METODE ANALISA DATA

1. Perhitungan Data Vakum 40 mmHg

a. Rata – rata

Rata – Rata ($\overline{X}$) = $\frac{\sum Xi}{n}$

Dimana : $\overline{X}$ = rata-rata

$\sum$Xi = Jumlah nilai data

n = Banyak data (1,2,3,…,n)

Rata – Rata ($\overline{X}$) =

(32,2+32,2+32,2+32,1+33,3+31,1+33,4+31,3+31,2+31,2+31,5+32,2+32,2+32,2+31,2)/15

=31,9

b. Standar deviasi

$$SD = \sqrt{\frac{\sum_{i=1}^{n}\left(X_i - \overline{X}\right)^2}{(n-1)}}$$

Dimana:

$x_i = data\ pengukuran$

$\bar{x} = Re\ rata\ hasil\ pengukuran$

n = jumlah data

SD = √((32,2-31,9)^2+(32,2-31,9)^2+(32,2-31,9)^2+(32,1-31,9)^2+

(33,3-31,9)^2+(31,1-31,9)^2+(33,4-31,9)^2+(31,3-31,9)^2+(31,2-31,9)^2+

(31,2-31,9)^2+(31,5-31,9)^2+(32,3-31,9)^2+(32,3-31,9)^2+(32,3-31,9)^2+

(31,2-31,9)^2/(15-1))

SD = √(945,654/14)

SD = 8,0

c. Error %

$$\text{Error} = \left(\frac{data\ setting - re\ rata}{data\ setting}\right) x\ 100\%$$

$$\text{Error} = \left(\frac{40-31,9}{40}\right) x\ 100\%$$

Error = 20%

2. Perhitungan Data Vakum 50 mmHg

a. Rata – rata

Rata – Rata ($\overline{X}$) = $\frac{\sum Xi}{n}$

Dimana : $\overline{X}$ = rata-rata

$\sum$Xi = Jumlah nilai data

n = Banyak data (1,2,3,…,n)

Rata – Rata ($\overline{X}$)

=(42,1+42,1+43,1+43,2+42,2+42,2+42,1+42,2+42,1+42,2+42,2+42,1+42,1+42,2+42,2)/15

=42,2

b. Standar deviasi

$$SD = \sqrt{\frac{\sum_{i=1}^{n}\left(X_i - \overline{X}\right)^2}{(n-1)}}$$

Dimana:

$x_i = data\ pengukuran$

$\bar{x} = Re\ rata\ hasil\ pengukuran$

n = jumlah data

SD = √((42,1-42,2)^2+(42,1-42,2)^2+(43,1-42,2)^2+(43,2-42,2)^2+

(42,2-42,2)^2+(42,2-42,2)^2+(42,1-42,2)^2+(42,2-42,2)^2+(42,1-42,2)^2+

(42,2-42,2)^2+(42,2-42,2)^2+(42,1-42,2)^2+(42,1-42,2)^2+(42,2-42,2)^2+

(42,2-42,2)^2/(15-1))

SD = √(912,6/14)

SD = 8,07

c. Error %

$$\text{Error} = \left(\frac{data\ setting - re\ rata}{data\ setting}\right) x\ 100\%$$

$$\text{Error} = \left(\frac{50-42,2}{50}\right) x\ 100\%$$

Error = 15%

3. Perhitungan Data Vakum 60 mmHg

a. Rata – rata

Rata – Rata ($\overline{X}$) = $\frac{\sum Xi}{n}$

Dimana : $\overline{X}$ = rata-rata

$\sum$Xi = Jumlah nilai data

n = Banyak data (1,2,3,…,n)

Rata – Rata ($\overline{X}$) =

(55,0+56,0+56,5+56,5+55,0+54,5+56,5+56,5+55,0+55,0+55,0+56,5+55,5+5

6,5+55,0)/15

=55,6

b. Standar deviasi

$$SD = \sqrt{\frac{\sum_{i=1}^{n}\left(X_i - \overline{X}\right)^2}{(n-1)}}$$

Dimana:

$x_i = data\ pengukuran$

$\bar{x} = Re\ rata\ hasil\ pengukuran$

n = jumlah data

SD = √((55,0-55,6)^2+(56,0-55,6)^2+(56,5-55,6)^2+(56,5-55,6)^2+

(55,0-55,6)^2+(54,5-55,6)^2+(56,5-55,6)^2+(56,5-55,6)^2+(55,0-55,6)^2+

(55,0-55,6)^2+(55,0-55,6)^2+(56,5-55,6)^2+(55,5-55,6)^2+(56,5-55,6)^2+

(55,0-55,6)^2/(15-1))

SD = √(290,4/14)

SD = 4,55

c. Error %

$$\text{Error} = \left(\frac{data\ setting - re\ rata}{data\ setting}\right) x\ 100\%$$

$$\text{Error} = \left(\frac{60-55,6}{60}\right) x\ 100\%$$

Error = 7%

4. **Perhitungan Data Vakum 93 mmHg**

a. Rata – rata

$$\text{Rata – Rata } (\overline{X}) = \frac{\sum Xi}{n}$$

Dimana : $\overline{X}$ = rata-rata

$\sum$Xi = Jumlah nilai data

n = Banyak data (1,2,3,…,n)

Rata – Rata ($\overline{X}$)

=(88,0+95,0+89,0+89,0+90,0+90,0+89,0+89,0+99,0+88,5+89,0+88,5+90,5+90,5+90,5+89,5)/15

=90,3

b. Standar deviasi

$$SD = \sqrt{\frac{\sum_{i=1}^{n}\left(X_i - \overline{X}\right)^2}{(n-1)}}$$

Dimana:

$x_i = data\ pengukuran$

$\bar{x} = Re\ rata\ hasil\ pengukuran$

n = jumlah data

SD = √((88,0-90,3)^2+(95,0-90,3)^2+(89,0-90,3)^2+(89,0-90,3)^2+(90,0-90,3)^2+(90,0-90,3)^2+(89,0-90,3)^2+(89,0-90,3)^2+(99,0-90,3)^2+(88,5-90,3)^2+(89,0-90,3)^2+(88,5-90,3)^2+(90,5-90,3)^2+(90,5-90,3)^2+(89,5-90,3)^2/(15-1))

SD = √(109,35/14)

SD = 2,79

c. Error %

$$\text{Error} = \left(\frac{data\ setting - re\ rata}{data\ setting}\right) x\ 100\%$$

$$\text{Error} = \left(\frac{93-90,3}{93}\right) x\ 100\%$$

Error = 3%

5. Perhitungan Data Vakum 121 mmHg

a. Rata – rata

$$\text{Rata – Rata } (\overline{X}) = \frac{\sum Xi}{n}$$

Dimana : $\overline{X}$ = rata-rata

$\sum$Xi = Jumlah nilai data

n = Banyak data (1,2,3,…,n)

Rata – Rata ($\overline{X}$)

=(119,0+120,0+119,0+121,0+121,5+121,0+123,0+118,0+123,0+119,0+119,

0+120,5+120,5+120,5+118,0)/15

=120,2

b. Standar deviasi

$$SD = \sqrt{\frac{\sum_{i=1}^{n}\left(X_i - \overline{X}\right)^2}{(n-1)}}$$

Dimana:

$x_i = data\ pengukuran$

$\bar{x} = Re\ rata\ hasil\ pengukuran$

n = jumlah data

SD = √((119,0-120,2)^2+(120,0-120,2)^2+(119,0-120,2)^2+

(121,0-120,2)^2+(121,5-120,2)^2+(121,0-120,2)^2+(123,0-120,2)^2+

(118,0-120,2)^2+(123,0-120,2)^2+(119,0-120,2)^2+(119,0-120,2)^2+

(120,5-120,2)^2+(120,5-120,2)^2+(120,5-120,2)^2+(118,0-120,2)^2/(15-1))

SD = √(9,6/14)

SD = 0,82

c. *Error %*

Error = $\left(\frac{data\ setting - re\ rata}{data\ setting}\right) x\ 100\%$

Error = $\left(\frac{121-120,2}{121}\right) x\ 100\%$

Error = 1%

6. **Perhitungan Data Vakum 150 mmHg**

a. Rata – rata

Rata – Rata ($\overline{X}$) = $\frac{\sum Xi}{n}$

Dimana : $\overline{X}$ = rata-rata

$\sum$Xi = Jumlah nilai data

n = Banyak data (1,2,3,…,n)

Rata – Rata ($\overline{X}$)

=(149,0+153,0+151,5+151,5+151,5+150,0+149,5+149,0+152,0+149,0+151,

0+151,0+151,0+152,0+151,0)/15

=150,8

b. Standar deviasi

$$SD = \sqrt{\frac{\sum_{i=1}^{n}\left(X_i - \overline{X}\right)^2}{(n-1)}}$$

Dimana:

$x_i = data\ pengukuran$

$\bar{x} = Re\ rata\ hasil\ pengukuran$

n = jumlah data

SD = $\sqrt{}$((149,0-150,8)^2+(153,0-150,8)^2+(151,5-150,8)^2+

$(151,5-150,8)^2+(151,5-150,8)^2+(150,0-150,8)^2+(149,5-150,8)^2+$

$(149,0-150,8)^2+(152,0-150,8)^2+(149,0-150,8)^2+(151,0-150,8)^2+$

$(151,0-150,8)^2+(151,0-150,8)^2+(152,0-150,8)^2+(151,0-150,8)^2/(15-1))$

SD = √(10,33/14)

SD = 0,85

c. Error %

Error = $\left(\frac{data\ setting-re\ rata}{data\ setting}\right) x\ 100\%$

Error = $\left(\frac{150-150,8}{150}\right) x\ 100\%$

Error = 1%

7. Perhitungan Data Vakum 187 mmHg

a. Rata – rata

Rata – Rata ($\overline{X}$) = $\frac{\sum Xi}{n}$

Dimana : $\overline{X}$ = rata-rata

$\sum$Xi = Jumlah nilai data

n = Banyak data (1,2,3,…,n)

Rata – Rata ($\overline{X}$)

=(189,0+180,0+192,0+188,0+189,5+186,5+187,0+191,0+185,0+185,0+188,

0+188,0+188,5+189,0+189,0)/15

=188,2

b. Standar deviasi

$$SD = \sqrt{\frac{\sum_{i=1}^{n}\left(X_i - \overline{X}\right)^2}{(n-1)}}$$

Dimana:

$x_i = data\ pengukuran$

$\bar{x} = Re\ rata\ hasil\ pengukuran$

n = jumlah data

SD = √((189,0-188,2)^2+(180,0-188,2)^2+(192,0-188,2)^2+

(188,0-188,2)^2+(189,5-188,2)^2+(186,5-188,2)^2+(187,0-188,2)^2+

(191,0-188,2)^2+(185,0-188,2)^2+(185,0-188,2)^2+(188,0-188,2)^2+

(188,0-188,2)^2+(188,5-188,2)^2+(189,0-188,2)^2+(189,0-188,2)^2/(15-1))

SD = √(23,81/14)

SD = 1,30

c. Error %

$$\text{Error} = \left(\frac{data\ setting - re\ rata}{data\ setting}\right) x\ 100\%$$

$$\text{Error} = \left(\frac{187 - 188{,}2}{187}\right) x\ 100\%$$

Error = 1%

LISTING PROGRAM

```
/*****************************************************
This program was produced by the
CodeWizardAVR V2.05.3 Standard
Automatic Program Generator
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Project :
Version :
Date    : 11/1/2017
Author  : MSI
Company :
Comments:


Chip type               : ATmega8
Program type            : Application
AVR Core Clock frequency: 8.000000 MHz
Memory model            : Small
External RAM size       : 0
Data Stack size         : 256
*****************************************************/

#include <mega8.h>
#include <stdio.h>
#include <stdlib.h>
#include <delay.h>
#include <alcd.h>

#define ADC_VREF_TYPE 0x00

unsigned char data;
unsigned int sensor,mmhg;
float sensors,result;
char buf[33];

// Read the AD conversion result
unsigned int read_adc(unsigned char adc_input)
{
ADMUX=adc_input | (ADC_VREF_TYPE & 0xff);
// Delay needed for the stabilization of the ADC input voltage
delay_us(10);
// Start the AD conversion
ADCSRA|=0x40;
// Wait for the AD conversion to complete
while ((ADCSRA & 0x10)==0);
ADCSRA|=0x10;
return ADCW;
}
void awal()// fungsi awal
{
lcd_gotoxy(0,0);
lcd_putsf("Press Start");//menampilkan press start
PORTD.3=1;//motor mati}
```

```
void sedot()
{
PORTD.3=0;//motor hidup
lcd_gotoxy(0,0);
lcd_putsf("Proses Sedot");//menampilkan proses sedot
if(PIND.1==0){//jika switch alarm terkena air
lcd_clear();
while(1){
PORTD.3=1;//motor mati
lcd_gotoxy(0,0);
lcd_putsf("penuh");//menampilkan penuh
PORTD.2=1;delay_ms(100);//buzzer nyala jeda 100ms
PORTD.2=0;delay_ms(100);//buzzer mati  jeda 100ms
if(!PIND.0){break;}//jika tombol start ditekan maka kembali ke
awal
}}}

void main(void)
{
PORTB=0x00;
DDRB=0x00;
PORTC=0x00;
DDRC=0x00;
PORTD=0x03;
DDRD=0x0C;
TCCR0=0x00;
TCNT0=0x00;
TCCR1A=0x00;
TCCR1B=0x00;
TCNT1H=0x00;
TCNT1L=0x00;
ICR1H=0x00;
ICR1L=0x00;
OCR1AH=0x00;
OCR1AL=0x00;
OCR1BH=0x00;
OCR1BL=0x00;
ASSR=0x00;
TCCR2=0x00;
TCNT2=0x00;
OCR2=0x00;
TIMSK=0x00;
UCSRB=0x00;
ACSR=0x80;
SFIOR=0x00;
ADMUX=ADC_VREF_TYPE & 0xff;
ADCSRA=0x83;
SPCR=0x00;
TWCR=0x00;
lcd_init(16);

lcd_gotoxy(0,0);
lcd_putsf("Viralia MP");
delay_ms(100);
//inisiasi lcd
```

```
while (1)
      { if(!PIND.0){delay_ms(500);data=data+1;lcd_clear();}//jika
tombol start ditekan maka data bertambah 1
       if(data>=2){data=0;}//jika data lebih 2 dari kembali ke
data 0
       if(data==0){awal();}//jika data bernilai 0 maka memanggil
fungsi awal
       if(data==1){sedot();//jika data bernilai 1 maka memanggil
fungsi sedot
       sensor=read_adc(0); // sensor membaca adc0
       sensors=((float)sensor*5/1024)+0.32;//rumus mengubah adc ke
tegangan(volt)
       result=-115+(23*sensors);//rumus mengubah tegangan ke kpa
       mmhg=result*7.5;         //rumus merubah kpa ke mmhg

       lcd_gotoxy(0,1);         //menempatkan karakter di lcd pada
kolom 0 baris 1
       sprintf(buf,"%d mmhg      ",mmhg);//menampilkan mmhg
       lcd_puts(buf);
       delay_ms(2000); //memberi jeda 2000 ms
       if(!PIND.0){delay_ms(500);data=data+1;lcd_clear();}////jika
tombol start ditekan maka data bertambah 1
  }}}
```