LAMPIRAN

1. Hasil Perhitungan Pengukuran

a. Perhitungan hitungan tegangan *power supply* sebelum menyala

a) Pengukuran Tegangan 12 V

1) Rata-rata

Rata-rata $\bar{x} = \frac{\sum x\text{i}}{n}$

Diketahui :

$\sum xi$ = 60,4 *Volt* (Hasil penjumlahan semua data)

n = 5

Ditanya :

$\bar{X}$ = rata-rata….?

Jawab :

$\bar{x} = \frac{\sum xi}{n}$

$\bar{x} = \frac{60{,}4\ volt}{5}$ = 12,08 *Volt*

2) Koreksi

Koreksi = $\bar{X} - Y$

Diketahui :

$\bar{X}$ = 12.08 *Volt*

Y = 12 *Volt*

Ditanya :

Koreksi…?

Jawab :

Koreksi = $\bar{X} - Y$

= 12.08 - 12 = 0,8 *Volt*

3) % *Error*

% *Error* = $\frac{Y-\bar{X}}{Y} \times 100$

Diketahui :

$\bar{X}$ = 12,08 *Volt*

$Y = 12\ Volt$

Ditanya :

% *Error*…?

Jawab

% *Error* = $\frac{Y-\bar{X}}{Y} \times 100$

= $\frac{12-12.08}{12} \times 100$ = 0,6 %

b) Pengukuran Tegangan 5 V

1) Rata-rata

Rata-rata $\bar{x} = \frac{\sum x\mathrm{i}}{n}$

Diketahui :

$\sum xi$ = 24,51 *Volt* (Hasil penjumlahan semua data)

n = 5

Ditanya :

$\bar{x}$ = rata-rata….?

Jawab :

$$\bar{x} = \frac{\sum xi}{n}$$

$\bar{x} = \frac{24,51}{5}$ = 4,90 *Volt*

2) Koreksi

Koreksi = $\bar{X} - Y$

Diketahui:

$\bar{X}$ = *4.90 Volt*

Y = 5 *Volt*

Ditanya :

Koreksi…?

Jawab :

Koreksi = $\bar{X} - Y$

= 4.90 - 5 = 0.1 *Volt*

3) % *Error*

% *Error* = $\frac{Y-\bar{X}}{Y} \times 100$

Diketahui:

$\bar{X}$ = 4,90 *Volt*

Y = 5 *Volt*

Ditanya :

% *Error*…?

Jawab :

% *Error* = $\frac{Y-\bar{X}}{Y} \times 100$

= $\frac{5-4.90}{5} \times 100$ = 2 %

b. Perhitungan hitungan tegangan *power supply* setelah menyala

a) Pengukuran Tegangan 12 V

1) Rata-rata

Rata-rata $\bar{x} = \frac{\sum x\text{i}}{n}$

Diketahui :

$\sum xi$ = 59,97 *Volt*

n = 5

Ditanya :

$\bar{x}$ = rata-rata….?

Jawab :

$\bar{x} = \frac{\sum x\text{i}}{n}$

$\bar{x} = \frac{59,97}{5}$ = 11,99 *Volt*

2) Koreksi

Koreksi = $\bar{X} - Y$

Diketahui:

$\bar{X}$ = 11,99 *Volt*

Y = 12 *Volt*

Ditanya :

Koreksi…?

Jawab :

Koreksi = $\bar{X} - Y$

= 11,99 - 12 = 0,01 *Volt*

3) % *Error*

% *Error* = $\frac{Y-\bar{X}}{Y} \times 100$

Diketahui :

$Y = 12\ Volt$

$\bar{X}$ = 11,99 *Volt*

Ditanya :

% *Error*…?

Jawab :

% *Error* = $\frac{Y-\bar{X}}{Y} \times 100$

= $\frac{12-11,99}{12} \times 100$ = 0,8 %

b) Pengukuran Tegangan 5 V

1) Rata-rata

Rata-rata $\bar{x} = \frac{\sum x\mathrm{i}}{n}$

Diketahui :

$\sum xi$ = 24,13 *Volt*

n = 5

Ditanya :

$\bar{x}$ = rata-rata….?

Jawab :

$\bar{x} = \frac{\sum x\mathrm{i}}{n}$

$\bar{x} = \frac{24,13}{5}$ = 4,82 *Volt*

2) Koreksi

Koreksi = $\bar{X} - Y$

Diketahui :

$\bar{X}$ = 4,82 *Volt*

Y = 5 *Volt*

Ditanya :

Koreksi…?

Jawab :

Koreksi = $\bar{X} - Y$

= 4,82 - 5 = 0,18 *Volt*

3) % *Error*

% *Error* = $\frac{Y-\bar{X}}{Y} \times 100$

Diketahui :

$Y = 5\,Volt$

$\bar{X}$ = 4.82 *Volt*

Ditanya :

% *Error*…?

Jawab :

% *Error* = $\frac{Y-\bar{X}}{Y} \times 100$

= $\frac{5-4,82}{5} \times 100$ = 3,6 %

c. Perhitungan hitungan tegangan *heater*

1) Rata-rata

Rata-rata $\bar{x} = \frac{\sum x\mathrm{i}}{n}$

Diketahui :

$\sum xi$ = 1.152 *Volt*

n = 5

Ditanya :

$\bar{x}$ = rata-rata….?

Jawab :

$$\bar{x} = \frac{\sum x\mathrm{i}}{n}$$

$\bar{x} = \frac{1.152}{5}$ = 230 *Volt*

2) Koreksi

Koreksi = $\bar{X} - Y$

Diketahui :

$\bar{X}$ = 230 *Volt*

Y = 5 Volt

Ditanya :

Koreksi…?

Jawab :

Koreksi = $\bar{X} - Y$

= 230 - 233= 3 *Volt*

3) % *Error*

% *Error* = $\frac{Y-\bar{X}}{Y} \times 100$

Diketahui :

$Y = 5\ Volt$

$\bar{X}$ = 230 Volt

Ditanya :

% *Error*…?

Jawab :

% *Error* = $\frac{Y-\bar{X}}{Y} \times 100$

= $\frac{233-230}{233} \times 100$ = 1,2 %

d. Perhitungan hitungan suhu

1) Rata-rata

Rata-rata $\bar{x} = \frac{\sum x\mathrm{i}}{n}$

Diketahui :

$\sum xi$ = 2469,1 ^{0}C

n = 31

Ditanya :

$\bar{x}$ = rata-rata….?

Jawab :

$\bar{x} = \frac{\sum x\mathrm{i}}{n}$

$\bar{x} = \frac{2469,1}{31}$ = 79,6 ^{0}C

2) Koreksi

Koreksi = $\bar{X} - Y$

Diketahui :

$\bar{X}$ = 79,6 ^{0}C

Y = 79 ^{0}C

Ditanya :

Koreksi…?

Jawab :

Koreksi = $\bar{X} - Y$

= 79,6 – 79 = 0,6 ^{0}C

3) % *Error*

% *Error* = $\frac{Y-\bar{X}}{Y} \times 100$

Diketahui :

Y = 79 ^{0}C

$\bar{X}$ = 79,6 ^{0}C

Ditanya :

% *Error* ?

Jawab :

% *Error* = $\frac{Y-\bar{X}}{Y} \times 100$

= $\frac{79-79,6}{79} \times 100$ = 0,7 %

e. Perhitungan hitungan *timer* alat bekerja

1) Rata-rata

Rata-rata $\bar{x} = \frac{\sum x\text{i}}{n}$

Diketahui :

$\sum xi$ = 742 Menit

n = 5

Ditanya :

$\bar{x}$ = rata-rata….?

Jawab :

$$\bar{x} = \frac{\sum x\text{i}}{n}$$

$\bar{x} = \frac{742}{5}$ = 148 Menit

2) Koreksi

Koreksi = $\bar{X} - Y$

Diketahui :

$\bar{X}$ = 148 Menit

Y = 150 Menit

Ditanya :

Koreksi…?

Jawab :

Koreksi = $\bar{X} - Y$

= 148 – 150 = 2 Menit

3) % *Error*

% *Error* = $\frac{Y-\bar{X}}{Y} \times 100$

Diketahui :

$Y = 150$ Menit

$\bar{X}$ = 148 Menit

Ditanya :

% *Error*…?

Jawab :

% *Error* = $\frac{Y-\bar{X}}{Y} \times 100$

= $\frac{150-148}{150} \times 100$ = 1,3 %

f. Perhitungan hitungan *timer* dari suhu awal hingga suhu tercapai

1) Rata-rata

Rata-rata $\bar{x} = \frac{\sum x\text{i}}{n}$

Diketahui :

$\sum xi$ = 2598 Detik

n = 5

Ditanya :

$\bar{x}$ = rata-rata….?

Jawab :

$\bar{x} = \frac{\sum x\text{i}}{n}$

$\bar{x} = \frac{2598}{5}$ = 519 Detik

g. Perhitungan hitungan hasil etanol

1) Rata-rata

Rata-rata $\bar{x} = \frac{\sum x\text{i}}{n}$

Diketahui :

$\sum xi$ = 720 mL

n = 5

Ditanya :

$\bar{x}$ = rata-rata….?

Jawab :

$$\bar{x} = \frac{\sum x\text{i}}{n}$$

$\bar{x} = \frac{724}{5}$ = 144 mL

2. *Listing Program* Keseluruhan

```
#include <LiquidCrystal_I2C.h>
#include <Wire.h>
#include <Countimer.h>
LiquidCrystal_I2C lcd(0x27, 16, 2);
Countimer timer;

int drvr=7, btok=9, btrst=11, bzzr=12, LM=A1;
float data, suhu;
int kunci;

void setup() {
  lcd.init();
  lcd.backlight();
  timer.setCounter(2, 30, 0, timer.COUNT_DOWN, timerSelesai);
  timer.setInterval(interval, 1000);

  pinMode(btok, INPUT_PULLUP);
  pinMode(btrst, INPUT_PULLUP);
  pinMode(LM, INPUT);
  pinMode(drvr, OUTPUT);
  pinMode(bzzr, OUTPUT);

  lcd.backlight();
  lcd.setCursor(0, 0);
  lcd.print("HEATING MANTLE");
  lcd.setCursor(0, 1);
  lcd.print("LOADING . . . .");
  delay(1500);
  lcd.clear();
  lcd.print("TEKAN START ");
  lcd.setCursor(0,1);
  lcd.print("UNTUK MEMULAI");
  delay(100);
}
```

```
void loop() {
      btok = digitalRead (9);
   if (btok == LOW) {
      kunci++;
   }
   if (kunci>=2) {
      kunci=0;
   }
   if (kunci == 1) {
      data = analogRead(LM);
      suhu = data / 2.1697;
    if (suhu<=79) {
       digitalWrite(drvr, HIGH);
    }
    else if (suhu>=81) {
       digitalWrite (drvr, LOW);
      }
     if (suhu>=79) {
       timer.run();
      }
     if (!timer.isCounterCompleted()) {
       lcd.setCursor(0,0);
       lcd.print("Suhu  : ");
       lcd.setCursor(8,0);
       lcd.print(suhu,1);
       lcd.setCursor(0, 1);
       lcd.print("Timer : ");
       lcd.setCursor(8, 1);
       lcd.print (timer.getCurrentTime());
       delay (1000);
```

```
lcd.clear();
        timer.start();
      }
    if (timer.isCounterCompleted())  {
        digitalWrite (drvr, LOW);
        digitalWrite (bzzr, HIGH);
        lcd.setCursor (5, 0);
        lcd.print ("SELESAI");
        delay(100);
        lcd.clear();
     }
          btrst = digitalRead(11);
  if (btrst== LOW) {
     lcd.clear();
     digitalWrite (drvr, LOW);
     digitalWrite (bzzr, LOW);
     kunci=0;
     timer.restart();
     timer.pause();
     lcd.print("TEKAN START");
     lcd.setCursor(0,1);
     lcd.print("UNTUK MEMULAI");
     delay(100);
      }
     }
}
```

```
void timerSelesai()
{


}

void interval()
{
timer.getCurrentTime();
}
```