BAB VI
KESIMPULAN DAN SARAN

6.1. Kesimpulan

Setelah program Desain Balok Beton Bertulang yang dibuat dalam skripsi selesai dikerjakan, divalidasi dengan hitungan manual dan program komputer lain yang mempunyai persamaan hitungan, serta dilakukan studi komparatif dengan program komputer lain sebagai pembanding, maka dapat ditarik kesimpulan sebagai berikut:

1. Perbedaan peraturan beton bertulang SK SNI T15-1991-03 (DPU, 1991) dan ACI 318-1995 (PCA, 1996) pada faktor pembebanan, faktor reduksi kekuatan, dan rumus-rumus yang digunakan, menyebabkan perbedaan hasil hitungan luas tulangan pada kasus perencanaan balok beton bertulang.
2. Program Desain Balok Beton Bertulang adalah program berbasis *windows*, yang dibuat dengan bahasa pemrograman Delphi 5, dan berguna untuk menghitung luas tulangan yang diperlukan oleh balok (persegi panjang, profil T, L, dan I) yang mendukung momen lentur, gaya geser, dan momen torsi. Peraturan beton yang digunakan dalam pembuatan program adalah SK SNI T-15-1991-03 (DPU, 1991).
3. Validasi menghasilkan perbedaan hasil hitungan luas tulangan dari hitungan manual dengan hitungan program Desain Balok Beton Bertulang yang dibuat dalam skripsi, tidak lebih dari 0.5 %, maka dapat disimpulkan program yang telah dibuat cukup akurat dan teliti. Perbedaan hasil

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hitungan antara program yang telah dibuat dengan penghitungan manual disebabkan pembulatan angka pada penghitungan manual, sedang perbedaan hasil hitungan antara program yang telah dibuat dalam skripsi dengan penghitungan program Beton 2000 (FTS UGM, 1999) dan Gear (ACECOMS, 2001) disebabkan karena perbedaan cara penghitungan dan perbedaan peraturan beton yang digunakan oleh masing-masing program.

4. Studi komparatif yang telah dilakukan pada skripsi ini telah menghasilkan suatu faktor konversi dari hasil hitungan yang menggunakan peraturan beton SK SNI T-15-1991-03 (DPU, 1991) dengan hitungan yang menggunakan peraturan beton bertulang ACI 318-1995 (PCA, 1996). Faktor-faktor konversi tersebut dapat digunakan untuk mengkonversikan hasil hitungan yang menggunakan peraturan SK SNI T-15-1991-03 ke ACI 318-1995 (PCA, 1996), faktor-faktor konversi yang diperoleh antara lain :

   a. faktor konversi hitungan tulangan lentur pada balok empat persegi panjang :
      - tulangan tarik : 112.682 %
      - tulangan desak : 76.464 %

   b. faktor konversi hitungan tulangan lentur pada balok profil T :
      - tulangan tarik : 112.769 %
      - tulangan desak : 69.798%

   c. faktor konversi hitungan tulangan lentur balok profil I :
      - tulangan tarik : 111.526 %

- tulangan desak : 67.893 %

d. faktor konversi hitungan tulangan geser dan torsi :

- tulangan sengkang gabungan : 94.019%
- tulangan torsi longitudinal : 114.856 %

5. Hasil hitungan luas tulangan lentur balok dengan menggunakan Peraturan SK SNI T-15-1991-03 membutuhkan luas tulangan desak lebih besar dari pada hasil hitungan dengan peraturan ACI 318-1995 (PCA, 1996), jika digunakan perencanaan balok dengan tulangan rangkap.

6.2. Saran

Saran–saran yang yang dapat diberikan oleh penulis untuk pengembangan program komputer perencanan balok selanjutnya adalah:

1. Data masukan dimensi balok yang digunakan dapat dikembangkan kembali misalnya pada balok profil T dan I terdapat perbedaan dimensi *flens* dibagian kiri dan kanan balok, pada balok profil T, I dan L terdapat perbedaan lebar badan balok pada pertemuan badan balok dengan *flens* dan lebar balok pada serat bawah balok, atau dengan menggunakan bentuk penampang lain yang belum ada dalam program Desain Balok Beton Bertulang yang dibuat pada skripsi ini.
2. Asumsi–asumsi pada penghitungan luas tegangan desak beton bisa dikembangkan lagi menggunakan bentuk trapesium atau dengan bentuk para bola, sehingga hasil hitungan lebih akurat.

3. Tampilan *form* dan *output* hasil hitungan program dapat dibuat lebih variatif dan disesuaikan dengan kebutuhan pengguna program dalam merencanakan tulangan balok yang mengalami momen lentur, gaya geser dan momen torsi.
4. Sengkang yang digunakan dapat dikembangkan dengan menggunakan tulangan miring untuk mendukung gaya geser pada balok.

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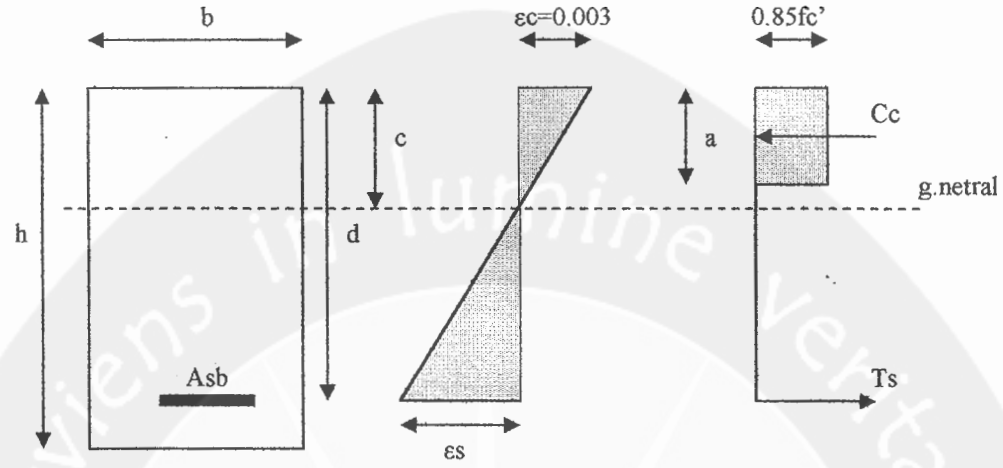
Penurunan Rumus Balok Empat Persegi Panjang

- Penurunan rumus besarnya ρbalance (Gunawan dan Saleh, 1999, halaman 6) **:**



Gambar diagram regangan dan tegangan balok persegi panjang

$$\rho b = Asb/(b \times d)$$

$$\varepsilon s = \varepsilon y$$

$$\varepsilon s = fy/Es$$

$$\frac{c}{d} = \frac{0.003}{(0.003 + fy/200000)}$$

$$0.85\,f'c \times \beta_1 \times .c_b \times b = As_b \times fy$$

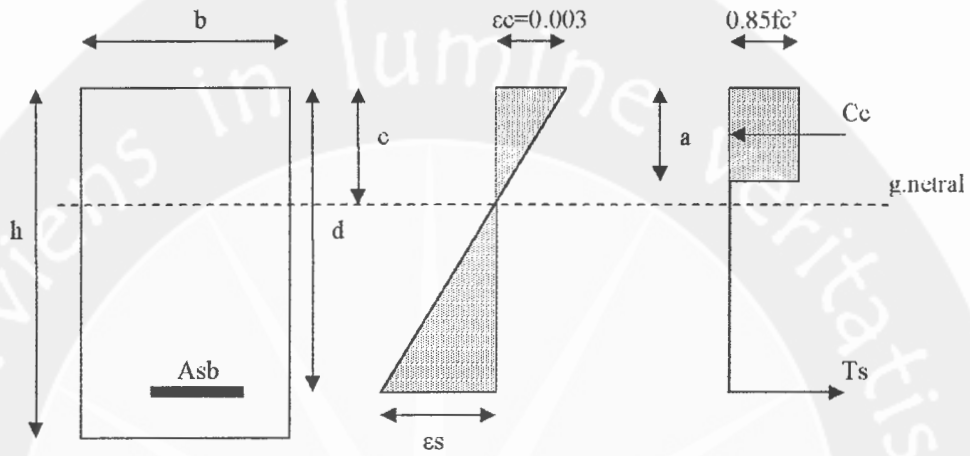
$$= \rho_b \times (b \times d) \times fy$$

$$\rho_b = \frac{0.85\,f'c \times .\beta 1 \times (0.003/(0.003 + fy/200.000)) \times b \times d}{b \times d \times fy}$$

$$= \frac{0.00255 \times \beta 1 \times f'c.}{fy \times (0.003 + fy/200.000)}$$

$$\boxed{\rho b = \frac{0.00255 \times \beta 1 \times fc'}{fy \times (0.003 + fy/200000)}}$$

- Penurunan rumus besarnya momen yang dapat didukung balok tulangan tunggal (Gunawan dan Saleh, 1999, halaman 6) **:**



Gambar diagram regangan dan tegangan balok persegi panjang

$$Mb = Cc \times (d - 0.5 \times a)$$

$$Cc = Ts = \rho \times b \times d \times fy$$

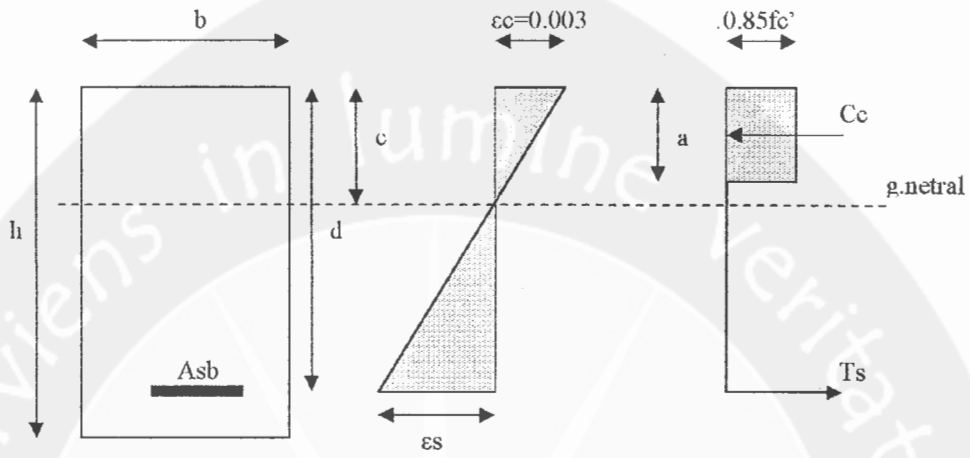
$$Mb = \rho b \times d \times d \times fy \times (d - 0.5 \times \beta 1 \times c)$$

$$= \rho b \times b \times d \times fy \times (d - 0.5 \times \beta 1 \times 0.003/(0.003 + fy/200000) \times d)$$

$$= \rho b \times b \times d^2 \times fy \times (1 - 0.0015 \times \beta 1/(0.003 + fy/200000))$$

$$\boxed{Mb = \rho b \times b \times d^2 \times fy \times (1 - 0.0015 \times \beta 1 \times 0.003/(0.003 + fy/200000))}$$

- **Penurunan rumus besarnya ρ** (Gunawan dan Saleh, 1999, halaman 7) **:**



Gambar diagram regangan dan tegangan balok persegi panjang

$Mn = Cc\,(d - 0.5a) = Ts\,(d - 0.5a)$

dimana = $Cc = Ts$

$0.85\,f'c.b.a = \rho.b.d.fy$

$$a = \frac{\rho.bd.fy}{0.85\,f'c.b}$$

$$= \rho\left(\frac{fy}{0.85\,f'c}\right).d$$

namakan $fy/(0.85\,f'c) = m$

jadi $a = \rho.m.d$

$Mu = \phi.Mn$

$= \phi.\rho.b.d\,fy\,(d - 0.5\,\rho\,m.d)$

$= \phi.\rho.b.d^2\,fy\,(1 - 0.5\,\rho\,m.d)$

$$\frac{Mu}{b.d^2} = \phi . \rho . fy (1 - 0.5 \rho m.d)$$

namakan $Mu / (b.d^2) = Ru$

$Ru = \phi . \rho . fy (1 - 0.5 \rho m.d)$

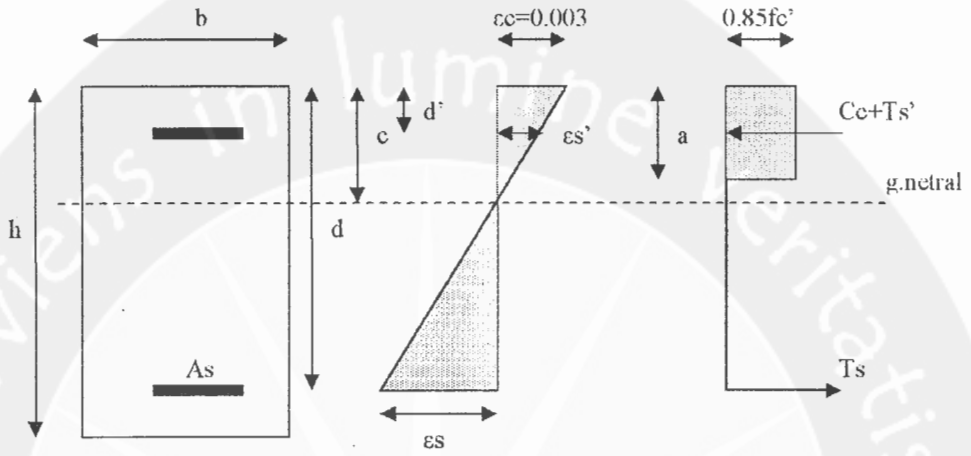
$Ru = -0{,}5 \phi . \rho^2 . m . fy + \phi . \rho . fy$

Jika diselesaikan lebih lanjut diperoleh:

$$\rho = \frac{fy - \sqrt{f^2y - 2 (Ru / \phi) . m . fy}}{m . fy}$$

$$\boxed{\rho = \frac{fy - \sqrt{f^2y - 2 (Ru / \phi) . m . fy}}{m . fy}}$$

- **Penurunan rumus syarat tulangan leleh pada balok persegi :** (Gunawan dan Saleh, 1999, halaman 10)



Gambar diagram regangan dan tegangan balok persegi panjang

$$\varepsilon' s : 0.003 = (c - d) : c$$

$$\varepsilon' s = \frac{0.003\,(c - d)}{c} = 0.003\ (1\text{-}d'/c)$$

$$\text{dimana } c = a/\beta 1 = \frac{As1\ .\ fy}{\beta 1\,.\,0.85 f'c\,.\,b} = \frac{\rho 1\,.\,fy\,.\,d}{\beta 1\,.\,0.85 f'c\,.\,b}$$

$$\text{jadi } \varepsilon' s = 0.003\ \left(1 - \frac{0.85\,.\,\beta 1\,.\,f'c}{\rho 1\,.\,fy}\frac{d'}{d}\right)$$

syarat agar tulangan tekan meleleh :

$$\varepsilon' s \geq \frac{fy}{200.000}$$

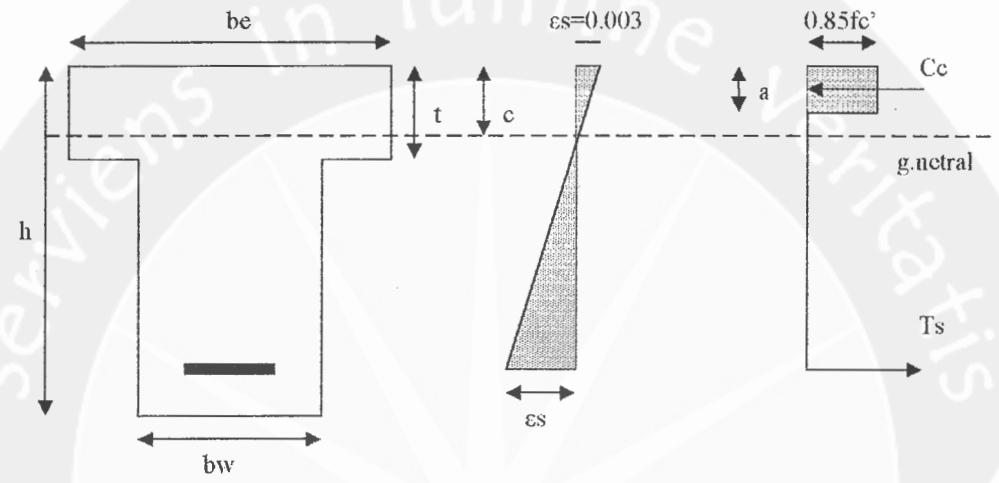
$$0.003\ \left(1 - \frac{0.85\,.\,\beta 1\,.\,f'c}{\rho 1\,.\,fy}\frac{d'}{d}\right) \geq \frac{fy}{200.000}$$

diperoleh :

$$\rho 1 \geq \frac{0.85.\beta 1.f'cd'}{fy.d}.\frac{600}{600-fy} \text{ .... syarat tulangan tekan sudah meleleh}$$

Penurunan Rumus Balok Profil T, I, dan L

_ **Penurunan rumus besarnya momen yang didukung balok T pada garis netral memotong *flens*** (Gunawan dan Saleh, 1999, halaman 28) :



Gambar diagram regangan dan tegangan balok profil 'I'

$Cc = 0.85 \times fc' \times be \times a$

$Ts = As \times fy$

$As = \rho . b_e . d$

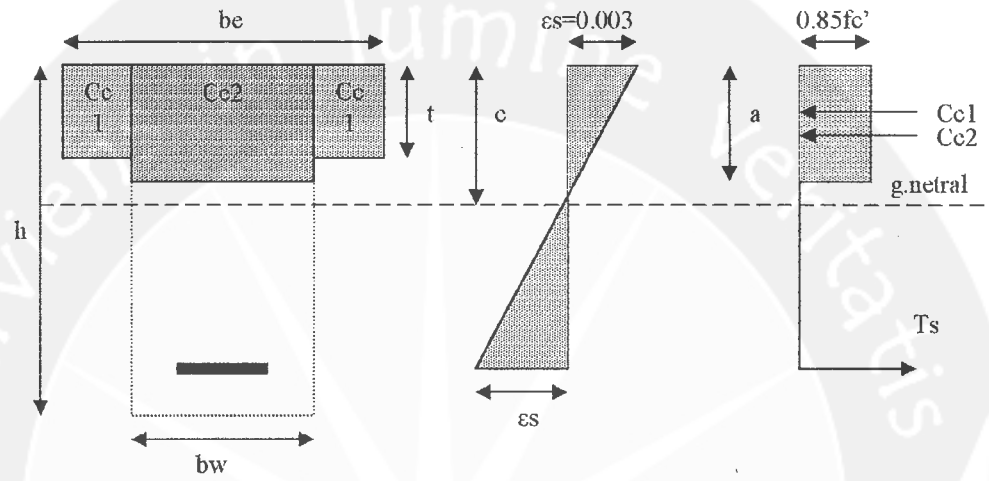
$0.85 f'c . b_e . a = \rho . b_e . d . fy$

$a = \rho (fy/(0.85 f'c)) . d$

$$Mu = \phi \rho . b_e . d fy (d - 0.5 \rho (fy/(0.85 f'c)) . d)$$

dimana $Mu = \phi Mn$, $\phi = 0.8$

- Penurunan rumus besarnya a jika garis netral memotong badan (Gunawan dan Saleh, 1999, halaman 29) **:**



Gambar diagram regangan dan tegangan balok profil T

$$Cc1 = 0.85 \times fc' \times (be - bw) \times t$$

$$Cc1 = Asf \times fy$$

$$Cc2 = 0.85 \times fc' \times bw \times a$$

Dalam keadaan setimbang :

$$Cc1 + Cc2 = Ts$$

$$Asf \,.\, fy + 0.85\, f'c \,.\, bw \,.\, a = As \,.\, fy$$

$$a = \frac{(As - Asf) \,.\, fy}{0.85\, f'c \,.\, bw}$$

dimana $As = \rho \,.\, be \,.\, d$

$$Asf = \frac{0.85\, f.c\, (be - bw) \,.\, t}{fy}$$

$$= \frac{(be - bw).t}{m}$$

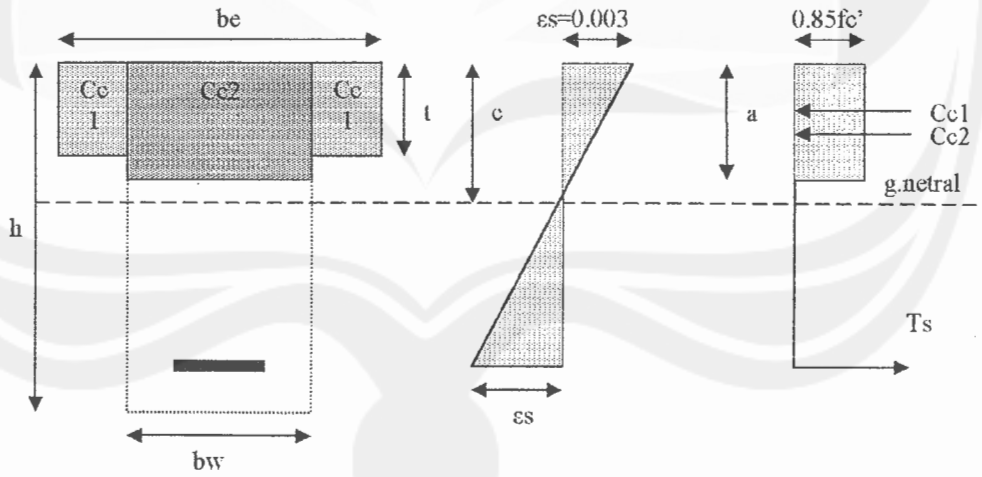
$$m = \frac{fy}{0.85 f'c}$$

$$g = be / bw$$

sehingga :

$$a = \rho . g . m . d - t g + t$$

- Penurunan rumus besarnya ρ pada balok profil T (Gunawan dan Saleh, 1999, halaman29) **:**



Gambar diagram regangan dan tegangan balok profil T

Momen terhadap tulangan tarik

$$Mu = \phi\,(Cc1\,(d - t/2) + Cc2\,(d - a/2))$$

$$= \phi\,(Asf \,.\, fy\,(d - t/2) + (As - Asf) \,.\, fy\,(d - a/2))$$

$$= \phi\,\left(\frac{(be - bw)t}{m} fy\,(d - t/2) + \rho \,.\, be \,.\, d.\, fy(d - a/2) - \frac{(be - bw) \,.\, t}{m} fy\,(d - a/2)\right)$$

di mana $Mu = Ru \,.\, be \,.\, d \,.\, d$

$$Ru \,.\, be \,.\, d \,.\, d = \phi\,(1/m\,(be\text{-}bw) \,.\, t \,.\, fy\,(1/2.\,\rho \,.\, g \,.\, m \,.\, d\text{-}1/2\,tg) +$$

$$\rho \,.\, be \,.\, d \,.\, fy\,(d\text{-}1/2\,\rho.g.m.d + 1/2\,.tg - 1/2))$$

Diperoleh :

$$0 = \rho^2\,(-1/2\,m\,fy\,g) + \rho\,(1/2\,t/d\,g - 1/2\,t/d + 1 + 1/2\,t/d.g.\,(1 - 1/m)).fy$$

$$+ ((-1/2\,t/d.g)(fy\,t/d\,1/m\,(1\text{-}1/m)) - Ru/\phi$$

namakan :

$$A = -1/2\,m\,fy\,g$$

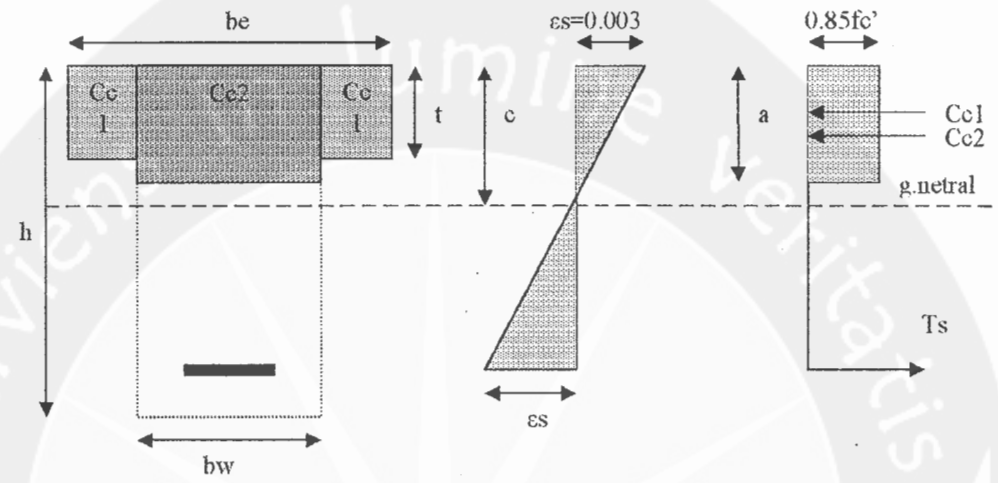
$$B = (1 + \tfrac{1}{2}\,t/d\,g - 1/2\,t/d + \tfrac{1}{2}\,g\,t/d\,(1\text{-}1/m)) \,.\, fy)$$

$$C = (-1/2.t/d.g)\,(fy\,t/d\,1/m\,(1 - 1/m)) - Ru/\phi$$

$$A\rho^2 + B\rho + C = 0$$

$$\rho = \frac{-B \pm \sqrt{B^2 - 4AC}}{2A}$$

- Penurunan rumus besarnya ρbalance pada balok profil T(Gunawan dan Saleh, 1999, halaman 30) **:**



Gambar diagram regangan dan tegangan balok profil 'T'

Untuk Balok T murni

$Cc1 = 0.85 f'c.\, bw.\, a$

Dimana untuk f'c <=30 Mpa , a=0.85 c

f'c =35 Mpa , a=0.81 c

$Cc2 = 0.85 f'c.\,(b_e - b_w).\, t$

$Ts = As.fy = \rho\, b.\, b_e\, .\, d.\, fy$

Dalam keadaan seimbang :

$0.003 : (0.003 + \varepsilon s) = c : d$

$$c / d = \frac{0.003}{0.003 + fy/200.000}$$

$Cc1 + Cc2 = Ts$

$$0.85 f'c (\beta 1 . b_w . c + t(b_e - b_w) = \rho b . b_e . d . fy$$

$$\rho b = \frac{0.85 f'c}{fy} \quad \frac{\beta 1 . bw . c + (be - bw)}{be . d}$$

namakan : $m = fy/(0.85 f'c)$

$g = be/bw$

Diperoleh :

$$\boxed{\rho b = 1/m (\beta 1 . 1/g . c/d + t/d - t/d . 1/g)}$$

dimana $c/d = 0.003/(0.003 + fy/200000)$

```
unit Unit1;

interface

uses
  Windows, Messages, SysUtils, Variants, Classes, Graphics, Controls, Forms,
  Dialogs,shellapi, Buttons, ExtCtrls, ToolWin, ActnMan, ActnCtrls, StdCtrls,
  ComCtrls;

type
    TSimpan = record
    cnama:string[25];
    eletak:string[25];
    ebeban:string[25];
    efy:string[5];
    efc:string[5];
    efys:string[5];
    es:string[5];
    emu:string[5];
    evu:string[5];
    etu:string[5];
    eik1:string[5];
    eik2:string[5];
    eit1:string[5];
    eit2:string[5];
    eit3:string[5];
    eit4:string[5];
    eil1:string[5];
    eil2:string[5];
    eil3:string[5];
    eil4:string[5];
    eii1:string[5];
    eii2:string[5];
    eii3:string[5];
    eii4:string[5];
    eii5:string[5];
    exg:string[1];
    ecs:string[1];
    end;
  TForm1 = class(TForm)
    Panel1: TPanel;
    SpeedButton1: TSpeedButton;
    SpeedButton2: TSpeedButton;
    SpeedButton3: TSpeedButton;
    SpeedButton4: TSpeedButton;
    SpeedButton5: TSpeedButton;
    SpeedButton6: TSpeedButton;
    Timer1: TTimer;
    Label1: TLabel;
    Label2: TLabel;
    Label3: TLabel;
    Label4: TLabel;
    Label5: TLabel;
    Edit1: TEdit;
    Edit2: TEdit;
    Edit3: TEdit;
    Edit4: TEdit;
    GroupBox1: TGroupBox;
    Memo1: TMemo;
    BitBtn1: TBitBtn;
    BitBtn2: TBitBtn;
    BitBtn3: TBitBtn;
    Panel2: TPanel;
    SpeedButton7: TSpeedButton;
    SpeedButton8: TSpeedButton;
    SpeedButton9: TSpeedButton;
    SpeedButton10: TSpeedButton;
    Panel3: TPanel;
    Image1: TImage;
    Panel4: TPanel;
    PageControl1: TPageControl;
```

```
TabSheet1: TTabSheet;
TabSheet2: TTabSheet;
Label6: TLabel;
Edit5: TEdit;
Label7: TLabel;
Edit6: TEdit;
Label8: TLabel;
Label9: TLabel;
Edit7: TEdit;
Edit8: TEdit;
ComboBox1: TComboBox;
ComboBox2: TComboBox;
Edit9: TEdit;
Edit10: TEdit;
Label10: TLabel;
Label11: TLabel;
Label12: TLabel;
Edit11: TEdit;
Label13: TLabel;
Edit12: TEdit;
Label14: TLabel;
Label15: TLabel;
Label16: TLabel;
Label17: TLabel;
Edit13: TEdit;
Edit14: TEdit;
Edit15: TEdit;
Edit16: TEdit;
Edit17: TEdit;
Edit18: TEdit;
Edit19: TEdit;
ComboBox3: TComboBox;
Edit20: TEdit;
Edit21: TEdit;
Edit22: TEdit;
Edit23: TEdit;
Label18: TLabel;
Label19: TLabel;
Label20: TLabel;
Label21: TLabel;
Panel5: TPanel;
Label22: TLabel;
Label23: TLabel;
Label24: TLabel;
Edit24: TEdit;
Edit25: TEdit;
BitBtn4: TBitBtn;
BitBtn5: TBitBtn;
BitBtn6: TBitBtn;
GroupBox2: TGroupBox;
BitBtn7: TBitBtn;
BitBtn8: TBitBtn;
BitBtn9: TBitBtn;
Edit27: TEdit;
Edit28: TEdit;
Edit29: TEdit;
Edit30: TEdit;
Edit31: TEdit;
Image2: TImage;
Image3: TImage;
Image4: TImage;
Edit32: TEdit;
Edit33: TEdit;
Edit34: TEdit;
Edit35: TEdit;
Edit36: TEdit;
Edit37: TEdit;
Edit38: TEdit;
Edit39: TEdit;
Edit40: TEdit;
Edit41: TEdit;
```

```
SaveDialog1: TSaveDialog;
OpenDialog1: TOpenDialog;
PrintDialog1: TPrintDialog;
SpeedButton11: TSpeedButton;
ComboBox4: TComboBox;
SpeedButton12: TSpeedButton;
RadioButton1: TRadioButton;
RadioButton2: TRadioButton;
RadioButton3: TRadioButton;
Label25: TLabel;
Label26: TLabel;
Label27: TLabel;
Label28: TLabel;
Label29: TLabel;
Label30: TLabel;
Label31: TLabel;
Label32: TLabel;
Label33: TLabel;
StatusBar1: TStatusBar;
SpeedButton13: TSpeedButton;
Label34: TLabel;
procedure FormCreate(Sender: TObject);
procedure Timer1Timer(Sender: TObject);
procedure SpeedButton7Click(Sender: TObject);
procedure SpeedButton8Click(Sender: TObject);
procedure SpeedButton9Click(Sender: TObject);
procedure SpeedButton10Click(Sender: TObject);
procedure BitBtn4Click(Sender: TObject);
procedure BitBtn1Click(Sender: TObject);
procedure BitBtn2Click(Sender: TObject);
procedure BitBtn3Click(Sender: TObject);
procedure BitBtn9Click(Sender: TObject);
procedure BitBtn7Click(Sender: TObject);
procedure BitBtn5Click(Sender: TObject);
procedure ComboBox1Change(Sender: TObject);
procedure ComboBox2Change(Sender: TObject);
procedure BitBtn6Click(Sender: TObject);
procedure Edit5Enter(Sender: TObject);
procedure Edit27Enter(Sender: TObject);
procedure Edit28Enter(Sender: TObject);
procedure Edit29Enter(Sender: TObject);
procedure Edit30Enter(Sender: TObject);
procedure Edit31Enter(Sender: TObject);
procedure Edit32Enter(Sender: TObject);
procedure Edit33Enter(Sender: TObject);
procedure Edit34Enter(Sender: TObject);
procedure Edit35Enter(Sender: TObject);
procedure Edit36Enter(Sender: TObject);
procedure Edit37Enter(Sender: TObject);
procedure Edit38Enter(Sender: TObject);
procedure Edit39Enter(Sender: TObject);
procedure Edit40Enter(Sender: TObject);
procedure Edit41Enter(Sender: TObject);
procedure PageControl1Change(Sender: TObject);
procedure Edit11Enter(Sender: TObject);
procedure Edit12Enter(Sender: TObject);
procedure ComboBox3Change(Sender: TObject);
procedure SpeedButton5Click(Sender: TObject);
procedure SpeedButton4Click(Sender: TObject);
procedure Edit4Enter(Sender: TObject);
procedure Edit30Change(Sender: TObject);
procedure Edit28Change(Sender: TObject);
procedure Edit34Change(Sender: TObject);
procedure Edit38Change(Sender: TObject);
procedure SpeedButton1Click(Sender: TObject);
procedure SpeedButton2Click(Sender: TObject);
procedure SpeedButton3Click(Sender: TObject);
procedure SpeedButton11Click(Sender: TObject);
procedure BitBtn8Click(Sender: TObject);
procedure SpeedButton12Click(Sender: TObject);
procedure SpeedButton6Click(Sender: TObject);
```

```
    procedure Edit5Click(Sender: TObject);
    procedure Edit1Click(Sender: TObject);
    procedure Edit3Click(Sender: TObject);
    procedure Edit2Click(Sender: TObject);
    procedure Edit4Click(Sender: TObject);
    procedure Edit24Click(Sender: TObject);
    procedure Edit25Change(Sender: TObject);
    procedure Edit11Click(Sender: TObject);
    procedure Edit27Click(Sender: TObject);
    procedure Edit28Click(Sender: TObject);
    procedure Edit29Click(Sender: TObject);
    procedure Edit30Click(Sender: TObject);
    procedure Edit31Click(Sender: TObject);
    procedure Edit32Click(Sender: TObject);
    procedure Edit33Click(Sender: TObject);
    procedure Edit34Click(Sender: TObject);
    procedure Edit35Click(Sender: TObject);
    procedure Edit36Click(Sender: TObject);
    procedure Edit37Click(Sender: TObject);
    procedure Edit38Click(Sender: TObject);
    procedure Edit39Click(Sender: TObject);
    procedure Edit40Click(Sender: TObject);
    procedure Edit41Click(Sender: TObject);
    procedure ComboBox1KeyPress(Sender: TObject; var Key: Char);
    procedure ComboBox2KeyPress(Sender: TObject; var Key: Char);
    procedure ComboBox3KeyPress(Sender: TObject; var Key: Char);
    procedure ComboBox4KeyPress(Sender: TObject; var Key: Char);
    procedure Edit12Click(Sender: TObject);
    procedure FormCloseQuery(Sender: TObject; var CanClose: Boolean);
    procedure FormClose(Sender: TObject; var Action: TCloseAction);
    procedure FormClick(Sender: TObject);
    procedure RadioButton2Click(Sender: TObject);
    procedure RadioButton3Click(Sender: TObject);
    procedure RadioButton1Click(Sender: TObject);
    procedure SpeedButton13Click(Sender: TObject);
    procedure Edit27Change(Sender: TObject);
    procedure Edit29Change(Sender: TObject);
    procedure Edit31Change(Sender: TObject);
    procedure Edit32Change(Sender: TObject);
    procedure Edit33Change(Sender: TObject);
    procedure Edit35Change(Sender: TObject);
    procedure Edit36Change(Sender: TObject);
    procedure Edit37Change(Sender: TObject);
    procedure Edit39Change(Sender: TObject);
    procedure Edit40Change(Sender: TObject);
    procedure Edit41Change(Sender: TObject);
    procedure Edit5Change(Sender: TObject);
    procedure Edit11Change(Sender: TObject);
    procedure Edit12Change(Sender: TObject);
    procedure Edit1Change(Sender: TObject);
    procedure Edit3Change(Sender: TObject);
    procedure Edit2Change(Sender: TObject);
    procedure Edit4Change(Sender: TObject);

  private
    { Private declarations }
    public
    { Public declarations }
  end;

var
  Form1: TForm1;
  namasimpan:file of Tsimpan;
  namafile:string;
  data:TSimpan;

efy,efc,efys,es,emu,evu,etu,enama,eletak,ebeban,eik1,eik2,eit1,eit2,eit3,eit4,eil1,eil2,eil3,eil4,eii1,eii2,eii3,eii4,eii5,exg,ecs:string
;
  xx,k1,k2,k3,t1,t2,t3,t4,t5,t6,l1,l2,l3,l4,l5,l6,l7,i1,i2,i3,i4,i5,i6,i7,i8,xg:integer;
  sk1,sk2,sk3,sk4,skk1,skk2,skk3,skk4,dm,dm2,skd,skd2:integer;
  ik1,ik2,it1,it2,it3,it4,il1,il2,il3,il4,ii1,ii2,ii3,ii4,ii5,skl:double;
```

```
  fc,fy,bt,pi,pa,pr,pb,mu,mmu,h,b,d,s,ds,dia,k,fs,m,asa,asb,asf,pra,prb,a:double;
  be,bw,t,g,c:double;
  xy,tc,vc,ts,vs,tu,vu,syt,ct,av,at,avt,fys,av2,at2,avt2,x1,y1,js,ejs,ls,dss,xv,al,sjs:double;
  nas,nm:string;
  pisah,tl,klk,rac,tpc,str,tl2,nnn,psg,dpsg,selimut:boolean;
  ary,ary2:integer;
  mstek1,mouse,balik,baku,notasi:boolean;
  editmemo,gtul,gsengk,ktulis,khapus,gantul:boolean;
  nmemo,cs:integer;
  tula,tulb,jrsk,skp,ns:integer;
  psx1,psx2,psy1,psy2,jrkxa1,jrkxa2,jrky1,jrky2,jrkxi1,jrkxi2,psxa1,psxa2,psxi1,psxi2,xpos,xpos2,pos1,pos2:integer;
  satpj,satls,satmmn,satgy,satkd,satun:string;
  konpja,konlsa,konmmna,kongya,konkda,konpjb,konlsb,konmmnb,kongyb,konkdb:double;
  nilaix1:array[2..200]of integer;
  nilaiy1:array[2..200]of integer;
  nilaix2:array[2..200]of integer;
  nilaiy2:array[2..200]of integer;
  nilaixk1:array[2..200]of integer;
  nilaiyk1:array[2..200]of integer;
  nilaixk2:array[2..200]of integer;
  nilaiyk2:array[2..200]of integer;

const
phi=3.14159265;

implementation

uses Unit2, Unit3, Unit4, Unit5, Unit6, Unit7, Unit8;

{$R *.dfm}

procedure TForm1.FormCreate(Sender: TObject);
begin
satuan;
timer1.Enabled:=true;
image1.Canvas.Brush.Color:=clwhite;
image1.Canvas.Rectangle(0,0,image1.ClientWidth,image1.ClientHeight);
xg:=1;
xx:=70;
dm:=20;
dm2:=20;
s:=strtofloat(form1.Edit4.Text)*konpjb;
form1.SpeedButton7.Click;
editmemo:=true;
selimut:=true;
tl:=true;
tpc:=true;
rac:=true;
tl2:=true;
ktulis:=true;
khapus:=true;
pisah:=true;
gantul:=false;
edit_sengk;
gtul:=false;
end;

procedure TForm1.Timer1Timer(Sender: TObject);
begin
form1.StatusBar1.Panels[3].Text:=timetostr(time);
end;

procedure TForm1.SpeedButton7Click(Sender: TObject);
begin
hps2;
xg:=1;
gambar_kotak;
ktulis:=true;
psg:=true;
end;
```

```
procedure TForm1.SpeedButton8Click(Sender: TObject);
begin
hps2;
xg:=2;
gambar_te;
ktulis:=true;
psg:=false;
end;

procedure TForm1.SpeedButton9Click(Sender: TObject);
begin
hps2;
xg:=3;
gambar_el;
ktulis:=true;
psg:=false;
end;

procedure TForm1.SpeedButton10Click(Sender: TObject);
begin
hps2;
xg:=4;
gambar_ii;
ktulis:=true;
psg:=false;
end;

procedure TForm1.BitBtn4Click(Sender: TObject);
begin
xx:=70;
case xg of
1:gambar_kotak;
2:gambar_te;
3:gambar_el;
4:gambar_ii;
end;
if (gtul=true)then
begin
gambar_tulkecil;
animasi2;
end;
end;

procedure TForm1.BitBtn1Click(Sender: TObject);
begin
if (ktulis=false) then
begin
form1.Memo1.Clear;
case xg of
1:tulis_kotak;
2:tulis_te;
3:tulis_el;
4:tulis_ii;
end;
khapus:=true;
end
else
begin
messagedlg('Hasil hitungan belum dapat ditampilkan sebelum'+#13+#10+'proses penghitungan
dilakukan',mtinformation,[mbok],0);
form1.Memo1.Clear;
end;
end;

procedure TForm1.BitBtn2Click(Sender: TObject);
begin
if (khapus=true) then
begin
tl:=false;
form4.QRMemo1.Font.Size:=12;
form4.QRMemo1.Lines:=form1.Memo1.Lines;
```

```
case xg of
1:
begin
form4.QRImage1.Canvas.CopyRect(rect(0,0,form4.QRImage1.ClientWidth,form4.QRImage1.ClientHeight),form1.image1.Canv
as,rect(0,0,image1.ClientWidth,image1.ClientHeight));
copy_kotak;
end;
2:
begin
form4.QRImage1.Canvas.CopyRect(rect(0,0,form4.QRImage1.ClientWidth,form4.QRImage1.ClientHeight),form1.image2.Canv
as,rect(0,0,image2.ClientWidth,image2.ClientHeight));
copy_te;
end;
3:
begin
form4.QRImage1.Canvas.CopyRect(rect(0,0,form4.QRImage1.ClientWidth,form4.QRImage1.ClientHeight),form1.image3.Canv
as,rect(0,0,image3.ClientWidth,image3.ClientHeight));
copy_el;
end;
4:
begin
form4.QRImage1.Canvas.CopyRect(rect(0,0,form4.QRImage1.ClientWidth,form4.QRImage1.ClientHeight),form1.image4.Canv
as,rect(0,0,image4.ClientWidth,image4.ClientHeight));
copy_ii;
end;
end;
end
else
begin
khapus:=true;
messagedlg('Data anda sudah dihapus, tidak dapat disimpan pada laporan',mtinformation,[mbok],0);
end;
end;

procedure TForm1.BitBtn3Click(Sender: TObject);
begin
form1.Memo1.Clear;
tl:=true;
khapus:=false;
end;

procedure TForm1.BitBtn9Click(Sender: TObject);
begin
case messagedlg('Anda ingin menyimpan data yang dihitung ?',mtconfirmation,mbyesnocancel,0)of
mryes:
begin
form1.SpeedButton3.Click;
application.Terminate;
end;
mrno:application.Terminate;
mrcancel: exit;
end;
end;

procedure TForm1.BitBtn7Click(Sender: TObject);
begin
if (tl=false) then
begin
form4.QuickRep1.Preview;
tl:=true;
tl2:=false;
end
else
messagedlg('Data belum disimpan dalam laporan.',mtinformation,[mbok],0);
exit;
end;

procedure TForm1.BitBtn5Click(Sender: TObject);
begin
form6.Memo1.Clear;
hps2;
```

```
ktulis:=false;
if (tpc=true)then
begin
klk:=true;
mm:  true;
rac:=true;
psg:  true;
case xg of
1:lentur_kotak;
2:lentur_te;
3:lentur_el;
4:lentur_ii;
end;
form1.Edit6.Text:='0';
rac:  false;
end
else
begin
klk:=true;
rac:=true;
str:=true;
case xg of
1:lentur_kotak;
2:lentur_te;
3:lentur_el;
4:lentur_ii;
end;
desgt;
form1.Edit6.Text:='0';
rac:=false;
end;
nmemo:=0;
gtul:=true;
gsengk:=true;
pisah:=true;
form1.BitBtn4.Click;
form1.BitBtn1.Click;
end;

procedure TForm1.ComboBox1Change(Sender: TObject);
begin
kalkul1;
rac:=false;
gtul:=true;
form1.BitBtn4.Click;
end;

procedure TForm1.ComboBox2Change(Sender: TObject);
begin
kalkul2;
rac:=false;
gtul:=true;
form1.BitBtn4.Click;
end;

procedure TForm1.BitBtn6Click(Sender: TObject);
begin
if (rac=false)then
begin
anlpsg;
keterangan;
rac:=true;
end
else
messagedlg('Untuk menganalisa program harus dilakukan penghitungan lebih dahulu'+#13+#10'atau dilakukan penghitungan
ulang',mtinformation,[mbok],0);
end;

procedure TForm1.Edit5Enter(Sender: TObject);
begin
hps2;
```

```
end;

procedure TForm1.Edit27Enter(Sender: TObject);
begin
hps2;
end;

procedure TForm1.Edit28Enter(Sender: TObject);
begin
hps2;
end;

procedure TForm1.Edit29Enter(Sender: TObject);
begin
hps2;
end;

procedure TForm1.Edit30Enter(Sender: TObject);
begin
hps2;
end;

procedure TForm1.Edit31Enter(Sender: TObject);
begin
hps2;
end;

procedure TForm1.Edit32Enter(Sender: TObject);
begin
hps2;
end;

procedure TForm1.Edit33Enter(Sender: TObject);
begin
hps2;
end;

procedure TForm1.Edit34Enter(Sender: TObject);
begin
hps2;
end;

procedure TForm1.Edit35Enter(Sender: TObject);
begin
hps2;
end;

procedure TForm1.Edit36Enter(Sender: TObject);
begin
hps2;
end;

procedure TForm1.Edit37Enter(Sender: TObject);
begin
hps2;
end;

procedure TForm1.Edit38Enter(Sender: TObject);
begin
hps2;
end;

procedure TForm1.Edit39Enter(Sender: TObject);
begin
hps2;
end;

procedure TForm1.Edit40Enter(Sender: TObject);
begin
hps2;
end;
```

```
procedure TForm1.Edit41Enter(Sender: TObject);
begin
hps2;
end;

procedure TForm1.PageControl1Change(Sender: TObject);
begin
if (tpc= true)then
tpc:=false
else
tpc:=true;
end;

procedure TForm1.Edit11Enter(Sender: TObject);
begin
hps2;
end;

procedure TForm1.Edit12Enter(Sender: TObject);
begin
hps2;
end;

procedure TForm1.ComboBox3Change(Sender: TObject);
begin
kalkul3;
end;

procedure TForm1.SpeedButton5Click(Sender: TObject);
var
nary,nary2:integer;
begin
xx:=120;
pisah:=true;
baku:=true;
editmemo:=false;
for nary:=1 to ary do
begin
nilaix1[ary]:=0;
nilaiy1[ary]:=0;
end;
for nary2:=1 to ary2 do
begin
nilaix2[ary2]:=0;
nilaiy2[ary2]:=0;
end;
ary:=1;
ary2:=1;
case xg of
1:gambar_kotakc;
2:gambar_tec;
3:gambar_elc;
4:gambar_iic;
end;
form6.Show;
form6.SpeedButton10.Click;
form6.Visible:=true;
form6.ComboBox1.clear;
form6.ComboBox2.clear;
form6.ComboBox1.Items:=form1.ComboBox1.Items;
form6.ComboBox1.Text:=form1.ComboBox1.Text;
form6.ComboBox2.Items:=form1.ComboBox2.Items;
form6.ComboBox2.Text:=form1.ComboBox2.Text;
end;

procedure TForm1.SpeedButton4Click(Sender: TObject);
begin
if (tl=false) then
form4.QuickRep1.Print
else
```

```
messagedlg('Data belum disimpan dalam laporan.',mtinformation,[mbok],0);
end;

procedure TForm1.Edit4Enter(Sender: TObject);
begin
selimut:  false;
end;

procedure TForm1.Edit30Change(Sender: TObject);
begin
ktulis:=true;
edit_sengk;
end;

procedure TForm1.Edit28Change(Sender: TObject);
begin
ktulis:=true;
edit_sengk;
end;

procedure TForm1.Edit34Change(Sender: TObject);
begin
ktulis:=true;
edit_sengk;
end;

procedure TForm1.Edit38Change(Sender: TObject);
begin
ktulis:=true;
edit_sengk;
end;

procedure TForm1.SpeedButton1Click(Sender: TObject);
begin
form1.Edit1.Text:='400';
form1.Edit2.Text:='30';
form1.Edit3.Text:='400';
edit_sengk;
form1.Edit5.Text:='200';
form1.Edit11.Text:='100';
form1.Edit12.Text:='5';
form1.Edit24.Text:='balok';
form1.Edit25.Text:='perletakan';
form1.ComboBox4.ItemIndex:=0;
form1.edit27.Text:='300';
form1.edit28.Text:='400';
form1.edit29.Text:='300';
form1.edit30.Text:='400';
form1.edit31.Text:='200';
form1.Edit32.Text:='100';
form1.Edit33.Text:='300';
form1.Edit34.Text:='400';
form1.Edit35.Text:='200';
form1.Edit36.Text:='100';
form1.Edit37.Text:='300';
form1.Edit38.Text:='400';
form1.Edit39.Text:='200';
form1.Edit40.Text:='100';
form1.Edit41.Text:='100';
form1.BitBtn5.Click;
end;

procedure TForm1.SpeedButton2Click(Sender: TObject);
begin
if form1.OpenDialog1.Execute then
begin
namafile:=form1.OpenDialog1.FileName;
if fileexists(namafile)then
begin
assignfile(namasimpan,namafile);
reset(namasimpan);
```

```
end
else
begin
messagedlg('Nama anda belum ada, atau file tidak sesuai.',mtinformation,[mbok],0);
exit;
end;
restore_data;
case cs of
1:
begin
form1.RadioButton1.Checked:=true;
form1.RadioButton2.Checked:=false;
form1.RadioButton3.Checked:=false;
end;
2:
begin
form1.RadioButton1.Checked:=false;
form1.RadioButton2.Checked:=true;;
form1.RadioButton3.Checked:=false;
end;
3:
begin
form1.RadioButton1.Checked:=false;
form1.RadioButton2.Checked:=false;
form1.RadioButton3.Checked:=true;
end;
end;
end
else
exit;
end;

procedure TForm1.SpeedButton3Click(Sender: TObject);
begin
if form1.SaveDialog1.Execute then
begin
namafile:=form1.SaveDialog1.FileName;
assignfile(namasimpan,namafile);
rewrite(namasimpan);
insert_data;
messagedlg('Data telah tersimpan pada file : '+ namafile,mtinformation,[mbok],0);
end
else
exit;
end;

procedure TForm1.SpeedButton11Click(Sender: TObject);
begin
if(editmemo=true)then
form7.Memo1.Lines:=form1.Memo1.Lines
else
form7.Memo1.Lines:=form6.Memo1.Lines;
form7.Show;
end;

procedure TForm1.BitBtn8Click(Sender: TObject);
begin
if (tl=false) then
form4.QuickRep1.Print
else
messagedlg('Data belum disimpan dalam laporan.',mtinformation,[mbok],0);
end;

procedure TForm1.SpeedButton12Click(Sender: TObject);
begin
form4.QuickRep1.PrinterSetup;
end;

procedure TForm1.SpeedButton6Click(Sender: TObject);
begin
application.HelpJump('open');
```

```
end;

procedure TForm1.Edit5Click(Sender: TObject);
begin
form1.Edit5.SelectAll;
end;

procedure TForm1.Edit1Click(Sender: TObject);
begin
form1.Edit1.SelectAll;
end;

procedure TForm1.Edit3Click(Sender: TObject);
begin
form1.Edit3.SelectAll;
end;

procedure TForm1.Edit2Click(Sender: TObject);
begin
form1.Edit2.SelectAll;
end;

procedure TForm1.Edit4Click(Sender: TObject);
begin
form1.Edit4.SelectAll;
end;

procedure TForm1.Edit24Click(Sender: TObject);
begin
form1.Edit24.SelectAll;
end;

procedure TForm1.Edit25Change(Sender: TObject);
begin
form1.Edit25.SelectAll;
end;

procedure TForm1.Edit11Click(Sender: TObject);
begin
form1.Edit11.SelectAll;
end;

procedure TForm1.Edit27Click(Sender: TObject);
begin
form1.Edit27.SelectAll;
end;

procedure TForm1.Edit28Click(Sender: TObject);
begin
form1.Edit28.SelectAll;
end;

procedure TForm1.Edit29Click(Sender: TObject);
begin
form1.Edit29.SelectAll;
end;

procedure TForm1.Edit30Click(Sender: TObject);
begin
form1.Edit30.SelectAll;
end;

procedure TForm1.Edit31Click(Sender: TObject);
begin
form1.Edit31.SelectAll;
end;

procedure TForm1.Edit32Click(Sender: TObject);
begin
form1.Edit32.SelectAll;
end;
```

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```
procedure TForm1.Edit33Click(Sender: TObject);
begin
form1.Edit33.SelectAll;
end;

procedure TForm1.Edit34Click(Sender: TObject);
begin
form1.Edit34.SelectAll;
end;

procedure TForm1.Edit35Click(Sender: TObject);
begin
form1.Edit35.SelectAll;
end;

procedure TForm1.Edit36Click(Sender: TObject);
begin
form1.Edit36.SelectAll;
end;

procedure TForm1.Edit37Click(Sender: TObject);
begin
form1.Edit37.SelectAll;
end;

procedure TForm1.Edit38Click(Sender: TObject);
begin
form1.Edit38.SelectAll;
end;

procedure TForm1.Edit39Click(Sender: TObject);
begin
form1.Edit39.SelectAll;
end;

procedure TForm1.Edit40Click(Sender: TObject);
begin
form1.Edit40.SelectAll;
end;

procedure TForm1.Edit41Click(Sender: TObject);
begin
form1.Edit41.SelectAll;
end;

procedure TForm1.ComboBox1KeyPress(Sender: TObject; var Key: Char);
begin
key:=#0;
end;

procedure TForm1.ComboBox2KeyPress(Sender: TObject; var Key: Char);
begin
key:=#0;
end;

procedure TForm1.ComboBox3KeyPress(Sender: TObject; var Key: Char);
begin
key:=#0;
end;

procedure TForm1.ComboBox4KeyPress(Sender: TObject; var Key: Char);
begin
key:=#0;
end;

procedure TForm1.Edit12Click(Sender: TObject);
begin
form1.Edit12.SelectAll;
end;
```

```
procedure TForm1.FormCloseQuery(Sender: TObject; var CanClose: Boolean);
begin
case messagedlg('Anda ingin menyimpan data yang dihitung ?',mtconfirmation,mbyesnocancel,0)of
mryes:
begin
form1.SpeedButton3.Click;
canclose:=true;
end;
mrno:canclose:=true;
mrcancel:canclose:=false;
end;
end;

procedure TForm1.FormClose(Sender: TObject; var Action: TCloseAction);
begin
action:=cafree;
end;

procedure TForm1.FormClick(Sender: TObject);
begin
satuan;
end;

procedure TForm1.RadioButton2Click(Sender: TObject);
begin
baru;
end;

procedure TForm1.RadioButton3Click(Sender: TObject);
begin
baru;
end;

procedure TForm1.RadioButton1Click(Sender: TObject);
begin
baru;
end;

procedure TForm1.SpeedButton13Click(Sender: TObject);
begin
form8.Show;
end;

procedure TForm1.Edit27Change(Sender: TObject);
begin
ktulis:=true;
end;

procedure TForm1.Edit29Change(Sender: TObject);
begin
ktulis:=true;
end;

procedure TForm1.Edit31Change(Sender: TObject);
begin
ktulis:=true;
end;

procedure TForm1.Edit32Change(Sender: TObject);
begin
ktulis:=true;
end;

procedure TForm1.Edit33Change(Sender: TObject);
begin
ktulis:=true;
end;

procedure TForm1.Edit35Change(Sender: TObject);
begin
ktulis:=true;
```

```
end;

procedure TForm1.Edit36Change(Sender: TObject);
begin
ktulis: =true;
end;

procedure TForm1.Edit37Change(Sender: TObject);
begin
ktulis: =true;
end;

procedure TForm1.Edit39Change(Sender: TObject);
begin
ktulis:=true;
end;

procedure TForm1.Edit40Change(Sender: TObject);
begin
ktulis:=true;
end;

procedure TForm1.Edit41Change(Sender: TObject);
begin
ktulis:=true;
end;

procedure TForm1.Edit5Change(Sender: TObject);
begin
ktulis:=true;
end;

procedure TForm1.Edit11Change(Sender: TObject);
begin
ktulis:=true;
end;

procedure TForm1.Edit12Change(Sender: TObject);
begin
ktulis:=true;
end;

procedure TForm1.Edit1Change(Sender: TObject);
begin
ktulis:=true;
end;

procedure TForm1.Edit3Change(Sender: TObject);
begin
ktulis:=true;
end;

procedure TForm1.Edit2Change(Sender: TObject);
begin
ktulis:=true;
end;

procedure TForm1.Edit4Change(Sender: TObject);
begin
ktulis:=true;
end;

end.

unit Unit2;

interface

procedure gambar_kotak;
procedure gambar_te;
procedure gambar_el;
```

```
procedure gambar_ii;
procedure gambar_kotakc;
procedure gambar_tec;
procedure gambar_elc;
procedure gambar_iic;
procedure gambar;
procedure copy_kotak;
procedure copy_te;
procedure copy_el;
procedure copy_ii;
procedure n_ary;
procedure n_ary2;
procedure n_aryk;
procedure n_aryk2;
procedure animasi;
procedure animasi2;
procedure genap;
procedure ganjil;
procedure genap2;
procedure ganjil2;
procedure bagi_tulangan;
procedure bagi_tulangan2;
procedure gambar_tulangan;
procedure gambar_tulkecil;
procedure gambarsengkang;

implementation

uses Unit1,Windows,Math, Messages, SysUtils, Variants, Classes, Graphics, Controls, Forms,
    Dialogs, Buttons, ExtCtrls, ToolWin, ActnMan, ActnCtrls, StdCtrls,
    ComCtrls, Unit3, Unit4, Unit5, Unit6, Unit7, Unit8;

procedure gambar_kotak;
begin
awal;
form1.edit27.Visible:=true;
form1.edit28.Visible:=true;
form1.edit29.Visible:=false;
form1.edit30.Visible:=false;
form1.edit31.Visible:=false;
form1.Edit32.Visible:=false;
form1.Edit33.Visible:=false;
form1.Edit34.Visible:=false;
form1.Edit35.Visible:=false;
form1.Edit36.Visible:=false;
form1.Edit37.Visible:=false;
form1.Edit38.Visible:=false;
form1.Edit39.Visible:=false;
form1.Edit40.Visible:=false;
form1.Edit41.Visible:=false;
form1.image1.Visible:=true;
form1.image2.Visible:=false;
form1.image3.Visible:=false;
form1.image4.Visible:=false;
form1.image1.Canvas.Brush.Color:=clwhite;
form1.image1.Canvas.Pen.Color:=clblack;
form1.Image1.Canvas.Pen.Style:=pssolid;
form1.image1.Canvas.Rectangle(0,0,form1.image1.ClientWidth,form1.image1.ClientHeight);
ik1:=strtofloat(form1.edit27.Text)*konpjb;
ik2:=strtofloat(form1.edit28.Text)*konpjb;
if (ik1>ik2) then
begin
k1:=xx;
k2:=round((ik2/ik1)*xx);
k3:=round((s/ik1)*xx*2);
skl:=ik1;
end
else
begin
k2:=xx;
k1:=round((ik1/ik2)*xx);
```

```
k3:=round((s/ik2)*xx*2);
sk1:=ik2;
end;
form1.Image1.Canvas.Pen.Width:=1;
form1.Image1.Canvas.Pen.Color:=clblack;
form1.Image1.Canvas.Brush.Color:=clskyblue;
form1.Image1.Canvas.Rectangle(form1.image1.ClientWidth div 2-k1,form1.image1.ClientHeight div 2-
k2,form1.image1.ClientWidth div 2+k1,form1.image1.ClientHeight div 2+k2);
form1.Image1.Canvas.Pen.Width:=2;
form1.Image1.Canvas.Pen.Color:=clblack;
sk1:=form1.image1.ClientWidth div 2-k1+k3;
sk2:=form1.image1.ClientHeight div 2-k2+k3;
sk3:=form1.image1.ClientWidth div 2+k1-k3;
sk4:=form1.image1.ClientHeight div 2+k2-k3;
form1.Image1.Canvas.Rectangle(sk1,sk2,sk3,sk4);
form1.Image1.Canvas.Pen.Width:=1;
form1.image1.Canvas.MoveTo(form1.image1.ClientWidth div 2-k1,form1.image1.ClientHeight div 2-k2-10);
form1.image1.Canvas.LineTo(form1.image1.ClientWidth div 2+k1,form1.image1.ClientHeight div 2-k2-10);
form1.image1.Canvas.MoveTo(form1.image1.ClientWidth div 2-k1-10,form1.image1.ClientHeight div 2-k2);
form1.image1.Canvas.LineTo(form1.image1.ClientWidth div 2-k1-10,form1.image1.ClientHeight div 2+k2);
form1.edit27.Left:=form1.image1.ClientWidth div 2-10;
form1.edit27.Top:=form1.image1.ClientHeight div 2-k2-15;
form1.edit28.Left:=form1.image1.ClientWidth div 2-k1-30;
form1.edit28.Top:=form1.image1.ClientHeight div 2-5;
end;

procedure gambar_te;
begin
awal;
form1.edit27.Visible:=false;
form1.edit28.Visible:=false;
form1.edit29.Visible:=true;
form1.edit30.Visible:=true;
form1.edit31.Visible:=true;
form1.Edit32.Visible:=true;
form1.Edit33.Visible:=false;
form1.Edit34.Visible:=false;
form1.Edit35.Visible:=false;
form1.Edit36.Visible:=false;
form1.Edit37.Visible:=false;
form1.Edit38.Visible:=false;
form1.Edit39.Visible:=false;
form1.Edit40.Visible:=false;
form1.Edit41.Visible:=false;
form1.image1.Visible:=false;
form1.image2.Visible:=true;
form1.image3.Visible:=false;
form1.image4.Visible:=false;
form1.image2.Canvas.Brush.Color:=clwhite;
form1.image2.Canvas.Pen.Color:=clblack;
form1.image2.Canvas.Rectangle(0,0,form1.image2.ClientWidth,form1.image2.ClientHeight);
it1:=strtofloat(form1.edit29.Text)*konpjb;
it2:=strtofloat(form1.edit30.Text)*konpjb;
it3:=strtofloat(form1.edit31.Text)*konpjb;
it4:=strtofloat(form1.edit32.Text)*konpjb;
if (it1>it2) then
begin
t1:=xx;
t2:=round((it2/it1)*xx);
t3:=round((it3/it1)*xx);
t4:=form1.image2.ClientHeight div 2-t2+round((it4/it1)*xx*2);
t5:=form1.Image2.ClientHeight div 2-t2+round((it4/it1)*xx)-5;
t6:=round((s/it1)*xx*2);
sk1:=it1;
end
else
begin
t2:=xx;
t1:=round((it1/it2)*xx);
t3:=round((it3/it2)*xx);
t4:=form1.image2.ClientHeight div 2-t2+round((it4/it2)*xx*2);
```

```
t5:=form1.Image2.ClientHeight div 2-t2+round((it4/it2)*xx)-5;
t6:=round((s/it2)*xx*2);
sk1:=it2;
end;
form1.image2.Canvas.Brush.Color:=clwhite;
form1.Image2.Canvas.Pen.Width:=1;
form1.Image2.Canvas.Pen.Color:=clblack;
form1.Image2.Canvas.Brush.Color:=clskyblue;
form1.image2.Canvas.polygon([point(form1.image2.ClientWidth div 2-t1,form1.image2.ClientHeight div 2-t2),
point(form1.image2.ClientWidth div 2+t1,form1.image2.ClientHeight div 2-t2),point(form1.image2.ClientWidth div 2+t1,t4),
point(form1.image2.ClientWidth div 2+t3,t4),point(form1.image2.ClientWidth div 2+t3,form1.image2.ClientHeight div 2+t2),
point(form1.image2.ClientWidth div 2-t3,form1.image2.ClientHeight div 2+t2),point(form1.image2.ClientWidth div 2-t3,t4),
point(form1.image2.ClientWidth div 2-t1,t4)]);
form1.Image2.Canvas.Pen.Width:=2;
form1.Image2.Canvas.Pen.Color:=clblack;
sk1:=form1.image2.ClientWidth div 2-t3+t6;
sk2:=form1.image2.ClientHeight div 2-t2+t6;
sk3:=form1.image2.ClientWidth div 2+t3-t6;
sk4:=form1.image2.ClientHeight div 2+t2-t6;
form1.Image2.Canvas.Rectangle(sk1,sk2,sk3,sk4);
form1.Image2.Canvas.Pen.Width:=1;
form1.image2.Canvas.MoveTo(form1.image2.ClientWidth div 2-t1,form1.image2.ClientHeight div 2-t2-10);
form1.image2.Canvas.LineTo(form1.image2.ClientWidth div 2+t1,form1.image2.ClientHeight div 2-t2-10);
form1.image2.Canvas.MoveTo(form1.image2.ClientWidth div 2-t1-10,form1.image2.ClientHeight div 2-t2);
form1.image2.Canvas.LineTo(form1.image2.ClientWidth div 2-t1-10,form1.image2.ClientHeight div 2+t2);
form1.image2.Canvas.MoveTo(form1.image2.ClientWidth div 2-t3,form1.image2.ClientHeight div 2+t2+10);
form1.image2.Canvas.LineTo(form1.image2.ClientWidth div 2+t3,form1.image2.ClientHeight div 2+t2+10);
form1.image2.Canvas.MoveTo(form1.image2.ClientWidth div 2+t1+10,form1.image2.ClientHeight div 2-t2);
form1.image2.Canvas.LineTo(form1.image2.ClientWidth div 2+t1+10,t4);
form1.edit29.Left:=form1.image2.ClientWidth div 2-10;
form1.edit29.Top:=form1.image2.ClientHeight div 2-t2-15;
form1.edit30.Left:=form1.image2.ClientWidth div 2-t1-30;
form1.edit30.Top:=form1.image2.ClientHeight div 2-5;
form1.edit31.Left:=form1.image2.ClientWidth div 2-10;
form1.edit31.Top:=form1.image2.ClientHeight div 2+t2+15;
form1.edit32.Left:=form1.image2.ClientWidth div 2+t1 +15;
form1.edit32.Top:=t5;
end;

procedure gambar_el;
begin
awal;
form1.edit27.Visible:=false;
form1.edit28.Visible:=false;
form1.edit29.Visible:=false;
form1.edit30.Visible:=false;
form1.edit31.Visible:=false;
form1.Edit32.Visible:=false;
form1.Edit33.Visible:=true;
form1.Edit34.Visible:=true;
form1.Edit35.Visible:=true;
form1.Edit36.Visible:=true;
form1.Edit37.Visible:=false;
form1.Edit38.Visible:=false;
form1.Edit39.Visible:=false;
form1.Edit40.Visible:=false;
form1.Edit41.Visible:=false;
form1.image1.Visible:=false;
form1.image2.Visible:=false;
form1.image3.Visible:=true;
form1.image4.Visible:=false;
form1.image3.Canvas.Brush.Color:=clwhite;
form1.image3.Canvas.Pen.Color:=clblack;
form1.image3.Canvas.Rectangle(0,0,form1.image3.ClientWidth,form1.image3.ClientHeight);
il1:=strtofloat(form1.edit33.Text)*konpjb;
il2:=strtofloat(form1.edit34.Text)*konpjb;
il3:=strtofloat(form1.edit35.Text)*konpjb;
il4:=strtofloat(form1.edit36.Text)*konpjb;
if (il1>il2) then
begin
l1:=xx;
```

```
l2:=round((il2/il1)*xx);
l3:=form1.image3.ClientWidth div 2-l1+round((il3/il1)*xx*2);
l4:=form1.image3.ClientHeight div 2-l2+round((il4/il1)*xx*2);
l5:=form1.Image3.ClientWidth div 2-l1+round((il3/il1)*xx)-10;
l6:=form1.image3.ClientHeight div 2-l2+round((il4/il1)*xx)-5;
l7:=round((s/il1)*65*2);
sk1:=il1;
end
else
begin
l2:=xx;
l1:=round((il1/il2)*xx);
l3:=form1.image3.ClientWidth div 2-l1+round((il3/il2)*xx*2);
l4:=form1.image3.ClientHeight div 2-l2+round((il4/il2)*xx*2);
l5:=form1.Image3.ClientWidth div 2-l1+round((il3/il2)*xx)-10;
l6:=form1.image3.ClientHeight div 2-l2+round((il4/il2)*xx)-5;
l7:=round((s/il2)*xx*2);
sk1:=il2;
end;
form1.image3.Canvas.Brush.Color:=clwhite;
form1.Image3.Canvas.Pen.Width:=1;
form1.image3.Canvas.Pen.Color:=clblack;
form1.Image3.Canvas.Brush.Color:=clskyblue;
form1.image3.Canvas.polygon([point(form1.image3.ClientWidth div 2-l1,form1.image3.ClientHeight div 2-l2),
point(form1.image3.ClientWidth div 2+l1,form1.image3.ClientHeight div 2-l2),point(form1.image3.ClientWidth div 2+l1,l4),
point(l3,l4),point(l3,form1.image3.ClientHeight div 2+l2),
point(form1.image3.ClientWidth div 2-l1,form1.image3.ClientHeight div 2+l2)]);
form1.Image3.Canvas.Pen.Width:=2;
form1.Image3.Canvas.Pen.Color:=clblack;
sk1:=form1.image3.ClientWidth div 2-l1+l7;
sk2:=form1.image3.ClientHeight div 2-l2+l7;
sk3:=l3-l7;
sk4:=form1.image3.ClientHeight div 2+l2-l7;
form1.Image3.Canvas.Rectangle(sk1,sk2,sk3,sk4);
form1.Image3.Canvas.Pen.Width:=1;
form1.image3.Canvas.MoveTo(form1.image3.ClientWidth div 2-l1,form1.image3.ClientHeight div 2-l2-10);
form1.image3.Canvas.LineTo(form1.image3.ClientWidth div 2+l1,form1.image3.ClientHeight div 2-l2-10);
form1.image3.Canvas.MoveTo(form1.image3.ClientWidth div 2-l1-10,form1.image3.ClientHeight div 2-l2);
form1.image3.Canvas.LineTo(form1.image3.ClientWidth div 2-l1-10,form1.image3.ClientHeight div 2+l2);
form1.image3.Canvas.MoveTo(form1.image3.ClientWidth div 2-l1,form1.image3.ClientHeight div 2+l2+10);
form1.image3.Canvas.LineTo(l3,form1.image3.ClientHeight div 2+l2+10);
form1.image3.Canvas.MoveTo(form1.image3.ClientWidth div 2+l1+10,form1.image3.ClientHeight div 2-l2);
form1.image3.Canvas.LineTo(form1.image3.ClientWidth div 2+l1+10,l4);
form1.edit33.Left:=form1.image3.ClientWidth div 2-10;
form1.edit33.Top:=form1.image3.ClientHeight div 2-l2-15;
form1.edit34.Left:=form1.image3.ClientWidth div 2-l1-30;
form1.edit34.Top:=form1.image3.ClientHeight div 2-5;
form1.edit35.Left:=l5;
form1.edit35.Top:=form1.image3.ClientHeight div 2+l2+15;
form1.edit36.Left:=form1.image3.ClientWidth div 2+l1+15;
form1.edit36.Top:=l6;
end;

procedure gambar_ii;
begin
awal;
form1.edit27.Visible:=false;
form1.edit28.Visible:=false;
form1.edit29.Visible:=false;
form1.edit30.Visible:=false;
form1.edit31.Visible:=false;
form1.Edit32.Visible:=false;
form1.Edit33.Visible:=false;
form1.Edit34.Visible:=false;
form1.Edit35.Visible:=false;
form1.Edit36.Visible:=false;
form1.Edit37.Visible:=true;
form1.Edit38.Visible:=true;
form1.Edit39.Visible:=true;
form1.Edit40.Visible:=true;
form1.Edit41.Visible:=true;
```

```
form1.image1.Visible:=false;
form1.image2.Visible:=false;
form1.image3.Visible:=false;
form1.image4.Visible:=true;
form1.image4.Canvas.Brush.Color:=clwhite;
form1.Image4.Canvas.Pen.Color:=clblack;
form1.Image4.Canvas.Rectangle(0,0,form1.image4.ClientWidth,form1.image4.ClientHeight);
ii1:=strtofloat(form1.Edit37.Text)*konpjb;
ii2:=strtofloat(form1.Edit38.Text)*konpjb;
ii3:=strtofloat(form1.Edit39.Text)*konpjb;
ii4:=strtofloat(form1.Edit40.Text)*konpjb;
ii5:=strtofloat(form1.Edit41.Text)*konpjb;
if ii1>ii2 then
begin
i1:=xx;
i2:=round((ii2/ii1)*xx);
i3:=round((ii3/ii1)*xx);
i4:=form1.Image4.ClientHeight div 2-i2+round((ii4/ii1)*xx*2);
i5:=form1.Image4.ClientHeight div 2+i2-form1.Image4.ClientIleight div 2-round((ii5/ii1)*xx*2);
i6:=form1.Image4.ClientHeight div 2-i2+round((ii4/ii1)*xx);
i7:=form1.Image4.ClientHeight div 2+i2-round((ii5/ii1)*xx)-5;
i8:=round((s/ii1)*xx*2);
skl:=ii1
end
else
begin
i2:=xx;
i1:=round((ii1/ii2)*xx);
i3:=round((ii3/ii2)*xx);
i4:=form1.Image4.ClientHeight div 2-i2+round((ii4/ii2)*xx*2);
i5:=form1.Image4.ClientIleight div 2+i2-form1.Image4.ClientIleight div 2-round((ii5/ii2)*xx*2);
i6:=form1.Image4.ClientHeight div 2-i2+round((ii4/ii2)*xx);
i7:=form1.Image4.ClientHeight div 2+i2-round((ii5/ii2)*xx)-5;
i8:=round((s/ii2)*xx*2);
skl:=ii2;
end;
form1.image4.Canvas.Brush.Color:=clwhite;
form1.Image4.Canvas.Pen.Width:=1;
form1.image4.Canvas.Pen.Color:=clblack;
form1.Image4.Canvas.Brush.Color:=clskyblue;
form1.image4.Canvas.polygon([point(form1.image4.ClientWidth div 2-i1,form1.image4.ClientIleight div 2-i2),
point(form1.image4.ClientWidth div 2+i1,form1.image4.ClientHeight div 2-i2),point(form1.image4.ClientWidth div 2+i1,i4),
point(form1.image4.ClientWidth div 2+i3,i4),point(form1.image4.ClientWidth div 2+i3,form1.image4.ClientIleight div 2+i5),
point(form1.image4.ClientWidth div 2+i1,form1.image4.ClientHeight div 2+i5),point(form1.image4.ClientWidth div
2+i1,form1.image4.ClientHeight div 2+i2),
point(form1.image4.ClientWidth div 2-i1,form1.image4.ClientHeight div 2+i2),point(form1.image4.ClientWidth div 2-
i1,form1.image4.ClientIleight div 2+i5),
point(form1.image4.ClientWidth div 2-i3,form1.image4.ClientHeight div 2+i5),point(form1.image4.ClientWidth div 2-
i3,i4),point(form1.image4.ClientWidth div 2-i1,i4)]);
form1.Image4.Canvas.Pen.Width:=2;
form1.Image4.Canvas.Pen.Color:=clblack;
sk1:=form1.image4.ClientWidth div 2-i3+i8;
sk2:=form1.image4.ClientIleight div 2-i2+i8;
sk3:=form1.image4.ClientWidth div 2+i3-i8;
sk4:=form1.image4.ClientHeight div 2+i2-i8;
form1.Image4.Canvas.Rectangle(sk1,sk2,sk3,sk4);
form1.Image4.Canvas.Pen.Width:=1;
form1.image4.Canvas.MoveTo(form1.image4.ClientWidth div 2-i1,form1.image4.ClientHeight div 2-i2-10);
form1.image4.Canvas.LineTo(form1.image4.ClientWidth div 2+i1,form1.image4.ClientIleight div 2-i2-10);
form1.image4.Canvas.MoveTo(form1.image4.ClientWidth div 2-i1-10,form1.image4.ClientHeight div 2-i2);
form1.image4.Canvas.LineTo(form1.image4.ClientWidth div 2-i1-10,form1.image4.ClientHeight div 2+i2);
form1.image4.Canvas.MoveTo(form1.image4.ClientWidth div 2+i3,form1.image4.ClientHeight div 2+i2+10);
form1.image4.Canvas.LineTo(form1.image4.ClientWidth div 2-i3,form1.image4.ClientIleight div 2+i2+10);
form1.image4.Canvas.MoveTo(form1.image4.ClientWidth div 2+i1+10,form1.image4.ClientHeight div 2-i2);
form1.image4.Canvas.LineTo(form1.image4.ClientWidth div 2+i1+10,i4);
form1.image4.Canvas.MoveTo(form1.image4.ClientWidth div 2+i1+10,form1.image4.ClientHeight div 2+i5);
form1.image4.Canvas.LineTo(form1.image4.ClientWidth div 2+i1+10,form1.image4.ClientHeight div 2+i2);
form1.edit37.Left:=form1.image4.ClientWidth div 2-10;
form1.edit37.Top:=form1.image4.ClientIleight div 2-i2-15;
form1.edit38.Left:=form1.image4.ClientWidth div 2-i1-30;
form1.edit38.Top:=form1.image4.ClientIleight div 2-5;
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form1.edit39.Left:=form1.image4.ClientWidth div 2-10;
form1.edit39.Top:=form1.image4.ClientHeight div 2+i2+15;
form1.edit40.Left:=form1.image4.ClientWidth div 2+i1+15;
form1.edit40.Top:=i6;
form1.edit41.Left:=form1.image4.ClientWidth div 2+i1+15;
form1.edit41.Top:=i7;
end;

procedure gambar_kotakc;
begin
form6.image1.Canvas.Brush.Color:=clwhite;
form6.Image1.Canvas.Brush.Style:=bssolid;
form6.image1.Canvas.Pen.Color:=clblack;
form6.Image1.Canvas.Rectangle(0,0,form6.image1.ClientWidth,form6.image1.ClientHeight);
if (pisah=true) then
begin
ik1:=strtofloat(form1.edit27.Text)*konpjb;
ik2:=strtofloat(form1.edit28.Text)*konpjb;
form6.Edit1.Text:=form1.edit27.Text;
form6.Edit2.Text:=form1.edit28.Text;
end
else
begin
ik1:=strtofloat(form6.Edit1.Text)*konpjb;
ik2:=strtofloat(form6.Edit2.Text)*konpjb;
form1.edit27.Text:=form6.Edit1.Text;
form1.edit28.Text:=form6.Edit2.Text;
end;
if (ik1>ik2) then
begin
k1:=xx;
k2:=round((ik2/ik1)*xx);
k3:=round((s/ik1)*xx*2);
skl:=ik1;
end
else
begin
k2:=xx;
k1:=round((ik1/ik2)*xx);
k3:=round((s/ik2)*xx*2);
skl:=ik2;
end;
gambar;
if(baku=true) then
form6.Image1.Canvas.Brush.Style:=bsclear
else
begin
form6.Image1.Canvas.Brush.Style:=bssolid;
form6.Image1.Canvas.Brush.Color:=clskyblue;
end;
form6.Image1.Canvas.Pen.Width:=1;
form6.Image1.Canvas.Pen.Color:=clblack;
form6.Image1.Canvas.Rectangle(form6.image1.ClientWidth div 2-k1,form6.image1.ClientHeight div 2-
k2,form6.image1.ClientWidth div 2+k1,form6.image1.ClientHeight div 2+k2);
form6.Image1.Canvas.Pen.Width:=2;
form6.Image1.Canvas.Pen.Color:=clnavy;
sk1:=form6.image1.ClientWidth div 2-k1+k3;
sk2:=form6.image1.ClientHeight div 2-k2+k3;
sk3:=form6.image1.ClientWidth div 2+k1-k3;
sk4:=form6.image1.ClientHeight div 2+k2-k3;
form6.Image1.Canvas.Rectangle(sk1,sk2,sk3,sk4);
form6.Image1.Canvas.Pen.Width:=1;
form6.image1.Canvas.Pen.Color:=clteal;
form6.image1.Canvas.MoveTo(form6.image1.ClientWidth div 2-k1,form6.image1.ClientHeight div 2-k2-10);
form6.image1.Canvas.LineTo(form6.image1.ClientWidth div 2+k1,form6.image1.ClientHeight div 2-k2-10);
form6.image1.Canvas.MoveTo(form6.image1.ClientWidth div 2-k1-10,form6.image1.ClientHeight div 2-k2);
form6.image1.Canvas.LineTo(form6.image1.ClientWidth div 2-k1-10,form6.image1.ClientHeight div 2+k2);
form6.Edit1.Visible:=true;
form6.Edit2.Visible:=true;
form6.Edit3.Visible:=false;
form6.Edit4.Visible:=false;
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```
form6.Edit5.Visible:=false;
form6.Edit1.Left:=form6.image1.ClientWidth div 2-10;
form6.Edit1.Top:=form6.image1.ClientHeight div 2-k2-15;
form6.Edit2.Left:=form6.image1.ClientWidth div 2-k1-30;
form6.Edit2.Top:=form6.image1.ClientHeight div 2-5;
end;

procedure gambar_tec;
begin
form6.image1.Canvas.Brush.Color:=clwhite;
form6.Image1.Canvas.Brush.Style:=bssolid;
form6.image1.Canvas.Pen.Color:=clblack;
form6.image1.Canvas.Rectangle(0,0,form6.image1.ClientWidth,form6.image1.ClientHeight);
if(pisah=true)then
begin
it1:=strtofloat(form1.edit29.Text)*konpjb;
it2:=strtofloat(form1.edit30.Text)*konpjb;
it3:=strtofloat(form1.edit31.Text)*konpjb;
it4:=strtofloat(form1.edit32.Text)*konpjb;
form6.Edit1.Text:=form1.edit29.Text;
form6.Edit2.Text:=form1.edit30.Text;
form6.Edit3.Text:=form1.edit31.Text;
form6.Edit4.Text:=form1.edit32.Text;
end
else
begin
it1:=strtofloat(form6.Edit1.Text)*konpjb;
it2:=strtofloat(form6.Edit2.Text)*konpjb;
it3:=strtofloat(form6.Edit3.Text)*konpjb;
it4:=strtofloat(form6.Edit4.Text)*konpjb;
form1.edit29.Text:=form6.Edit1.Text;
form1.edit30.Text:=form6.Edit2.Text;
form1.edit31.Text:=form6.Edit3.Text;
form1.edit32.Text:=form6.Edit4.Text;
end;
if (it1>it2) then
begin
t1:=xx;
t2:=round((it2/it1)*xx);
t3:=round((it3/it1)*xx);
t4:=form6.image1.ClientHeight div 2-t2+round((it4/it1)*xx*2);
t5:=form6.Image1.ClientHeight div 2-t2+round((it4/it1)*xx)-5;
t6:=round((s/it1)*xx*2);
skl:=it1;
end
else
begin
t2:=xx;
t1:=round((it1/it2)*xx);
t3:=round((it3/it2)*xx);
t4:=form6.image1.ClientHeight div 2-t2+round((it4/it2)*xx*2);
t5:=form6.Image1.ClientHeight div 2-t2+round((it4/it2)*xx)-5;
t6:=round((s/it2)*xx*2);
skl:=it2;
end;
gambar;
if(baku=true) then
form6.Image1.Canvas.Brush.Style:=bsclear
else
begin
form6.Image1.Canvas.Brush.Style:=bssolid;
form6.Image1.Canvas.Brush.Color:=clskyblue;
end;
form6.Image1.Canvas.Pen.Width:=1;
form6.Image1.Canvas.Pen.Color:=clblack;
form6.image1.Canvas.polygon([point(form6.image1.ClientWidth div 2-t1,form6.image1.ClientHeight div 2-t2),
point(form6.image1.ClientWidth div 2+t1,form6.image1.ClientHeight div 2-t2),point(form6.image1.ClientWidth div 2+t1,t4),
point(form6.image1.ClientWidth div 2+t3,t4),point(form6.image1.ClientWidth div 2+t3,form6.image1.ClientHeight div 2+t2),
point(form6.image1.ClientWidth div 2-t3,form6.image1.ClientHeight div 2+t2),point(form6.image1.ClientWidth div 2-t3,t4),
point(form6.image1.ClientWidth div 2-t1,t4)]);
form6.Image1.Canvas.Pen.Width:=2;
```

```
form6.Image1.Canvas.Pen.Color:=clnavy;
sk1:=form6.image1.ClientWidth div 2-t3+t6;
sk2:=form6.image1.ClientHeight div 2-t2+t6;
sk3:=form6.image1.ClientWidth div 2+t3-t6;
sk4:=form6.image1.ClientHeight div 2+t2-t6;
form6.Image1.Canvas.Rectangle(sk1,sk2,sk3,sk4);
form6.image1.Canvas.Pen.Color:=clteal;
form6.Image1.Canvas.Pen.Width:=1;
form6.image1.Canvas.MoveTo(form6.image1.ClientWidth div 2-t1,form6.image1.ClientHeight div 2-t2-10);
form6.image1.Canvas.LineTo(form6.image1.ClientWidth div 2+t1,form6.image1.ClientHeight div 2-t2-10);
form6.image1.Canvas.MoveTo(form6.image1.ClientWidth div 2-t1-10,form6.image1.ClientHeight div 2-t2);
form6.image1.Canvas.LineTo(form6.image1.ClientWidth div 2-t1-10,form6.image1.ClientHeight div 2+t2);
form6.image1.Canvas.MoveTo(form6.image1.ClientWidth div 2-t3,form6.image1.ClientHeight div 2+t2+10);
form6.image1.Canvas.LineTo(form6.image1.ClientWidth div 2+t3,form6.image1.ClientHeight div 2+t2+10);
form6.image1.Canvas.MoveTo(form6.image1.ClientWidth div 2+t1+10,form6.image1.ClientHeight div 2-t2);
form6.image1.Canvas.LineTo(form6.image1.ClientWidth div 2+t1+10,t4);
form6.Edit1.Visible:=true;
form6.Edit2.Visible:=true;
form6.Edit3.Visible:=true;
form6.Edit4.Visible:=true;
form6.Edit5.Visible:=false;
form6.Edit1.Left:=form6.image1.ClientWidth div 2-10;
form6.Edit1.Top:=form6.image1.ClientHeight div 2-t2-15;
form6.Edit2.Left:=form6.image1.ClientWidth div 2-t1-30;
form6.Edit2.Top:=form6.image1.ClientHeight div 2-5;
form6.Edit3.Left:=form6.image1.ClientWidth div 2-15;
form6.Edit3.Top:=form6.image1.ClientHeight div 2+t2+10;
form6.Edit4.Left:=form6.image1.ClientWidth div 2+t1 +15;
form6.Edit4.Top:=t5;
end;

procedure gambar_elc;
begin
form6.image1.Canvas.Brush.Color:=clwhite;
form6.Image1.Canvas.Brush.Style:=bssolid;
form6.image1.Canvas.Pen.Color:=clblack;
form6.image1.Canvas.Rectangle(0,0,form6.image1.ClientWidth,form6.image1.ClientHeight);
if(pisah=true)then
begin
il1:=strtofloat(form1.edit33.Text)*konpjb;
il2:=strtofloat(form1.edit34.Text)*konpjb;
il3:=strtofloat(form1.edit35.Text)*konpjb;
il4:=strtofloat(form1.edit36.Text)*konpjb;
form6.Edit1.Text:=form1.edit33.Text;
form6.Edit2.Text:=form1.edit34.Text;
form6.Edit3.Text:=form1.edit35.Text;
form6.Edit4.Text:=form1.edit36.Text;
end
else
begin
il1:=strtofloat(form6.Edit1.Text)*konpjb;
il2:=strtofloat(form6.Edit2.Text)*konpjb;
il3:=strtofloat(form6.Edit3.Text)*konpjb;
il4:=strtofloat(form6.Edit4.Text)*konpjb;
form1.edit33.Text:=form6.Edit1.Text;
form1.edit34.Text:=form6.Edit2.Text;
form1.edit35.Text:=form6.Edit3.Text;
form1.edit36.Text:=form6.Edit4.Text;
end;
if (il1>il2) then
begin
l1:=xx;
l2:=round((il2/il1)*xx);
l3:=form6.image1.ClientWidth div 2-l1+round((il3/il1)*xx*2);
l4:=form6.image1.ClientHeight div 2-l2+round((il4/il1)*xx*2);
l5:=form6.Image1.ClientWidth div 2-l1+round((il3/il1)*xx)-10;
l6:=form6.image1.ClientHeight div 2-l2+round((il4/il1)*xx)-5;
l7:=round((s/il1)*xx*2);
sk1:=il1;
end
else
```

```
begin
l2:=xx;
l1:=round((il1/il2)*xx);
l3:=form6.image1.ClientWidth div 2-l1+round((il3/il2)*xx*2);
l4:=form6.image1.ClientHeight div 2-l2+round((il4/il2)*xx*2);
l5:=form6.Image1.ClientWidth div 2-l1+round((il3/il2)*xx)-10;
l6:=form6.image1.ClientHeight div 2-l2+round((il4/il2)*xx)-5;
l7:=round((s/il2)*xx*2);
sk1:=il2;
end;
gambar;
if(baku=true) then
form6.Image1.Canvas.Brush.Style:=bsclear
else
begin
form6.Image1.Canvas.Brush.Style:=bssolid;
form6.Image1.Canvas.Brush.Color:=clskyblue;
end;
form6.Image1.Canvas.Pen.Width:=1;
form6.image1.Canvas.Pen.Color:=clblack;
form6.image1.Canvas.polygon([point(form6.image1.ClientWidth div 2-l1,form6.image1.ClientHeight div 2-l2),
point(form6.image1.ClientWidth div 2+l1,form6.image1.ClientHeight div 2-l2),point(form6.image1.ClientWidth div 2+l1,l4),
point(l3,l4),point(l3,form6.image1.ClientHeight div 2+l2),
point(form6.image1.ClientWidth div 2-l1,form6.image1.ClientHeight div 2+l2)]);
form6.Image1.Canvas.Pen.Width:=2;
form6.Image1.Canvas.Pen.Color:=clnavy;
sk1:=form6.image1.ClientWidth div 2-l1+l7;
sk2:=form6.image1.ClientHeight div 2-l2+l7;
sk3:=l3-l7;
sk4:=form6.image1.ClientHeight div 2+l2-l7;
form6.Image1.Canvas.Rectangle(sk1,sk2,sk3,sk4);
form6.image1.Canvas.Pen.Color:=clteal;
form6.Image1.Canvas.Pen.Width:=1;
form6.image1.Canvas.MoveTo(form6.image1.ClientWidth div 2-l1,form6.image1.ClientHeight div 2-l2-10);
form6.image1.Canvas.LineTo(form6.image1.ClientWidth div 2+l1,form6.image1.ClientHeight div 2-l2-10);
form6.image1.Canvas.MoveTo(form6.image1.ClientWidth div 2-l1-10,form6.image1.ClientHeight div 2-l2);
form6.image1.Canvas.LineTo(form6.image1.ClientWidth div 2-l1-10,form6.image1.ClientHeight div 2+l2);
form6.image1.Canvas.MoveTo(form6.image1.ClientWidth div 2-l1,form6.image1.ClientHeight div 2+l2+10);
form6.image1.Canvas.LineTo(l3,form6.image1.ClientHeight div 2+l2+10);
form6.image1.Canvas.MoveTo(form6.image1.ClientWidth div 2+l1+10,form6.image1.ClientHeight div 2-l2);
form6.image1.Canvas.LineTo(form6.image1.ClientWidth div 2+l1+10,l4);
form6.Edit1.Visible:=true;
form6.Edit2.Visible:=true;
form6.Edit3.Visible:=true;
form6.Edit4.Visible:=true;
form6.Edit5.Visible:=false;
form6.Edit1.Left:=form6.image1.ClientWidth div 2-10;
form6.Edit1.Top:=form6.image1.ClientHeight div 2-l2-15;
form6.Edit2.Left:=form6.image1.ClientWidth div 2-l1-30;
form6.Edit2.Top:=form6.image1.ClientHeight div 2-5;
form6.Edit3.Left:=l5;
form6.Edit3.Top:=form6.image1.ClientHeight div 2+l2+10;
form6.Edit4.Left:=form6.image1.ClientWidth div 2+l1+15;
form6.Edit4.Top:=l6;
end;

procedure gambar_iic;
begin
form6.image1.Canvas.Brush.Color:=clwhite;
form6.Image1.Canvas.Brush.Style:=bssolid;
form6.Image1.Canvas.Pen.Color:=clblack;
form6.Image1.Canvas.Rectangle(0,0,form6.image1.ClientWidth,form6.image1.ClientHeight);
if(pisah=true)then
begin
ii1:=strtofloat(form1.Edit37.Text)*konpjb;
ii2:=strtofloat(form1.Edit38.Text)*konpjb;
ii3:=strtofloat(form1.Edit39.Text)*konpjb;
ii4:=strtofloat(form1.Edit40.Text)*konpjb;
ii5:=strtofloat(form1.Edit41.Text)*konpjb;
form6.Edit1.Text:=form1.Edit37.Text;
form6.Edit2.Text:=form1.Edit38.Text;
```

```
form6.Edit3.Text:=form1.Edit39.Text;
form6.Edit4.Text:=form1.Edit40.Text;
form6.Edit5.Text:=form1.Edit41.Text;
end
else
begin
ii1:=strtofloat(form6.Edit1.Text)*konpjb;
ii2:=strtofloat(form6.Edit2.Text)*konpjb;
ii3:=strtofloat(form6.Edit3.Text)*konpjb;
ii4:=strtofloat(form6.Edit4.Text)*konpjb;
ii5:=strtofloat(form6.Edit5.Text)*konpjb;
form1.Edit37.Text:=form6.Edit1.Text;
form1.Edit38.Text:=form6.Edit2.Text;
form1.Edit39.Text:=form6.Edit3.Text;
form1.Edit40.Text:=form6.Edit4.Text;
form1.Edit41.Text:=form6.Edit5.Text;
end;
if ii1>ii2 then
begin
i1:=xx;
i2:=round((ii2/ii1)*xx);
i3:=round((ii3/ii1)*xx);
i4:=form6.Image1.ClientHeight div 2-i2+round((ii4/ii1)*xx*2);
i5:=form6.Image1.ClientHeight div 2+i2-form6.Image1.ClientHeight div 2-round((ii5/ii1)*xx*2);
i6:=form6.Image1.ClientHeight div 2-i2+round((ii4/ii1)*xx);
i7:=form6.Image1.ClientHeight div 2+i2-round((ii5/ii1)*xx)-5;
i8:=round((s/ii1)*xx*2);
skl:=ii1;
end
else
begin
i2:=xx;
i1:=round((ii1/ii2)*xx);
i3:=round((ii3/ii2)*xx);
i4:=form6.Image1.ClientHeight div 2-i2+round((ii4/ii2)*xx*2);
i5:=form6.Image1.ClientHeight div 2+i2-form6.Image1.ClientHeight div 2-round((ii5/ii2)*xx*2);
i6:=form6.Image1.ClientHeight div 2-i2+round((ii4/ii2)*xx);
i7:=form6.Image1.ClientHeight div 2+i2-round((ii5/ii2)*xx)-5;
i8:=round((s/ii2)*xx*2);
skl:=ii2;
end;
gambar;
if(baku=true) then
form6.Image1.Canvas.Brush.Style:=bsclear
else
begin
form6.Image1.Canvas.Brush.Style:=bssolid;
form6.Image1.Canvas.Brush.Color:=clskyblue;
end;
form6.Image1.Canvas.Pen.Width:=1;
form6.image1.Canvas.Pen.Color:=clblack;
form6.image1.Canvas.polygon([point(form6.image1.ClientWidth div 2-i1,form6.image1.ClientHeight div 2-i2),
point(form6.image1.ClientWidth div 2+i1,form6.image1.ClientHeight div 2-i2),point(form6.image1.ClientWidth div 2+i1,i4),
point(form6.image1.ClientWidth div 2+i3,i4),point(form6.image1.ClientWidth div 2+i3,form6.image1.ClientHeight div 2+i5),
point(form6.image1.ClientWidth div 2+i1,form6.image1.ClientHeight div 2+i5),point(form6.image1.ClientWidth div
2+i1,form6.image1.ClientHeight div 2+i2),
point(form6.image1.ClientWidth div 2-i1,form6.image1.ClientHeight div 2+i2),point(form6.image1.ClientWidth div 2-
i1,form6.image1.ClientHeight div 2+i5),
point(form6.image1.ClientWidth div 2-i3,form6.image1.ClientHeight div 2+i5),point(form6.image1.ClientWidth div 2-
i3,i4),point(form6.image1.ClientWidth div 2-i1,i4)]);
form6.Image1.Canvas.Pen.Width:=2;
form6.Image1.Canvas.Pen.Color:=clnavy;
sk1:=form6.image1.ClientWidth div 2-i3+i8;
sk2:=form6.image1.ClientHeight div 2-i2+i8;
sk3:=form6.image1.ClientWidth div 2+i3-i8;
sk4:=form6.image1.ClientHeight div 2+i2-i8;
form6.Image1.Canvas.Rectangle(sk1,sk2,sk3,sk4);
form6.image1.Canvas.Pen.Color:=clteal;
form6.Image1.Canvas.Pen.Width:=1;
form6.image1.Canvas.Pen.Color:=clteal;
form6.image1.Canvas.MoveTo(form6.image1.ClientWidth div 2-i1,form6.image1.ClientHeight div 2-i2-10);
```

```
form6.image1.Canvas.LineTo(form6.image1.ClientWidth div 2+i1,form6.image1.ClientHeight div 2-i2-10);
form6.image1.Canvas.MoveTo(form6.image1.ClientWidth div 2-i1-10,form6.image1.ClientHeight div 2-i2);
form6.image1.Canvas.LineTo(form6.image1.ClientWidth div 2-i1-10,form6.image1.ClientHeight div 2+i2);
form6.image1.Canvas.MoveTo(form6.image1.ClientWidth div 2+i3,form6.image1.ClientHeight div 2+i2+10);
form6.image1.Canvas.LineTo(form6.image1.ClientWidth div 2-i3,form6.image1.ClientHeight div 2+i2+10);
form6.image1.Canvas.MoveTo(form6.image1.ClientWidth div 2+i1+10,form6.image1.ClientHeight div 2-i2);
form6.image1.Canvas.LineTo(form6.image1.ClientWidth div 2+i1+10,i4);
form6.image1.Canvas.MoveTo(form6.image1.ClientWidth div 2+i1+10,form6.image1.ClientHeight div 2+i5);
form6.image1.Canvas.LineTo(form6.image1.ClientWidth div 2+i1+10,form6.image1.ClientHeight div 2+i2);
form6.Edit1.Visible:=true;
form6.Edit2.Visible:=true;
form6.Edit3.Visible:=true;
form6.Edit4.Visible:=true;
form6.Edit5.Visible:=true;
form6.Edit1.Left:=form6.image1.ClientWidth div 2-10;
form6.Edit1.Top:=form6.image1.ClientHeight div 2-i2-15;
form6.Edit2.Left:=form6.image1.ClientWidth div 2-i1-30;
form6.Edit2.Top:=form6.image1.ClientHeight div 2-5;
form6.Edit3.Left:=form6.image1.ClientWidth div 2-10;
form6.Edit3.Top:=form6.image1.ClientHeight div 2+i2+10;
form6.Edit4.Left:=form6.image1.ClientWidth div 2+i1+15;
form6.Edit4.Top:=i6;
form6.Edit5.Left:=form6.image1.ClientWidth div 2+i1+15;
form6.Edit5.Top:=i7;
end;

procedure gambar;
var stp,stx1,sty1,stx2,sty2,stx3,sty3,gp:integer;
begin
if (baku=true) then
begin
stx1:=0;
sty1:=0;
form6.Image1.Canvas.Pen.Width:=1;
form6.Image1.Canvas.Pen.Color:=clgray;
form6.Image1.Canvas.Pen.Style:=pssolid;
form6.Image1.Canvas.MoveTo(0,form6.Image1.ClientHeight div 2);
form6.Image1.Canvas.lineTo(form6.Image1.ClientWidth,form6.Image1.ClientHeight div 2);
form6.Image1.Canvas.MoveTo(form6.Image1.ClientWidth div 2 ,0);
form6.Image1.Canvas.lineTo(form6.Image1.ClientWidth div 2 ,form6.Image1.ClientHeight);
form6.Image1.Canvas.Pen.Color:=clsilver;
for stp:= 1 to 50 do
begin
gp:=round((100/skl)*xx);
stx1:=stx1+gp;
sty1:=sty1+gp;
stx2:=form6.Image1.ClientWidth div 2+2*stx1;
stx3:=form6.Image1.ClientWidth div 2-2*sty1;
sty2:=form6.Image1.ClientHeight div 2+2*stx1;
sty3:=form6.Image1.ClientHeight div 2-2*sty1;
form6.Image1.Canvas.MoveTo(0,sty2);
form6.Image1.Canvas.LineTo(form6.Image1.ClientWidth,sty2);
form6.Image1.Canvas.MoveTo(0,sty3);
form6.Image1.Canvas.LineTo(form6.Image1.ClientWidth,sty3);
form6.Image1.Canvas.MoveTo(stx2,0);
form6.Image1.Canvas.LineTo(stx2,form6.Image1.ClientHeight);
form6.Image1.Canvas.MoveTo(stx3,0);
form6.Image1.Canvas.LineTo(stx3,form6.Image1.ClientHeight);
end;
end;
end;

procedure copy_kotak;
begin
form4.QRImage1.Canvas.Font.Size:=8;
form4.QRImage1.Canvas.TextOut(form4.QRImage1.ClientWidth div 2-10,form4.QRImage1.ClientHeight div 2-k2-25,'
'+form1.Edit27.Text+' ');
form4.QRImage1.Canvas.TextOut(form4.QRImage1.ClientWidth div 2-k1-35,form4.QRImage1.ClientHeight div 2-5,'
'+form1.Edit28.Text+' ');
end;
```

```
procedure copy_tc;
begin
form4.QRImage1.Canvas.Font.Size:=8;
form4.QRImage1.Canvas.TextOut(form4.QRImage1.ClientWidth div 2-10,form4.QRImage1.ClientHeight div 2-t2-25,'
'+form1.Edit29.Text+' ');
form4.QRImage1.Canvas.TextOut(form4.QRImage1.ClientWidth div 2-t1-40,form4.QRImage1.ClientHeight div 2-5,'
'+form1.Edit30.Text+' ');
form4.QRImage1.Canvas.TextOut(form4.QRImage1.ClientWidth div 2-10,form4.QRImage1.ClientHeight div 2+t2+15,'
'+form1.Edit31.Text+' ');
form4.QRImage1.Canvas.TextOut(form4.QRImage1.ClientWidth div 2+t1 +15,t5,' '+form1.Edit32.Text+' ');
end;

procedure copy_cl;
begin
form4.QRImage1.Canvas.Font.Size:=8;
form4.QRImage1.Canvas.TextOut(form4.QRImage1.ClientWidth div 2-10,form4.QRImage1.ClientHeight div 2-l2-25,'
'+form1.edit33.Text+' ');
form4.QRImage1.Canvas.TextOut(form4.QRImage1.ClientWidth div 2-l1-35,form4.QRImage1.ClientHeight div 2-5,'
'+form1.edit34.Text+' ');
form4.QRImage1.Canvas.TextOut(l5,form4.QRImage1.ClientHeight div 2+l2+15,' '+form1.edit35.Text+' ');
form4.QRImage1.Canvas.TextOut(form4.QRImage1.ClientWidth div 2+l1+15,l6,' '+form1.edit36.Text+' ');
end;

procedure copy_ii;
begin
form4.QRImage1.Canvas.Font.Size:=8;
form4.QRImage1.Canvas.TextOut(form4.QRImage1.ClientWidth div 2-10,form4.QRImage1.ClientHeight div 2-i2-25,'
'+form1.edit37.Text+' ');
form4.QRImage1.Canvas.TextOut(form4.QRImage1.ClientWidth div 2-i1-40,form4.QRImage1.ClientHeight div 2-5,'
'+form1.edit38.Text+' ');
form4.QRImage1.Canvas.TextOut(form4.QRImage1.ClientWidth div 2-10,form4.QRImage1.ClientHeight div 2+i2+15,'
'+form1.edit39.Text+' ');
form4.QRImage1.Canvas.TextOut(form4.QRImage1.ClientWidth div 2+i1+15,i6,' '+form1.edit40.Text+' ');
form4.QRImage1.Canvas.TextOut(form4.QRImage1.ClientWidth div 2+i1+15,i7,' '+form1.edit41.Text+' ');
end;

procedure n_ary;
var
pos1:integer;
begin
for pos1:=low(nilaix1) to xpos do
begin
form6.Image1.Canvas.Pen.Color:=clblack;
form6.Image1.Canvas.Pen.Style:=pssolid;
form6.Image1.Canvas.Brush.Color:=clred;
if (nilaix1[pos1]>0) and (nilaiy1[pos1]>0)then
form6.Image1.Canvas.Ellipse(nilaix1[pos1]-skd ,nilaiy1[pos1]-skd ,nilaix1[pos1]-skd,nilaiy1[pos1]+skd );
end;
end;

procedure n_ary2;
var
pos2:integer;
begin
for pos2:=low(nilaix2) to xpos2 do
begin
form6.Image1.Canvas.Pen.Color:=clblack;
form6.Image1.Canvas.Pen.Style:=pssolid;
form6.Image1.Canvas.Brush.Color:=clred;
if (nilaix2[pos2]>0) and (nilaiy2[pos2]>0)then
form6.Image1.Canvas.Ellipse(nilaix2[pos2]-skd2,nilaiy2[pos2]-skd2,nilaix2[pos2]+skd2,nilaiy2[pos2]+skd2);
end;
end;

procedure n_aryk;
var
pos1:integer;
begin
for pos1:=low(nilaixk1)to xpos do
begin
form1.Image1.Canvas.Pen.Color:=clblack;
```

```
form1.Image1.Canvas.Pen.Style:=pssolid;
form1.Image1.Canvas.Brush.Color:=clred;
if (nilaixk1[pos1]>0) and (nilaiyk1[pos1]>0)then
case xg of
1:
begin
form1.Image1.Canvas.Pen.Color:=clblack;
form1.Image1.Canvas.Pen.Style:=pssolid;
form1.Image1.Canvas.Brush.Color:=clred;
form1.Image1.Canvas.Ellipse(nilaixk1[pos1]-skd,nilaiyk1[pos1]-skd,nilaixk1[pos1]+skd,nilaiyk1[pos1]+skd);
end;
2:
begin
form1.Image2.Canvas.Pen.Color:=clblack;
form1.Image2.Canvas.Pen.Style:=pssolid;
form1.Image2.Canvas.Brush.Color:=clred;
form1.Image2.Canvas.Ellipse(nilaixk1[pos1]-skd,nilaiyk1[pos1]-skd,nilaixk1[pos1]+skd,nilaiyk1[pos1]+skd);
end;
3:
begin
form1.Image3.Canvas.Pen.Color:=clblack;
form1.Image3.Canvas.Pen.Style:=pssolid;
form1.Image3.Canvas.Brush.Color:=clred;
form1.Image3.Canvas.Ellipse(nilaixk1[pos1]-skd,nilaiyk1[pos1]-skd,nilaixk1[pos1]+skd,nilaiyk1[pos1]+skd);
end;
4:
begin
form1.Image4.Canvas.Pen.Color:=clblack;
form1.Image4.Canvas.Pen.Style:=pssolid;
form1.Image4.Canvas.Brush.Color:=clred;
form1.Image4.Canvas.Ellipse(nilaixk1[pos1]-skd,nilaiyk1[pos1]-skd,nilaixk1[pos1]+skd,nilaiyk1[pos1]+skd);
end;
end;
end;
end;

procedure n_aryk2;
var
pos2:integer;
begin
for pos2:=low(nilaixk2) to xpos2 do
begin
if (nilaixk2[pos2]>0) and (nilaiyk2[pos2]>0)then
case xg of
1:
begin
form1.Image1.Canvas.Pen.Color:=clblack;
form1.Image1.Canvas.Pen.Style:=pssolid;
form1.Image1.Canvas.Brush.Color:=clred;
form1.Image1.Canvas.Ellipse(nilaixk2[pos2]-skd2,nilaiyk2[pos2]-skd2,nilaixk2[pos2]+skd2,nilaiyk2[pos2]+skd2);
end;
2:
begin
form1.Image2.Canvas.Pen.Color:=clblack;
form1.Image2.Canvas.Pen.Style:=pssolid;
form1.Image2.Canvas.Brush.Color:=clred;
form1.Image2.Canvas.Ellipse(nilaixk2[pos2]-skd2,nilaiyk2[pos2]-skd2,nilaixk2[pos2]+skd2,nilaiyk2[pos2]+skd2);
end;
3:
begin
form1.Image3.Canvas.Pen.Color:=clblack;
form1.Image3.Canvas.Pen.Style:=pssolid;
form1.Image3.Canvas.Brush.Color:=clred;
form1.Image3.Canvas.Ellipse(nilaixk2[pos2]-skd2,nilaiyk2[pos2]-skd2,nilaixk2[pos2]+skd2,nilaiyk2[pos2]+skd2);
end;
4:
begin
form1.Image4.Canvas.Pen.Color:=clblack;
form1.Image4.Canvas.Pen.Style:=pssolid;
form1.Image4.Canvas.Brush.Color:=clred;
form1.Image4.Canvas.Ellipse(nilaixk2[pos2]-skd2,nilaiyk2[pos2]-skd2,nilaixk2[pos2]+skd2,nilaiyk2[pos2]+skd2);
```

```
end;
end;
end;
end;

procedure animasi;
begin
case xg of
1:gambar_kotakc;
2:gambar_tcc;
3:gambar_elc;
4:gambar_iic;
end;
n_ary;
n_ary2;
if (notasi=true) then
notation;
end;

procedure animasi2;
begin
case xg of
1:gambar_kotak;
2:gambar_tc;
3:gambar_el;
4:gambar_ii;
end;
n_aryk;
n_aryk2;
end;

procedure genap;
var
pos1:integer;
begin
jrkxa1:=0;
jrkxi1:=0;
psxa1:=sk1+skd;
psxi1:=sk3-skd;
for pos1:= xpos to xpos+ary  do
begin
if (pos1 mod 2=0)then
begin
psxa1:=psxa1+jrkxa1;
nilaix1[pos1]:=psxa1;
nilaiy1[pos1]:=psy1;
nilaixk1[pos1]:=psxa1;
nilaiyk1[pos1]:=psy1;
jrkxa1:=round((sk3-sk1-2*skd)/(ary-2));
end
else
begin
psxi1:=psxi1-jrkxi1;
nilaix1[pos1]:=psxi1;
nilaiy1[pos1]:=psy1;
nilaixk1[pos1]:=psxi1;
nilaiyk1[pos1]:=psy1;
jrkxi1:=round((sk3-sk1-2*skd)/(ary-2));
end;
end;
end;

procedure genap2;
var
pos2:integer;
begin
jrkxa2:=0;
jrkxi2:=0;
psxa2:=sk1+skd2;
psxi2:=sk3-skd2;
for pos2:=xpos2 to xpos2+ary2 do
```

```
begin
if (pos2 mod 2=0)then
begin
psxa2:=psxa2+jrkxa2;
nilaix2[pos2]:=psxa2;
nilaiy2[pos2]:=psy2;
nilaixk2[pos2]:=psxa2;
nilaiyk2[pos2]:=psy2;
jrkxa2:=round((sk3-sk1-2*skd2)/(ary2-2));
end
else
begin
psxi2:=psxi2-jrkxi2;
nilaix2[pos2]:=psxi2;
nilaiy2[pos2]:=psy2;
nilaixk2[pos2]:=psxi2;
nilaiyk2[pos2]:=psy2;
jrkxi2:=round((sk3-sk1-2*skd2)/(ary2-2));
end;
end;
end;

procedure ganjil;
var
pos1:integer;
begin
jrkxa1:=0;
jrkxi1:=0;
psxa1:=sk1+skd;
psxi1:=sk3-skd;
for pos1:=xpos to xpos+ary  do
begin
if (pos1=xpos)then
begin
psxa1:=psxa1+round((sk3-sk1-2*skd)/2);
nilaix1[pos1]:=psxa1;
nilaiy1[pos1]:=psy1;
nilaixk1[pos1]:=psxa1;
nilaiyk1[pos1]:=psy1;
psxa1:=sk1+skd;
end
else
begin
if (pos1 mod 2=0)then
begin
psxa1:=psxa1+jrkxa1;
nilaix1[pos1]:=psxa1;
nilaiy1[pos1]:=psy1;
nilaixk1[pos1]:=psxa1;
nilaiyk1[pos1]:=psy1;
jrkxa1:=round((sk3-sk1-2*skd)/(ary-2));
end
else
begin
psxi1:=psxi1-jrkxi1;
nilaix1[pos1]:=psxi1;
nilaiy1[pos1]:=psy1;
nilaixk1[pos1]:=psxi1;
nilaiyk1[pos1]:=psy1;
jrkxi1:=round((sk3-sk1-2*skd)/(ary-2));
end;
end;
end;
end;

procedure ganjil2;
var
pos2:integer;
begin
jrkxa2:=0;
jrkxi2:=0;
```

```
psxa2:=sk1+skd2;
psxi2:=sk3-skd2;
for pos2:= xpos2 to xpos2+ary2 do
begin
if (pos2=xpos2)then
begin
psxa2:=psxa2+round((sk3-sk1-2*skd2)/2);
nilaix2[pos2]:=psxa2;
nilaiy2[pos2]:=psy2;
nilaixk2[pos2]:=psxa2;
nilaiyk2[pos2]:=psy2;
psxa2:=sk1+skd2;
end
else
begin
if (pos2 mod 2=0)then
begin
psxa2:=psxa2+jrkxa2;
nilaix2[pos2]:=psxa2;
nilaiy2[pos2]:=psy2;
nilaixk2[pos2]:=psxa2;
nilaiyk2[pos2]:=psy2;
jrkxa2:=round((sk3-sk1-2*skd2)/(ary2-2));
end
else
begin
psxi2:=psxi2-jrkxi2;
nilaix2[pos2]:=psxi2;
nilaiy2[pos2]:=psy2;
nilaixk2[pos2]:=psxi2;
nilaiyk2[pos2]:=psy2;
jrkxi2:=round((sk3-sk1-2*skd2)/(ary2-2));
end;
end;
end;
end;

procedure bagi_tulangan;
var
pos1,posjar,jar1,njar,mjar,yjar:integer;
begin
jrkxa1:=round((sk3-sk1-2*skd2)/(ary-2));
if(dm<=12)then jar1:=trunc((25+2*dm)*xx/skl) else jar1:=trunc(4*dm*xx/skl);
xpos:=2;
if (jrkxa1>jar1)
then
begin
skd:=trunc((dm/skl)*xx);
if (ary mod 2=0)then ganjil else genap;
xpos:=xpos+ary-2;
end
else
begin
skd:=trunc((dm/skl)*xx);
if(jar1<1)then jar1:=1;
njar:=ceil((sk3-sk1-2*skd)/jar1);
if(njar<2)then
begin
messagedlg('Susunan tulangan tidak memenuhi syarat',mtinformation,[mbok],0);
exit;
end;
yjar:=(ary-1) div njar;
mjar:=(ary-1) mod njar;
for posjar:=1 to yjar do
begin
ary:=njar+1;
if (ary mod 2=0)then ganjil else genap;
psy1:=psy1+jar1;
xpos:=xpos+njar;
end;
if(mjar>1)then
```

```
begin
ary:=mjar+1;
if (ary mod 2 = 0)then ganjil else genap;
xpos:=xpos+mjar-1;
end
else if (mjar=1)then
begin
ary:=mjar;
genap;
xpos:=xpos;
end
else
xpos:=xpos-1;
end;
end;

procedure bagi_tulangan2;
var
pos2,posjar2,jar2,njar2,mjar2,yjar2:integer;
begin
jrkxa2:=round((sk3-sk1-2*skd2)/(ary2-2));
if(dm2<=12)then jar2:=(trunc((25+2*dm2)*xx/skl) else jar2:=trunc(4*dm2*xx/skl);
xpos2:=2;
if (jrkxa2>jar2)
then
begin
skd2:=trunc((dm2/skl)*xx);
if (ary2 mod 2=0)then ganjil2 else genap2;
xpos2:=xpos2+ary2-2;
end
else
begin
skd2:=trunc((dm2/skl)*xx);
if(jar2<1)then jar2:=1;
njar2:=ceil((sk3-sk1-2*skd2)/jar2);
if(njar2<2)then
begin
messagedlg('Susunan tulangan tidak memenuhi syarat',mtinformation,[mbok],0);
exit;
end;
yjar2:=(ary2-1) div njar2;
mjar2:=(ary2-1) mod njar2;
for posjar2:=1 to yjar2 do
begin
ary2:=njar2+1;
if (ary2 mod 2=0)then ganjil2 else genap2;
psy2:=psy2-jar2;
xpos2:=xpos2+njar2;
end;
if(mjar2>1)then
begin
ary2:=mjar2+1;
if (ary2 mod 2=0)then ganjil2 else genap2;
xpos2:=xpos2+mjar2-1;
end
else if (mjar2=1)then
begin
ary2:=mjar2;
genap2;
xpos2:=xpos2;
end
else
xpos2:=xpos2-1;
end;
end;

procedure gambar_tulangan;
var
pos1,pos2:integer;
begin
susun_tulangan;
```

```
empty1;
empty2;
skd:=trunc((dm/skl)*xx);
skd2:=trunc((dm2/skl)*xx);
psy1:=sk2+skd;
psy2:=sk4-skd2;
jrky1:=0;
jrky2:=0;
bagi_tulangan;
bagi_tulangan2;
end;

procedure gambar_tulkecil;
var
pos1,pos2:integer;
begin
susun_tulangan;
skd:=trunc((dm/skl)*xx);
skd2:=trunc((dm2/skl)*xx);
psx1:=sk1+skd;
psx2:=sk1+skd2;
psy1:=sk2+skd;
psy2:=sk4-skd2;
empty3;
empty4;
jrkxa1:=0;
jrkxa2:=0;
bagi_tulangan;
bagi_tulangan2;
end;

procedure gambarsengkang;
var
nsk:integer;
begin
skp:=sk1;
jrsk:=trunc((sk3-sk1)/ns);
for nsk:= 1 to ns do
begin
skp:=jrsk+skp;
form1.Image1.Canvas.MoveTo(skp,sk2);
form1.Image1.Canvas.LineTo(skp,sk4);
end;
end;

end.

unit Unit3;

interface

procedure tulis_kotak;
procedure tulis_te;
procedure tulis_el;
procedure tulis_ii;
procedure insert_data;
procedure restore_data;
procedure edit_sengk;
procedure ptpc;
procedure tulangan;
procedure tulangan2;
procedure kalkul1;
procedure kalkul2;
procedure kalkul3;
procedure kalkulasi;
procedure notation;
procedure susun_tulangan;
procedure d_6;
procedure d_8;
procedure d_10;
procedure d_12;
```

```
procedure d_16;
procedure d_19;
procedure d_20;
procedure d_22;
procedure d_25;
procedure d_28;
procedure d_32;
procedure d_40;
procedure sl_6;
procedure sl_8;
procedure sl_10;
procedure sl_12;
procedure sl_13;
procedure sl_16;
procedure sl_19;
procedure sl_20;
procedure sl_22;
function pangkat(a,b:integer):integer;
procedure hps1;
procedure hps2;
procedure empty1;
procedure empty2;
procedure empty3;
procedure empty4;
procedure satuan;
procedure baru;
procedure strg;

implementation

uses Unit1, Unit2,Windows,Math, Messages, SysUtils, Variants, Classes, Graphics, Controls, Forms,
  Dialogs, Buttons, ExtCtrls, ToolWin, ActnMan, ActnCtrls, StdCtrls,
  ComCtrls, Unit4, Unit5, Unit6, Unit7, Unit8;

var
  lta,ltb:real;
  r1,t1,s1,u1,x1,y1,z1,w1,r2,t2,s2,u2,x2,y2,z2,w2,r3,t3,s3,u3,x3,y3,z3,w3:integer;
  ls1,ls2,ls3:double;
  sia1,sib1,sia2,sib2,sia3,sib3:boolean;
  nilaia1:array[1..100] of integer;
  nilaia2:array[1..100] of integer;
  nilaib1:array[1..100] of integer;
  nilaib2:array[1..100] of integer;
  nilaia3:array[1..100] of integer;
  nilaib3:array[1..100] of integer;

procedure tulis_kotak;
begin
form1.Memo1.Font.Color:=clblack;
form1.Memo1.Lines.Add('Data masukkan :');
form1.Memo1.Lines.Add('----------------------');
form1.Memo1.Lines.Add('Nama balok : '+form1.Edit24.Text);
form1.Memo1.Lines.Add('Bagian yang dihitung : '+form1.Edit25.Text);
form1.Memo1.Lines.Add('Beban yang digunakan : '+form1.ComboBox4.Text);
form1.Memo1.Lines.Add('Kuat tarik baja = '+form1.Edit1.Text+' '+satkd);
form1.Memo1.Lines.Add('Kuat desak beton = '+form1.Edit2.Text+' '+satkd);
form1.Memo1.Lines.Add('Kuat tarik sengkang = '+form1.Edit3.Text+' '+satkd);
form1.Memo1.Lines.Add('Tebal selimut = '+form1.Edit4.Text+' '+satpj);
form1.Memo1.Lines.Add('Tinggi balok = '+form1.Edit28.Text+' '+satpj);
form1.Memo1.Lines.Add('Lebar balok = '+form1.Edit27.Text+' '+satpj);
form1.Memo1.Lines.Add('Momen yang bekerja = '+form1.Edit5.Text+' '+satmmn);
if (tpc=false) then
begin
form1.Memo1.Lines.Add('Gaya geser yang bekerja = '+form1.Edit11.Text+' '+satgy);
form1.Memo1.Lines.Add('Momen torsi yang bekerja = '+form1.Edit12.Text+' '+satmmn);
end;
form1.Memo1.Lines.Add('');
form1.Memo1.Lines.Add('Hasil hitungan lentur :');
form1.Memo1.Lines.Add('----------------------------');
form1.Memo1.Lines.Add('Luas tulangan tekan yang dibutuhkan = '+form1.Edit7.Text+' '+satls);
form1.Memo1.Lines.Add('Luas tulangan tarik yang dibutuhkan = '+form1.Edit8.Text+' '+satls);
```

```
form1.Memo1.Lines.Add('Penulangan tekan yang digunakan = '+form1.ComboBox1.Text);
form1.Memo1.Lines.Add('Penulangan tarik yang digunakan = '+form1.ComboBox2.Text);
form1.Memo1.Lines.Add('Luas tulangan tekan yang digunakan = '+form1.Edit9.Text+' '+satls);
form1.Memo1.Lines.Add('Luas tulangan tarik yang digunakan = '+form1.Edit10.Text+' '+satls);
if not (strtofloat(form1.Edit6.Text)=0)then
form1.Memo1.Lines.Add('Hasil hitungan analisis tampang balok (Mn) = '+form1.Edit6.Text+' '+satmmn);
if (tpc=false) then
ptpc;
end;

procedure tulis_te;
begin
form1.Memo1.Font.Color:=clblack;
form1.Memo1.Lines.Add('Data masukkan :');
form1.Memo1.Lines.Add('----------');
form1.Memo1.Lines.Add('Nama balok : '+form1.Edit24.Text);
form1.Memo1.Lines.Add('Bagian yang dihitung : '+form1.Edit25.Text);
form1.Memo1.Lines.Add('Beban yang digunakan : '+form1.ComboBox4.Text);
form1.Memo1.Lines.Add('Kuat tarik baja = '+form1.Edit1.Text+' '+satkd);
form1.Memo1.Lines.Add('Kuat desak beton = '+form1.Edit2.Text+' '+satkd);
form1.Memo1.Lines.Add('Kuat tarik sengkang = '+form1.Edit3.Text+' '+satkd);
form1.Memo1.Lines.Add('Tebal selimut = '+form1.Edit4.Text+' '+satpj);
form1.Memo1.Lines.Add('Tinggi balok = '+form1.Edit30.Text+' '+satpj);
form1.Memo1.Lines.Add('Lebar sayap atas = '+form1.Edit29.Text+' '+satpj);
form1.Memo1.Lines.Add('Lebar badan balok = '+form1.Edit31.Text+' '+satpj);
form1.Memo1.Lines.Add('Tinggi sayap atas = '+form1.Edit32.Text+' '+satpj);
form1.Memo1.Lines.Add('Momen yang bekerja = '+form1.Edit5.Text+' '+satmmn);
if (tpc=false) then
begin
form1.Memo1.Lines.Add('Gaya geser yang bekerja = '+form1.Edit11.Text+' '+satgy);
form1.Memo1.Lines.Add('Momen torsi yang bekerja = '+form1.Edit12.Text+' '+satmmn);
end;
form1.Memo1.Lines.Add('');
form1.Memo1.Lines.Add('Hasil hitungan :');
form1.Memo1.Lines.Add('----------');
form1.Memo1.Lines.Add('Luas tulangan tekan yang dibutuhkan = '+form1.Edit7.Text+' '+satls);
form1.Memo1.Lines.Add('Luas tulangan tarik yang dibutuhkan = '+form1.Edit8.Text+' '+satls);
form1.Memo1.Lines.Add('Penulangan tekan yang digunakan = '+form1.ComboBox1.Text);
form1.Memo1.Lines.Add('Penulangan tarik yang digunakan = '+form1.ComboBox2.Text);
form1.Memo1.Lines.Add('Luas tulangan tekan yang digunakan = '+form1.Edit9.Text+' '+satls);
form1.Memo1.Lines.Add('Luas tulangan tarik yang digunakan = '+form1.Edit10.Text+' '+satls);
if not (strtofloat(form1.Edit6.Text)=0)then
form1.Memo1.Lines.Add('Hasil hitungan analisis tampang balok (Mn) = '+form1.Edit6.Text+' '+satmmn);
if (tpc=false) then
ptpc;
end;

procedure tulis_el;
begin
form1.Memo1.Font.Color:=clblack;
form1.Memo1.Lines.Add('Data masukkan :');
form1.Memo1.Lines.Add('----------');
form1.Memo1.Lines.Add('Nama balok : '+form1.Edit24.Text);
form1.Memo1.Lines.Add('Bagian yang dihitung : '+form1.Edit25.Text);
form1.Memo1.Lines.Add('Beban yang digunakan : '+form1.ComboBox4.Text);
form1.Memo1.Lines.Add('Kuat tarik baja = '+form1.Edit1.Text+' '+satkd);
form1.Memo1.Lines.Add('Kuat desak beton = '+form1.Edit2.Text+' '+satkd);
form1.Memo1.Lines.Add('Kuat tarik sengkang = '+form1.Edit3.Text+' '+satkd);
form1.Memo1.Lines.Add('Tebal selimut = '+form1.Edit4.Text+' '+satpj);
form1.Memo1.Lines.Add('Tinggi balok = '+form1.Edit34.Text+' '+satpj);
form1.Memo1.Lines.Add('Lebar sayap atas = '+form1.Edit33.Text+' '+satpj);
form1.Memo1.Lines.Add('Lebar badan balok = '+form1.Edit35.Text+' '+satpj);
form1.Memo1.Lines.Add('Tinggi sayap atas = '+form1.Edit36.Text+' '+satpj);
form1.Memo1.Lines.Add('Momen yang bekerja = '+form1.Edit5.Text+' '+satmmn);
if (tpc=false) then
begin
form1.Memo1.Lines.Add('Gaya geser yang bekerja = '+form1.Edit11.Text+' '+satgy);
form1.Memo1.Lines.Add('Momen torsi yang bekerja = '+form1.Edit12.Text+' '+satmmn);
end;
form1.Memo1.Lines.Add('');
form1.Memo1.Lines.Add('Hasil hitungan :');
```

```
form1.Memo1.Lines.Add('----------');
form1.Memo1.Lines.Add('Luas tulangan tekan yang dibutuhkan = '+form1.Edit7.Text+' '+satls);
form1.Memo1.Lines.Add('Luas tulangan tarik yang dibutuhkan = '+form1.Edit8.Text+' '+satls);
form1.Memo1.Lines.Add('Penulangan tekan yang digunakan = '+form1.ComboBox1.Text);
form1.Memo1.Lines.Add('Penulangan tarik yang digunakan = '+form1.ComboBox2.Text);
form1.Memo1.Lines.Add('Luas tulangan tekan yang digunakan = '+form1.Edit9.Text+' '+satls);
form1.Memo1.Lines.Add('Luas tulangan tarik yang digunakan = '+form1.Edit10.Text+' '+satls);
if not (strtofloat(form1.Edit6.Text)=0)then
form1.Memo1.Lines.Add('Hasil hitungan analisis tampang balok (Mn) = '+form1.Edit6.Text+' '+satmmn);
if (tpc=false) then
ptpc;
end;

procedure tulis_ii;
begin
form1.Memo1.Font.Color:=clblack;
form1.Memo1.Lines.Add('Data masukkan :');
form1.Memo1.Lines.Add('----------');
form1.Memo1.Lines.Add('Nama balok : '+form1.Edit24.Text);
form1.Memo1.Lines.Add('Bagian yang dihitung : '+form1.Edit25.Text);
form1.Memo1.Lines.Add('Beban yang digunakan : '+form1.ComboBox4.Text);
form1.Memo1.Lines.Add('Kuat tarik baja = '+form1.Edit1.Text+' '+satkd);
form1.Memo1.Lines.Add('Kuat desak beton = '+form1.Edit2.Text+' '+satkd);
form1.Memo1.Lines.Add('Kuat tarik sengkang = '+form1.Edit3.Text+satkd);
form1.Memo1.Lines.Add('Tebal selimut = '+form1.Edit4.Text+' '+satpj);
form1.Memo1.Lines.Add('Tinggi balok = '+form1.Edit38.Text+' '+satpj);
form1.Memo1.Lines.Add('Lebar sayap atas = '+form1.Edit37.Text+' '+satpj);
form1.Memo1.Lines.Add('Lebar badan balok = '+form1.Edit39.Text+' '+satpj);
form1.Memo1.Lines.Add('Tinggi sayap atas = '+form1.Edit40.Text+' '+satpj);
form1.Memo1.Lines.Add('Tinggi sayap bawah = '+form1.Edit41.Text+' '+satpj);
form1.Memo1.Lines.Add('Momen yang bekerja = '+form1.Edit5.Text+' '+satmmn);
if (tpc=false) then
begin
form1.Memo1.Lines.Add('Gaya geser yang bekerja = '+form1.Edit11.Text+' '+satgy);
form1.Memo1.Lines.Add('Momen torsi yang bekerja = '+form1.Edit12.Text+' '+satmmn);
end;
form1.Memo1.Lines.Add('');
form1.Memo1.Lines.Add('Hasil hitungan :');
form1.Memo1.Lines.Add('----------');
form1.Memo1.Lines.Add('Luas tulangan tekan yang dibutuhkan = '+form1.Edit7.Text+' '+satls);
form1.Memo1.Lines.Add('Luas tulangan tarik yang dibutuhkan = '+form1.Edit8.Text+' '+satls);
form1.Memo1.Lines.Add('Penulangan tekan yang digunakan = '+form1.ComboBox1.Text);
form1.Memo1.Lines.Add('Penulangan tarik yang digunakan = '+form1.ComboBox2.Text);
form1.Memo1.Lines.Add('Luas tulangan tekan yang digunakan = '+form1.Edit9.Text+' '+satls);
form1.Memo1.Lines.Add('Luas tulangan tarik yang digunakan = '+form1.Edit10.Text+' '+satls);
if not (strtofloat(form1.Edit6.Text)=0)then
form1.Memo1.Lines.Add('Hasil hitungan analisis tampang balok (Mn) = '+form1.Edit6.Text+' '+satmmn);
if (tpc=false) then
ptpc;
end;

procedure ptpc;
begin
form1.Memo1.Lines.Add('');
form1.Memo1.Lines.Add('Hasil hitungan geser dan torsi :');
form1.Memo1.Lines.Add('----------');
form1.Memo1.Lines.Add('Sigma X kuadrat Y : '+floattostr(xy));
form1.Memo1.Lines.Add('Tc = '+format('%5.5f',[tc*kongya/1000000])+' '+satmmn);
form1.Memo1.Lines.Add('Ts = '+format('%5.5f',[ts*kongya/1000000])+' '+satmmn);
form1.Memo1.Lines.Add('Vc = '+format('%5.5f',[vc*kongya/1000])+' '+satgy);
form1.Memo1.Lines.Add('Vs = '+format('%5.5f',[vs*kongya/1000])+' '+satgy);
form1.Memo1.Lines.Add('Av/s yang bekerja = '+format('%5.3f',[av*konlsa])+' '+satls);
form1.Memo1.Lines.Add('At/s yang bekerja = '+format('%5.3f',[at*konlsa])+' '+satls);
form1.Memo1.Lines.Add('Avt/s yang bekerja = '+format('%5.3f',[avt*konlsa])+' '+satls);
form1.Memo1.Lines.Add('Al yang bekerja = '+ format('%5.2f',[al*konlsa])+' '+satls);
form1.Memo1.Lines.Add('Penulangan geser yang digunakan = '+ form1.Edit17.Text);
form1.Memo1.Lines.Add('Penulangan torsi yang digunakan = '+ form1.Edit18.Text);
form1.Memo1.Lines.Add('Penulangan gabungan geser dan torsi yang digunakan = '+form1.Edit19.Text);
form1.Memo1.Lines.Add('Penulangan torsi longitudinal yang digunakan ='+form1.ComboBox3.Text);
form1.Memo1.Lines.Add('Av/s yang digunakan = '+format('%5.3f',[av2*konlsa])+' '+satls);
form1.Memo1.Lines.Add('At/s yang digunakan = '+format('%5.3f',[at2*konlsa])+' '+satls);
```

```
form1.Memo1.Lines.Add('Avt/s yang digunakan = '+format('%5.3f',[avt2*konlsa])+' '+satls);
form1.Memo1.Lines.Add('Al yang digunakan = '+format('%5.2f',[ls3*konlsa])+' '+satls);
end;

procedure insert_data;
begin
with data do
begin
efy:=form1.Edit1.Text;
efc:=form1.Edit2.Text;
efys:=form1.Edit3.Text;
es:=form1.Edit4.Text;
emu:=form1.Edit5.Text;
evu:=form1.Edit11.Text;
etu:=form1.Edit12.Text;
enama:=form1.Edit24.Text;
eletak:=form1.Edit25.Text;
ebeban:=form1.ComboBox4.Text;
eik1:=form1.edit27.Text;
eik2:=form1.edit28.Text;
eit1:=form1.edit29.Text;
eit2:=form1.edit30.Text;
eit3:=form1.edit31.Text;
eit4:=form1.Edit32.Text;
eil1:=form1.Edit33.Text;
eil2:=form1.Edit34.Text;
eil3:=form1.Edit35.Text;
eil4:=form1.Edit36.Text;
eii1:=form1.Edit37.Text;
eii2:=form1.Edit38.Text;
eii3:=form1.Edit39.Text;
eii4:=form1.Edit40.Text;
eii5:=form1.Edit41.Text;
exg:=inttostr(xg);
ecs:=inttostr(cs);
end;
write(namasimpan,data);
closefile(namasimpan);
end;

procedure restore_data;
begin
read(namasimpan,data);
with data do
begin
form1.Edit1.Text:=efy;
form1.Edit2.Text:=efc;
form1.Edit3.Text:=efys;
form1.Edit4.Text:=es;
form1.Edit5.Text:=emu;
form1.Edit11.Text:=evu;
form1.Edit12.Text:=etu;
form1.Edit24.Text:=enama;
form1.Edit25.Text:=eletak;
form1.ComboBox4.Text:=ebeban;
form1.edit27.Text:=eik1;
form1.edit28.Text:=eik2;
form1.edit29.Text:=eit1;
form1.edit30.Text:=eit2;
form1.edit31.Text:=eit3;
form1.Edit32.Text:=eit4;
form1.Edit33.Text:=eil1;
form1.Edit34.Text:=eil2;
form1.Edit35.Text:=eil3;
form1.Edit36.Text:=eil4;
form1.Edit37.Text:=eii1;
form1.Edit38.Text:=eii2;
form1.Edit39.Text:=eii3;
form1.Edit40.Text:=eii4;
form1.Edit41.Text:=eii5;
xg:=strtoint(exg);
```

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```
cs:=strtoint(ecs);
end;
closefile(namasimpan);
end;


procedure edit_sengk;
begin
case xg of
1:h:=strtofloat(form1.Edit28.Text)*konpjb;
2:h:=strtofloat(form1.Edit30.Text)*konpjb;
3:h:=strtofloat(form1.Edit34.Text)*konpjb;
4:h:=strtofloat(form1.Edit38.Text)*konpjb;
end;
if(selimut=true)then
begin
s:=h/10;
if (s<35)then s:=35;
form1.Edit4.Text:=floattostr(s*konpja);
end
else
form1.Edit4.Text:=floattostr(s*konpja);
end;

procedure tulangan;
begin
lta:=strtofloat(form1.edit7.Text)*konlsb;
ltb:=strtofloat(form1.Edit8.Text)*konlsb;
form1.ComboBox1.Clear;
form1.ComboBox2.Clear;
d_6;
d_8;
d_10;
d_12;
d_16;
d_19;
d_20;
d_22;
d_25;
d_28;
d_32;
d_40;
form1.ComboBox1.Text:=form1.ComboBox1.Items[0];
form1.ComboBox2.Text:=form1.ComboBox2.Items[0];
if (klk=true)and (nnn=true)then
begin
kalkul1;
kalkul2;
end
else if (klk=false)and (nnn=true) then
begin
kalkul2;
form1.ComboBox1.Text:='0d0';
form1.Edit9.Text:='0';
end
else if (klk=true)and (nnn=false) then
begin
kalkul1;
form1.ComboBox2.Text:='0d0';
form1.Edit10.Text:='0';
end
else
exit;
end;

procedure kalkulasi;
begin
u1:=0;
u2:=0;
w1:=0;
w2:=0;
```

```
if (klk=true)and (nnn=true)then
begin
kalkul1;
kalkul2;
end
else if (klk=false)and (nnn=true) then
begin
kalkul2;
end
else if (klk=true)and (nnn=false) then
begin
kalkul1;
end
else
exit;
end;

procedure d_6;
var
a_6,b_6:integer;
begin
a_6:=ceil(lta/(0.25*phi*sqr(6)));
b_6:=ceil(ltb/(0.25*phi*sqr(6)));
if (a_6>1)and (a_6<20)then
form1.ComboBox1.Items.Add(inttostr(a_6)+'d'+'6');
if (b_6>1)and (b_6<20)then
form1.ComboBox2.Items.Add(inttostr(b_6)+'d'+'6');
end;

procedure d_8;
var
a_8,b_8:integer;
begin
a_8:=ceil(lta/(0.25*phi*sqr(8)));
b_8:=ceil(ltb/(0.25*phi*sqr(8)));
if (a_8>1)and (a_8<20)then
form1.ComboBox1.Items.Add(inttostr(a_8)+'d'+'8');
if (b_8>1)and (b_8<20)then
form1.ComboBox2.Items.Add(inttostr(b_8)+'d'+'8');
end;

procedure d_10;
var
a_10,b_10:integer;
begin
a_10:=ceil(lta/(0.25*phi*sqr(10)));
b_10:=ceil(ltb/(0.25*phi*sqr(10)));
if (a_10>1)and (a_10<20)then
form1.ComboBox1.Items.Add(inttostr(a_10)+'d'+'10');
if (b_10>1)and (b_10<20)then
form1.ComboBox2.Items.Add(inttostr(b_10)+'d'+'10');
end;

procedure d_12;
var
a_12,b_12:integer;
begin
a_12:=ceil(lta/(0.25*phi*sqr(12)));
b_12:=ceil(ltb/(0.25*phi*sqr(12)));
if (a_12>1)and (a_12<20)then
form1.ComboBox1.Items.Add(inttostr(a_12)+'d'+'12');
if (b_12>1)and (b_12<20)then
form1.ComboBox2.Items.Add(inttostr(b_12)+'d'+'12');
end;

procedure d_16;
var
a_16,b_16:integer;
begin
a_16:=ceil(lta/(0.25*phi*sqr(16)));
b_16:=ceil(ltb/(0.25*phi*sqr(16)));
```

```
if (a_16>1)and (a_16<20)then
form1.ComboBox1.Items.Add(inttostr(a_16)+'d'+'16');
if (b_16>1)and (b_16<20)then
form1.ComboBox2.Items.Add(inttostr(b_16)+'d'+'16');
end;

procedure d_19;
var
a_19,b_19:integer;
begin
a_19:=ceil(lta/(0.25*phi*sqr(19)));
b_19:=ceil(ltb/(0.25*phi*sqr(19)));
if (a_19>1)and (a_19<20)then
form1.ComboBox1.Items.Add(inttostr(a_19)+'d'+'19');
if (b_19>1)and (b_19<20)then
form1.ComboBox2.Items.Add(inttostr(b_19)+'d'+'19');
end;

procedure d_20;
var
a_20,b_20:integer;
begin
a_20:=ceil(lta/(0.25*phi*sqr(20)));
b_20:=ceil(ltb/(0.25*phi*sqr(20)));
if (a_20>1)and (a_20<20)then
form1.ComboBox1.Items.Add(inttostr(a_20)+'d'+'20');
if (b_20>1)and (b_20<20)then
form1.ComboBox2.Items.Add(inttostr(b_20)+'d'+'20');
end;

procedure d_22;
var
a_22,b_22:integer;
begin
a_22:=ceil(lta/(0.25*phi*sqr(22)));
b_22:=ceil(ltb/(0.25*phi*sqr(22)));
if (a_22>1)and (a_22<20)then
form1.ComboBox1.Items.Add(inttostr(a_22)+'d'+'22');
if (b_22>1)and (b_22<20)then
form1.ComboBox2.Items.Add(inttostr(b_22)+'d'+'22');
end;

procedure d_25;
var
a_25,b_25:integer;
begin
a_25:=ceil(lta/(0.25*phi*sqr(25)));
b_25:=ceil(ltb/(0.25*phi*sqr(25)));
if (a_25>1)and (a_25<20)then
form1.ComboBox1.Items.Add(inttostr(a_25)+'d'+'25');
if (b_25>1)and (b_25<20)then
form1.ComboBox2.Items.Add(inttostr(b_25)+'d'+'25');
end;

procedure d_28;
var
a_28,b_28:integer;
begin
a_28:=ceil(lta/(0.25*phi*sqr(28)));
b_28:=ceil(ltb/(0.25*phi*sqr(28)));
if (a_28>1)and (a_28<20)then
form1.ComboBox1.Items.Add(inttostr(a_28)+'d'+'28');
if (b_28>1)and (b_28<20)then
form1.ComboBox2.Items.Add(inttostr(b_28)+'d'+'28');
end;

procedure d_32;
var
a_32,b_32:integer;
begin
a_32:=ceil(lta/(0.25*phi*sqr(32)));
```

```
b_32:=ceil(ltb/(0.25*phi*sqr(32)));
if (a_32>1)and (a_32<20)then
form1.ComboBox1.Items.Add(inttostr(a_32)+'d'+'32');
if (b_32>1)and (b_32<20)then
form1.ComboBox2.Items.Add(inttostr(b_32)+'d'+'32');
end;

procedure d_40;
var
a_40,b_40:integer;
begin
a_40:=ceil(lta/(0.25*phi*sqr(40)));
b_40:=ceil(ltb/(0.25*phi*sqr(40)));
if (a_40>1)then
form1.ComboBox1.Items.Add(inttostr(a_40)+'d'+'40');
if (b_40>1)then
form1.ComboBox2.Items.Add(inttostr(b_40)+'d'+'40');
end;

procedure tulangan2;
begin
form1.ComboBox3.Clear;
sl_6;
sl_8;
sl_10;
sl_12;
sl_13;
sl_16;
sl_19;
sl_20;
sl_22;
form1.ComboBox3.Text:=form1.ComboBox3.Items[0];
kalkul3;
end;

procedure sl_6;
var
sl6:integer;
begin
sl6:=ceil(al/(0.25*phi*sqr(6)));
if (sl6>1)and (sl6<20)then
form1.ComboBox3.Items.Add(inttostr(sl6)+'d'+'6');
end;

procedure sl_8;
var
sl8:integer;
begin
sl8:=ceil(al/(0.25*phi*sqr(8)));
if (sl8>1)and (sl8<20)then
form1.ComboBox3.Items.Add(inttostr(sl8)+'d'+'8');
end;

procedure sl_10;
var
sl10:integer;
begin
sl10:=ceil(al/(0.25*phi*sqr(10)));
if (sl10>1)and (sl10<20)then
form1.ComboBox3.Items.Add(inttostr(sl10)+'d'+'10');
end;

procedure sl_12;
var
sl12:integer;
begin
sl12:=ceil(al/(0.25*phi*sqr(12)));
if (sl12>1)and (sl12<20)then
form1.ComboBox3.Items.Add(inttostr(sl12)+'d'+'12');
end;
```

```
procedure sl_13;
var
sl13:integer;
begin
sl13:=ceil(al/(0.25*phi*sqr(12)));
if (sl13>1)and (sl13<20)then
form1.ComboBox3.Items.Add(inttostr(sl13)+'d'+'13');
end;

procedure sl_16;
var
sl16:integer;
begin
sl16:=ceil(al/(0.25*phi*sqr(16)));
if (sl16>1)and (sl16<20)then
form1.ComboBox3.Items.Add(inttostr(sl16)+'d'+'16');
end;

procedure sl_19;
var
sl19:integer;
begin
sl19:=ceil(al/(0.25*phi*sqr(19)));
if (sl19>1)and (sl19<20)then
form1.ComboBox3.Items.Add(inttostr(sl19)+'d'+'19');
end;

procedure sl_20;
var
sl20:integer;
begin
sl20:=ceil(al/(0.25*phi*sqr(20)));
if (sl20>1)and (sl20<20)then
form1.ComboBox3.Items.Add(inttostr(sl20)+'d'+'20');
end;

procedure sl_22;
var
sl22:integer;
begin
sl22:=ceil(al/(0.25*phi*sqr(22)));
if (sl22>1)then
form1.ComboBox3.Items.Add(inttostr(sl22)+'d'+'22');
end;

procedure susun_tulangan;
begin
kalkulasi;
dm:=u1;
dm2:=u2;
ary:=w1+1;
ary2:=w2+1;
end;

function pangkat(a,b:integer):integer;
var
f,c:integer;
begin
c:=1;
for f:=1 to b do
begin
c:=c*a;
end;
result:=c;
end;

procedure kalkul1;
var
nr1,sr1,kr1:char;
begin
sia1:=true;
```

```
sib1:=false;
x1:=length(form1.ComboBox1.Text);
for y1:=1 to x1 do
begin
kr1:  form1.ComboBox1.text[y1];
if (kr1='d') or (kr1='D')then
break;
s1:=y1+2;
nilaia1[y1]:=strtoint(form1.ComboBox1.Text[y1]);
end;
for r1:=s1 to x1 do
begin
sr1:=form1.ComboBox1.text[r1];
nilaib1[r1]:=strtoint(form1.ComboBox1.Text[r1]);
end;
w1:=0;
for z1:=1 to (y1-1) do
begin
w1:=w1+nilaia1[z1]*pangkat(10,(y1-z1-1));
end;
u1:=0;
for t1:=s1 to x1 do
begin
u1:=u1+nilaib1[t1]*pangkat(10,(x1-t1));
end;
ls1:=0.25*phi*pangkat(u1,2)*w1;
form1.edit9.Text:=format('%5.2f',[ls1*konlsa]);
end;

procedure kalkul2;
var
mr2,sr2,kr2:char;
begin
sia2:=true;
sib2:=false;
x2:=length(form1.ComboBox2.Text);
for y2:=1 to x2 do
begin
kr2:=form1.ComboBox2.text[y2];
if (kr2='d') or (kr2='D')then
break;
s2:=y2+2;
nilaia2[y2]:=strtoint(form1.ComboBox2.Text[y2]);
end;
for r2:=s2 to x2 do
begin
sr2:=form1.ComboBox2.text[r2];
nilaib2[r2]:=strtoint(form1.ComboBox2.Text[r2]);
end;
w2:=0;
for z2:=1 to (y2-1) do
begin
w2:=w2+nilaia2[z2]*pangkat(10,(y2-z2-1));
end;
u2:=0;
for t2:=s2 to x2 do
begin
u2:=u2+nilaib2[t2]*pangkat(10,(x2-t2));
end;
ls2:=0.25*phi*pangkat(u2,2)*w2;
form1.edit10.Text:=format('%5.2f',[ls2*konlsa]);
end;

procedure kalkul3;
var
mr3,sr3,kr3:char;
begin
sia3:=true;
sib3:=false;
x3:=length(form1.ComboBox3.Text);
for y3:=1 to x3 do
```

```
begin
kr3:=form1.ComboBox3.text[y3];
if (kr3='d') or (kr3='D')then
break;
s3:=y3+2;
nilaia3[y3]:=strtoint(form1.ComboBox3.Text[y3]);
end;
for r3:=s3 to x3 do
begin
sr3:=form1.ComboBox3.text[r3];
nilaib3[r3]:=strtoint(form1.ComboBox3.Text[r3]);
end;
w3:=0;
for z3:=1 to (y3-1) do
begin
w3:=w3+nilaia3[z3]*pangkat(10,(y3-z3-1));
end;
u3:=0;
for t3:=s3 to x3 do
begin
u3:=u3+nilaib3[t3]*pangkat(10,(x3-t3));
end;
ls3:=0.25*phi*pangkat(u3,2)*w3;
form1.edit23.Text:=format('%5.2f',[ls3*konlsa]);
end;

procedure hps1;
begin
form1.edit27.Color:=clyellow;
form1.edit28.Color:=clyellow;
form1.edit29.Color:=clyellow;
form1.edit30.Color:=clyellow;
form1.edit31.Color:=clyellow;
form1.Edit32.Color:=clyellow;
form1.Edit33.Color:=clyellow;
form1.Edit34.Color:=clyellow;
form1.Edit35.Color:=clyellow;
form1.Edit36.Color:=clyellow;
form1.Edit37.Color:=clyellow;
form1.Edit38.Color:=clyellow;
form1.Edit39.Color:=clyellow;
form1.Edit40.Color:=clyellow;
form1.Edit41.Color:=clyellow;
end;

procedure hps2;
begin
form1.Edit5.Color:=clwindow;
form1.Edit11.Color:=clwindow;
form1.Edit12.Color:=clwindow;
form1.edit27.Color:=clwindow;
form1.edit28.Color:=clwindow;
form1.edit29.Color:=clwindow;
form1.edit30.Color:=clwindow;
form1.edit31.Color:=clwindow;
form1.Edit32.Color:=clwindow;
form1.Edit33.Color:=clwindow;
form1.Edit34.Color:=clwindow;
form1.Edit35.Color:=clwindow;
form1.Edit36.Color:=clwindow;
form1.Edit37.Color:=clwindow;
form1.Edit38.Color:=clwindow;
form1.Edit39.Color:=clwindow;
form1.Edit40.Color:=clwindow;
form1.Edit41.Color:=clwindow;
end;

procedure notation;
begin
form6.Image1.Canvas.Font.Color:=clpurple;
if(balik=true)then
```

```
begin
form6.Image1.Canvas.Brush.Style:=bsclear;
if(dm2>1)then form6.Image1.Canvas.TextOut((sk3+sk1)div 2-15,psy2+skd2+5,inttostr(xpos2-1)+'d'+inttostr(dm2));
if(dm>1)then form6.Image1.Canvas.TextOut((sk3+sk1)div 2-15,psy1-skd-15,inttostr(xpos-1)+'d'+inttostr(dm));
end
else
begin
form6.Image1.Canvas.Brush.Style:=bsclear;
if(dm2>1)then form6.Image1.Canvas.TextOut((sk3+sk1)div 2-15,psy2-skd2-15,inttostr(xpos2-1)+'d'+inttostr(dm2));
if(dm>1)then form6.Image1.Canvas.TextOut((sk3+sk1)div 2-15,psy1+skd+5,inttostr(xpos-1)+'d'+inttostr(dm));
end;
form6.Image1.Canvas.Font.Color:=clblack;
end;

procedure empty1;
var
position :integer;
begin
for position:=low(nilaix1)to high (nilaix1)do
nilaix1[position]:=0;
for position:=low(nilaiy1)to high (nilaiy1)do
nilaiy1[position]:=0;
end;

procedure empty2;
var
position :integer;
begin
for position:=low(nilaix2)to high (nilaix2)do
nilaix2[position]:=0;
for position:=low(nilaiy2)to high (nilaiy2)do
nilaiy2[position]:=0;
end;

procedure empty3;
var
position :integer;
begin
for position:=low(nilaixk1)to high (nilaixk1)do
nilaixk1[position]:=0;
for position:=low(nilaiyk1)to high (nilaiyk1)do
nilaiyk1[position]:=0;
end;

procedure empty4;
var
position :integer;
begin
for position:=low(nilaixk2)to high (nilaixk2)do
nilaixk2[position]:=0;
for position:=low(nilaiyk2)to high (nilaiyk2)do
nilaiyk2[position]:=0;
end;

procedure satuan;
begin
if (form1.RadioButton2.Checked=true)then
begin
cs:=2;
satun:='Metric';
satpj:='cm';
konpja:=0.1;
konpjb:=10;
satls:='cm^2';
konlsa:=0.01;
konlsb:=100;
satgy:='ton';
kongya:=0.1;
kongyb:=10;
satmmn:='ton-m';
konmmna:=0.1;
```

```
konmmnb:=10;
satkd:='kg/cm^2';
konkda:= 10.197;
konkdb:=0.098;
end
else if(form1.RadioButton3.Checked=true)then
begin
cs:=3;
satun:='US';
satpj:= 'inch';
konpja:=0.03937;
konpjb:=25.4;
satls:='inch^2';
konlsa:=0.00155;
konlsb:=645.16;
satgy:='Kip';
kongya:=0.3;
kongyb:=3.33;
satmmn:='Kip-ft';
konmmna:=1;
konmmnb:=1;
satkd:='Ksi';
konkda:=0.1449;
konkdb:=6.9;
end
else
begin
cs:=1;
satun:='SI';
satpj:='mm';
konpja:=1;
konpjb:=1;
satls:='mm^2';
konlsa:=1;
konlsb:=1;
satgy:='Kn';
kongya:=1;
kongyb:=1;
satmmn:='Kn-m';
konmmna:=1;
konmmnb:=1;
satkd:='Mpa';
konkda:=1;
konkdb:=1;
end;
form1.Label2.Caption:=satkd;
form1.Label3.Caption:=satkd;
form1.Label4.Caption:=satkd;
form1.Label5.Caption:=satpj;
form1.Label6.Caption:=satmmn;
form1.Label7.Caption:=satmmn;
form1.Label10.Caption:=satls;
form1.Label11.Caption:=satls;
form1.Label12.Caption:=satgy;
form1.Label13.Caption:=satmmn;
form1.Label18.Caption:=satls;
form1.Label19.Caption:=satls;
form1.Label20.Caption:=satls;
form1.Label21.Caption:=satls;
form1.Label33.Caption:='satuan : '+satpj;
form1.StatusBar1.Panels[2].Text:='Satuan'+' : '+satun;
end;

procedure baru;
begin
satuan;
case cs of
1:
begin
form1.Edit1.Text:='400';
form1.Edit2.Text:='30';
```

```
form1.Edit3.Text:='240';
edit_sengk;
form1.Edit5.Text:='200';
form1.Edit11.Text:='100';
form1.Edit12.Text:='5';
form1.Edit24.Text:='balok';
form1.Edit25.Text:='perletakan';
form1.ComboBox4.ItemIndex:=0;
form1.edit27.Text:='300';
form1.edit28.Text:='400';
form1.edit29.Text:='300';
form1.edit30.Text:='400';
form1.edit31.Text:='200';
form1.Edit32.Text:='100';
form1.Edit33.Text:='300';
form1.Edit34.Text:='400';
form1.Edit35.Text:='200';
form1.Edit36.Text:='100';
form1.Edit37.Text:='300';
form1.Edit38.Text:='400';
form1.Edit39.Text:='200';
form1.Edit40.Text:='100';
form1.Edit41.Text:='100';
end;
2:
begin
form1.Edit1.Text:='4000';
form1.Edit2.Text:='300';
form1.Edit3.Text:='2400';
edit_sengk;
form1.Edit5.Text:='20';
form1.Edit11.Text:='10';
form1.Edit12.Text:='0.5';
form1.Edit24.Text:='balok';
form1.Edit25.Text:='perletakan';
form1.ComboBox4.ItemIndex:=0;
form1.edit27.Text:='30';
form1.edit28.Text:='40';
form1.edit29.Text:='30';
form1.edit30.Text:='40';
form1.edit31.Text:='20';
form1.Edit32.Text:='10';
form1.Edit33.Text:='30';
form1.Edit34.Text:='40';
form1.Edit35.Text:='20';
form1.Edit36.Text:='10';
form1.Edit37.Text:='30';
form1.Edit38.Text:='40';
form1.Edit39.Text:='20';
form1.Edit40.Text:='10';
form1.Edit41.Text:='10';
end;
3:
begin
form1.Edit1.Text:='57.96';
form1.Edit2.Text:='4.35';
form1.Edit3.Text:='34.78';
edit_sengk;
form1.Edit5.Text:='200';
form1.Edit11.Text:='33.33';
form1.Edit12.Text:='5';
form1.Edit24.Text:='balok';
form1.Edit25.Text:='perletakan';
form1.ComboBox4.ItemIndex:=0;
form1.edit27.Text:='12';
form1.edit28.Text:='16';
form1.edit29.Text:='12';
form1.edit30.Text:='16';
form1.edit31.Text:='8';
form1.Edit32.Text:='4';
form1.Edit33.Text:='12';
```

```
form1.Edit34.Text:='16';
form1.Edit35.Text:='8';
form1.Edit36.Text:='4';
form1.Edit37.Text:='12';
form1.Edit38.Text:='16';
form1.Edit39.Text:='8';
form1.Edit40.Text:='4';
form1.Edit41.Text:='4';
end;
end;
messagedlg('Program telah mengalami perubahan satuan, data direset ulang ke data default'+#13+#10+'satuan yang digunakan
sekarang : '+satun,mtinformation,[mbok],0);
end;

procedure strg;
begin
str1:=strtofloat(form8.ComboBox1.Text);
str2:=strtofloat(form8.ComboBox2.Text);
str3:=strtofloat(form8.ComboBox3.Text);
str4:=strtofloat(form8.ComboBox5.Text);
str5:=strtofloat(form8.ComboBox6.Text);
end;

end.

unit Unit4;

interface

uses
  Windows, Messages, SysUtils, Variants, Classes, Graphics, Controls, Forms,
  Dialogs, ExtCtrls, QuickRpt, QRCtrls;

type
  TForm4 = class(TForm)
    QuickRep1: TQuickRep;
    TitleBand1: TQRBand;
    PageHeaderBand1: TQRBand;
    PageFooterBand1: TQRBand;
    QRLabel1: TQRLabel;
    QRLabel2: TQRLabel;
    QRImage1: TQRImage;
    QRMemo1: TQRMemo;
  private
    { Private declarations }
  public
    { Public declarations }
  end;

var
  Form4: TForm4;

implementation

uses Unit1, Unit2, Unit3, Unit5, Unit6, Unit7, Unit8;

{$R *.dfm}

end.

unit Unit5;

interface
procedure awal;
procedure beta;
procedure pro;
procedure leleh;
procedure despsg;
procedure anlpsg;
procedure deste;
procedure prote;
```

```
procedure lentur_kotak;
procedure lentur_te;
procedure lentur_el;
procedure lentur_ii;
procedure keterangan;
procedure cari_xy;
procedure torsi;
procedure geser;
procedure sengkang;
procedure desgt;
procedure jrksengkang;
procedure longitudinal;

implementation

uses Windows, Messages, Math, SysUtils, Variants, Classes, Graphics, Controls, Forms,
  Dialogs,shellapi, Buttons, ExtCtrls, ToolWin, ActnMan, ActnCtrls, StdCtrls,
  ComCtrls,Unit1, Unit2, Unit3, Unit4, Unit6, Unit7, Unit8;

var
  ru,rup,rp:double;

procedure awal;
begin
satuan;
fc:=strtofloat(form1.Edit2.Text)*konkdb;
fy:=strtofloat(form1.Edit1.Text)*konkdb;
fys:=strtofloat(form1.Edit3.Text)*konkdb;
mu:=strtofloat(form1.Edit5.Text)*konmmnb;
mmu:=strtofloat(form1.Edit5.Text)*konmmnb;
s:=strtofloat(form1.Edit4.Text)*konpjb;
asa:=strtofloat(form1.Edit9.Text)*konlsb;
asb:=strtofloat(form1.Edit10.Text)*konlsb;
vu:=strtofloat(form1.Edit11.Text)*kongyb;
tu:=strtofloat(form1.Edit12.Text)*konmmnb;
if (gantul=false) then   dia:=8;
d:=h-s;
m:=fy/(0.85*fc);
end;

procedure beta;
begin
if (fc<=30) then
begin
bt:=0.85;
end
else if (fc>30)then
begin
bt:=0.85-0.008*(fc-30);
if (bt<0.65)then
bt:=0.65;
end;
end;

procedure pro;
begin
ru:=mu*1000000/(sqr(d)*b);
rup:=sqr(fy)-2*ru/0.8*m*fy;
if (rup<=0) then
begin
hps1;
form1.Edit5.Color:=clyellow;
messagedlg('Momen yang bekerja terlalu besar,'+#13+#10+'atau penampang balok terlalu kecil.',mtinformation,[mbok],0);
form6.Memo1.Lines.Add('Tampang balok tidak dapat mendukung beban yang bekerja, sehingga perlu diperbesar.' );
rup:=0;
ktulis:=true;
end;
pi:=1.4/fy;
pa:=0.75*0.00255*bt*fc/(fy*(0.003+fy/200000));
pr:=(fy-sqrt(rup))/(m*fy);
end;
```

```
procedure leleh;
var
es:double;
begin
k:=(0.85*fc*bt*s/(fy*d))*(600/(600-fy));
if (pa>=k)then
begin
messagedlg('Tulangan tekan sudah luluh.',mtinformation,[mbok],0);
form6.Memo1.Lines.Add('Tulangan tekan sudah luluh sehinga fs = fy.');
fs:=fy;
end
else
begin
messagedlg('Tulangan tekan belum luluh.',mtinformation,[mbok],0);
form6.Memo1.Lines.Add('Tulangan tekan belum luluh sehingga fs = es*Es');
es:=0.003*(1-0.85*fc*bt*s/(pa*fy*d));
fs:=es*200000;
end;
end;

procedure despsg;
var
as2,as1,mu1,mu2:double;
begin
awal;
if (mu<0) then mu:=mmu*-1;
beta;
pro;
form6.Memo1.Lines.Add('Penampang balok berbentuk persegi.');
if (rup=0)then exit;
if (pr<pa)then
begin
if (mmu>=0) then klk:=false
else nnn:=false;
if (pr<pi)then
begin
messagedlg('Momen yang bekerja telalu kecil,'+#13+#10+'atau penampang balok terlalu besar,'+#13+#10'digunakan pro
minimum.',mtinformation,[mbok],0);
form6.Memo1.Lines.Add('Penampang balok terlalu besar untuk mendukung beban yang bekerja, digunakan pro minimum.
perkecil penampang atau perbesar beban yang bekerja');
if(psg=true) then pr:=pi;
end;
messagedlg('Tulangan tunggal.',mtinformation,[mbok],0);
form6.Memo1.Lines.Add('Balok menggunakan tulangan tunggal.');
asb:=pr*b*d;
asa:=0;
if(mmu>=0)then
begin
form1.Edit8.Text:=format('%5.2f',[asb*konlsa]);
form1.Edit7.Text:=format('%5.2f',[asa*konlsa]);
end
else
begin
form1.Edit8.Text:=format('%5.2f',[asa*konlsa]);
form1.Edit7.Text:=format('%5.2f',[asb*konlsa]);
end;
tulangan;
end
else
begin
messagedlg('Tulangan rangkap.',mtinformation,[mbok],0);
form6.Memo1.Lines.Add('Balok menggunakan tulangan rangkap.');
as1:=pa*b*d;
mu1:=0.8*pa*b*sqr(d)*fy*(1-0.5*pa*m);
mu2:=mu*1000000-mu1;
leleh;
as2:=mu2/(0.8*fs*(d-s));
asa:=as2;
asb:=as1+as2;
if(mmu>=0)then
```

```
begin
form1.Edit8.Text:=format('%5.2f',[asb*konlsa]);
form1.Edit7.Text:=format('%5.2f',[asa*konlsa]);
end
else
begin
form1.Edit8.Text:=format('%5.2f',[asa*konlsa]);
form1.Edit7.Text:=format('%5.2f',[asb*konlsa]);
end;
tulangan;
end;
a:=(asb*fy-asa*fs)/(0.85*fc*b);
pi:=1.4/fy;
pb:=0.00255*bt*fc/(fy*(0.003+fy/200000));
end;


procedure prote;
var
ap,bp,cp,gg:double;
begin
g:=be/bw;
gg:=t/d;
ap:=-0.5*m*fy*g;
bp:=(1+0.5*gg*g-0.5*gg+0.5*gg*g*(1-1/m))*fy;
cp:=(-0.5*gg*g)*(fy*gg*1/m*(1-1/m))-ru/0.8;
rp:=sqr(bp)-4*ap*cp;
if (rp<=0)then
begin
messagedlg('Data yang dimasukkan tidak dapat diproses dengan baik.'+#13+#10+'hasil dari proses pengitungan kurang
akurat.',mtwarning,[mbok],0);
exit;
end;
pr:=(-bp+sqrt(rp))/(2*ap);
pa:=0.75*0.85*fc/fy*(bt*1/g*(600/(600+fy))+gg*(1-1/g));
end;

procedure deste;
var
as2,as1,mu1,mu2:double;
begin
awal;
psg:=false;
if (mmu<0)then
begin
psg:=true;
mu:=mmu*-1;
end;
beta;
b:=be;
pro;
if (rup=0)then exit;
a:=pr*m*d;
if(a<t) then
begin
messagedlg('Balok yang digunakan dihitung sebagai balok persegi',mtinformation,[mbok],0);
form6.Memo1.Lines.Add('Balok yang digunakan dihitung sebagai balok persegi.');
despsg;
end
else
begin
messagedlg('Balok profil '+nm,mtinformation,[mbok],0);
form6.Memo1.Lines.Add('Balok menggunakan tampang berbentuk profil '+nm);
prote;
if (rp=0)then exit;
if (pr>=pa)then
begin
messagedlg('Tulangan rangkap',mtinformation,[mbok],0);
form6.Memo1.Lines.Add('Penampang menggunakan tulangan rangkap');
a:=pa*g*m*d-t*g+t;
if(a<t)then
```

```
begin
a:=t;
pa:=(a+t*g-t)/(g*m*d);
end;
asf:=(be-bw)*t*0.85*fc/fy;
mu1:=0.8*((pa*be*d-asf)*fy*(d-a/2)+asf*fy*(d-t/2));
mu2:=mu*1000000-mu1;
leleh;
as2:=mu2/(0.8*fs*(d-s));
as1:=pa*be*d;
asa:=as2;
asb:=as1+as2;
if(mmu>=0)then
begin
form1.Edit8.Text:=format('%5.2f',[asb*konlsa]);
form1.Edit7.Text:=format('%5.2f',[asa*konlsa]);
end
else
begin
form1.Edit8.Text:=format('%5.2f',[asa*konlsa]);
form1.Edit7.Text:=format('%5.2f',[asb*konlsa]);
end;
tulangan:
end
else
begin
messagedlg('Tulangan tunggal',mtinformation,[mbok],0);
form6.Memo1.Lines.Add('Balok menggunakan tulangan tunggal');
if (mmu>=0) then klk:=false
else mnn:=false;
asa:=0;
asf:=0;
asb:=pr*be*d;
if(mmu>=0)then
begin
form1.Edit8.Text:=format('%5.2f',[asb*konlsa]);
form1.Edit7.Text:=format('%5.2f',[asa*konlsa]);
end
else
begin
form1.Edit8.Text:=format('%5.2f',[asa*konlsa]);
form1.Edit7.Text:=format('%5.2f',[asb*konlsa]);
end;
tulangan:
end;
pi:=1.4/fy;
pb:=0.85*fc/fy*(bt*1/g*600/(600+fy)+t/d*(1-1/g));
end;
end;


procedure lentur_kotak;
begin
h:=strtofloat(form1.Edit28.Text)*konpjb;
b:=strtofloat(form1.Edit27.Text)*konpjb;
despsg;
end;

procedure lentur_te;
begin
awal;
if (mu<0) then
begin
h:=strtofloat(form1.Edit30.Text)*konpjb;
b:=strtofloat(form1.Edit31.Text)*konpjb;
messagedlg('Balok persegi',mtinformation,[mbok],0);
form6.Memo1.Lines.Add('Balok yang digunakan dihitung sebagai balok persegi.');
psg:=false;
despsg;
end
else
```

```
begin
be:=strtofloat(form1.Edit29.Text)*konpjb;
h:=strtofloat(form1.Edit30.Text)*konpjb;
bw:=strtofloat(form1.Edit31.Text)*konpjb;
t:  strtofloat(form1.Edit32.Text)*konpjb;
nm:='[T]';
deste;
end;
end;

procedure lentur_el;
begin
awal;
if (mu<0) then
begin
h:=strtofloat(form1.Edit34.Text)*konpjb;
b:=strtofloat(form1.Edit35.Text)*konpjb;
messagedlg('Balok persegi',mtinformation,[mbok],0);
form6.Memo1.Lines.Add('Balok yang digunakan dihitung sebagai balok persegi.');
psg:=false;
despsg;
end
else
begin
be:=strtofloat(form1.Edit33.Text)*konpjb;
h:=strtofloat(form1.Edit34.Text)*konpjb;
bw:=strtofloat(form1.Edit35.Text)*konpjb;
t:=strtofloat(form1.Edit36.Text)*konpjb;
nm:='[L]';
deste;
end;
end;

procedure lentur_ii;
begin
be:=strtofloat(form1.Edit37.Text)*konpjb;
h:=strtofloat(form1.Edit38.Text)*konpjb;
bw:=strtofloat(form1.Edit39.Text)*konpjb;
t:=strtofloat(form1.Edit40.Text)*konpjb;
nm:='[I]';
deste;
end;

procedure keterangan;
begin
if (mu>=0) then
begin
pr:= asb/(b*d);
pa:=0.75*pb+asa/(b*d)*fs/fy;
end
else
begin
pr:= asa/(b*d);
pa:=0.75*pb+asb/(b*d)*fs/fy;
end;
c:=a/bt;
nmemo:=nmemo+1;
form6.Memo1.Lines.Add('');
form6.Memo1.Lines.Add('Hitungan analisis tampang balok ke : '+inttostr(nmemo));
if (pr>pa) then
begin
form6.Memo1.Lines.Add('Dimensi tulangan kurang sesuai, ganti ukuran yang diameter lain dan analisis ulang');
end;
form6.Memo1.Font.Color:=clblack;
form6.Memo1.Lines.Add('Besar konstanta dari kelas kuat beton (beta1) = '+format('%5.2f',[bt]));
form6.Memo1.Lines.Add('Besar rasio penulangan minimum (promin) = '+ format('%5.3f',[pi]));
form6.Memo1.Lines.Add('Besar rasio penulangan sesuai dengan beban (pro) = '+format('%5.3f',[pr]));
form6.Memo1.Lines.Add('Besar rasio penulangan maksimum (promak)= '+format('%5.3f',[pa]));
form6.Memo1.Lines.Add('Jarak serat atas balok dengan garis normal (c) = '+format('%5.3f',[c*konpja])+' '+satpj);
form6.Memo1.Lines.Add('Jarak kedalaman balok tegangan yang terjadi jika terjadi keseimbangan gaya (a) =
'+format('%5.2f',[a*konpja])+' '+satpj);
```

```
end;

procedure anlpsg;
begin
awal;
if (dpsg=true) then
begin
if(mu>=0)then
begin
a:=(asb*fy-asa*fs)/(0.85*fc*b);
mu:=(0.8*((asb*fy-asa*fs)*(d-a/2)+asa*fs*(d-s)))/1000000;
form1.Edit6.Text:=format('%5.2f',[mu*konmmna]);
end
else
begin
a:=(asa*fy-asb*fs)/(0.85*fc*b);
mu:=-(0.8*((asa*fy-asb*fs)*(d-a/2)+asb*fs*(d-s)))/1000000;
form1.Edit6.Text:=format('%5.2f',[mu*konmmna]);
end;
end
else
begin
if(mu>=0)then
begin
a:=(asb*fy-asa*fs)/(0.85*fc*be);
mu:=(0.8*(asa*fs*(d-s)+asf*fy*(d-t/2)+(asb*fy-asf*fy-asa*fs)*(d-a/2)))/1000000;
form1.Edit6.Text:=format('%5.2f',[mu*konmmna]);
end
else
begin
a:=(asa*fy-asb*fs)/(0.85*fc*be);
mu:=-(0.8*(asb*fs*(d-s)+asf*fy*(d-t/2)+(asa*fy-asf*fy-asb*fs)*(d-a/2)))/1000000;
form1.Edit6.Text:=format('%5.2f',[mu*konmmna]);
end;
end;
if(strtofloat(form1.Edit5.Text)>strtofloat(form1.Edit6.Text))then
form1.Edit6.Text:=floattostr(strtofloat(form1.Edit5.Text)*1.001);
end;

procedure cari_xy;
var
tt:double;
begin
case xg of
1:
begin
h:=strtofloat(form1.Edit28.Text)*konpjb;
b:=strtofloat(form1.Edit27.Text)*konpjb;
xy:=sqr(b)*h;
end;
2:
begin
be:=strtofloat(form1.Edit29.Text)*konpjb;
h:=strtofloat(form1.Edit30.Text)*konpjb;
bw:=strtofloat(form1.Edit31.Text)*konpjb;
t:=strtofloat(form1.Edit32.Text)*konpjb;
if (t<=(be-bw)/2)then
xy:=sqr(bw)*h+2*sqr(t)*((be-bw)/2)
else
xy:=sqr(bw)*h+2*sqr((be-bw)/2)*t;
b:=bw;
end;
3:
begin
be:=strtofloat(form1.Edit33.Text)*konpjb;
h:=strtofloat(form1.Edit34.Text)*konpjb;
bw:=strtofloat(form1.Edit35.Text)*konpjb;
t:=strtofloat(form1.Edit36.Text)*konpjb;
if (t<=(be-bw))then
xy:=sqr(bw)*h+sqr(t)*(be-bw)
else
```

```
xy:=sqr(bw)*h+sqr(be-bw)*t;
b:=bw;
end;
4:
begin
be:=strtofloat(form1.Edit37.Text)*konpjb;
h:=strtofloat(form1.Edit38.Text)*konpjb;
bw:=strtofloat(form1.Edit39.Text)*konpjb;
t:=strtofloat(form1.Edit40.Text)*konpjb;
tt:=strtofloat(form1.Edit41.Text)*konpjb;
if (t<=(be-bw)/2)then
xy:=sqr(bw)*h+2*sqr(t)*((be-bw)/2)+2*sqr(tt)*((be-bw)/2)
else
xy:=sqr(bw)*h+2*sqr((be-bw)/2)*t+2*sqr((be-bw)/2)*tt;
b:=bw;
end;
end;
end;

procedure torsi;
begin
ct:=b*d/xy;
tc:=(1/15*sqrt(fc)*xy)/sqrt(1+sqr((0.4*vu)/(ct*tu*1000)));
ts:=tu*1000000/0.6-tc;
end;

procedure geser;
begin
ct:=b*d/xy;
vc:=(1/6*sqrt(fc)*b*d)/sqrt(1+sqr((2.5*ct*tu*1000)/vu));
vs:=vu*1000/0.6-vc;
end;

procedure desgt;
var
syt,syg:double;
begin
cari_xy;
awal;
if (vu<0) or (tu<0) then
begin
messagedlg('Data yang anda masukkan ( Vu atau Tu ) negative, ubah jadi positif.',mtinformation,[mbok],0);
exit;
end;
syt:=0.6*1/20*sqrt(fc)*xy;
if (tu*1000000>syt)then
begin
torsi;
if (ts>=4*tc) then
begin
hps1;
form1.Edit12.Color:=clyellow;
messagedlg('Torsi yang bekerja terlalu besar,'+#13+#10+'atau penampang terlalu kecil.',mtinformation,[mbok],0);
form6.Memo1.Lines.Add('Torsi yang bekerja terlalu besar, atau dimensi penampang kurang besar.');
form1.Edit13.Text:='0';
form1.Edit14.Text:='0';
form1.Edit15.Text:='0';
ktulis:=true;
end;
end
else
begin
messagedlg('Torsi tidak diperhitungakan.',mtinformation,[mbok],0);
form6.Memo1.Lines.Add('Torsi yang bekerja kurang besar sehingga tidak diperhitungkan.' );
tc:=0;
ts:=0;
str:=false;
end;
geser;
if(vu*1000<0.6*vc) then
begin
```

```
messagedlg('Tidak perlu tulangan geser.',mtinformation,[mbok],0);
form6.Memo1.Lines.Add('Gaya geser yang bekerja kurang besar sehingga tidak diperhitungkan.');
vc:=0;
vs:=0;
form1.Edit20.Text:='0';
form1.Edit22.Text:='0';
end;
syg:=2/3*sqrt(fc)*b*d;
if(vs>syg)then
begin
hps1;
form1.Edit11.Color:=clyellow;
messagedlg('Gaya geser yang bekerja terlalu besar,'+#13+#10+'atau penampang terlalu kecil.',mtinformation,[mbok],0);
form6.Memo1.Lines.Add('Gaya geser yang bekerja terlalu besar, dimensi penampang kurang besar.');
form1.Edit13.Text:='0';
form1.Edit14.Text:='0';
form1.Edit15.Text:='0';
ktulis:=true;
exit;
end;
if (ts>4*tc) then exit;
x1:=(b-2*s-dia);
y1:=(h-2*s-dia);
sengkang;
form1.Edit13.Text:=format('%5.3f',[av*konlsa]);
form1.Edit14.Text:=format('%5.3f',[at*konlsa]);
form1.Edit15.Text:=format('%5.3f',[avt*konlsa]);
if (av<=0)then
begin
av:=0;
nas:='0';
end
else
begin
xv:=av;
jrksengkang;
if(ds>0)then
av2:=(ns*0.25*phi*ds*ds)/js
else
av2:=0;
form1.Edit20.Text:=format('%5.3f',[av2*konlsa]);
end;
form1.Edit17.Text:=nas;
if (at<=0)then
begin
at:=0;
nas:='0';
end
else
begin
xv:=2*at;
jrksengkang;
if(ds>0)then
at2:=(ns*0.25*phi*ds*ds)/(2*js)
else
at2:=0;
form1.Edit21.Text:=format('%5.3f',[at2*konlsa]);
end;
form1.Edit18.Text:=nas;
if (avt<=0)then
begin
avt:=0;
nas:='0';
end
else
begin
xv:=avt;
jrksengkang;
if(ds>0)then
avt2:=(ns*0.25*phi*ds*ds)/js
else
```

```
avt2:=0;
form1.Edit22.Text:=format('%5.3f',[avt2*konlsa]);
end;
form6.Memo1.Lines.Add('Jarak tulangan sengkang maksimum = '+floattostr(sjs*konpja)+' '+satpj);
form1.Edit19.Text:  nas;
longitudinal;
end;

procedure sengkang;
var
aa:double;
begin
aa:=(2+y1/x1)/3;
if (aa>1.6) then aa:=1.6;
av:=vs/(fys*d);
at:=ts/(aa*x1*y1*fys);
avt:=2*at+av;
end;

procedure jrksengkang;
var
ls1,ls2:double;
begin
ls1:=2*0.25*phi*sqr(dia);
if(xv=0)then
begin
ls1:=0;
ls2:=0;
end
else
begin
if ((x1+y1)/4>300)then sjs:=300
else sjs:=(x1+y1)/4;
if ((ls1/xv)>75)then
begin
js:=ls1/xv;
ds:=dia;
if (js>=sjs) then
begin
ns:=2;
nas:='2Ld'+floattostr(dia)+'-'+ format('%5.1f',[sjs*konpja]);
end
else
begin
js:=round(ls1/xv);
nas:='2Ld'+floattostr(dia)+'-'+ format('%5.1f',[js*konpja]);
ns:=2;
end;
end
else
begin
ds:=dia;;
ns:=ceil(sjs*xv/(0.25*phi*sqr(dia)));
ls2:=ns*0.25*phi*sqr(dia);
js:=floor(2*ls2/xv);
if (js>sjs)then js:=sjs;
nas:=floattostr(ns)+'Ld'+floattostr(dia)+'-'+ format('%5.1f',[js*konpja]);
end;
end;
end;

procedure longitudinal;
var
xxx,al1,tea,al2,al3:double;
begin
if (str=true)then
begin
if (b<h) then xxx:=b
else xxx:=h;
al1:=2*at*(x1+y1);
tea:=tu*1000/(tu*1000+vu/(3*ct));
```

```
al2:=(2.8*xxx*js/fy*tea-2*at*js)*(x1+y1)/js;
al3:=(2.8*xxx*js/fy*tea-2/3*b*js/fy)*(x1+y1)/js;
if (al2>al3) then al2:= al3;
if (al2<0)then al:=al1;
if (al2>=al1)then al:= al2
else al:=al1;
form1.Edit16.Text:= format('%5.2f',[al*konlsa]);
tulangan2;
end
else
begin
form1.Edit16.Text:='0';
form1.ComboBox3.Clear;
form1.ComboBox3.Text:='0d0';
form1.Edit21.Text:='0';
form1.Edit23.Text:='0';
end;
end;

end.

unit Unit6;

interface

uses
  Windows, Messages, SysUtils, Variants, Classes, Graphics, Controls, Forms,
  Dialogs, StdCtrls,Buttons, ExtCtrls, ComCtrls,shellapi;

type
  TForm6 = class(TForm)
    Panel1: TPanel;
    Panel2: TPanel;
    StatusBar1: TStatusBar;
    Label1: TLabel;
    Panel3: TPanel;
    Image1: TImage;
    SpeedButton1: TSpeedButton;
    GroupBox1: TGroupBox;
    Memo1: TMemo;
    SpeedButton2: TSpeedButton;
    SpeedButton3: TSpeedButton;
    SpeedButton4: TSpeedButton;
    SpeedButton5: TSpeedButton;
    SpeedButton6: TSpeedButton;
    Label2: TLabel;
    ComboBox1: TComboBox;
    BitBtn4: TBitBtn;
    SpeedButton7: TSpeedButton;
    Label4: TLabel;
    Shape1: TShape;
    BitBtn9: TBitBtn;
    SpeedButton8: TSpeedButton;
    SpeedButton9: TSpeedButton;
    SpeedButton10: TSpeedButton;
    Shape2: TShape;
    Edit1: TEdit;
    Edit2: TEdit;
    Edit3: TEdit;
    Edit4: TEdit;
    Edit5: TEdit;
    SpeedButton11: TSpeedButton;
    ComboBox2: TComboBox;
    Label3: TLabel;
    Label5: TLabel;
    BitBtn5: TBitBtn;
    Button1: TButton;
    procedure FormCreate(Sender: TObject);
    procedure SpeedButton1Click(Sender: TObject);
    procedure SpeedButton3Click(Sender: TObject);
    procedure Image1MouseMove(Sender: TObject; Shift: TShiftState; X,
```

```
    Y: Integer);
  procedure Image1MouseDown(Sender: TObject; Button: TMouseButton;
    Shift: TShiftState; X, Y: Integer);
  procedure Image1MouseUp(Sender: TObject; Button: TMouseButton;
    Shift: TShiftState; X, Y: Integer);
  procedure SpeedButton2Click(Sender: TObject);
  procedure SpeedButton6Click(Sender: TObject);
  procedure SpeedButton7Click(Sender: TObject);
  procedure SpeedButton4Click(Sender: TObject);
  procedure SpeedButton5Click(Sender: TObject);
  procedure BitBtn9Click(Sender: TObject);
  procedure BitBtn1Click(Sender: TObject);
  procedure BitBtn2Click(Sender: TObject);
  procedure BitBtn3Click(Sender: TObject);
  procedure Image1DblClick(Sender: TObject);
  procedure SpeedButton8Click(Sender: TObject);
  procedure SpeedButton9Click(Sender: TObject);
  procedure SpeedButton10Click(Sender: TObject);
  procedure SpeedButton11Click(Sender: TObject);
  procedure BitBtn5Click(Sender: TObject);
  procedure BitBtn4Click(Sender: TObject);
  procedure ComboBox1Change(Sender: TObject);
  procedure ComboBox2Change(Sender: TObject);
  procedure ComboBox1KeyPress(Sender: TObject; var Key: Char);
  procedure ComboBox2KeyPress(Sender: TObject; var Key: Char);
  procedure Edit1Click(Sender: TObject);
  procedure Edit2Click(Sender: TObject);
  procedure Edit3Click(Sender: TObject);
  procedure Edit4Click(Sender: TObject);
  procedure Edit5Click(Sender: TObject);
  procedure Edit1Enter(Sender: TObject);
  procedure Edit2Enter(Sender: TObject);
  procedure Edit3Enter(Sender: TObject);
  procedure Edit4Enter(Sender: TObject);
  procedure Edit5Enter(Sender: TObject);

 private
  { Private declarations }
 public
  { Public declarations }
 end;

var
 Form6: TForm6;
 xx1,yy1,xx2,yy2:integer;

implementation

uses Unit1, Unit2, Unit3, Unit4, Unit5, Unit7, Unit8;

{$R *.dfm}

procedure TForm6.FormCreate(Sender: TObject);
begin
form6.Image1.Canvas.Brush.Color:=clwhite;
notasi:=false;
end;

procedure TForm6.SpeedButton1Click(Sender: TObject);
begin
gtul:=true;
pisah:=false;
notasi:=false;
editmemo:=true;
satuan;
form1.BitBtn4.Click;
form6.Close;;
end;

procedure TForm6.SpeedButton3Click(Sender: TObject);
begin
```

```
if (tl2  false)or(tl  false)then
form4.QuickRep1.Preview
else
messagedlg('Data belum tersimpan dalam laporan.',mtinformation,[mbok],0);
end;

procedure TForm6.Image1MouseMove(Sender: TObject; Shift: TShiftState; X,
  Y: Integer);
begin
mouse:=true;
if (mouse  true)then
begin
if(pisah  false)then
begin
empty1;
empty2;
empty3;
empty4;
form6.ComboBox1.Clear;
form6.ComboBox2.Clear;
form6.ComboBox1.Text:='  penulangan';
form6.ComboBox2.Text:='  penulangan';
notation;
notasi:=false;
messagedlg('Dimensi balok berubah, masukkan momen ultimed yang bekerja pada balok'+#13+#10'pada tampilan awal dan
rancang ulang balok',mtinformation,[mbok],0);
form6.Close;
end;
animasi;
form6.Image1.Canvas.Brush.Color:=clwhite;;
form6.Label2.Top:=y-10;
form6.Label2.Left:=x+10;
form6.Label2.Visible:=true;
form6.Label2.Caption:=inttostr(trunc((x-form6.Image1.ClientWidth div 2)*skl/xx/2*konpja))+','+inttostr(trunc((y-
form6.Image1.ClientHeight div 2)*-1*skl/xx/2*konpja));
form6.Image1.Canvas.Pen.Width:=1;
form6.Image1.Canvas.Pen.Style:=psdot;
form6.Image1.Canvas.Pen.Color:=clsilver;
form6.Image1.Canvas.MoveTo(0,y);
form6.Image1.Canvas.LineTo(form6.Image1.ClientWidth,y);
form6.Image1.Canvas.MoveTo(x,0);
form6.Image1.Canvas.LineTo(x,form6.Image1.ClientHeight);
end;
if (mstek1=true)then
begin
xx2:=x;
yy2:=y;
form6.Image1.Canvas.Pen.Color:=clblack;
form6.Image1.Canvas.Brush.Style:=bsclear;
form6.Image1.Canvas.Rectangle(xx1,yy1,xx2,yy2);
end;
form6.Image1.Canvas.Pen.Style:=pssolid;
form6.Image1.Canvas.Brush.Style:=bssolid;
end;

procedure TForm6.Image1MouseDown(Sender: TObject; Button: TMouseButton;
  Shift: TShiftState; X, Y: Integer);
begin
mstek1:=true;
xx1:=x;
yy1:=y;
end;

procedure TForm6.Image1MouseUp(Sender: TObject; Button: TMouseButton;
  Shift: TShiftState; X, Y: Integer);
begin
mstek1:=false;
end;

procedure TForm6.SpeedButton2Click(Sender: TObject);
begin
```

```
anlpsg;
keterangan;
end;


procedure TForm6.SpeedButton6Click(Sender: TObject);
begin
shellexecute(handle,'open','c:\windows\calc.exe','','',sw_shownormal);
end;

procedure TForm6.SpeedButton7Click(Sender: TObject);
begin
application.HelpJump('open');
end;

procedure TForm6.SpeedButton4Click(Sender: TObject);
begin
form4.QuickRep1.PrinterSetup;
end;

procedure TForm6.SpeedButton5Click(Sender: TObject);
begin
form4.QuickRep1.Print;
end;

procedure TForm6.BitBtn9Click(Sender: TObject);
begin
baku:=false;
animasi;
end;

procedure TForm6.BitBtn1Click(Sender: TObject);
var
pos1,pos2:integer;
begin
animasi;
gambar_tulangan;
animasi;
end;

procedure TForm6.BitBtn2Click(Sender: TObject);
begin
pisah:=false;
baku:=true;
animasi;
end;

procedure TForm6.BitBtn3Click(Sender: TObject);
begin
baku:=true;
animasi;
end;

procedure TForm6.Image1DblClick(Sender: TObject);
begin
notasi:=false;
end;

procedure TForm6.SpeedButton8Click(Sender: TObject);
begin
if (xx<300)then
begin
xx:=xx+10;
animasi;
gambar_tulangan;
animasi;
end;
end;

procedure TForm6.SpeedButton9Click(Sender: TObject);
begin
```

```
if(xx>40)then
begin
xx:=xx-10;
animasi;
gambar_tulangan;
animasi;
end;
end;

procedure TForm6.SpeedButton10Click(Sender: TObject);
begin
xx:=120;
animasi;
gambar_tulangan;
animasi;
end;

procedure TForm6.SpeedButton11Click(Sender: TObject);
begin
if(editmemo=true)then
form7.Memo1.Lines:=form1.Memo1.Lines
else
form7.Memo1.Lines:=form6.Memo1.Lines;
form7.Show;
end;

procedure TForm6.BitBtn5Click(Sender: TObject);
begin
baku:=true;
animasi;
gambar_tulangan;
animasi;
end;

procedure TForm6.BitBtn4Click(Sender: TObject);
begin
notasi:=true;
animasi;
end;

procedure TForm6.ComboBox1Change(Sender: TObject);
begin
form1.ComboBox1.Text:=form6.ComboBox1.Text;
animasi;
gambar_tulangan;
animasi;
end;

procedure TForm6.ComboBox2Change(Sender: TObject);
begin
form1.ComboBox2.Text:=form6.ComboBox2.Text;
animasi;
gambar_tulangan;
animasi;
end;

procedure TForm6.ComboBox1KeyPress(Sender: TObject; var Key: Char);
begin
key:=#0;
end;

procedure TForm6.ComboBox2KeyPress(Sender: TObject; var Key: Char);
begin
key:=#0;
end;

procedure TForm6.Edit1Click(Sender: TObject);
begin
form6.Edit1.SelectAll;
end;
```

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```
procedure TForm6.Edit2Click(Sender: TObject);
begin
form6.Edit2.SelectAll;
end;

procedure TForm6.Edit3Click(Sender: TObject);
begin
form6.Edit3.SelectAll;
end;

procedure TForm6.Edit4Click(Sender: TObject);
begin
form6.Edit4.SelectAll;
end;

procedure TForm6.Edit5Click(Sender: TObject);
begin
form6.Edit5.SelectAll;
end;

procedure TForm6.Edit1Enter(Sender: TObject);
begin
pisah:=false;
end;

procedure TForm6.Edit2Enter(Sender: TObject);
begin
pisah:=false;
end;

procedure TForm6.Edit3Enter(Sender: TObject);
begin
pisah:=false;
end;

procedure TForm6.Edit4Enter(Sender: TObject);
begin
pisah:=false;
end;

procedure TForm6.Edit5Enter(Sender: TObject);
begin
pisah:=false;
end;

end.

unit Unit7;

interface

uses
  Windows, Messages, SysUtils, printers, Variants, Classes, Graphics, Controls, Forms,
  Dialogs, StdCtrls, Buttons, ExtCtrls;

type
  TForm7 = class(TForm)
    GroupBox1: TGroupBox;
    Memo1: TMemo;
    BitBtn1: TBitBtn;
    BitBtn2: TBitBtn;
    Label1: TLabel;
    Timer1: TTimer;
    BitBtn3: TBitBtn;
    SaveDialog1: TSaveDialog;
    procedure BitBtn2Click(Sender: TObject);
    procedure BitBtn1Click(Sender: TObject);
    procedure Timer1Timer(Sender: TObject);
    procedure BitBtn3Click(Sender: TObject);
  private
    { Private declarations }
```

```
 public
  { Public declarations }
 end;

var
 Form7: TForm7;

implementation

uses Unit1, Unit2, Unit3, Unit4, Unit5, Unit6, Unit8;

{$R *.dfm}

procedure TForm7.BitBtn2Click(Sender: TObject);
begin
form7.Close;
end;

procedure TForm7.BitBtn1Click(Sender: TObject);
var
yprint,nprint:integer;
r:trect;
begin
with printer do
begin
form7.Label1.Visible:=true;
r:=rect(200,200,PageWidth-200,PageHeight-200);
Begindoc;
for nprint:=0 to form7.Memo1.Lines.Count do
Canvas.TextOut(200,200+(nprint*Canvas.TextHeight(form7.Memo1.Lines.Strings[nprint])),form7.Memo1.Lines.Strings[nprint]
);
Canvas.Brush.Color:=clblack;
Canvas.FrameRect(r);
EndDoc;
form7.Timer1.Enabled:=true;
end;
end;

procedure TForm7.Timer1Timer(Sender: TObject);
begin
form7.Label1.Visible:=false;
end;

procedure TForm7.BitBtn3Click(Sender: TObject);
var
namfile:textfile;
nome:integer;
baris:string;
namaf:string;
begin
if form7.SaveDialog1.Execute then
begin
namaf:=form7.SaveDialog1.FileName;
assignfile(namfile,namaf);
rewrite(namfile);
for nome:=0 to form7.Memo1.Lines.Count-1 do
begin
baris:=uppercase(form7.Memo1.Lines[nome]);
writeln(namfile,baris);
end;
closefile(namfile);
messagedlg('Output hasil hitungan anda telah disimpan pada file : '+ namaf,mtinformation,[mbok],0);
end
else
exit;
end;
end.

unit Unit8;

interface
```

```
uses
  Windows, Messages, SysUtils, Variants, Classes, Graphics, Controls, Forms,
  Dialogs, StdCtrls, Buttons;

type
  TForm8 = class(TForm)
    BitBtn1: TBitBtn;
    Label1: TLabel;
    Label2: TLabel;
    Label3: TLabel;
    Label4: TLabel;
    Label5: TLabel;
    Label7: TLabel;
    Label8: TLabel;
    Label9: TLabel;
    Label10: TLabel;
    ComboBox1: TComboBox;
    ComboBox2: TComboBox;
    ComboBox3: TComboBox;
    ComboBox5: TComboBox;
    ComboBox6: TComboBox;
    Label11: TLabel;
    Label12: TLabel;
    Label13: TLabel;
    Label15: TLabel;
    Label17: TLabel;
    procedure BitBtn1Click(Sender: TObject);
    procedure FormCreate(Sender: TObject);
    procedure ComboBox1Exit(Sender: TObject);
    procedure ComboBox6Exit(Sender: TObject);
    procedure ComboBox5Exit(Sender: TObject);
    procedure ComboBox2Exit(Sender: TObject);
  private
    { Private declarations }

  public
    { Public declarations }
  end;

var
  Form8: TForm8;
  str1,str2,str3,str4,str5:double;
implementation

uses Unit1, Unit2, Unit3, Unit4, Unit5, Unit6, Unit7;

{$R *.dfm}

procedure TForm8.BitBtn1Click(Sender: TObject);
begin
gantul:=true;
dia:=strtofloat(form8.ComboBox3.Text);
form8.Visible:=false;
end;

procedure TForm8.FormCreate(Sender: TObject);
begin
strg;
end;

procedure TForm8.ComboBox1Exit(Sender: TObject);
begin
strg;
if(str1<str2)then
begin
messagedlg('Penginputan tulangan anda  salah ',mtinformation,[mbok],0);
form8.ComboBox1.Text:=form8.ComboBox2.Text;
end;
end;
```

```
procedure TForm8.ComboBox6Exit(Sender: TObject);
begin
strg;
if(str4<str5)then
begin
messagedlg('Penginputan tulangan anda  salah ',mtinformation,[mbok],0);
form8.ComboBox5.Text:=form8.ComboBox6.Text;
end;
end;

procedure TForm8.ComboBox5Exit(Sender: TObject);
begin
strg;
if(str4<str5)then
begin
messagedlg('Penginputan tulangan anda  salah ',mtinformation,[mbok],0);
form8.ComboBox5.Text:=form8.ComboBox6.Text;
end;
end;

procedure TForm8.ComboBox2Exit(Sender: TObject);
begin
strg;
if(str1<str2)then
begin
messagedlg('Penginputan tulangan anda  salah ',mtinformation,[mbok],0);
form8.ComboBox1.Text:=form8.ComboBox2.Text;
end;
end;

end.

program Project1;

uses
  Forms,
  Unit1 in 'Unit1.pas' {Form1},
  Unit2 in 'Unit2.pas',
  Unit3 in 'Unit3.pas',
  Unit4 in 'Unit4.pas' {Form4},
  Unit5 in 'Unit5.pas',
  Unit6 in 'Unit6.pas' {Form6},
  Unit7 in 'Unit7.pas' {Form7},
  Unit8 in 'Unit8.pas' {Form8};

{$R *.res}

begin
  Application.Initialize;
  Application.HelpFile := 'E:\SKRI\Bantuan.hlp';
  Application.CreateForm(TForm1, Form1);
  Application.CreateForm(TForm4, Form4);
  Application.CreateForm(TForm6, Form6);
  Application.CreateForm(TForm7, Form7);
  Application.CreateForm(TForm8, Form8);
  Application.Run;
end.
```

HASIL OUTPUT ANALISIS BALOK ARAH SB-Y

PROGRAM:SAP90/FILE:ta8151~y.F3F

TUGAS AKHIR BY MARTAHAN PURBA

F R A M E E L E M E N T F O R C E S

ELT ID	LOAD COMB	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
148								
	1	0.000			0.000			0.000
		0.000	103.381	113.732		0.000	0.000	
		3.000	0.000	41.340		0.000	0.000	
		6.000	-103.382	-113.732		0.000	0.000	
		6.000			0.000			0.000
	2	0.000			0.000			0.000
		0.000	19.476	-21.223		0.000	0.000	
		3.000	0.000	7.991		0.000	0.000	
		6.000	-19.476	-21.223		0.000	0.000	
		6.000			0.000			0.000
	3	0.000			0.000			-7.061
		0.000	-178.442	535.325		0.000	0.000	
		3.000	-178.442	0.000		0.000	0.000	
		6.000	-178.442	-535.325		0.000	0.000	
		6.000			0.000			-7.061
	4	0.000			0.000			7.061
		0.000	178.442	-535.325		0.000	0.000	
		3.000	178.442	0.000		0.000	0.000	
		6.000	178.442	535.325		0.000	0.000	
		6.000			0.000			7.061
154								
	1	0.000			0.000			11.584
		0.000	145.121	-185.743		0.000	0.000	
		4.200	-1.292	116.298		0.000	0.000	
		8.400	-147.706	-196.599		0.000	0.000	
		8.400			0.000			11.584
	2	0.000			0.000			2.204
		0.000	27.392	-33.136		0.000	0.000	
		4.200	-0.919	22.457		0.000	0.000	
		8.400	-29.230	-40.856		0.000	0.000	
		8.400			0.000			2.204
	3	0.000			0.000			-3.125
		0.000	-122.236	471.687		0.000	0.000	
		4.200	-122.236	-41.706		0.000	0.000	
		8.400	-122.236	-555.099		0.000	0.000	
		8.400			0.000			-3.125
	4	0.000			0.000			3.125
		0.000	122.236	-471.687		0.000	0.000	
		4.200	122.236	41.706		0.000	0.000	
		8.400	122.236	555.099		0.000	0.000	
		8.400			0.000			3.125
253								

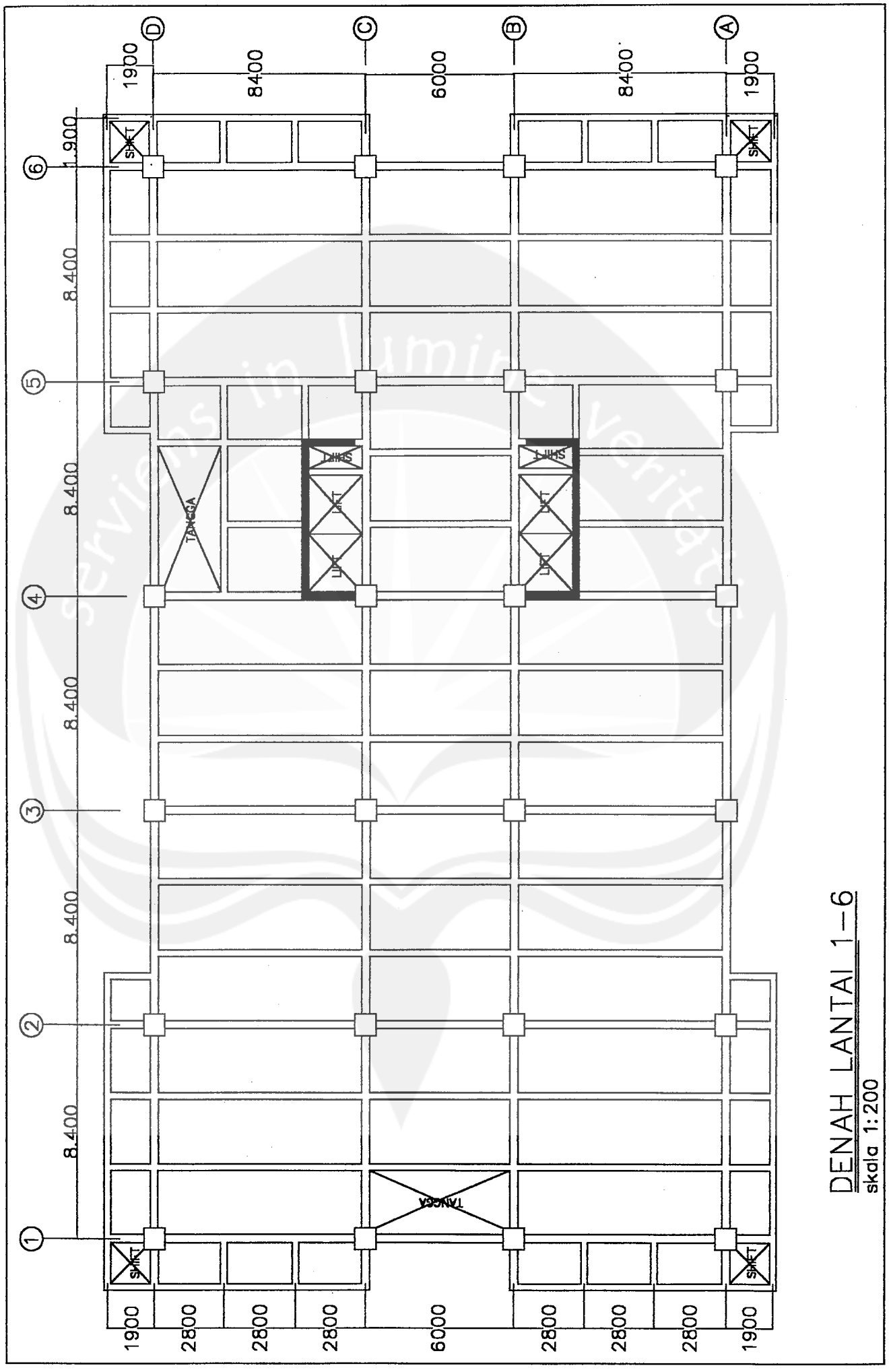
	1	0.000			0.000			0.000
		0.000	103.381	-109.273		0.000	0.000	
		3.000	0.000	45.799		0.000	0.000	
		6.000	-103.382	-109.273		0.000	0.000	
		6.000			0.000			0.000
	2	0.000			0.000			0.000
		0.000	19.476	-20.200		0.000	0.000	
		3.000	0.000	9.013		0.000	0.000	
		6.000	-19.476	-20.200		0.000	0.000	
		6.000			0.000			0.000
	3	0.000			0.000			1.982
		0.000	-181.924	545.771		0.000	0.000	
		3.000	-181.924	0.000		0.000	0.000	
		6.000	-181.924	-545.771		0.000	0.000	
		6.000			0.000			1.982
	4	0.000			0.000			-1.982
		0.000	181.924	-545.771		0.000	0.000	
		3.000	181.924	0.000		0.000	0.000	
		6.000	181.924	545.771		0.000	0.000	
		6.000			0.000			-1.982
259	----------							
	1	0.000			0.000			21.662
		0.000	140.177	-168.997		0.000	0.000	
		4.200	-6.237	112.276		0.000	0.000	
		8.400	-152.651	-221.389		0.000	0.000	
		8.400			0.000			21.662
	2	0.000			0.000			4.356
		0.000	25.968	-27.891		0.000	0.000	
		4.200	-2.343	21.721		0.000	0.000	
		8.400	-30.654	-47.573		0.000	0.000	
		8.400			0.000			4.356
	3	0.000			0.000			6.480
		0.000	-117.537	462.050		0.000	0.000	
		4.200	-117.537	-31.604		0.000	0.000	
		8.400	-117.537	-525.259		0.000	0.000	
		8.400			0.000			6.480
	4	0.000			0.000			-6.480
		0.000	117.537	-462.050		0.000	0.000	
		4.200	117.537	31.604		0.000	0.000	
		8.400	117.537	525.259		0.000	0.000	
		8.400			0.000			-6.480
353	----------							
	1	0.000			0.000			0.000
		0.000	103.381	-110.341		0.000	0.000	
		3.000	0.000	44.731		0.000	0.000	
		6.000	-103.382	-110.341		0.000	0.000	
		6.000			0.000			0.000
	2	0.000			0.000			0.000
		0.000	19.476	-20.192		0.000	0.000	
		3.000	0.000	9.021		0.000	0.000	

		6.000	-19.476	-20.192		0.000	0.000	
		6.000			0.000			0.000
	3	0.000			0.000			5.039
		0.000	-160.099	480.296		0.000	0.000	
		3.000	-160.099	0.000		0.000	0.000	
		6.000	-160.099	-480.296		0.000	0.000	
		6.000			0.000			5.039
	4	0.000			0.000			-5.039
		0.000	160.099	-480.296		0.000	0.000	
		3.000	160.099	0.000		0.000	0.000	
		6.000	160.099	480.296		0.000	0.000	
		6.000			0.000			-5.039
359	----------							
	1	0.000			0.000			33.538
		0.000	138.304	-158.013		0.000	0.000	
		4.200	-8.109	115.397		0.000	0.000	
		8.400	-154.523	-226.131		0.000	0.000	
		8.400			0.000			33.538
	2	0.000			0.000			6.738
		0.000	25.269	-24.325		0.000	0.000	
		4.200	-3.042	22.352		0.000	0.000	
		8.400	-31.353	-49.877		0.000	0.000	
		8.400			0.000			6.738
	3	0.000			0.000			10.596
		0.000	-110.785	427.705		0.000	0.000	
		4.200	-110.785	-37.591		0.000	0.000	
		8.400	-110.785	-502.886		0.000	0.000	
		8.400			0.000			10.596
	4	0.000			0.000			-10.596
		0.000	110.785	-427.705		0.000	0.000	
		4.200	110.785	37.591		0.000	0.000	
		8.400	110.785	502.886		0.000	0.000	
		8.400			0.000			-10.596
453	----------							
	1	0.000			0.000			0.000
		0.000	103.381	-111.964		0.000	0.000	
		3.000	0.000	43.108		0.000	0.000	
		6.000	-103.382	-111.964		0.000	0.000	
		6.000			0.000			0.000
	2	0.000			0.000			0.000
		0.000	19.476	-20.060		0.000	0.000	
		3.000	0.000	9.153		0.000	0.000	
		6.000	-19.476	-20.060		0.000	0.000	
		6.000			0.000			0.000
	3	0.000			0.000			-0.798
		0.000	-132.850	398.549		0.000	0.000	
		3.000	-132.850	0.000		0.000	0.000	
		6.000	-132.850	-398.549		0.000	0.000	
		6.000			0.000			-0.798

	4	0.000			0.000			0.798
		0.000	132.850	-398.549		0.000	0.000	
		3.000	132.850	0.000		0.000	0.000	
		6.000	132.850	398.549		0.000	0.000	
		6.000			0.000			0.798
459	---	---	---	---	---	---	---	---
	1	0.000			0.000			49.695
		0.000	136.575	-146.839		0.000	0.000	
		4.200	-9.839	119.307		0.000	0.000	
		8.400	156.252	229.484		0.000	0.000	
		8.400			0.000			49.695
	2	0.000			0.000			9.902
		0.000	24.682	-21.126		0.000	0.000	
		4.200	-3.629	23.084		0.000	0.000	
		8.400	-31.940	-51.612		0.000	0.000	
		8.400			0.000			9.902
	3	0.000			0.000			6.772
		0.000	-100.904	380.176		0.000	0.000	
		4.200	-100.904	-43.622		0.000	0.000	
		8.400	-100.904	-467.419		0.000	0.000	
		8.400			0.000			6.772
	4	0.000			0.000			-6.772
		0.000	100.904	-380.176		0.000	0.000	
		4.200	100.904	43.622		0.000	0.000	
		8.400	100.904	467.419		0.000	0.000	
		8.400			0.000			-6.772
553	---	---	---	---	---	---	---	---
	1	0.000			0.000			0.000
		0.000	103.381	-108.493		0.000	0.000	
		3.000	0.000	46.579		0.000	0.000	
		6.000	-103.382	-108.493		0.000	0.000	
		6.000			0.000			0.000
	2	0.000			0.000			0.000
		0.000	19.476	-19.529		0.000	0.000	
		3.000	0.000	9.685		0.000	0.000	
		6.000	-19.476	-19.529		0.000	0.000	
		6.000			0.000			0.000
	3	0.000			0.000			-2.484
		0.000	-111.446	334.338		0.000	0.000	
		3.000	-111.446	0.000		0.000	0.000	
		6.000	-111.446	-334.338		0.000	0.000	
		6.000			0.000			-2.484
	4	0.000			0.000			2.484
		0.000	111.446	-334.338		0.000	0.000	
		3.000	111.446	0.000		0.000	0.000	
		6.000	111.446	334.338		0.000	0.000	
		6.000			0.000			2.484
559	---	---	---	---	---	---	---	---
	1	0.000			0.000			58.281
		0.000	133.804	-137.594		0.000	0.000	
		4.200	-12.610	116.914		0.000	0.000	

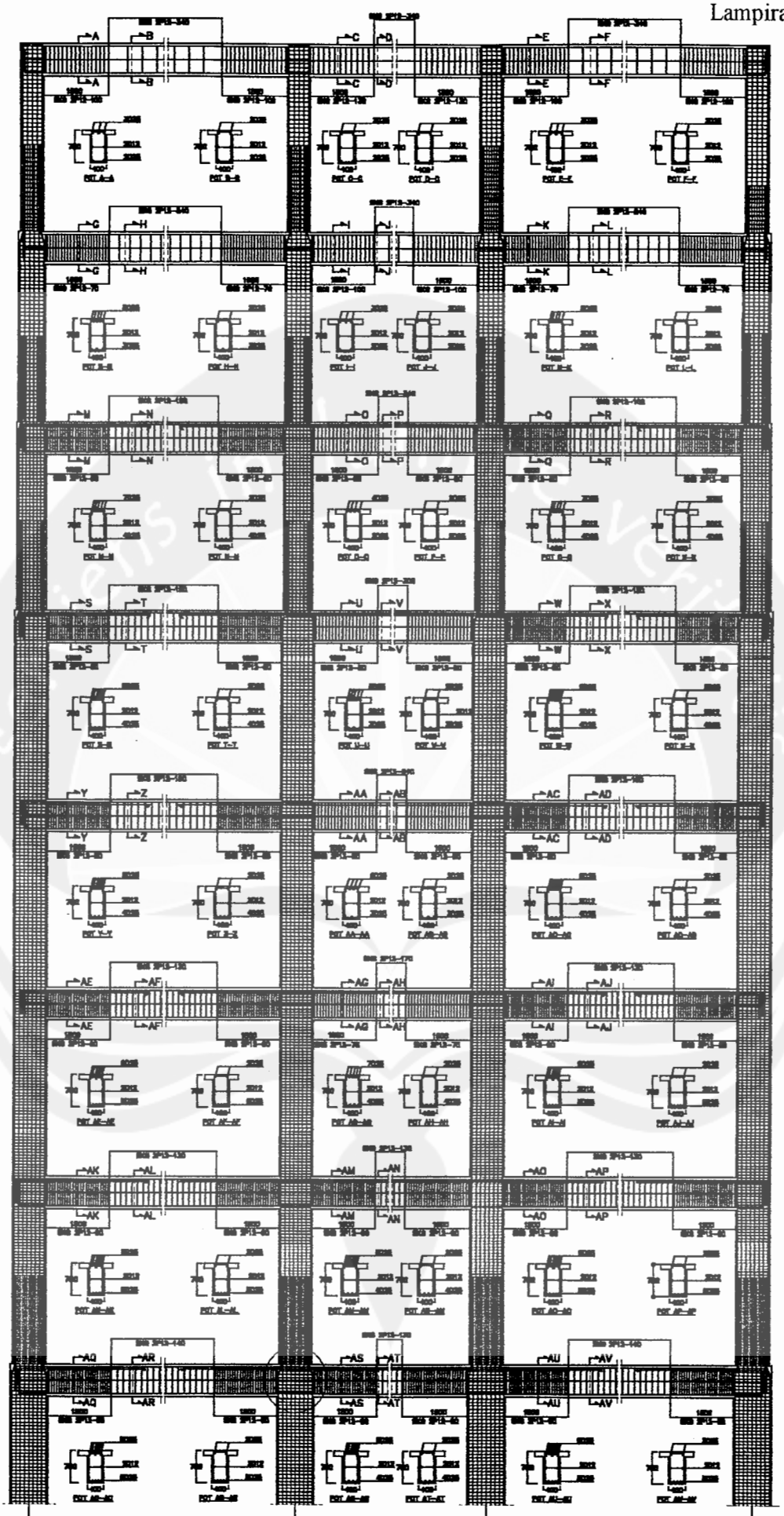
		8.400	-159.023	-243.515		0.000	0.000	
		8.400			0.000			58.281
	2	0.000			0.000			11.533
		0.000	23.860	-17.989		0.000	0.000	
		4.200	-4.451	22.769		0.000	0.000	
		8.400	-32.762	-55.380		0.000	0.000	
		8.400			0.000			11.533
	3	0.000			0.000			5.542
		0.000	-82.263	312.229		0.000	0.000	
		4.200	-82.263	-33.276		0.000	0.000	
		8.400	-82.263	-378.781		0.000	0.000	
		8.400			0.000			5.542
	4	0.000			0.000			-5.542
		0.000	82.263	-312.229		0.000	0.000	
		4.200	82.263	33.276		0.000	0.000	
		8.400	82.263	378.781		0.000	0.000	
		8.400			0.000			-5.542
653								
	1	0.000			0.000			0.000
		0.000	103.381	-112.423		0.000	0.000	
		3.000	0.000	42.649		0.000	0.000	
		6.000	-103.382	-112.423		0.000	0.000	
		6.000			0.000			0.000
	2	0.000			0.000			0.000
		0.000	19.476	-19.553		0.000	0.000	
		3.000	0.000	9.660		0.000	0.000	
		6.000	-19.476	-19.553		0.000	0.000	
		6.000			0.000			0.000
	3	0.000			0.000			-6.135
		0.000	-77.551	232.653		0.000	0.000	
		3.000	-77.551	0.000		0.000	0.000	
		6.000	-77.551	-232.653		0.000	0.000	
		6.000			0.000			-6.135
	4	0.000			0.000			6.135
		0.000	77.551	-232.653		0.000	0.000	
		3.000	77.551	0.000		0.000	0.000	
		6.000	77.551	232.653		0.000	0.000	
		6.000			0.000			6.135
659								
	1	0.000			0.000			71.790
		0.000	133.454	-130.902		0.000	0.000	
		4.200	-12.959	122.137		0.000	0.000	
		8.400	-159.373	-239.761		0.000	0.000	
		8.400			0.000			71.790
	2	0.000			0.000			14.018
		0.000	23.820	-17.043		0.000	0.000	
		4.200	-4.491	23.548		0.000	0.000	
		8.400	-32.802	-54.767		0.000	0.000	
		8.400			0.000			14.018

	3	0.000			0.000		2.803
		0.000	-63.055	233.540		0.000	0.000
		4.200	-63.055	-31.292		0.000	0.000
		8.400	-63.055	-296.125		0.000	0.000
		8.400			0.000		2.803
	4	0.000			0.000		-2.803
		0.000	63.055	-233.540		0.000	0.000
		4.200	63.055	31.292		0.000	0.000
		8.400	63.055	296.125		0.000	0.000
		8.400			0.000		-2.803
753	---	---	---	---	---	---	---
	1	0.000			0.000		0.000
		0.000	103.381	-109.728		0.000	0.000
		3.000	0.000	45.345		0.000	0.000
		6.000	-103.382	-109.728		0.000	0.000
		6.000			0.000		0.000
	2	0.000			0.000		0.000
		0.000	19.476	-20.011		0.000	0.000
		3.000	0.000	9.202		0.000	0.000
		6.000	-19.476	-20.011		0.000	0.000
		6.000			0.000		0.000
	3	0.000			0.000		-9.562
		0.000	-39.491	118.473		0.000	0.000
		3.000	-39.491	0.000		0.000	0.000
		6.000	-39.491	-118.473		0.000	0.000
		6.000			0.000		-9.562
	4	0.000			0.000		9.562
		0.000	39.491	-118.473		0.000	0.000
		3.000	39.491	0.000		0.000	0.000
		6.000	39.491	118.473		0.000	0.000
		6.000			0.000		9.562
759	---	---	---	---	---	---	---
	1	0.000			0.000		86.330
		0.000	134.506	-133.189		0.000	0.000
		4.200	-11.908	124.267		0.000	0.000
		8.400	-158.322	-233.215		0.000	0.000
		8.400			0.000		86.330
	2	0.000			0.000		16.426
		0.000	24.209	-17.228		0.000	0.000
		4.200	-4.102	24.997		0.000	0.000
		8.400	-32.413	-51.684		0.000	0.000
		8.400			0.000		16.426
	3	0.000			0.000		0.032
		0.000	-37.430	133.853		0.000	0.000
		4.200	-37.430	-23.355		0.000	0.000
		8.400	-37.430	-180.563		0.000	0.000
		8.400			0.000		0.032
	4	0.000			0.000		-0.032
		0.000	37.430	-133.853		0.000	0.000
		4.200	37.430	23.355		0.000	0.000



DENAH LANTAI 1–6

skala 1:200



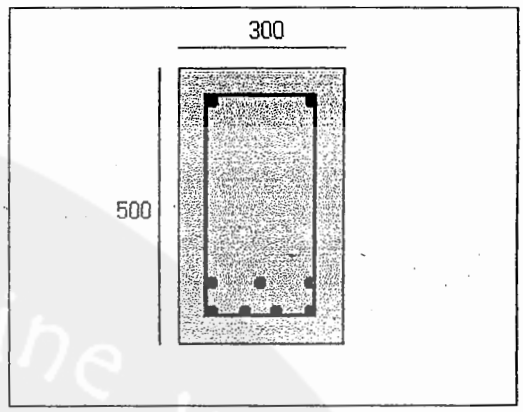
DETAIL TULANGAN PORTAL AS 3-3

SKALA 1 : 50

PROGRAM DESAIN DAN ANALIS BALOK BETON BERTULANG UNIVERSITAS ATMA JAYA YOGYAKARATA

Data masukkan :

Nama balok : kasus2
Bagian yang dihitung : Perletakan
Beban yang digunakan : Beban gravitasi
Kuat tarik baja = 400 Mpa
Kuat desak beton = 20 Mpa
Kuat tarik sengkang = 240 Mpa
Tebal selimut = 50 mm
Tinggi balok = 500 mm
Lebar balok = 300 mm
Momen yang bekerja = 378.63 Kn-m



Hasil hitungan lentur :

Luas tulangan tekan yang dibutuhkan = 961.31 mm^2
Luas tulangan tarik yang dibutuhkan = 3155.90 mm^2
Penulangan tekan yang digunakan = 2d25
Penulangan tarik yang digunakan = 7d25
Luas tulangan tekan yang digunakan = 981.75 mm^2
Luas tulangan tarik yang digunakan = 3436.12 mm^2
Hasil hitungan analisis tampang balok (Mn) = 403.50 Kn-m

Project Information:

Project = Project1
Title = Job1
Client = Client1
Organization = ACECOMS
Engineer = Engineer1

Design Criteria

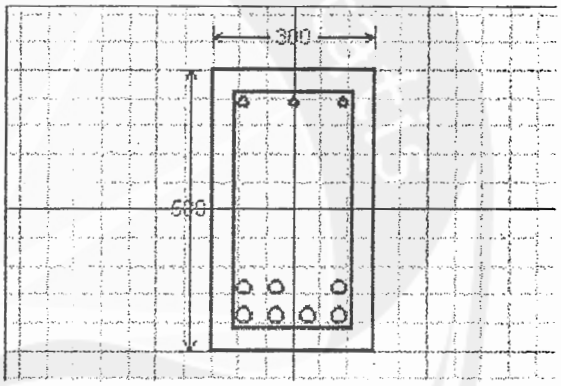
Design Code = ACI-318-95, Design Method = USD
Concrete Stress Block = ACI-Whitney Rectangular

RC Beam Section

Beam B-1 : Sect0001 : Load1

Material

Rebar Fy = 400.0 N/mm^2
Rebar Fys = 240.0 N/mm^2
Concrete fc' = 20.0 N/mm^2
Clear Cover = 50 mm



Beam Cross-section

Calculations

Flexural Design:

Design Moment, Mu = 378.6 kN-m
Balanced Moment capacity, ØMb = 464.8 kN-m
Concrete section capacity, ØMrc = 348.6 kN-m

Mu > ØMrc , Doubly reinforced beam required
Net moment for compression steel, Mu' = 64.9 kN-m
Computed steel in compression, Asc = 450 mm^2
Steel stress in compression bars, fs' = 400.0 N/mm^2

Minimum tension steel, Ast min = 380 mm^2
Required tension steel, Ast = 2,999 mm^2
Required compression steel, Asc = 450 mm^2

Skin Reinforcement Not Required

Design for Shear + Torsion:

Design shear force, Vu = 50.0 kN
Design torsional moment, Tu = 0.0 kN-m

Effective web width, bw = 300 mm
Concrete shear capacity, ØVc = 86.9 kN (Eq 11-3)

Area of concrete section, Acp = 150,000 mm^2
Perimeter of concrete section, Pcp = 1,600 mm
Allowable Torsion for concrete, ØTc = 4.3 kN-m

Vs < 0, Minimum shear stirrups sequired
Computed steel for Shear, Av/S = 0.433
Maximum stirrup spacing for shear only = 226 mm
Required stirrups for shear only = 2L d 10@225 mm

Torsion = 0, No torsion design required

Final Results

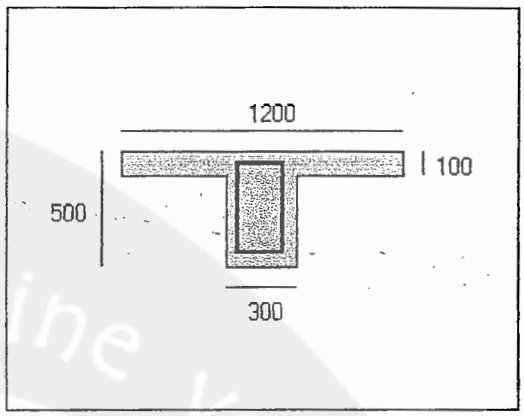
Top Bars = 3-d 16
Bottom Bars = 7-d 25
Skin Bars = <Not Required>

Stirrup Bars for Shear = 2L d 10@225 mm
Stirrup Bars for Torsion = <No Bars>
Longitudinal Bars for Torsion = <No Bars>
Stirrup Bars for Shear + Torsion = 2L d 10@225 mm

ROGRAM DESAIN DAN ANALIS BALOK BETON BERTULANG UNIVERSITAS ATMA JAYA YOGYAKARATA

Data masukkan :

Nama balok : kasus1
Bagian yang dihitung : Perletakan
Beban yang digunakan : Beban gravitasi
Kuat tarik baja = 400 Mpa
Kuat desak beton = 25 Mpa
Kuat tarik sengkang = 240 Mpa
Tebal selimut = 50 mm
Tinggi balok = 500 mm
Lebar sayap atas = 1200 mm
Lebar badan balok = 300 mm
Tinggi sayap atas = 100 mm
Momen yang bekerja = 300 Kn-m



Hasil hitungan :

Luas tulangan tekan yang dibutuhkan = 0.00 mm^2
Luas tulangan tarik yang dibutuhkan = 2165.03 mm^2
Penulangan tekan yang digunakan = 0d0
Penulangan tarik yang digunakan = 5d25
Luas tulangan tekan yang digunakan = 0 mm^2
Luas tulangan tarik yang digunakan = 2454.37 mm^2
Hasil hitungan analisis tampang balok (Mn) = 338.31 Kn-m

ESUAI DENGAN PERATURAN BETON INDONESIA (SK-SNI 1991)

Project Information:

Project = Project1
Title = Job1
Client = Client1
Organization = ACECOMS
Engineer = Engineer1

Design Criteria

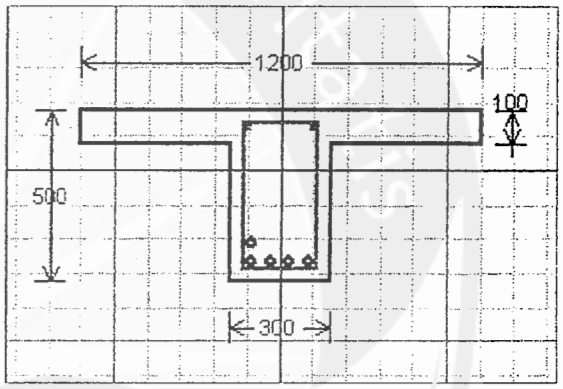
Design Code = ACI-318-95, Design Method = USD
Concrete Stress Block = ACI-Whitney Rectangular

RC Beam Section

Beam B-1 : Sect0001 : Load1

Material

Rebar Fy = 400.0 N/mm^2
Rebar Fys = 240.0 N/mm^2
Concrete fc' = 25.0 N/mm^2
Clear Cover = 50 mm



Beam Cross-section

Calculations

Flexural Design:

Design Moment, Mu = 300.0 kN-m
Balanced Moment capacity, ØMb = 1,499.8 kN-m
Concrete section capacity, ØMrc = 1,124.9 kN-m

Mu < ØMrc, Singly reinforced beam required
Computed steel, Ast = 2,186 mm^2
at Neutral axis depth = 24 mm

Minimum tension steel, Ast min = 425 mm^2
Required tension steel, Ast = 2,186 mm^2
Required compression steel, Asc = 0 mm^2

Skin Reinforcement Not Required

Design for Shear + Torsion:

Design shear force, Vu = 50.0 kN
Design torsional moment, Tu = 0.0 kN-m
Effective web width, bw = 300 mm

Concrete shear capacity, ØVc = 97.2 kN (Eq 11-3)

Area of concrete section, Acp = 230,000 mm^2
Perimeter of concrete section, Pcp = 3,400 mm
Allowable Torsion for concrete, ØTc = 5.4 kN-m

Vs < 0, Minimum shear stirrups sequired
Computed steel for Shear, Av/S = 0.433
Maximum stirrup spacing for shear only = 226 mm
Required stirrups for shear only = 2L d 6@128 mm

Torsion = 0, No torsion design required

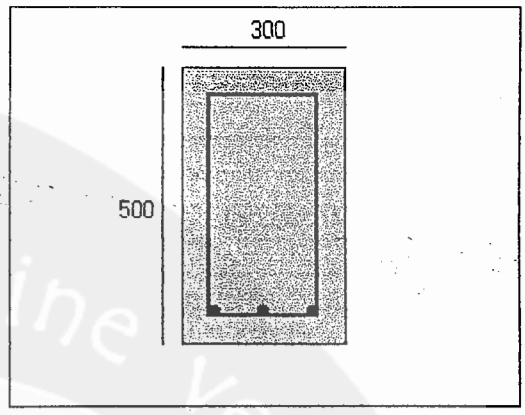
Final Results
Top Bars = <Not Required>
Bottom Bars = 5-d 25
Skin Bars = <Not Required>

Stirrup Bars for Shear = 2L d 6@128 mm
Stirrup Bars for Torsion = <No Bars>
Longitudinal Bars for Torsion = <No Bars>
Stirrup Bars for Shear + Torsion = 2L d 6@128 mm

ROGRAM DESAIN DAN ANALIS BALOK BETON BERTULANG UNIVERSITAS ATMA JAYA YOGYAKARATA

Data masukkan :

Nama balok : kasus2
Bagian yang dihitung : Perletakan
Beban yang digunakan : Beban gravitasi
Kuat tarik baja = 400 Mpa
Kuat desak beton = 25 Mpa
Kuat tarik sengkang = 400 Mpa
Tebal selimut = 50 mm
Tinggi balok = 500 mm
Lebar balok = 300 mm
Momen yang bekerja = 200 Kn-m
Gaya geser yang bekerja = 250 Kn
Momen torsi yang bekerja = 20 Kn-m



Hasil hitungan lentur :

Luas tulangan tekan yang dibutuhkan = 0.00 mm^2
Luas tulangan tarik yang dibutuhkan = 1558.15 mm^2
Penulangan tekan yang digunakan = 0d0
Penulangan tarik yang digunakan = 3d28
Luas tulangan tekan yang digunakan = 0 mm^2
Luas tulangan tarik yang digunakan = 1847.26 mm^2
Hasil hitungan analisis tampang balok (Mn) = 231.75 Kn-m

Hasil hitungan geser dan torsi :

Sigma X kuadrat Y : 45000000
Tc = 7.71744 Kn-m
Ts = 25.61590 Kn-m
Vc = 96.46795 Kn
Vs = 320.19871 Kn
Av/s yang bekerja = 1.779 mm^2
At/s yang bekerja = 0.652 mm^2
Avt/s yang bekerja = 3.084 mm^2
Al yang bekerja = 748.89 mm^2
Penulangan geser yang digunakan = 2Ld13-143.5
Penulangan torsi yang digunakan = 2Ld13-143.5
Penulangan gabungan geser dan torsi yang digunakan = 2Ld13- 86.0
Penulangan torsi longitudinal yang digunakan =4d16
Av/s yang digunakan = 1.779 mm^2
At/s yang digunakan = 0.652 mm^2
Avt/s yang digunakan = 3.087 mm^2
Al yang digunakan = 804.25 mm^2

ESUAI DENGAN PERATURAN BETON INDONESIA (SK-SNI 1991)

Project Information:

Project = Project1
Title = Job1
Client = Client1
Organization = ACECOMS
Engineer = Engineer1

Design Criteria

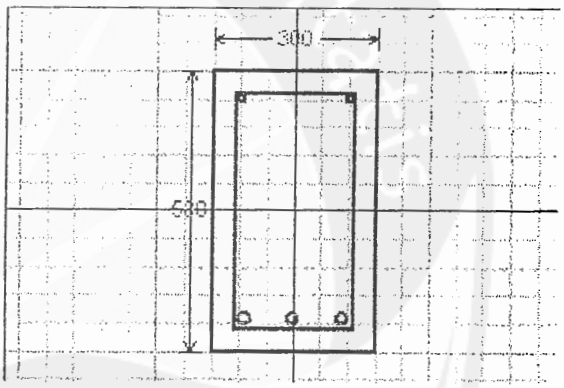
Design Code = ACI-318-95, Design Method = USD
Concrete Stress Block = ACI-Whitney Rectangular

RC Beam Section

Beam B-1 : Sect0001 : Load1

Material

Rebar Fy = 400.0 N/mm^2
Rebar Fys = 400.0 N/mm^2
Concrete fc' = 25.0 N/mm^2
Clear Cover = 50 mm



Beam Cross-section

Calculations

Flexural Design:

Design Moment, Mu = 100.0 kN-m
Balanced Moment capacity, ØMb = 581.1 kN-m
Concrete section capacity, ØMrc = 435.8 kN-m

Mu < ØMrc, Singly reinforced beam required
Computed steel, Ast = 737 mm^2
at Neutral axis depth = 41 mm

Minimum tension steel, Ast min = 425 mm^2
Required tension steel, Ast = 737 mm^2
Required compression steel, Asc = 0 mm^2

Skin Reinforcement Not Required

Design for Shear + Torsion:

Design shear force, Vu = 250.0 kN
Design torsional moment, Tu = 20.0 kN-m
Effective web width, bw = 300 mm

Concrete shear capacity, ØVc = 97.2 kN (Eq 11-3)

Area of concrete section, Acp = 150,000 mm^2
Perimeter of concrete section, Pcp = 1,600 mm
Allowable Torsion for concrete, ØTc = 4.9 kN-m

Vs = 177.8 kN (Shear Stirrups Required)
Computed steel for Shear, Av/S = 0.993
Maximum stirrup spacing for shear only = 226 mm
Required stirrups for shear only = 2L d 10@159 mm

Tu > Tmin, Hoops Required for Torsion
Area of concrete in stirrups, Aoh = 80,000 mm^2
Perimeter of concrete in stirrup, Ph = 1,400 mm
Computed steel for Torsion, At/S = 0.441
Computed longitudinal steel for torsion, Al = 619 mm^2
Maximum stirrup spacing for torsion= 226 mm
Required hoops for torsion only = 2L d 10@178 mm

Computed steel for Shear + Torsion, Avt/S = 1.877
Required stirrups for shear + torsion = 2L d 10@84 mm

Final Results

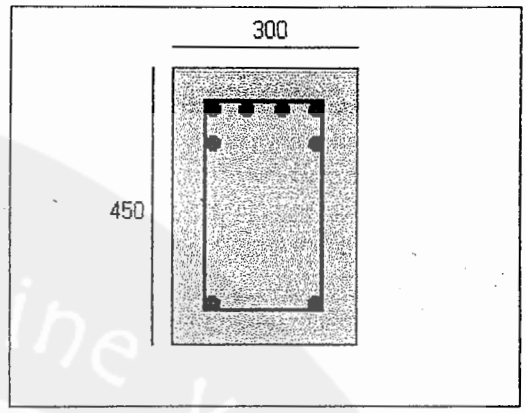
Top Bars = <Not Required>
Bottom Bars = 3-d 20
Skin Bars = <Not Required>

Stirrup Bars for Shear = 2L d 10@159 mm
Stirrup Bars for Torsion = 2L d 10@178 mm
Longitudinal Bars for Torsion = 2-d 20
Stirrup Bars for Shear + Torsion = 2L d 10@84 mm

ROGRAM DESAIN DAN ANALIS BALOK BETON BERTULANG UNIVERSITAS ATMA JAYA YOGYAKARATA

Data masukkan :

Nama balok : balok 559
Bagian yang dihitung : Perletakan
Beban yang digunakan : Beban gravitasi
Kuat tarik baja = 400 Mpa
Kuat desak beton = 30 Mpa
Kuat tarik sengkang = 400 Mpa
Tebal selimut = 55 mm
Tinggi balok = 450 mm
Lebar balok = 300 mm
Momen yang bekerja = -380.8 Kn-m



Hasil hitungan lentur :

Luas tulangan tekan yang dibutuhkan = 3674.59 mm^2
Luas tulangan tarik yang dibutuhkan = 785.05 mm^2
Penulangan tekan yang digunakan = 6d28
Penulangan tarik yang digunakan = 2d28
Luas tulangan tekan yang digunakan = 3694.51 mm^2
Luas tulangan tarik yang digunakan = 1231.50 mm^2
Hasil hitungan analisis tampang balok (Mn) = -381.1808 Kn-m

ESUAI DENGAN PERATURAN BETON INDONESIA (SK-SNI 1991)

Project Information:

Project = Project1
Title = Job1
Client = Client1
Organization = ACECOMS
Engineer = Engineer1

Design Criteria

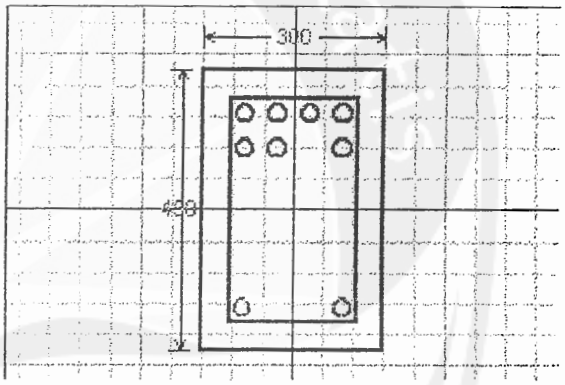
Design Code = ACI-318-95, Design Method = USD
Concrete Stress Block = ACI-Whitney Rectangular

RC Beam Section

Beam B-1 : Sect0001 : Load1

Material

Rebar Fy = 400.0 N/mm^2
Rebar Fys = 240.0 N/mm^2
Concrete fc' = 30.0 N/mm^2
Clear Cover = 55 mm



Beam Cross-section

Calculations

Flexural Design:

Design Moment, Mu = -435.1 kN-m
Balanced Moment capacity, ØMb = -511.7 kN-m
Concrete section capacity, ØMrc = -383.8 kN-m

Mu > ØMrc , Doubly reinforced beam required
Net moment for compression steel, Mu' = -89.7 kN-m
Computed steel in compression, Asc = 777 mm^2
Steel stress in compression bars, fs' = 376.9 N/mm^2

Minimum tension steel, Ast min = 409 mm^2
Required tension steel, Ast = 3,772 mm^2
Required compression steel, Asc = 777 mm^2

Skin Reinforcement Not Required

Design for Shear + Torsion:

Design shear force, Vu = 50.0 kN
Design torsional moment, Tu = 0.0 kN-m

Effective web width, bw = 300 mm
Concrete shear capacity, ØVc = 93.5 kN (Eq 11-3)

Area of concrete section, Acp = 135,000 mm^2
Perimeter of concrete section, Pcp = 1,500 mm
Allowable Torsion for concrete, ØTc = 4.6 kN-m

Vs < 0, Minimum shear stirrups sequired
Computed steel for Shear, Av/S = 0.433
Maximum stirrup spacing for shear only = 199 mm
Required stirrups for shear only = 2L d 6@128 mm

Torsion = 0, No torsion design required

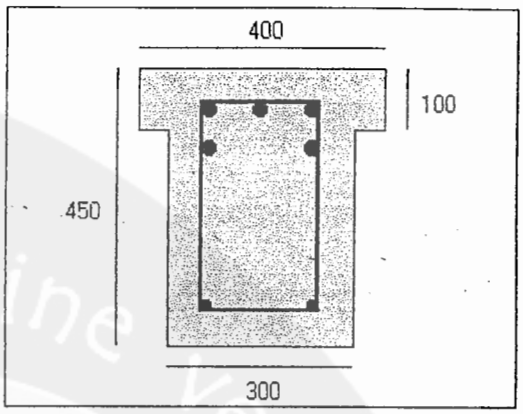
Final Results
Top Bars = 7-d 28
Bottom Bars = 2-d 25
Skin Bars = <Not Required>

Stirrup Bars for Shear = 2L d 6@128 mm
Stirrup Bars for Torsion = <No Bars>
Longitudinal Bars for Torsion = <No Bars>
Stirrup Bars for Shear + Torsion = 2L d 6@128 mm

ROGRAM DESAIN DAN ANALIS BALOK BETON BERTULANG UNIVERSITAS ATMA JAYA YOGYAKARATA

Data masukkan :

Nama balok : balok 259
Bagian yang dihitung : Perletakan
Beban yang digunakan : Beban gravitasi
Kuat tarik baja = 400 Mpa
Kuat desak beton = 30 Mpa
Kuat tarik sengkang = 400 Mpa
Tebal selimut = 55 mm
Tinggi balok = 450 mm
Lebar sayap atas = 400 mm
Lebar badan balok = 300 mm
Tinggi sayap atas = 100 mm
Momen yang bekerja = -341.7 Kn-m



Hasil hitungan :

Luas tulangan tekan yang dibutuhkan = 3315.22 mm^2
Luas tulangan tarik yang dibutuhkan = 425.67 mm^2
Penulangan tekan yang digunakan = 5d32
Penulangan tarik yang digunakan = 2d22
Luas tulangan tekan yang digunakan = 4021.24 mm^2
Luas tulangan tarik yang digunakan = 760.27 mm^2
Hasil hitungan analisis tampang balok (Mn) = -342.0417 Kn-m

ESUAI DENGAN PERATURAN BETON INDONESIA (SK-SNI 1991)

Project Information:

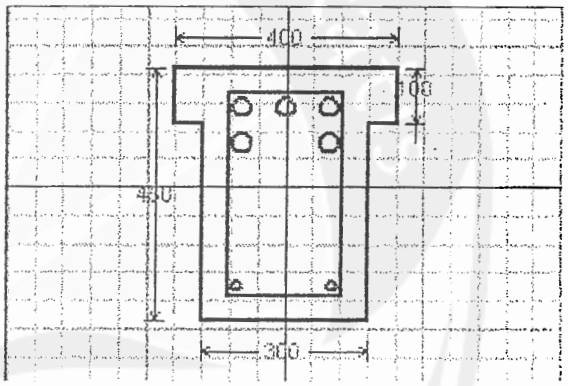
Project = Project1
Title = Job1
Client = Client1
Organization = ACECOMS
Engineer = Engineer1

Design Criteria

Design Code = ACI-318-95, Design Method = USD
Concrete Stress Block = ACI-Whitney Rectangular

RC Beam Section

Beam B-1 : Sect0001 : Load1



Beam Cross-section

Material

Rebar Fy = 400.0 N/mm^2
Rebar Fys = 240.0 N/mm^2
Concrete fc' = 30.0 N/mm^2
Clear Cover = 55 mm

Calculations

Flexural Design:

Design Moment, Mu = -390.8 kN-m
Balanced Moment capacity, ØMb = -519.5 kN-m
Concrete section capacity, ØMrc = -389.6 kN-m

Mu > ØMrc , Doubly reinforced beam required
Net moment for compression steel, Mu' = -40.2 kN-m
Computed steel in compression, Asc = 348 mm^2
Steel stress in compression bars, fs' = 376.9 N/mm^2

Minimum tension steel, Ast min = 409 mm^2
Required tension steel, Ast = 3,402 mm^2
Required compression steel, Asc = 348 mm^2

Skin Reinforcement Not Required

Design for Shear + Torsion:

Design shear force, Vu = 50.0 kN
Design torsional moment, Tu = 0.0 kN-m

Effective web width, bw = 300 mm
Concrete shear capacity, ØVc = 93.5 kN (Eq 11-3)

Area of concrete section, Acp = 145,000 mm^2
Perimeter of concrete section, Pcp = 1,700 mm
Allowable Torsion for concrete, ØTc = 4.7 kN-m

Vs < 0, Minimum shear stirrups sequired
Computed steel for Shear, Av/S = 0.433
Maximum stirrup spacing for shear only = 199 mm
Required stirrups for shear only = 2L d 6@128 mm

Torsion = 0, No torsion design required

Final Results

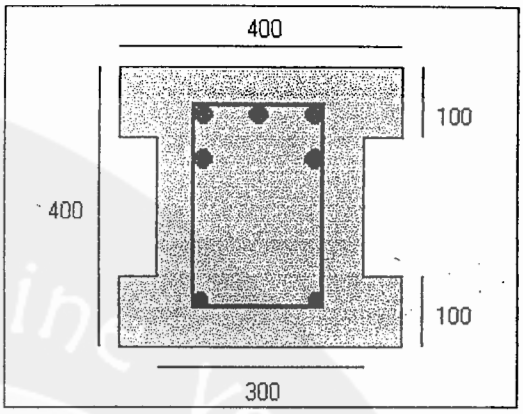
Top Bars = 5-d 32
Bottom Bars = 2-d 16
Skin Bars = <Not Required>

Stirrup Bars for Shear = 2L d 6@128 mm
Stirrup Bars for Torsion = <No Bars>
Longitudinal Bars for Torsion = <No Bars>
Stirrup Bars for Shear + Torsion = 2L d 6@128 mm

ROGRAM DESAIN DAN ANALIS BALOK BETON BERTULANG UNIVERSITAS ATMA JAYA YOGYAKARATA

Data masukkan :

Nama balok : balok 459
Bagian yang dihitung : Perletakan
Beban yang digunakan : Beban gravitasi
Kuat tarik baja = 400 Mpa
Kuat desak beton = 30 Mpa
Kuat tarik sengkang = 400Mpa
Tebal selimut = 55 mm
Tinggi balok = 400 mm
Lebar sayap atas = 400 mm
Lebar badan balok = 300 mm
Tinggi sayap atas = 100 mm
Tinggi sayap bawah = 100 mm
Momen yang bekerja = -357.9 Kn-m



Hasil hitungan :

Luas tulangan tekan yang dibutuhkan = 3996.41 mm^2
Luas tulangan tarik yang dibutuhkan = 994.50 mm^2
Penulangan tekan yang digunakan = 5d32
Penulangan tarik yang digunakan = 2d28
Luas tulangan tekan yang digunakan = 4021.24 mm^2
Luas tulangan tarik yang digunakan = 1231.50 mm^2
Hasil hitungan analisis tampang balok (Mn) = -358.2579 Kn-m

SUAI DENGAN PERATURAN BETON INDONESIA (SK-SNI 1991)

Project Information:

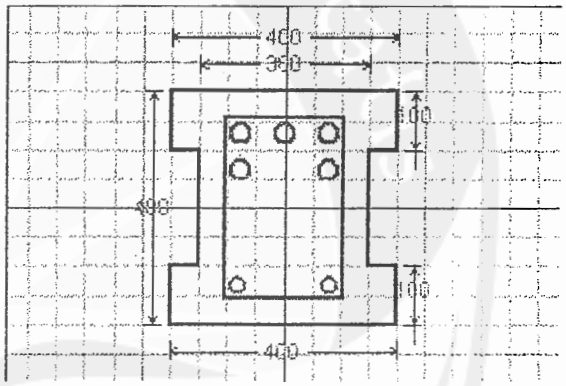
Project = Project1
Title = Job1
Client = Client1
Organization = ACECOMS
Engineer = Engineer1

Design Criteria

Design Code = ACI-318-95, Design Method = USD
Concrete Stress Block = ACI-Whitney Rectangular

RC Beam Section

Beam B-1 : Sect0001 : Load1



Beam Cross-section

Material

Rebar Fy = 400.0 N/mm^2
Rebar Fys = 240.0 N/mm^2
Concrete fc' = 30.0 N/mm^2
Clear Cover = 55 mm

Calculations

Flexural Design:

Design Moment, Mu = -409.0 kN-m
Balanced Moment capacity, ØMb = -497.9 kN-m
Concrete section capacity, ØMrc = -373.5 kN-m

Mu > ØMrc , Doubly reinforced beam required
Net moment for compression steel, Mu' = -72.9 kN-m
Computed steel in compression, Asc = 778 mm^2
Steel stress in compression bars, fs' = 359.1 N/mm^2

Minimum tension steel, Ast min = 357 mm^2
Required tension steel, Ast = 4,007 mm^2
Required compression steel, Asc = 778 mm^2

Skin Reinforcement Not Required

Design for Shear + Torsion:

Design shear force, Vu = 50.0 kN
Design torsional moment, Tu = 0.0 kN-m

Effective web width, bw = 300 mm
Concrete shear capacity, ØVc = 81.6 kN (Eq 11-3)

Area of concrete section, Acp = 130,000 mm^2
Perimeter of concrete section, Pcp = 1,700 mm
Allowable Torsion for concrete, ØTc = 3.8 kN-m

Vs < 0, Minimum shear stirrups sequired
Computed steel for Shear, Av/S = 0.433
Maximum stirrup spacing for shear only = 173 mm
Required stirrups for shear only = 2L d 6@128 mm

Torsion = 0, No torsion design required

Final Results

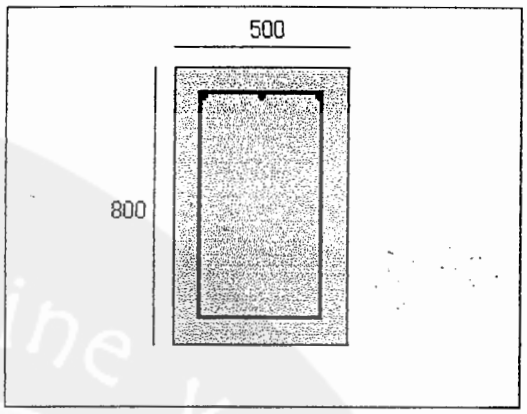
Top Bars = 5-d 32
Bottom Bars = 2-d 25
Skin Bars = <Not Required>

Stirrup Bars for Shear = 2L d 6@128 mm
Stirrup Bars for Torsion = <No Bars>
Longitudinal Bars for Torsion = <No Bars>
Stirrup Bars for Shear + Torsion = 2L d 6@128 mm

ROGRAM DESAIN DAN ANALIS BALOK BETON BERTULANG UNIVERSITAS ATMA JAYA YOGYAKARATA

Data masukkan :

Nama balok : balok 459
Bagian yang dihitung : Perletakan
Beban yang digunakan : Beban gravitasi
Kuat tarik baja = 400 Mpa
Kuat desak beton = 30 Mpa
Kuat tarik sengkang = 240 Mpa
Tebal selimut = 75 mm
Tinggi balok = 800 mm
Lebar balok = 500 mm
Momen yang bekerja = -400 Kn-m
Gaya geser yang bekerja = 235.5 Kn
Momen torsi yang bekerja = 75.47 Kn-m



Hasil hitungan lentur :

Luas tulangan tekan yang dibutuhkan = 1793.75 mm^2
Luas tulangan tarik yang dibutuhkan = 0.00 mm^2
Penulangan tekan yang digunakan = 3d28
Penulangan tarik yang digunakan = 0d0
Luas tulangan tekan yang digunakan = 1847.26 mm^2
Luas tulangan tarik yang digunakan = 0 mm^2
Hasil hitungan analisis tampang balok (Mn) = -400.4 Kn-m

Hasil hitungan geser dan torsi :

Sigma X kuadrat Y : 200000000
Tc = 60.14720 Kn-m
Ts = 65.63613 Kn-m
Vc = 187.68606 Kn
Vs = 204.81394 Kn
Av/s yang bekerja = 1.177 mm^2
At/s yang bekerja = 0.971 mm^2
Avt/s yang bekerja = 3.119 mm^2
Al yang bekerja = 1903.51 mm^2
Penulangan geser yang digunakan = 2Ld10-133.0
Penulangan torsi yang digunakan = 2Ld10- 81.0
Penulangan gabungan geser dan torsi yang digunakan = 10Ld10-245.0
Penulangan torsi longitudinal yang digunakan =17d12
Av/s yang digunakan = 1.181 mm^2
At/s yang digunakan = 0.970 mm^2
Avt/s yang digunakan = 3.206 mm^2
Al yang digunakan = 1922.65 mm^2

ESUAI DENGAN PERATURAN BETON INDONESIA (SK-SNI 1991)

Project Information:

Project = Project1
Title = Job1
Client = Client1
Organization = ACECOMS
Engineer = Engineer1

Design Criteria

Design Code = ACI-318-95, Design Method = USD
Concrete Stress Block = ACI-Whitney Rectangular

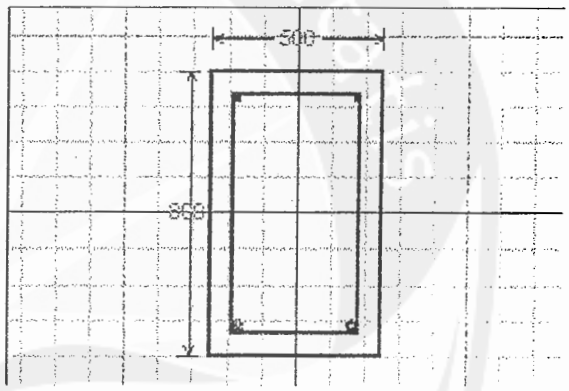
RC Beam Section

Beam B-1 : Sect0001 : Load1

Material

Rebar Fy = 400.0 N/mm^2
Rebar Fys = 240.0 N/mm^2
Concrete fc' = 30.0 N/mm^2
Clear Cover = 75 mm

Calculations



Beam Cross-section

Flexural Design:

Design Moment, Mu = 100.0 kN-m
Balanced Moment capacity, ØMb = 2,697.5 kN-m
Concrete section capacity, ØMrc = 2,023.1 kN-m

Mu < ØMrc, Singly reinforced beam required
Computed steel, Ast = 446 mm^2
at Neutral axis depth = 9 mm

Minimum tension steel, Ast min = 600 mm^2
Required tension steel, Ast = 600 mm^2
Required compression steel, Asc = 0 mm^2

Skin Reinforcement Not Required

Design for Shear + Torsion:

Design shear force, Vu = 269.6 kN
Design torsional moment, Tu = 86.4 kN-m
Effective web width, bw = 500 mm

Concrete shear capacity, ØVc = 285.9 kN (Eq 11-3)

Area of concrete section, Acp = 400,000 mm^2
Perimeter of concrete section, Pcp = 2,600 mm
Allowable Torsion for concrete, ØTc = 23.3 kN-m

Vs < 0, Minimum shear stirrups sequired
Computed steel for Shear, Av/S = 0.722
Maximum stirrup spacing for shear only = 364 mm
Required stirrups for shear only = 2L d 10@218 mm

Tu > Tmin, Hoops Required for Torsion
Area of concrete in stirrups, Aoh = 227,500 mm^2
Perimeter of concrete in stirrup, Ph = 2,300 mm
Computed steel for Torsion, At/S = 1.118
Computed longitudinal steel for torsion, Al = 1,544 mm^2
Maximum stirrup spacing for torsion= 306 mm
Required hoops for torsion only = 3L d 10@106 mm

Computed steel for Shear + Torsion, Avt/S = 2.599
Required stirrups for shear + torsion = 3L d 10@91 mm

Final Results

Top Bars = <Not Required>
Bottom Bars = 2-d 20
Skin Bars = <Not Required>

Stirrup Bars for Shear = 2L d 10@218 mm
Stirrup Bars for Torsion = 3L d 10@106 mm
Longitudinal Bars for Torsion = 2-d 32
Stirrup Bars for Shear + Torsion = 3L d 10@91 mm

PERPUSTAKAAN
UNIVERSITAS ATMA JAYA YOGYAKARTA
FAKULTAS TEKNIK
Program Studi Teknik Sipil