho585*0.0048875855;  
  
sample1o=pho585o*0.0048875855;  
  
lfinger1=sample1-sample1o;
```

```
pho875o=(ph8751+ph8752+ph8753+ph8754+ph8755+ph8756)/6;
```

```
sample2=pho875*0.0048875855;
```

```
sample2o=pho875o*0.0048875855;
```

```
lfinger2=sample2-sample2o;
```

```
TR585=lfinger1/pho585;
```

```
TR875=lfinger2/pho875;
```

```
lcd.clear();
```

```
lcd.setCursor(0,0);
```

```
lcd.print("Enter The Weight");
```

```
lcd.setCursor(0,1);
```

```
lcd.print(wieght);
```

```
lcd.setCursor(4,1);
```

```
lcd.print("KG");
```

```
delay(1000);
```

```
while (digitalRead (enter)!=HIGH)
```

```
{
```

```
while (digitalRead (up)==HIGH)
{
    lcd.setCursor(0,1);

    lcd.print(wieght);

    wieght=wieght+1;

    lcd.setCursor(0,0);

    lcd.print("Enter The Weight");

    lcd.setCursor(0,1);

    lcd.print(wieght);

    lcd.setCursor(4,1);

    lcd.print("KG");

    delay(50);

    if (wieght>150)
    {
        wieght = 150;

    }

}
```



```
while (digitalRead(down) == HIGH)
```

```
{      lcd.setCursor(0,1);
```

```
      lcd.print(wieght);
```

```
      wieght=wieght-1;
```

```
      lcd.setCursor(0,0);
```

```
      lcd.print("Enter The Weight");
```

```
      lcd.setCursor(0,1);
```

```
      lcd.print(wieght);
```

```
      lcd.setCursor(4,1);
```

```
      lcd.print("KG");
```

```
      delay(50);
```

```
      lcd.clear();
```

```
      lcd.setCursor(0,0);
```

```
      lcd.print("Enter The Weight");
```

```
      lcd.setCursor(0,1);
```

```
      lcd.print(wieght);
```

```
      lcd.setCursor(4,1);
```

```
      lcd.print("KG");
```

```
      delay(50);
```

```
if(wieght<0)
```

```
      wieght=0;
```

```
}  
  
}
```

```
while (digitalRead (enter)!=LOW)  
{ lcd.clear();  
  
  lcd.setCursor(0,0);  
  
  lcd.print("The Weight = ");  
  
  lcd.setCursor(0,1);  
  
  lcd.print(wieght);  
  
  lcd.setCursor(4,1);  
  
  lcd.print("KG");  
  
  delay(5000);  
  
  lcd.clear();
```

```
lcd.print("Enter The Gender");  
  
delay(10000);  
  
lcd.setCursor(1,1);
```

```
if(digitalRead(MF)==HIGH)  
{  
  
  lcd.print("Male");  
  
  delay(5000);
```

```
HCT = (Ifinger1-Ifinger2)/0.047;
```

```
PV=(1-HCT/100)*(864+47.9*wieght);
```

```
}
```

```
else if(digitalRead(MF)==LOW)
```

```
{
```

```
  lcd.print("Female");
```

```
  delay (5000);
```

```
  HCT = (Ifinger1-Ifinger2)/0.047;
```

```
  PV=(1-(HCT/100))*(1530+41*wieght);
```

```
  } lcd.setCursor(0,0);
```

```
}
```

```
lcd.clear();
```

```
lcd.setCursor(0,0);
```

```
lcd.print("Hematocrite=");
```

```
lcd.setCursor(0,1);
```

```
lcd.print ( HCT);
```

```
lcd.setCursor(6,1);
```

```
lcd.print ("%");
```

```
lcd.setCursor(0,2);
```

```
lcd.print("Plasma Volume=");
```

```
    lcd.setCursor(0,3);
```

```
lcd.print (PV);
```

```
    lcd.setCursor(9,3);
```

```
    lcd.print("ml");
```

```
delay (50000);
```

```
}
```

```
else if(digitalRead(MF)==LOW)
```

```
{
```

```
    lcd.clear();
```

```
    lcd.setCursor(0,0);
```

```
    lcd.print("Enter UFR");
```

```
    lcd.setCursor(0,1);
```

```
    lcd.print(UFR);
```

```
    lcd.setCursor(6,1);
```

```
    lcd.print("ML/MIN");
```

```
while (digitalRead (enter)!=HIGH)
```

```
{
```

```
while (digitalRead (up)==HIGH)
{

    UFR=UFR+0.1;

    lcd.setCursor(0,0);

    lcd.print("Enter UFR");

    lcd.setCursor(0,1);

    lcd.print(UFR);

    lcd.setCursor(6,1);

    lcd.print("ML/MIN");

    delay(50);

    if (UFR>50)

        UFR = 50;

}
```

```
while (digitalRead(down) == HIGH)
{
```

```
    UFR=UFR-0.1;

    lcd.setCursor(0,0);
```

```
lcd.print("Enter UFR");  
  
lcd.setCursor(0,1);  
  
lcd.print(UFR);  
  
lcd.setCursor(6,1);  
  
lcd.print("ML/MIN");  
  
delay(50);
```

```
if(UFR<0)
```

```
UFR=0;
```

```
}
```

```
}
```

```
lcd.clear();
```

```
lcd.setCursor(0,0);
```

```
lcd.print("UFR = ");
```

```
lcd.setCursor(0,1);
```

```
lcd.print(UFR);
```

```
Serial.println(UFR);
```

```
lcd.setCursor(4,1);
```

```
lcd.print("ML/MIN");
```

```
delay(1000);
```

```
lcd.clear();
```

```
lcd.setCursor(0,0);
```

```
lcd.print("Enter TARTn");
```

```
while (digitalRead (enter)!=HIGH)
```

```
{
```

```
TARTn=analogRead(A0);
```

```
}
```

```
lcd.setCursor(0,1);
```

```
lcd.print(TARTn);
```

```
delay(1000);
```

```
Serial.println(TARTn);
```

```
lcd.clear();
```

```
TARTn=(TARTn*0.0049);
```

```
lcd.setCursor(0,0);
```

```
lcd.print("Tartn = ");  
lcd.setCursor(0,1);  
Serial.println(TARTn);  
lcd.print(TARTn);  
delay(3000);  
TARTn=(TARTn/0.0049);
```

```
lcd.clear();  
lcd.setCursor(0,0);  
lcd.print("Enter TVENx");  
while (digitalRead (enter)!=HIGH)  
{  
  
    TVENx=analogRead(A1);  
  
}  
  
lcd.clear();  
lcd.setCursor(0,0);  
lcd.print(TVENx);  
Serial.println(TVENx);
```



```
delay(1000);
```

```
lcd.clear();
```

```
TVENx=(TVENx*0.0049);
```

```
lcd.setCursor(0,0);
```

```
lcd.print("TVENx = ");
```

```
lcd.setCursor(8,0);
```

```
lcd.print(TVENx);
```

```
Serial.println(TVENx);
```

```
TVENx=(TVENx/0.0049);
```

```
delay(3000);
```

```
lcd.clear();
```

```
lcd.setCursor(0,0);
```

```
lcd.print("Enter QBx");
```

```
lcd.setCursor(0,1);
```

```
lcd.print(QBx);
```

```
lcd.setCursor(5,1);
```

```
lcd.print("ML/MIN");
```

```
while (digitalRead (enter)!=HIGH)
```

```
{

while (digitalRead (up)==HIGH)
{

    QBx=QBx+1;

    lcd.setCursor(0,0);

    lcd.print("Enter QBx");

    lcd.setCursor(0,1);

    lcd.print(QBx);

    lcd.setCursor(5,1);

    lcd.print("ML/MIN");

    delay(50);

if (QBx>500)

    QBx = 500;

}

while (digitalRead(down) == HIGH)
{
```

```
QBx=QBx-1;  
lcd.setCursor(0,0);  
lcd.print("Enter QBx");  
lcd.setCursor(0,1);  
lcd.print(QBx);  
lcd.setCursor(5,1);  
lcd.print("ML/MIN");  
delay(50);
```

```
if(QBx<0)
```

```
QBx=0;
```

```
}
```

```
}
```

```
lcd.clear();
```

```
lcd.setCursor(0,0);
```

```
lcd.print("QBx = ");
```

```
lcd.setCursor(0,1);
```

```
lcd.print(QBx);
```

```
Serial.println(QBx);  
lcd.setCursor(5,1);  
lcd.print("ML/MIN");  
delay(2000);  
lcd.clear();
```

```
QA=(QBx-UFR)*(TARTn/TVENx);  
RR=((QBx-QA)/QBx)*100;  
lcd.setCursor(0,0);  
lcd.print("Access Flow =");  
lcd.setCursor(0,1);  
lcd.print(QA);  
Serial.println(QA);  
lcd.setCursor(5,1);  
lcd.print("ML/MIN");
```

```
lcd.setCursor(0,2);  
lcd.print("Recirculation= ");  
lcd.setCursor(0,3);  
lcd.print(RR);  
Serial.println(RR);  
lcd.setCursor(5,3);
```

```
    lcd.print("");  
    delay(5000);  
  }  
}
```