LAMPIRAN

YAYASAN BADAN WAKAF SULTAN AGUNG
UNIVERSITAS ISLAM SULTAN AGUNG (UNISSULA)
FAKULTAS TEKNIK PROGRAM STUDI TEKNIK SIPIL
Jl. Raya Kaligawe Km 4 Telp (024) 6583584 Ext 507 Fax (024) 6582455 Semarang 50112

BERITA ACARA SEMINAR TUGAS AKHIR

Nomor : 60 / A.2 / SA - T / VIII / 2018

...ari, Rabu Tanggal Dua Puluh Sembilan Bulan Agustus Tahun Dua Ribu Delapan Belas telah dilaksanakan ...Tugas Akhir, dengan peserta sebagai berikut :

Dia Aprilia	30201403735
Lulu Isnaini Ija	30201403826

Pengujian Program Analisis Struktur Frame Dua Dimensi Metode Kekakuan Langsung

...Hasil : Dapat dilanjutkan dengan beberapa perbaikan.

...Berita Acara Seminar Tugas Akhir ini dibuat untuk diketahui dan pergunakan seperlunya.

Dosen Pembimbing I	Dosen Pembimbing II	Dosen Pembanding
Ir. H. Sumirin, MS	Prof.Dr.Ir.Antonius, MT	Ir. Gata Dian Asfari, MT

Mengetahui ,
Ketua Program Studi Teknik Sipil

Ari Sentani, ST, MSc

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Mahasiswa / NIM : DIA APRILIA , LULU ISNAINI UA / 30201403735 , 30201403226
/ Tanggal : RABU / 29 AGUSTUS 2018
TA : PENGUJIAN PROGRAM ANALISIS STRUKTUR FRAME DUA
: DIMENSI METODE KEKAKUAN LANGSUNG

Gambar Freebody ditambah nilainya !
Pemberian / Pembetulan gambar pembebanan :
Perbaiki penulisan Lampiran.
Pemberian penomoran pada gambar !

DOSEN PENGUJI

Dr. Ir. H. Sumirin , MS

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LEMBAR KOREKSI
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Nama Mahasiswa / NIM : DIA APRILIA , LULU ISNAINI 139 / 30201403735 , 30201403826
Hari / Tanggal : RABU / 29 AGUSTUS 2018
Judul TA : PENGUJIAN PROGRAM ANALISIS STRUKTUR FRAME DUA DIMENSI
: METODE KEKAKUAN LANGSUNG

- Abstrak : dibuat spasi 1.
- tujuan dijawab di kesimpulan
- tabel² diberi keterangan
- Banyak referensi yg tdk ada di daftar pustaka dan sebaliknya.
- perbaiki sesuai koreksi

ACC 9 - 2018

DOSEN PENGUJI

Ir. Gata Dian Asyari, MT

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Hari / Tanggal : RABU / 29 AGUSTUS 2018
Judul TA : PENGUJIAN PROGRAM ANALISIS STRUKTUR FRAME DUA DIMENSI METODE KEFAKUAN LANGSUNG

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Prof. Dr. Ir. Antoni, MT

YAYASAN BADAN WAKAF SULTAN AGUNG
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gal	Rabu 29 Agustus 2018 15 .00 WIB

Judul Tugas Akhir

Pengujian Program Analisis Struktur Frame Dua Dimensi Metode Kekakuan Langsung

)ia Aprilia	30201403735	
.ulu Isnaini Ija	30201403826	

NAMA	TANDA TANGAN	
r. Ir. H. Sumirin, MS	1	
of.Dr. Ir. Antonius, MT		2
Gata Dian Asfari, MT	3	

Semarang, 29 Agustus 2018
Ketua Program Studi Teknik Sipil

Ari Sentani, ST, MSc
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Hari : Rabu
Tanggal : 29 Agustus 2018
Tempat : Ruang Rapat

NAMA	NIM	TANDA TANGAN
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Melinda		4
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Sifa Melinda A	30201409920	6
Novita Anggraini	30201403881	7
Avianda Reina S.	30201403794	8
Niko		9
Dayat		10
Abtah Azzahro		11 Azzahro
		12
		13
		14
		15
		16
		17
		18
		19
		20

MENGETAHUI

DOSEN PENGUJI

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DOSEN PENGUJI

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LEMBAR ASISTENSI

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Nama	: Dia Aprilia	(30201403735)
	Lulu Isnaini Ija	(30201403826)
Dosen Pembimbing	: Dr. Ir. H. Sumirin, MS	
	Prof. Dr. Ir. Antonius, MT	

No	Tanggal	Keterangan	Paraf
1.		- Prosedur analisis metode direct stiffness dg prog. comp (Matlab) - Opsi 1) kemudahan input data. 2) Penampang non prismatis [illegible] prismatis [illegible]	
2,		Pelajari metode direct stiffness methode	
3,		- Bab . 2. Metode matrits kekakuan dengan beban terpusat atau merata. - Pelajari Matlab (Coding).	
4,		Cari buku william weaver &	

dewobroto Bikin pemodelan.

No	Tanggal	Keterangan	Paraf
5.	18 - Juli - 2018	- Cari Contoh frame lain - Berikan perbandingan Persentase perbedaan hasil Matlab dan Sap2000	
6.	23 - Juli - 2018	- Masuk Ke Studi - Bandingkan Manual dalam Buku Teknik Sipil dg Matlab.	
7.	27/ Juli - 2018	- Cek lagi tumpuan - Baca bab 1 sampai ~~bab 4~~.	
8.	31/ Juli 2018	- Cari contoh struktur bangunan baja pabrik. - Buatlah kasus ~~dengan~~ dari beberapa perbandingan tinggi terhadap bentang	
9	1/ Agustus 2018	- Uji dengan menggunti tumpuan jepit, Cari Rumus atau dan referensi lain dengan melihat perbedaan jenis bahan nurata.	

No	Tanggal	Keterangan	Paraf
10.	3 Agustus 2018	- Cari lagi contoh soal yang sesuai dengan matlab Pakkan (?) Menentukan semua. - Buat presentasi	
11.	7 Agustus 2018	- Perbaiki penulisan - Lanjutkan bab 4 dengan beban merata menyeluruh - Perbaiki power point.	
12.	8 Agustus 2018	- Susun lagi yang baik - Gambarkan Momen dan perbedaannya.	
13.	13 Agustus 2018	- Lakukan pengujian bila Penampang diganti. - Mencari nilai tinggi untuk mendapatkan momen nol pada tengah bentang. - Input dan Output dipindah ke lampiran. - Perbaiki lagi Power point.	

No	Tanggal	Keterangan	Paraf
14.	18-08-18.	- Pindahkan Input dan Out put ke Lampiran - Perbaiki	
15.	23-08-18	- semm cuka [illegible] & perbaiki	

Acc 8/9/2018

LEMBAR ASISTENSI

TUGAS AKHIR

Nama : Dia Aprilia (30201403735)

Lulu Isnaini Ija (30201403826)

Dosen Pembimbing : Dr. Ir. H. Sumirin, MS

Prof. Dr. Ir. Antonius, MT

No	Tanggal	Keterangan	Paraf
1.	2-8/18	cek defromasi hasil SAP w/ struktur gable & frame → modulus dan angkanya.	[signature]
2.	16-8/18	– Tabel 4.5 buat tabel perband. rat. Mmotro/MSAP2000 & Mmatla/MSAP14.0. – Seminar TA Acc.	[signature]

TA_3735-3826 Aprilia-Lulu

by Aprilia Lulu

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TUGAS AKHIR

PENGUJIAN PROGRAM ANALISIS STRUKTUR FRAME 2 DIMENSI METODE KEKAKUAN LANGSUNG

Diajukan Untuk Memenuhi Persyaratan Dalam Menyelesaikan

Pendidikan Program Sarjana (S1) Fakultas Teknik Jurusan Teknik Sipil

Universitas Islam Sultan Agung Semarang

Disusun Oleh:

Dia Aprilia	**Lulu Isnaini Ija**
30.2014.03.735	**30.2014.03.826**

FAKULTAS TEKNIK JURUSAN TEKNIK SIPIL

UNIVERSITAS ISLAM SULTAN AGUNG

SEMARANG

2018

YAYASAN BADAN WAKAF SULTAN AGUNG
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FAKULTAS TEKNIK
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HALAMAN PENGESAHAN

PENGUJIAN PROGRAM ANALISIS STRUKTUR FRAME 2 DIMENSI METODE KEKAKUAN LANGSUNG

Dia Aprilia
30.2014.03.735

Lulu Isnaini Ija
30.2014.03.826

Telah disetujui pada tanggal :

Oleh:

Pembimbing I,	Pembimbing II,
Dr. Ir. H. Sumirin, MS	Prof. Dr. Ir. Antonius, MT

Disahkan,

Ketua Program Studi Teknik Sipil

Fakultas Teknik UNISSULA

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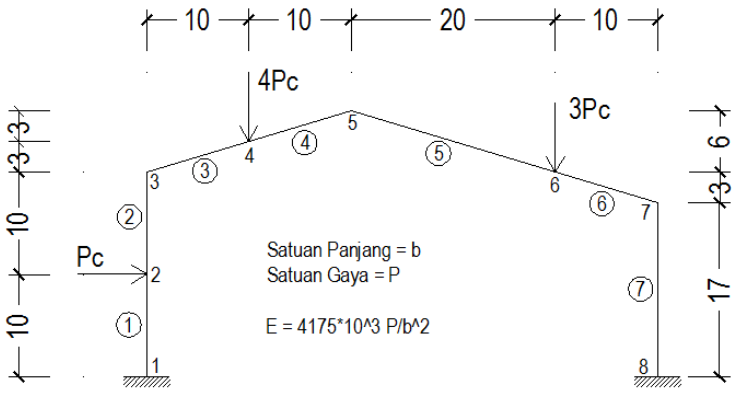
TUGAS AKHIR PENGUJIAN PROGRAM ANALISIS STRUKTUR FRAME 2 DIMENSI METODE KEKAKUAN LANGSUNG Diajukan Untuk Memenuhi Persyaratan Dalam Menyelesaikan Pendidikan Program Sarjana (S1) Fakultas Teknik Jurusan Teknik Sipil Universitas Islam Sultan Agung Semarang Disusun Oleh: Dia Aprilia Lulu Isnaini Ija 30.2014.03.735 30.2014.03.826 FAKULTAS TEKNIK JURUSAN TEKNIK SIPIL UNIVERSITAS ISLAM SULTAN AGUNG SEMARANG 2018 i YAYASAN BADAN WAKAF SULTAN AGUNG UNIVERSITAS ISLAM SULTAN AGUNG (UNISSULA) FAKULTAS TEKNIK Jalan Raya Kaligawe KM. 4 Po. BOX 1054 Telp.(024)6583584 Ext.507 Semarang 50112 HALAMAN PENGESAHAN PENGUJIAN PROGRAM ANALISIS STRUKTUR FRAME 2 DIMENSI METODE KEKAKUAN LANGSUNG Dia Aprilia 30.2014.03.735 Lulu Isnaini Ija 30.2014.03.826 Telah disetujui pada tanggal : Pembimbing I, Oleh: Pembimbing II, Dr. Ir. H. Sumirin, MS Prof. Dr. Ir. Antonius, MT Disahkan, Ketua Program Studi Teknik Sipil Fakultas Teknik UNISSULA Ari Sentani, ST., M.Sc ii YAYASAN BADAN WAKAF SULTAN AGUNG UNIVERSITAS ISLAM SULTAN AGUNG (UNISSULA) FAKULTAS TEKNIK Jalan Raya Kaligawe KM. 4 Po. BOX 1054 Telp.(024)6583584 Ext.507 Semarang 50112 BERITA ACARA BIMBINGAN TUGAS AKHIR No. 60 / A.2 / SA-T / VIII/2018 Pada hari ini, , tanggal Agustus 2018 berdasarkan Surat Keputusan Rektor Universitas Islam Sultan Agung (UNISSULA) Semarang perihal penunjukan Dosen Pembimbing I dan Dosen Pembimbing II : 1. Nama Jabatan Akademik Jabatan : Dr. Ir. H. Sumirin, MS : Lektor : Dosen Pembimbing I 2. Nama Jabatan Akademik Jabatan : Prof. Dr. Ir. Antonius, MT : Lektor : Dosen Pembimbing II Dengan ini menyatakan bahwa



Gambar A1. Gable Frame

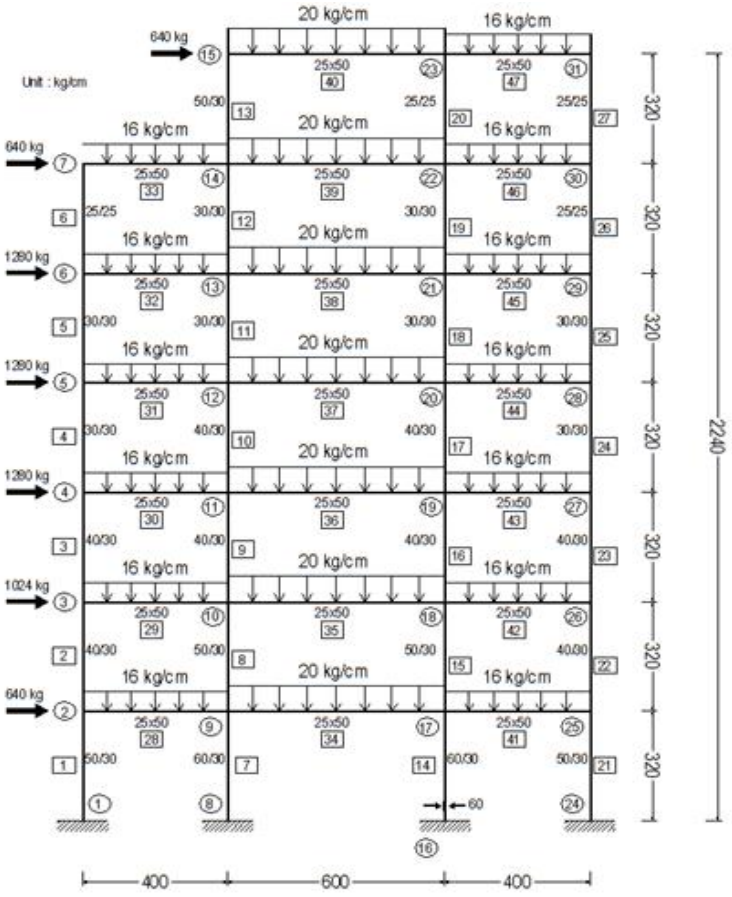
Tabel A.1.1 Input Data Soal Gable Frame

```
%****PORTAL 2D---TEKNIK SIPIL UNISSULA SEMARANG----
%****nama file :TugasAkhirLuluDia2----oleh :luludia----
%****struktur : gable frame beban titik
     clear all
     clc
%****General Data---
     type='FRAME2D'
     nfile='TugasAkhirLuluDia2'
%****Material Properties---i,E,A,I---
     prop = [   1   4175e3  0.2044  0.1440
                2   4175e3  0.3266  0.2464
                3   4175e3  0.2653  0.1934
                4   4175e3  0.1716  0.1140];

%****Coordinates---
%****--- Joint    X     Y  ---
     coord=[ 1    0       0
             2    0       10
             3    0       20
             4    10      23
             5    20      26
             6    40      20
             7    50      17
             8    50       0 ];
%****Elemet data---
%****--- Element  J1 J2  prop---
     element=[ 1    1    2     1
               2    2    3     1
               3    3    4     2
               4    4    5     2
               5    5    6     3
               6    6    7     3
               7    7    8     4 ];
```

```
%****Nodal Restraint---
%****---- Joint  JR1   JR2  JR3---
     Support=[ 1    1     1     1
               8    1     1     1 ];
%****Joint Load---
%****---Joint   FX   FY   MZ---
     JL=[ 2   1.0     0     0
          4   0      -4.0   0
          6   0      -3.0   0 ];
%****Gaya & Momen Jepit---
     q=0; L=0; P=0;
     Fox1(1)=0;                  Fox2(1)=0;
     Foy1(1)=q*L/2+P/2;          Foy2(1)=Foy1(1);
     Moz1(1)=q*L^2/12+1/8*P*L;   Moz2(1)=-Moz1(1);
%****Matriks Beban Batang------
     AML=[ 1  Fox1(1) Foy1(1) Moz1(1)  Fox2(1) Foy2(1) Moz2(1) ];
%****Call function for analysis portal 2d--------------------
[dof,index,coord,element]=FRAME2D_sdata(prop,element,coord,type);
[S,Sm,SmS,Cx,Cy,RT,L,A,Joint,Xj,Xk,Yj,Yk]=FRAME2D_stiff...
    (prop,element,coord,index,nfile);
[IR,IF,Support]=FRAME2D_ldata(Support,dof);
[DF,AR,AM]=FRAME2D_analysis_result...
    (element,dof,index,IF,IR,S,Sm,JL,AML,RT,Support,type,nfile);
[joint_disp,support_reaction,beam_endforces]=FRAME2D_print_result...
    (JL,AML,dof,Support,element,IF,IR,DF,AR,AM,type,nfile);
%****end data-----------------------------------------------
%
      FRAME2D_xplot
%
```

Tabel A.1.2 Output Data Soal Gable Frame

```
     Displacement of Joints of Members :
     Member         Dx1          Dy1          Rz1          Dx2          Dy2
Rz2
         1  0.0000e+000  0.0000e+000  0.0000e+000 -4.0374e-004 -4.3445e-005
5.8227e-005
         2 -4.0374e-004 -4.3445e-005  5.8227e-005 -4.3687e-004 -8.6889e-005 -
1.0185e-004
         3 -4.3687e-004 -8.6889e-005 -1.0185e-004 -2.7953e-005 -1.5246e-003 -
1.3095e-004
         4 -2.7953e-005 -1.5246e-003 -1.3095e-004  1.9804e-004 -2.3219e-003 -
4.1939e-005
         5  1.9804e-004 -2.3219e-003 -4.1939e-005  3.9943e-004 -1.5312e-003
1.4168e-004
         6  3.9943e-004 -1.5312e-003  1.4168e-004  8.0896e-004 -7.8128e-005
8.8247e-005
         7  8.0896e-004 -7.8128e-005  8.8247e-005  0.0000e+000  0.0000e+000
0.0000e+000
     Member End Forces :
     [AM]mx4 = [AML]mx6 + [AML]mx6[Sm]6x6[RT]6x6[Dj]6x6
     Member         Fx1          Fy1          Mz1          Fx2          Fy2          Mz2
          1       3.707       -0.812       -7.563       -3.707        0.812       -0.562
          2       3.707       -1.812        0.562       -3.707        1.812      -18.686
          3       2.801        3.030       18.686       -2.801       -3.030       12.951
          4       1.652       -0.801      -12.951       -1.652        0.801        4.589
          5       1.820        0.241       -4.589       -1.820       -0.241        9.612
          6       2.682       -2.633       -9.612       -2.682        2.633      -17.876
          7       3.293        1.812       17.876       -3.293       -1.812       12.935

     Reaction of Supports :
     {AR}IFx1 = -{ARC}IRx1 + [SRF]IRxIF {DF}IFx1
          1     8.124e-001
          2     3.707e+000
          3    -7.563e+000
         22    -1.812e+000
         23     3.293e+000
         24     1.293e+001
```



Gambar A2. Plane Frame

Tabel A.2.1 Input Data Soal Plane Frame

```
%****PORTAL 2D---TEKNIK SIPIL UNISSULA SEMARANG----
%****nama file : lulucoba2----oleh :luludia----
%****struktur : portal bertingkat banyak dengan beban merata dan
titik -kg.cm--
     clear all
     clc
%****General Data---
     type='p2d'
     nfile=' lulucoba2 '
%****Material Properties---i,E,A,I---
     prop = [   1   2100000  1800   540000
                2   2100000  1500   312500
                3   2100000  1200   160000
                4   2100000   900    67500
                5   2100000   625    32552.08
                6   2100000  1250   260416.66 ];
%****Coordinates---
%****--- Joint   X    Y  ---
     coord=[ 1   0       0
             2   0     320
             3   0     640
```

```
              4   0     960
              5   0    1280
              6   0    1600
              7   0    1920
              8   400     0
              9   400   320
             10   400   640
             11   400   960
             12   400  1280
             13   400  1600
             14   400  1920
             15   400  2240
             16  1000     0
             17  1000   320
             18  1000   640
             19  1000   960
             20  1000  1280
             21  1000  1600
             22  1000  1920
             23  1000  2240
             24  1400     0
             25  1400   320
             26  1400   640
             27  1400   960
             28  1400  1280
             29  1400  1600
             30  1400  1920
             31  1400  2240];
%****Element data---
%****--- Element  J1 J2  prop---
     element=[ 1   1   2    2
               2   2   3    3
               3   3   4    3
               4   4   5    4
               5   5   6    4
               6   6   7    5
               7   8   9    1
               8   9  10    2
               9  10  11    3
              10  11  12    3
              11  12  13    4
              12  13  14    4
              13  14  15    5
              14  16  17    1
              15  17  18    2
              16  18  19    3
              17  19  20    3
              18  20  21    4
              19  21  22    4
              20  22  23    5
              21  24  25    2
              22  25  26    3
              23  26  27    3
              24  27  28    4
              25  28  29    4
              26  29  30    5
              27  30  31    5
              28   2   9    6
```

```
                 29    3  10   6
                30    4  11   6
                31    5  12   6
                32    6  13   6
                33    7  14   6
                34    9  17   6
                35   10  18   6
                36   11  19   6
                37   12  20   6
                38   13  21   6
                39   14  22   6
                40   15  23   6
                41   17  25   6
                42   18  26   6
                43   19  27   6
                44   20  28   6
                45   21  29   6
                46   22  30   6
                47   23  31   6 ];
%****Nodal Restraint---
%****---- Joint  JR1   JR2  JR3---
     Support=[ 1    1     1     1
               8    1     1     1
              16    1     1     1
              24    1     1     1 ];
%****Joint Load---
%****---Joint   FX      FY   MZ---
     JL=[ 2      640     0   0
          3     1024     0   0
          4     1280     0   0
          5     1280     0   0
          6     1280     0   0
          7      640     0   0
         15      640     0   0 ];
%****Load Data---
     q1=16;   q2=20;
     L1=400;  L2=600;
     Ra1=(1/2*q1*L1);            Rb1=Ra1;
     Ma1=(1/12*q1*L1^2);         Mb1=-Ma1;
     Ra2=(1/2*q2*L2);            Rb2=Ra2;
     Ma2=(1/12*q2*L2^2);         Mb2=-Ma2;
%****
     AML=[ 28   0   Ra1  Ma1   0   Rb1  Mb1
           29   0   Ra1  Ma1   0   Rb1  Mb1
           30   0   Ra1  Ma1   0   Rb1  Mb1
           31   0   Ra1  Ma1   0   Rb1  Mb1
           32   0   Ra1  Ma1   0   Rb1  Mb1
           33   0   Ra1  Ma1   0   Rb1  Mb1
           34   0   Ra2  Ma2   0   Rb2  Mb2
           35   0   Ra2  Ma2   0   Rb2  Mb2
           36   0   Ra2  Ma2   0   Rb2  Mb2
           37   0   Ra2  Ma2   0   Rb2  Mb2
           38   0   Ra2  Ma2   0   Rb2  Mb2
           39   0   Ra2  Ma2   0   Rb2  Mb2
           40   0   Ra2  Ma2   0   Rb2  Mb2
           41   0   Ra1  Ma1   0   Rb1  Mb1
           42   0   Ra1  Ma1   0   Rb1  Mb1
           43   0   Ra1  Ma1   0   Rb1  Mb1
           44   0   Ra1  Ma1   0   Rb1  Mb1
           45   0   Ra1  Ma1   0   Rb1  Mb1
```

```
           46   0   Ra1  Ma1   0   Rb1  Mb1
           47   0   Ra1  Ma1   0   Rb1  Mb1];
%****Call function for analysis portal 2d--------------------
[dof,index,coord,element]=FRAME2D_sdata(prop,element,coord,type);
[S,Sm,SmS,Cx,Cy,RT,L,A,Joint,Xj,Xk,Yj,Yk]=FRAME2D_stiff...
    (prop,element,coord,index,nfile);
[IR,IF,Support]=FRAME2D_ldata(Support,dof);
[DF,AR,AM]=FRAME2D_analysis_result...
    (element,dof,index,IF,IR,S,Sm,JL,AML,RT,Support,type,nfile);
[joint_disp,support_reaction,beam_endforces]=FRAME2D_print_result...
    (JL,AML,dof,Support,element,IF,IR,DF,AR,AM,type,nfile);
%****end data-------------------------------------------------
%
      FRAME2D_xplot
%
```

Output Data File Matlab

Displacement of Joints of Members :

Member	Dx1	Dy1	Rz1	Dx2	Dy2	Rz2
1	0.0000e+000	0.0000e+000	0.0000e+000	1.1473e-002	-1.2312e-003	-5.0186e-005
2	1.1473e-002	-1.2312e-003	-5.0186e-005	3.3202e-002	-2.5738e-003	-6.2388e-005
3	3.3202e-002	-2.5738e-003	-6.2388e-005	5.6622e-002	-3.7202e-003	-6.6291e-005
4	5.6622e-002	-3.7202e-003	-6.6291e-005	7.7921e-002	-4.9267e-003	-6.5905e-005
5	7.7921e-002	-4.9267e-003	-6.5905e-005	9.7925e-002	-5.7601e-003	-6.8911e-005
6	9.7925e-002	-5.7601e-003	-6.8911e-005	1.1111e-001	-6.3685e-003	-8.0553e-005
7	0.0000e+000	0.0000e+000	0.0000e+000	1.1432e-002	-5.4692e-003	-5.1668e-005
8	1.1432e-002	-5.4692e-003	-5.1668e-005	3.3063e-002	-1.1004e-002	-6.0431e-005
9	3.3063e-002	-1.1004e-002	-6.0431e-005	5.6479e-002	-1.6640e-002	-6.1601e-005
10	5.6479e-002	-1.6640e-002	-6.1601e-005	7.7739e-002	-2.1021e-002	-6.3155e-005
11	7.7739e-002	-2.1021e-002	-6.3155e-005	9.7759e-002	-2.5219e-002	-6.6090e-005
12	9.7759e-002	-2.5219e-002	-6.6090e-005	1.1097e-001	-2.7773e-002	-6.0818e-005
13	1.1097e-001	-2.7773e-002	-6.0818e-005	1.2048e-001	-2.9061e-002	-1.7923e-004
14	0.0000e+000	0.0000e+000	0.0000e+000	1.1468e-002	-5.3660e-003	-2.8380e-005
15	1.1468e-002	-5.3660e-003	-2.8380e-005	3.2947e-002	-1.0936e-002	-2.1657e-005
16	3.2947e-002	-1.0936e-002	-2.1657e-005	5.6337e-002	-1.6839e-002	-7.2829e-006
17	5.6337e-002	-1.6839e-002	-7.2829e-006	7.7511e-002	-2.1667e-002	7.3843e-006
18	7.7511e-002	-2.1667e-002	7.3843e-006	9.7585e-002	-2.6608e-002	3.3153e-005
19	9.7585e-002	-2.6608e-002	3.3153e-005	1.1085e-001	-3.0014e-002	4.1449e-005
20	1.1085e-001	-3.0014e-002	4.1449e-005	1.2017e-001	-3.2640e-002	8.8796e-005
21	0.0000e+000	0.0000e+000	0.0000e+000	1.1437e-002	-2.7519e-003	-2.5569e-005
22	1.1437e-002	-2.7519e-003	-2.5569e-005	3.3012e-002	-5.6109e-003	-3.0008e-005
23	3.3012e-002	-5.6109e-003	-3.0008e-005	5.6197e-002	-7.8597e-003	-1.4096e-005
24	5.6197e-002	-7.8597e-003	-1.4096e-005	7.7547e-002	-1.0086e-002	8.8944e-006
25	7.7547e-002	-1.0086e-002	8.8944e-006	9.7481e-002	-1.1626e-002	2.2653e-005
26	9.7481e-002	-1.1626e-002	2.2653e-005	1.1085e-001	-1.2968e-002	4.5798e-005
27	1.1085e-001	-1.2968e-002	4.5798e-005	1.2008e-001	-1.3540e-002	4.8341e-005
28	1.1473e-002	-1.2312e-003	-5.0186e-005	1.1432e-002	-5.4692e-003	-5.1668e-005
29	3.3202e-002	-2.5738e-003	-6.2388e-005	3.3063e-002	-1.1004e-002	-6.0431e-005
30	5.6622e-002	-3.7202e-003	-6.6291e-005	5.6479e-002	-1.6640e-002	-6.1601e-005
31	7.7921e-002	-4.9267e-003	-6.5905e-005	7.7739e-002	-2.1021e-002	-6.3155e-005
32	9.7925e-002	-5.7601e-003	-6.8911e-005	9.7759e-002	-2.5219e-002	-6.6090e-005
33	1.1111e-001	-6.3685e-003	-8.0553e-005	1.1097e-001	-2.7773e-002	-6.0818e-005
34	1.1432e-002	-5.4692e-003	-5.1668e-005	1.1468e-002	-5.3660e-003	-2.8380e-005
35	3.3063e-002	-1.1004e-002	-6.0431e-005	3.2947e-002	-1.0936e-002	-2.1657e-005
36	5.6479e-002	-1.6640e-002	-6.1601e-005	5.6337e-002	-1.6839e-002	-7.2829e-006
37	7.7739e-002	-2.1021e-002	-6.3155e-005	7.7511e-002	-2.1667e-002	7.3843e-006
38	9.7759e-002	-2.5219e-002	-6.6090e-005	9.7585e-002	-2.6608e-002	3.3153e-005
39	1.1097e-001	-2.7773e-002	-6.0818e-005	1.1085e-001	-3.0014e-002	4.1449e-005
40	1.2048e-001	-2.9061e-002	-1.7923e-004	1.2017e-001	-3.2640e-002	8.8796e-005
41	1.1468e-002	-5.3660e-003	-2.8380e-005	1.1437e-002	-2.7519e-003	-2.5569e-005
42	3.2947e-002	-1.0936e-002	-2.1657e-005	3.3012e-002	-5.6109e-003	-3.0008e-005
43	5.6337e-002	-1.6839e-002	-7.2829e-006	5.6197e-002	-7.8597e-003	-1.4096e-005
44	7.7511e-002	-2.1667e-002	7.3843e-006	7.7547e-002	-1.0086e-002	8.8944e-006
45	9.7585e-002	-2.6608e-002	3.3153e-005	9.7481e-002	-1.1626e-002	2.2653e-005
46	1.1085e-001	-3.0014e-002	4.1449e-005	1.1085e-001	-1.2968e-002	4.5798e-005
47	1.2017e-001	-3.2640e-002	8.8796e-005	1.2008e-001	-1.3540e-002	4.8341e-005

Member End Forces :

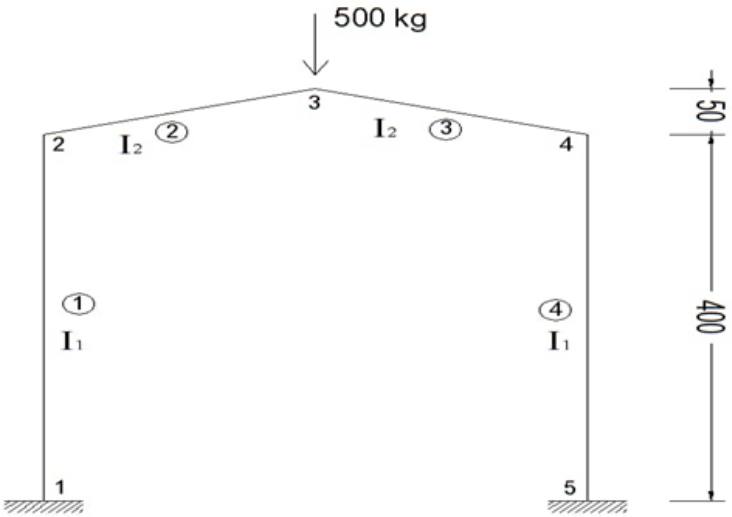
[AM]mx4 = [AML]mx6 + [AML]mx6[Sm]6x6[RT]6x6[Dj]6x6

Member	Fx1	Fy1	Mz1	Fx2	Fy2	Mz2
1	12119.229	827.557	235328.723	-12119.229	-827.557	29489.405
2	10573.462	457.400	85996.755	-10573.462	-457.400	60371.162
3	9027.779	348.356	59835.135	-9027.779	-348.356	51638.707
4	7125.836	7.640	1051.454	-7125.836	-7.640	1393.298
5	4922.288	-81.296	-11675.845	-4922.288	81.296	-14338.733
6	2495.539	-268.585	-40486.667	-2495.539	268.585	-45460.426
7	64605.243	1314.421	393406.991	-64605.243	-1314.421	27207.770
8	54483.752	887.992	160048.485	-54483.752	-887.992	124109.114
9	44379.707	478.771	77832.646	-44379.707	-478.771	75374.037
10	34503.457	159.872	27210.597	-34503.457	-159.872	23948.364
11	24795.719	-34.237	-4177.949	-24795.719	34.237	-6777.899
12	15080.481	-368.138	-61237.093	-15080.481	368.138	-56566.940
13	5284.452	-723.392	-90446.681	-5284.452	723.392	-141038.768
14	63386.360	2876.680	560840.611	-63386.360	-2876.680	359696.867
15	54828.043	3238.010	504294.802	-54828.043	-3238.010	531868.271
16	46483.324	2308.292	354233.521	-46483.324	-2308.292	384420.011
17	38020.619	2607.419	401786.397	-38020.619	-2607.419	432587.531
18	29185.502	1378.736	209183.169	-29185.502	-1378.736	232012.205
19	20119.243	1307.965	205599.553	-20119.243	-1307.965	212949.277
20	10769.465	755.165	110711.939	-10769.465	-755.165	130940.983
21	27089.168	1765.343	334891.042	-27089.168	-1765.343	230018.591
22	22514.743	1560.598	254356.423	-22514.743	-1560.598	245034.987
23	17709.190	1984.581	300825.230	-17709.190	-1984.581	334240.713
24	13150.088	1065.070	160227.334	-13150.088	-1065.070	180595.025
25	9096.492	1296.797	201392.897	-9096.492	-1296.797	213582.155
26	5504.737	608.757	92456.956	-5504.737	-608.757	102345.340
27	2346.083	608.227	96772.917	-2346.083	-608.227	97859.609
28	269.843	1545.767	-115486.160	-269.843	4854.233	-546207.178
29	914.956	1545.684	-120206.297	-914.956	4854.316	-541520.239
30	939.284	1901.942	-52690.162	-939.284	4498.058	-466532.987
31	1191.065	2203.549	10282.548	-1191.065	4196.451	-408863.050
32	1092.711	2426.749	54825.401	-1092.711	3973.251	-364125.943
33	908.585	2495.539	45460.426	-908.585	3904.461	-327244.808
34	-156.586	5267.257	358950.923	156.586	6732.743	-798596.538
35	505.734	5249.729	339578.478	-505.734	6750.271	-789741.054
36	620.385	5378.192	363948.352	-620.385	6621.808	-737033.421
37	996.956	5511.287	389092.635	-996.956	6488.713	-682320.242
38	758.810	5741.987	432140.935	-758.810	6258.013	-586948.930
39	553.330	5891.568	474258.429	-553.330	6108.432	-539317.916
40	1363.392	5284.452	141038.768	-1363.392	6715.548	-570367.394
41	204.744	1825.575	-65395.132	-204.744	4574.425	-484375.013
42	-423.983	1594.448	-96360.738	423.983	4805.552	-545860.217
43	919.511	1840.897	-49172.986	-919.511	4559.103	-494468.047
44	-231.727	2346.404	40549.542	231.727	4053.596	-381987.922
45	688.040	2808.245	149337.172	-688.040	3591.755	-306039.111
46	0.531	3241.346	215656.699	-0.531	3158.654	-199118.257
47	608.227	4053.917	439426.411	-608.227	2346.083	-97859.609

Reaction of Supports :

{AR}IFx1 = -{ARC}IRx1 + [SRF]IRxIF {DF}IFx1

1	-8.276e+002
2	1.212e+004
3	2.353e+005
22	-1.314e+003
23	6.461e+004
24	3.934e+005
46	-2.877e+003
47	6.339e+004
48	5.608e+005
70	-1.765e+003
71	2.709e+004
72	3.349e+005



Gambar A3. Gable Frame

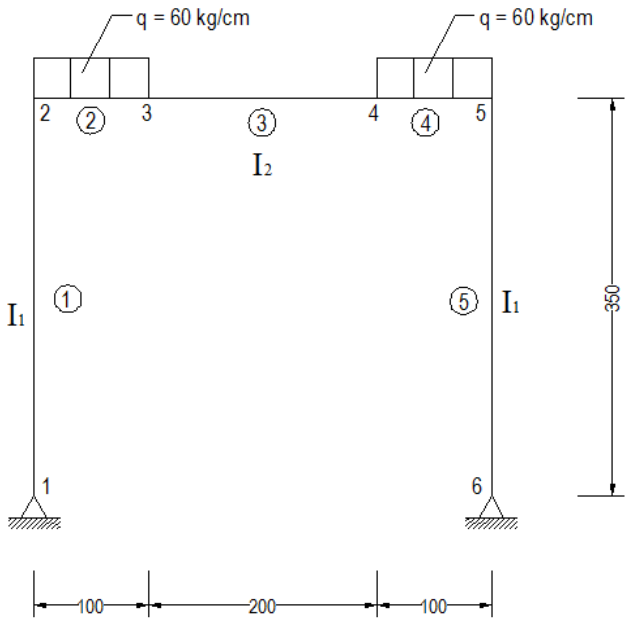
Tabel A.3.1 Input Data Soal Gable Frame

```
%****PORTAL 2D---TEKNIK SIPIL UNISSULA SEMARANG----
%****nama file :studikasus1----oleh :luluisnain23/07/2018---
%****struktur : portal 2 kolom 2 balok miring
     clear all
     clc
%****General Data---
     type='FRAME2D'
     nfile=' studikasus1'
%****Material Properties---i,E,A,I---
     prop = [   1   2100e3  1200  160000
                2   2100e3  1250  260416.6];

%****Coordinates---
%****--- Joint   X    Y  ---
     coord=[ 1   0      0
             2   0      400
             3   200    450
             4   400    400
             5   400     0];
%****Elemet data---
%****--- Element  J1 J2  prop---
     element=[ 1   1   2    1
               2   2   3    2
               3   3   4    2
               4   4   5    1];
%****Nodal Restraint---
%****---- Joint  JR1   JR2  JR3---
     Support=[ 1    1     1     1
               5    1     1     1 ];
%****Joint Load---
%****---Joint   FX   FY    MZ---
     JL=[ 3     0   500   0];
%****Gaya & Momen Jepit---
     q=0; L=0; P=0;
     Fox1(1)=0;                  Fox2(1)=0;
     Foy1(1)=q*L/2+P/2;          Foy2(1)=Foy1(1);
```

```
      Moz1(1)=q*L^2/12+1/8*P*L;  Moz2(1)=-Moz1(1);
%****Matriks Beban Batang------
     AML=[ 1  Fox1(1) Foy1(1) Moz1(1)  Fox2(1) Foy2(1) Moz2(1) ];
%****Call function for analysis portal 2d--------------------
[dof,index,coord,element]=FRAME2D_sdata(prop,element,coord,type);
[S,Sm,SmS,Cx,Cy,RT,L,A,Joint,Xj,Xk,Yj,Yk]=FRAME2D_stiff...
    (prop,element,coord,index,nfile);
[IR,IF,Support]=FRAME2D_ldata(Support,dof);
[DF,AR,AM]=FRAME2D_analysis_result...
    (element,dof,index,IF,IR,S,Sm,JL,AML,RT,Support,type,nfile);
[joint_disp,support_reaction,beam_endforces]=FRAME2D_print_result...
    (JL,AML,dof,Support,element,IF,IR,DF,AR,AM,type,nfile);
%****end data-------------------------------------------------
%
      FRAME2D_xplot
%
```

Tabel A.3.2 Output Data Soal Gable Frame

```
Displacement of Joints of Members :
Member         Dx1           Dy1           Rz1           Dx2           Dy2           Rz2
      1  0.0000e+000  0.0000e+000  0.0000e+000 -1.5556e-004 -3.9683e-005 -3.6024e-006
      2 -1.5556e-004 -3.9683e-005 -3.6024e-006 -5.6688e-018 -6.9890e-004 -2.8787e-021
      3 -5.6688e-018 -6.9890e-004 -2.8787e-021  1.5556e-004 -3.9683e-005  3.6024e-006
      4  1.5556e-004 -3.9683e-005  3.6024e-006  0.0000e+000  0.0000e+000  0.0000e+000

Member End Forces :
[AM]mx4 = [AML]mx6 + [AML]mx6[Sm]6x6[RT]6x6[Dj]6x6
Member         Fx1          Fy1          Mz1          Fx2          Fy2          Mz2
      1      250.000      -55.190   -8012.077    -250.000       55.190  -14064.081
      2      114.176      229.150   14064.081    -114.176     -229.150   33176.400
      3      114.176     -229.150  -33176.400    -114.176      229.150  -14064.081
      4      250.000       55.190   14064.081    -250.000      -55.190    8012.077

Reaction of Supports :
{AR}IFx1 = -{ARC}IRx1 + [SRF]IRxIF {DF}IFx1
      1     5.519e+001
      2     2.500e+002
      3    -8.012e+003
     13    -5.519e+001
     14     2.500e+002
     15     8.012e+003
```



Gambar A.4. Plane Frame

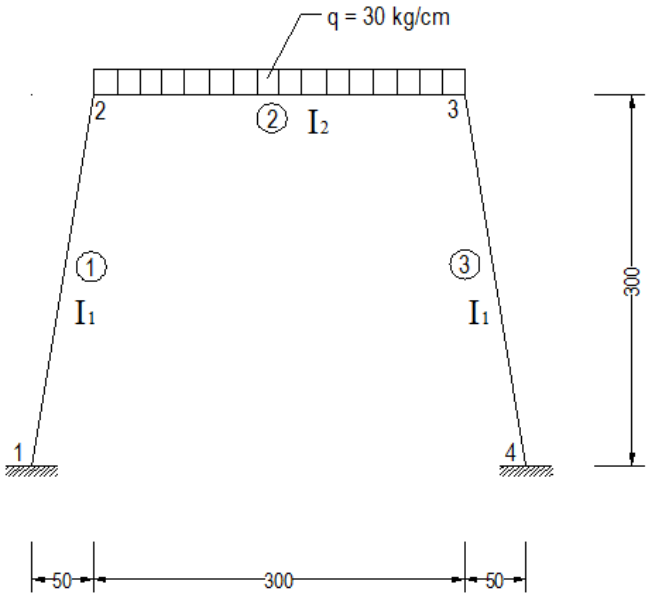
Tabel A.4.1 Input Data Soal Plane Frame

```
%****PORTAL 2D---TEKNIK SIPIL UNISSULA SEMARANG----
%****nama file :studikasus22----oleh :luludia---
%****struktur : portal 2 kolom 1 balok dua beban merata pada balok
     clear all
     clc
%****General Data---
     type='FRAME2D'
     nfile=' studikasus22'
%****Material Properties---i,E,A,I---
     prop = [   1   2100e3  1200  160000
                2   2100e3  1500  312500];

%****Coordinates---
%****--- Joint    X     Y  ---
     coord=[ 1    0       0
             2    0       350
             3    100     350
             4    300     350
             5   400     350
             6   400      0    ];
%****Elemet data---
%****--- Element  J1 J2  prop---
     element=[ 1   1   2    1
               2   2   3    2
               3   3   4    2
               4   4   5    2
               5   5   6    1];
%****Nodal Restraint---
%****---- Joint  JR1   JR2  JR3---
     Support=[ 1    1     1     0
               6    1     1     0 ];
```

```
%****Joint Load---
%*****---Joint   FX   FY    MZ---
     JL=[ 3     0     0   0];
%****Gaya & Momen Jepit---
     q1=60; L=100; q2=0;
     Fox1(1)=0;                  Fox2(1)=0;
     Foy1(1)=q1*L/2;              Foy2(1)=Foy1(1);
     Moz1(1)=q1*L^2/12;           Moz2(1)=-Moz1(1);
     Foy12(1)=q2*L/2;              Foy22(1)=Foy12(1);
     Moz12(1)=q2*L^2/12;           Moz22(1)=-Moz12(1);

%****Matriks Beban Batang------
     AML=[ 2  Fox1(1) Foy1(1) Moz1(1)  Fox2(1) Foy2(1) Moz2(1)
           4  Fox1(1) Foy1(1) Moz1(1)  Fox2(1) Foy2(1) Moz2(1)
         ];
%****Call function for analysis portal 2d--------------------
[dof,index,coord,element]=FRAME2D_sdata(prop,element,coord,type);
[S,Sm,SmS,Cx,Cy,RT,L,A,Joint,Xj,Xk,Yj,Yk]=FRAME2D_stiff...
    (prop,element,coord,index,nfile);
[IR,IF,Support]=FRAME2D_ldata(Support,dof);
[DF,AR,AM]=FRAME2D_analysis_result...
    (element,dof,index,IF,IR,S,Sm,JL,AML,RT,Support,type,nfile);
[joint_disp,support_reaction,beam_endforces]=FRAME2D_print_result...
    (JL,AML,dof,Support,element,IF,IR,DF,AR,AM,type,nfile);
%****end data-----------------------------------------------
%
      FRAME2D_xplot
%
```

Tabel A.4.2 Output Data Soal Plane Frame

```
Displacement of Joints of Members :
Member         Dx1          Dy1          Rz1          Dx2          Dy2          Rz2
     1  0.0000e+000  0.0000e+000  2.0211e-005  2.1182e-005 -8.3333e-004 -4.0604e-005
     2  2.1182e-005 -8.3333e-004 -4.0604e-005  1.0591e-005 -4.6406e-003 -2.7921e-005
     3  1.0591e-005 -4.6406e-003 -2.7921e-005 -1.0591e-005 -4.6406e-003  2.7921e-005
     4 -1.0591e-005 -4.6406e-003  2.7921e-005 -2.1182e-005 -8.3333e-004  4.0604e-005
     5 -2.1182e-005 -8.3333e-004  4.0604e-005  0.0000e+000  0.0000e+000 -2.0211e-005

Member End Forces :
[AM]mx4 = [AML]mx6 + [AML]mx6[Sm]6x6[RT]6x6[Dj]6x6
Member          Fx1          Fy1          Mz1          Fx2          Fy2          Mz2
     1     6000.000     -333.619       -0.000    -6000.000      333.619 -116766.579
     2      333.619     6000.000  116766.579     -333.619        0.000  183233.421
     3      333.619        0.000 -183233.421     -333.619       -0.000  183233.421
     4      333.619        0.000 -183233.421     -333.619     6000.000 -116766.579
     5     6000.000      333.619  116766.579    -6000.000     -333.619       -0.000

Reaction of Supports :
{AR}IFx1 = -{ARC}IRx1 + [SRF]IRxIF {DF}IFx1
     1     3.336e+002
     2     6.000e+003
    16    -3.336e+002
    17     6.000e+003
```



Gambar A.5. Frame

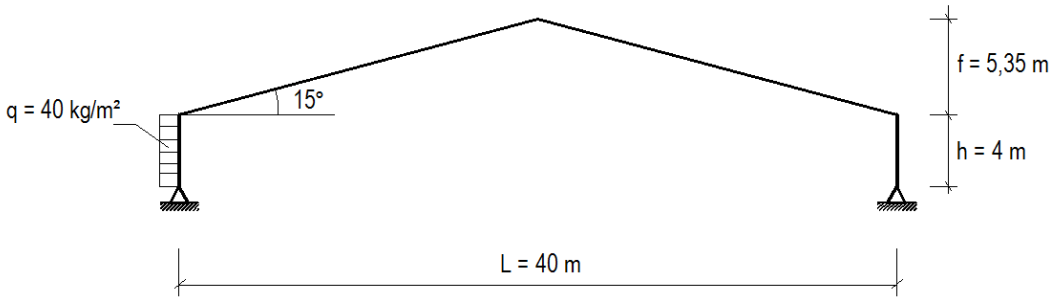
Tabel A.5.1 Input Data Soal Frame

```
%****PORTAL 2D---TEKNIK SIPIL UNISSULA SEMARANG----
%****nama file :studikasus20----oleh :luluisndia---
%****struktur : portal kolom miring beban merata
     clear all
     clc
%****General Data---
     type='FRAME2D'
     nfile=' studikasus20'
%****Material Properties---i,E,A,I---
     prop = [   1   2100e3  1200  160000
                2   2100e3  1200  160000];

%****Coordinates---
%****--- Joint   X    Y  ---
     coord=[ 1   0      0
             2   50     300
             3   350    300
             4   400    0 ];
%****Elemet data---
%****--- Element  J1 J2  prop---
     element=[ 1   1   2    1
               2   2   3    1
               3   3   4    1];
%****Nodal Restraint---
%****---- Joint  JR1   JR2  JR3---
     Support=[ 1    1     1     1
               4    1     1     1 ];
```

```
%****Joint Load---
%****---Joint   FX   FY    MZ---
     JL=[ 3     0     0   0];
%****Gaya & Momen Jepit---
     q1=30; L=300; q2=0;
     Fox1(1)=0;                  Fox2(1)=0;
     Foy1(1)=q1*L/2;              Foy2(1)=Foy1(1);
     Moz1(1)=q1*L^2/12;           Moz2(1)=-Moz1(1);
     Foy12(1)=q2*L/2;              Foy22(1)=Foy12(1);
     Moz12(1)=q2*L^2/12;           Moz22(1)=-Moz12(1);

%****Matriks Beban Batang------
     AML=[ 2  Fox1(1) Foy1(1) Moz1(1)  Fox2(1) Foy2(1) Moz2(1)
         ];
%****Call function for analysis portal 2d--------------------
[dof,index,coord,element]=FRAME2D_sdata(prop,element,coord,type);
[S,Sm,SmS,Cx,Cy,RT,L,A,Joint,Xj,Xk,Yj,Yk]=FRAME2D_stiff...
    (prop,element,coord,index,nfile);
[IR,IF,Support]=FRAME2D_ldata(Support,dof);
[DF,AR,AM]=FRAME2D_analysis_result...
    (element,dof,index,IF,IR,S,Sm,JL,AML,RT,Support,type,nfile);
[joint_disp,support_reaction,beam_endforces]=FRAME2D_print_result...
    (JL,AML,dof,Support,element,IF,IR,DF,AR,AM,type,nfile);
%****end data-----------------------------------------------
%
      FRAME2D_xplot
%
```

Tabel A.5.2 Output Data Soal Frame

```
Displacement of Joints of Members :
Member         Dx1          Dy1          Rz1          Dx2          Dy2          Rz2
     1  0.0000e+000  0.0000e+000  0.0000e+000  8.8283e-005 -5.8765e-004 -3.4390e-005
     2  8.8283e-005 -5.8765e-004 -3.4390e-005 -8.8283e-005 -5.8765e-004  3.4390e-005
     3 -8.8283e-005 -5.8765e-004  3.4390e-005  0.0000e+000  0.0000e+000  0.0000e+000

Member End Forces :
[AM]mx4 = [AML]mx6 + [AML]mx6[Sm]6x6[RT]6x6[Dj]6x6
Member         Fx1          Fy1          Mz1          Fx2          Fy2          Mz2
     1     4682.603    -723.186  -71981.638   -4682.603     723.186 -147966.759
     2     1483.161    4500.000  147966.759   -1483.161    4500.000 -147966.759
     3     4682.603     723.186  147966.759   -4682.603    -723.186   71981.638

Reaction of Supports :
{AR}IFx1 = -{ARC}IRx1 + [SRF]IRxIF {DF}IFx1
     1     1.483e+003
     2     4.500e+003
     3    -7.198e+004
    10    -1.483e+003
    11     4.500e+003
    12     7.198e+004
```



Gambar A6. Gable Frame

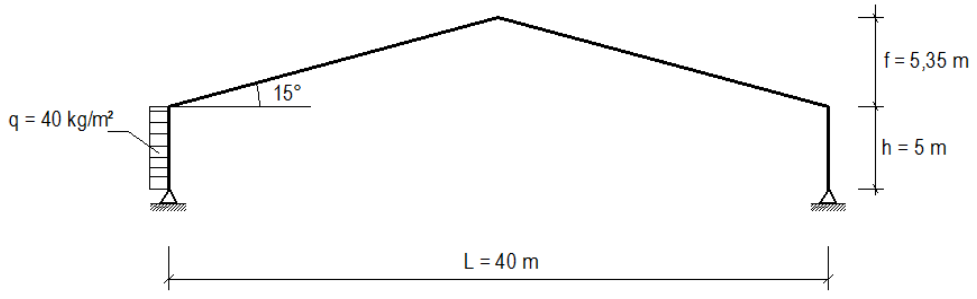
Tabel A.6.1 Input Data Soal Gable Frame

```
  %****PORTAL 2D---TEKNIK SIPIL UNISSULA SEMARANG----
%****nama file : pabrikbaja1 ----oleh :luluisnain23/07/2018---
%****struktur : gable frame beban merata pada kolom samping
     clear all
     clc
%****General Data---
     type='FRAME2D'
     nfile=' pabrikbaja1'
%****Material Properties---i,E,A,I---
     prop = [   1   210  0.008412  0.000237];

%****Coordinates---
%****--- Joint   X    Y  ---
     coord=[ 1   0      0
             2   0      4
             3   20     9.35
             4   40     4
             5   40     0];
%****Elemet data---
%****--- Element  J1 J2  prop---
     element=[ 1   1   2    1
               2   2   3    1
               3   3   4    1
               4   4   5    1];
%****Nodal Restraint---
%****---- Joint  JR1   JR2  JR3---
     Support=[ 1    1     1   0
               5    1     1   0  ];
%****Joint Load---
%****---Joint   FX          FY    MZ---
     JL=[ 2  -32.738279     0    0];
%****Gaya & Momen Jepit---
     q=6.32455 ; L=4; P=0;
     Fox1(1)=0;                  Fox2(1)=0;
     Foy1(1)=q*L/2+P/2;          Foy2(1)=Foy1(1);
     Moz1(1)=q*L^2/12+1/8*P*L;   Moz2(1)=-Moz1(1);
%****Matriks Beban Batang------
     AML=[ 1  Fox1(1) Foy1(1) Moz1(1)  Fox2(1) Foy2(1) Moz2(1) ];
```

```
%****Call function for analysis portal 2d--------------------
[dof,index,coord,element]=FRAME2D_sdata(prop,element,coord,type);
[S,Sm,SmS,Cx,Cy,RT,L,A,Joint,Xj,Xk,Yj,Yk]=FRAME2D_stiff...
    (prop,element,coord,index,nfile);
[IR,IF,Support]=FRAME2D_ldata(Support,dof);
[DF,AR,AM]=FRAME2D_analysis_result...
    (element,dof,index,IF,IR,S,Sm,JL,AML,RT,Support,type,nfile);
[joint_disp,support_reaction,beam_endforces]=FRAME2D_print_result...
    (JL,AML,dof,Support,element,IF,IR,DF,AR,AM,type,nfile);
%****end data-------------------------------------------------
%
      FRAME2D_xplot
%
```

Tabel A.6.2 Output Data Soal Gable Frame

```
Displacement of Joints of Members :
Member          Dx1           Dy1           Rz1           Dx2           Dy2           Rz2
     1  0.0000e+000  0.0000e+000 -5.9096e+003  2.0362e+004  2.8642e+000 -3.7915e+003
     2  2.0362e+004  2.8642e+000 -3.7915e+003  1.7426e+004  1.0835e+004  1.7537e+003
     3  1.7426e+004  1.0835e+004  1.7537e+003  1.4480e+004 -2.8642e+000 -3.2247e+003
     4  1.4480e+004 -2.8642e+000 -3.2247e+003  0.0000e+000  0.0000e+000 -3.8175e+003

Member End Forces :
[AM]mx4 = [AML]mx6 + [AML]mx6[Sm]6x6[RT]6x6[Dj]6x6
Member          Fx1          Fy1          Mz1          Fx2          Fy2          Mz2
     1       -1.265       21.610        0.000        1.265        3.688       35.845
     2        3.236       -2.175      -35.845       -3.236        2.175       -9.184
     3        3.889       -0.269        9.184       -3.889        0.269      -14.752
     4        1.265        3.688       14.752       -1.265       -3.688        0.000

Reaction of Supports :
{AR}IFx1 = -{ARC}IRx1 + [SRF]IRxIF {DF}IFx1
     1    -2.161e+001
     2    -1.265e+000
    13    -3.688e+000
    14     1.265e+000
```



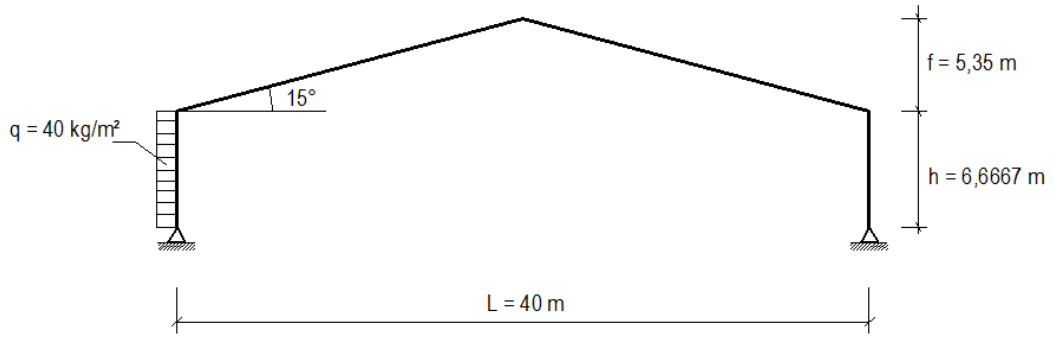
Gambar A7. Plane Frame

Tabel A.7.1 Input Data Soal Gable Frame

```
  %****PORTAL 2D---TEKNIK SIPIL UNISSULA SEMARANG----
%****nama file : pabrikbajat5 ----oleh :luluisnain23/07/2018---
%****struktur : portal 2 kolom 2 balok miring
     clear all
     clc
%****General Data---
     type='FRAME2D'
     nfile=' pabrikbajat5'
%****Material Properties---i,E,A,I---
     prop = [   1   210  0.008412  0.000237];

%****Coordinates---
%****--- Joint   X    Y  ---
     coord=[ 1   0      0
             2   0      5
             3   20     10.35
             4   40     5
             5   40     0];
%****Elemet data---
%****--- Element  J1 J2  prop---
     element=[ 1   1   2    1
               2   2   3    1
               3   3   4    1
               4   4   5    1];
%****Nodal Restraint---
%****---- Joint  JR1   JR2  JR3---
     Support=[ 1    1     1   0
               5    1     1   0  ];
%****Joint Load---
%****---Joint   FX         FY    MZ---
     JL=[ 2     0     0    0];
%****Gaya & Momen Jepit---
     q=6.32455; L=5; P=0;
     Fox1(1)=0;                  Fox2(1)=0;
     Foy1(1)=q*L/2+P/2;          Foy2(1)=Foy1(1);
     Moz1(1)=q*L^2/12+1/8*P*L;  Moz2(1)=-Moz1(1);
%****Matriks Beban Batang------
     AML=[ 2  Fox1(1) Foy1(1) Moz1(1)  Fox2(1) Foy2(1) Moz2(1) ];
%****Call function for analysis portal 2d--------------------
[dof,index,coord,element]=FRAME2D_sdata(prop,element,coord,type);
[S,Sm,SmS,Cx,Cy,RT,L,A,Joint,Xj,Xk,Yj,Yk]=FRAME2D_stiff...
    (prop,element,coord,index,nfile);
[IR,IF,Support]=FRAME2D_ldata(Support,dof);
[DF,AR,AM]=FRAME2D_analysis_result...
    (element,dof,index,IF,IR,S,Sm,JL,AML,RT,Support,type,nfile);
[joint_disp,support_reaction,beam_endforces]=FRAME2D_print_result...
    (JL,AML,dof,Support,element,IF,IR,DF,AR,AM,type,nfile);
%****end data-----------------------------------------------
%
      FRAME2D_xplot
%
```

Tabel A.7.2 Output Data Soal Gable Frame

```
Displacement of Joints of Members :
Member         Dx1           Dy1           Rz1           Dx2           Dy2           Rz2
     1  0.0000e+000  0.0000e+000 -9.6402e+003  4.0410e+004  5.5941e+000 -5.6274e+003
     2  4.0410e+004  5.5941e+000 -5.6274e+003  3.5688e+004  1.7458e+004  2.7401e+003
     3  3.5688e+004  1.7458e+004  2.7401e+003  3.0950e+004 -5.5941e+000 -5.3353e+003
     4  3.0950e+004 -5.5941e+000 -5.3353e+003  0.0000e+000  0.0000e+000 -6.6173e+003

Member End Forces :
[AM]mx4 = [AML]mx6 + [AML]mx6[Sm]6x6[RT]6x6[Dj]6x6
Member          Fx1          Fy1          Mz1          Fx2          Fy2          Mz2
     1       -1.976       26.518       -0.000        1.976        5.104       53.534
     2        4.420       -3.228      -53.534       -4.420        3.228      -13.304
     3        5.442       -0.590       13.304       -5.442        0.590      -25.522
     4        1.976        5.104       25.522       -1.976       -5.104       -0.000

Reaction of Supports :
{AR}IFx1 = -{ARC}IRx1 + [SRF]IRxIF {DF}IFx1
     1    -2.652e+001
     2    -1.976e+000
    13    -5.104e+000
    14     1.976e+000
```



Gambar A8. Plane Frame

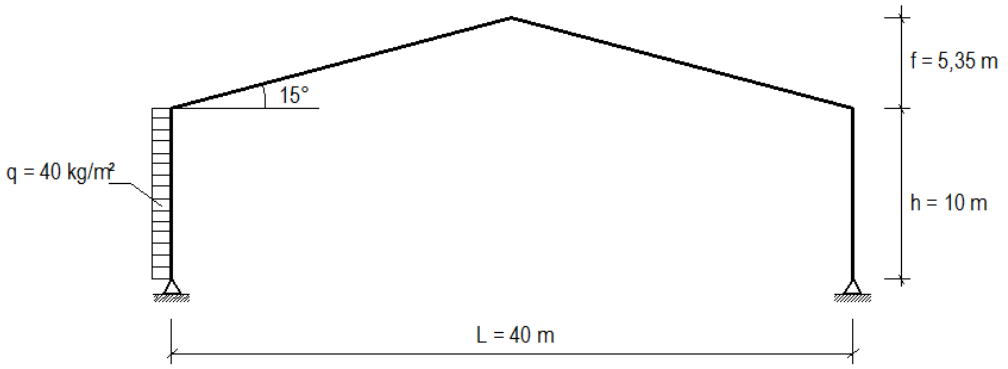
Tabel A.8.1 Input Data Soal Gable Frame

```
  %****PORTAL 2D---TEKNIK SIPIL UNISSULA SEMARANG----
%****nama file : pabrikbajat6,67 ----oleh :luludia---
%****struktur : gable frame
     clear all
     clc
%****General Data---
     type='FRAME2D'
     nfile=' pabrikbajat6,67'
%****Material Properties---i,E,A,I---
     prop = [   1   210  0.008412  0.000237];

%****Coordinates---
%****--- Joint    X     Y  ---
     coord=[ 1    0       0
             2    0       6.6667
```

```
          3   20     12.017
              4   40     6.6667
              5   40     0];
%****Elemet data---
%****--- Element  J1 J2  prop---
     element=[ 1   1   2    1
               2   2   3    1
               3   3   4    1
               4   4   5    1];
%****Nodal Restraint---
%****---- Joint  JR1   JR2  JR3---
     Support=[ 1    1     1   0
               5    1     1   0  ];
%****Joint Load---
%****---Joint   FX          FY    MZ---
     JL=[ 2      0     0    0];
%****Gaya & Momen Jepit---
     q=6.32455; L=6.6667; P=0;
     Fox1(1)=0;                  Fox2(1)=0;
     Foy1(1)=q*L/2+P/2;          Foy2(1)=Foy1(1);
     Moz1(1)=q*L^2/12+1/8*P*L;  Moz2(1)=-Moz1(1);
%****Matriks Beban Batang------
     AML=[ 2  Fox1(1) Foy1(1) Moz1(1)  Fox2(1) Foy2(1) Moz2(1) ];
%****Call function for analysis portal 2d--------------------
[dof,index,coord,element]=FRAME2D_sdata(prop,element,coord,type);
[S,Sm,SmS,Cx,Cy,RT,L,A,Joint,Xj,Xk,Yj,Yk]=FRAME2D_stiff...
    (prop,element,coord,index,nfile);
[IR,IF,Support]=FRAME2D_ldata(Support,dof);
[DF,AR,AM]=FRAME2D_analysis_result...
    (element,dof,index,IF,IR,S,Sm,JL,AML,RT,Support,type,nfile);
[joint_disp,support_reaction,beam_endforces]=FRAME2D_print_result...
    (JL,AML,dof,Support,element,IF,IR,DF,AR,AM,type,nfile);
%****end data-----------------------------------------------
%
      FRAME2D_xplot
%
```

Tabel A.8.2 Output Data Soal Gable Frame

```
Displacement of Joints of Members :
Member         Dx1          Dy1          Rz1          Dx2          Dy2          Rz2
     1  0.0000e+000  0.0000e+000 -1.8532e+004  9.9728e+004  1.3261e+001 -9.3818e+003
     2  9.9728e+004  1.3261e+001 -9.3818e+003  9.1131e+004  3.1861e+004  4.8714e+003
     3  9.1131e+004  3.1861e+004  4.8714e+003  8.2504e+004 -1.3261e+001 -1.0108e+004
     4  8.2504e+004 -1.3261e+001 -1.0108e+004  0.0000e+000  0.0000e+000 -1.3509e+004

Member End Forces :
[AM]mx4 = [AML]mx6 + [AML]mx6[Sm]6x6[RT]6x6[Dj]6x6
Member         Fx1          Fy1          Mz1          Fx2          Fy2          Mz2
     1      -3.514       34.548        0.000        3.514        7.616       89.776
     2       6.449       -5.363      -89.775       -6.449        5.363      -21.247
     3       8.265       -1.426       21.247       -8.265        1.426      -50.775
     4       3.514        7.616       50.776       -3.514       -7.616        0.000

Reaction of Supports :
{AR}IFx1 = -{ARC}IRx1 + [SRF]IRxIF {DF}IFx1
     1    -3.455e+001
     2    -3.514e+000
    13    -7.616e+000
    14     3.514e+000
```



Gambar A9. Plane Frame

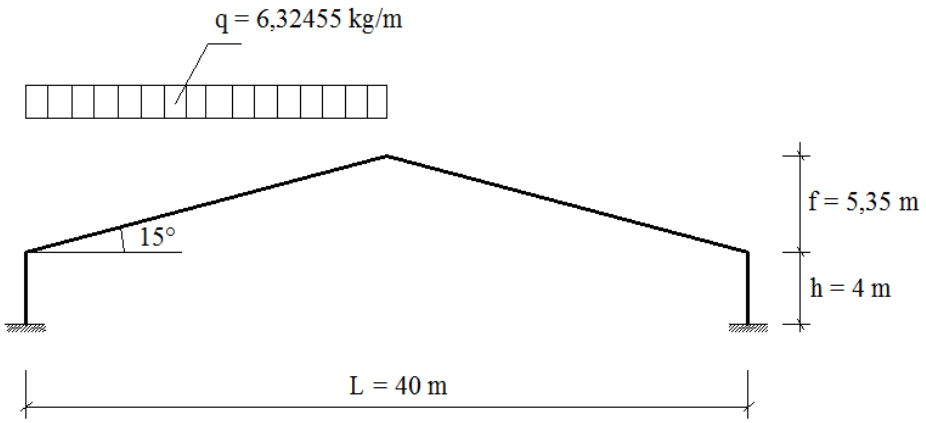
Tabel A.9.1 Input Data Soal Gable Frame

```
  %****PORTAL 2D---TEKNIK SIPIL UNISSULA SEMARANG----
%****nama file : pabrikbajat10 ----oleh :luludia---
%****struktur : portal 2 kolom 2 balok miring
     clear all
     clc
%****General Data---
     type='FRAME2D'
     nfile=' pabrikbajat10'
%****Material Properties---i,E,A,I---
     prop = [   1   210  0.008412  0.000237];

%****Coordinates---
%****--- Joint   X    Y  ---
     coord=[ 1   0      0
             2   0      10
             3   20     15.35
             4   40     10
             5   40     0];
%****Elemet data---
%****--- Element  J1 J2  prop---
     element=[ 1   1   2    1
               2   2   3    1
               3   3   4    1
               4   4   5    1];
%****Nodal Restraint---
%****---- Joint  JR1   JR2  JR3---
     Support=[ 1    1     1   0
               5    1     1   0  ];
%****Joint Load---
%****---Joint   FX          FY    MZ---
     JL=[ 2      0     0    0];
%****Gaya & Momen Jepit---
     q=6.32455; L=10; P=0;
     Fox1(1)=0;                  Fox2(1)=0;
     Foy1(1)=q*L/2+P/2;          Foy2(1)=Foy1(1);
     Moz1(1)=q*L^2/12+1/8*P*L;   Moz2(1)=-Moz1(1);
```

```
%****Matriks Beban Batang------
     AML=[ 2  Fox1(1) Foy1(1) Moz1(1)  Fox2(1) Foy2(1) Moz2(1) ];
%****Call function for analysis portal 2d--------------------
[dof,index,coord,element]=FRAME2D_sdata(prop,element,coord,type);
[S,Sm,SmS,Cx,Cy,RT,L,A,Joint,Xj,Xk,Yj,Yk]=FRAME2D_stiff...
    (prop,element,coord,index,nfile);
[IR,IF,Support]=FRAME2D_ldata(Support,dof);
[DF,AR,AM]=FRAME2D_analysis_result...
    (element,dof,index,IF,IR,S,Sm,JL,AML,RT,Support,type,nfile);
[joint_disp,support_reaction,beam_endforces]=FRAME2D_print_result...
    (JL,AML,dof,Support,element,IF,IR,DF,AR,AM,type,nfile);
%****end data-------------------------------------------------
%
      FRAME2D_xplot
%
```

Tabel A.9.2 Output Data Soal Gable Frame

```
Displacement of Joints of Members :
Member         Dx1           Dy1           Rz1           Dx2           Dy2           Rz2
     1  0.0000e+000  0.0000e+000 -4.8695e+004  3.7151e+005  4.4753e+001 -1.9358e+004
     2  3.7151e+005  4.4753e+001 -1.9358e+004  3.5167e+005  7.3727e+004  1.0959e+004
     3  3.5167e+005  7.3727e+004  1.0959e+004  3.3176e+005 -4.4753e+001 -2.4495e+004
     4  3.3176e+005 -4.4753e+001 -2.4495e+004  0.0000e+000  0.0000e+000 -3.7517e+004

Member End Forces :
[AM]mx4 = [AML]mx6 + [AML]mx6[Sm]6x6[RT]6x6[Dj]6x6
Member         Fx1           Fy1           Mz1           Fx2           Fy2           Mz2
     1      -7.906        50.284         0.000         7.906        12.962       186.612
     2      10.478       -10.987      -186.612       -10.478        10.987       -40.849
     3      14.564        -4.288        40.849       -14.564         4.288      -129.615
     4       7.906        12.962       129.615        -7.906       -12.962        -0.000

Reaction of Supports :
{AR}IFx1 = -{ARC}IRx1 + [SRF]IRxIF {DF}IFx1
     1    -5.028e+001
     2    -7.906e+000
    13    -1.296e+001
    14     7.906e+000
```



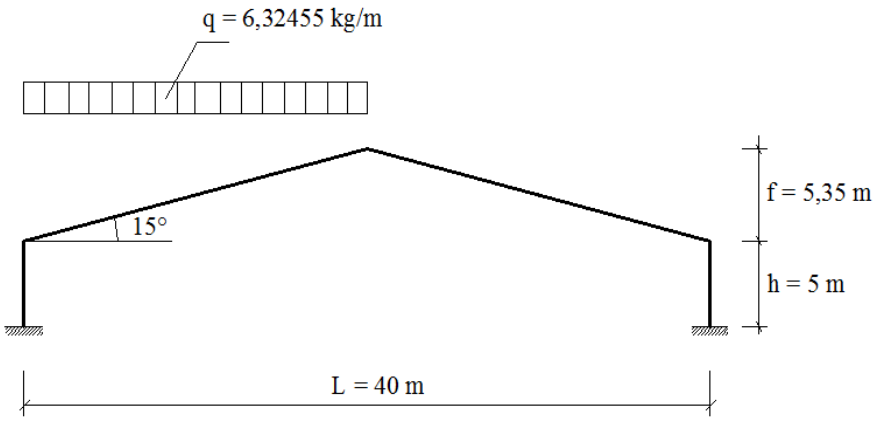
Gambar A10. Plane Frame

Tabel A.10.1 Input Data Soal Gable Frame

```
 %****PORTAL 2D---TEKNIK SIPIL UNISSULA SEMARANG----
%****nama file : pabrikbajabebanatas4m ----oleh :luluisnain23/07/2018-
--
%****struktur : portal 2 kolom 2 balok miring
     clear all
     clc
%****General Data---
     type='FRAME2D'
     nfile=' pabrikbajabebanatas4m '
%****Material Properties---i,E,A,I---
     prop = [   1   210  0.008412  0.000237];

%****Coordinates---
%****--- Joint   X    Y  ---
     coord=[ 1   0      0
             2   0      4
             3   20     9.35
             4   40     4
             5   40     0];
%****Elemet data---
%****--- Element  J1 J2  prop---
     element=[ 1   1   2    1
               2   2   3    1
               3   3   4    1
               4   4   5    1];
%****Nodal Restraint---
%****---- Joint  JR1   JR2  JR3---
     Support=[ 1    1     1   1
               5    1     1   1  ];
%****Joint Load---
%****---Joint   FX   FY    MZ---
     JL=[ 3     0     0   0];
%****Gaya & Momen Jepit---
     q=6.10904618;  L=20;
     Fox1(1)=16.3691395;   Fox2(1)= Fox1(1);
     Foy1(1)=q*L/2;         Foy2(1)=Foy1(1);
     Moz1(1)=q*L^2/12;      Moz2(1)=-Moz1(1);
%****Matriks Beban Batang------
     AML=[ 2  Fox1(1) Foy1(1) Moz1(1)  Fox2(1) Foy2(1) Moz2(1) ];
%****Call function for analysis portal 2d--------------------
[dof,index,coord,element]=FRAME2D_sdata(prop,element,coord,type);
[S,Sm,SmS,Cx,Cy,RT,L,A,Joint,Xj,Xk,Yj,Yk]=FRAME2D_stiff...
    (prop,element,coord,index,nfile);
[IR,IF,Support]=FRAME2D_ldata(Support,dof);
[DF,AR,AM]=FRAME2D_analysis_result...
    (element,dof,index,IF,IR,S,Sm,JL,AML,RT,Support,type,nfile);
[joint_disp,support_reaction,beam_endforces]=FRAME2D_print_result...
    (JL,AML,dof,Support,element,IF,IR,DF,AR,AM,type,nfile);
%****end data-----------------------------------------------
%
      FRAME2D_xplot
%
```

Tabel A.10.2 Output Data Soal Gable Frame

```
Displacement of Joints of Members :
Member          Dx1           Dy1           Rz1           Dx2           Dy2           Rz2
     1  0.0000e+000  0.0000e+000  0.0000e+000  8.3218e+002 -2.2577e+002 -5.5810e+003
     2  8.3218e+002 -2.2577e+002 -5.5810e+003  1.5492e+004 -5.9680e+004  1.4478e+004
     3  1.5492e+004 -5.9680e+004  1.4478e+004  3.0227e+004 -6.0650e+001 -9.9516e+003
     4  3.0227e+004 -6.0650e+001 -9.9516e+003  0.0000e+000  0.0000e+000  0.0000e+000

Member End Forces :
[AM]mx4 = [AML]mx6 + [AML]mx6[Sm]6x6[RT]6x6[Dj]6x6
Member          Fx1           Fy1           Mz1           Fx2           Fy2           Mz2
     1       99.706       -96.396      -123.350       -99.706        96.396      -262.232
     2      118.887        71.410       262.233       -86.149        50.771       -48.594
     3       99.992        -0.979        48.594       -99.992         0.979       -68.863
     4       26.785        96.343        68.862       -26.785       -96.343       316.509

Reaction of Supports :
{AR}IFx1 = -{ARC}IRx1 + [SRF]IRxIF {DF}IFx1
     1     9.640e+001
     2     9.971e+001
     3    -1.234e+002
    13    -9.634e+001
    14     2.678e+001
    15     3.165e+002
```



Gambar A11. Plane Frame

Tabel A.11.1 Input Data Soal Gable Frame

```
 %****PORTAL 2D---TEKNIK SIPIL UNISSULA SEMARANG----
%****nama file : bebanatassetengah5m ----oleh :luluisnain23/07/2018---
%****struktur : portal 2 kolom 2 balok miring
     clear all
     clc
%****General Data---
     type='FRAME2D'
     nfile=' bebanatassetengah5m '
%****Material Properties---i,E,A,I---
     prop = [   1   210  0.008412  0.000237];

%****Coordinates---
%****--- Joint    X     Y  ---
     coord=[ 1    0       0
```

```
              2   0      5
              3   20     10.35
              4   40     5
              5   40     0];
%****Elemet data---
%****--- Element  J1 J2  prop---
     element=[ 1   1   2    1
               2   2   3    1
               3   3   4    1
               4   4   5    1];
%****Nodal Restraint---
%****---- Joint  JR1   JR2  JR3---
     Support=[ 1    1     1   1
               5    1     1   1  ];
%****Joint Load---
%****---Joint   FX   FY    MZ---
     JL=[ 3     0     0   0];
%****Gaya & Momen Jepit---
     q=6.10904618;  L=20;
     Fox1(1)=16.3691395;   Fox2(1)= Fox1(1);
     Foy1(1)=q*L/2;         Foy2(1)=Foy1(1);
     Moz1(1)=q*L^2/12;      Moz2(1)=-Moz1(1);
%****Matriks Beban Batang------
     AML=[ 2  Fox1(1) Foy1(1) Moz1(1)  Fox2(1) Foy2(1) Moz2(1) ];
%****Call function for analysis portal 2d--------------------
[dof,index,coord,element]=FRAME2D_sdata(prop,element,coord,type);
[S,Sm,SmS,Cx,Cy,RT,L,A,Joint,Xj,Xk,Yj,Yk]=FRAME2D_stiff...
    (prop,element,coord,index,nfile);
[IR,IF,Support]=FRAME2D_ldata(Support,dof);
[DF,AR,AM]=FRAME2D_analysis_result...
    (element,dof,index,IF,IR,S,Sm,JL,AML,RT,Support,type,nfile);
[joint_disp,support_reaction,beam_endforces]=FRAME2D_print_result...
    (JL,AML,dof,Support,element,IF,IR,DF,AR,AM,type,nfile);
%****end data-----------------------------------------------
%
      FRAME2D_xplot
%
```

Tabel A.11.2 Output Data Soal Gable Frame

Displacement of Joints of Members :

Member	Dx1	Dy1	Rz1	Dx2	Dy2	Rz2
1	0.0000e+000	0.0000e+000	0.0000e+000	-1.8475e+003	-2.8106e+002	-6.5039e+003
2	-1.8475e+003	-2.8106e+002	-6.5039e+003	2.2181e+004	-9.4317e+004	1.5042e+004
3	2.2181e+004	-9.4317e+004	1.5042e+004	4.6291e+004	-7.6962e+001	-1.1278e+004
4	4.6291e+004	-7.6962e+001	-1.1278e+004	0.0000e+000	0.0000e+000	0.0000e+000

Member End Forces :

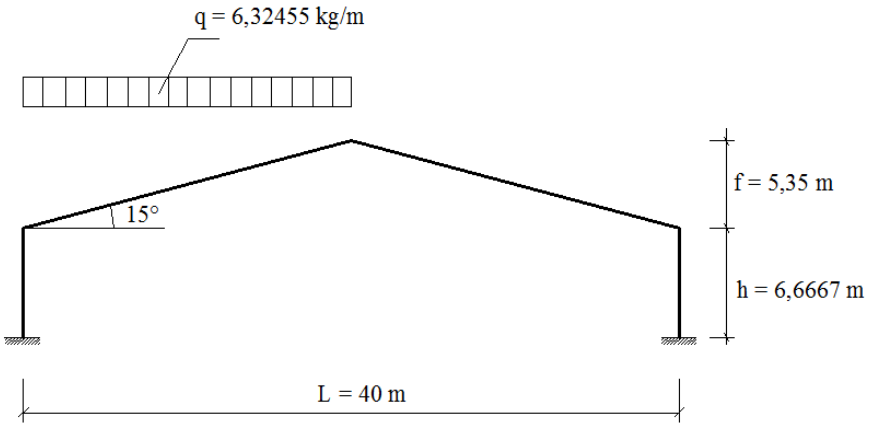
[AM]mx4 = [AML]mx6 + [AML]mx6[Sm]6x6[RT]6x6[Dj]6x6

Member	Fx1	Fy1	Mz1	Fx2	Fy2	Mz2
1	99.300	-86.516	-151.549	-99.300	86.516	-281.029
2	109.238	73.571	281.030	-76.500	48.610	-22.649
3	90.553	-3.924	22.649	-90.553	3.924	-103.895
4	27.191	86.463	103.895	-27.191	-86.463	328.418

Reaction of Supports :

{AR}IFx1 = -{ARC}IRx1 + [SRF]IRxIF {DF}IFx1

1	8.652e+001
2	9.930e+001
3	-1.515e+002
13	-8.646e+001
14	2.719e+001
15	3.284e+002



Gambar A12. Plane Frame

Tabel A.12.1 Input Data Soal Gable Frame

```
 %****PORTAL 2D---TEKNIK SIPIL UNISSULA SEMARANG----
%****nama file : bebanatassetengah6,667m ----luludia---
%****struktur : portal 2 kolom 2 balok miring
     clear all
     clc
%****General Data---
     type='FRAME2D'
     nfile=' bebanatassetengah6,667m '
%****Material Properties---i,E,A,I---
     prop = [   1   210  0.008412  0.000237];

%****Coordinates---
%****--- Joint   X    Y  ---
     coord=[ 1   0      0
             2   0      6.6667
             3   20     12.0167
             4   40     6.6667
             5   40     0];
%****Elemet data---
%****--- Element  J1 J2  prop---
     element=[ 1   1   2    1
               2   2   3    1
               3   3   4    1
               4   4   5    1];
%****Nodal Restraint---
%****---- Joint  JR1   JR2  JR3---
     Support=[ 1    1     1   1
               5    1     1   1  ];
%****Joint Load---
%****---Joint   FX   FY    MZ---
     JL=[ 3     0     0   0];
%****Gaya & Momen Jepit---
     q=6.10904618;  L=20;
     Fox1(1)=16.3691395;   Fox2(1)= Fox1(1);
     Foy1(1)=q*L/2;         Foy2(1)=Foy1(1);
     Moz1(1)=q*L^2/12;      Moz2(1)=-Moz1(1);
%****Matriks Beban Batang------
     AML=[ 2  Fox1(1) Foy1(1) Moz1(1)  Fox2(1) Foy2(1) Moz2(1) ];
%****Call function for analysis portal 2d--------------------
[dof,index,coord,element]=FRAME2D_sdata(prop,element,coord,type);
[S,Sm,SmS,Cx,Cy,RT,L,A,Joint,Xj,Xk,Yj,Yk]=FRAME2D_stiff...
    (prop,element,coord,index,nfile);
[IR,IF,Support]=FRAME2D_ldata(Support,dof);
```

```
[DF,AR,AM]=FRAME2D_analysis_result...
    (element,dof,index,IF,IR,S,Sm,JL,AML,RT,Support,type,nfile);
[joint_disp,support_reaction,beam_endforces]=FRAME2D_print_result...
    (JL,AML,dof,Support,element,IF,IR,DF,AR,AM,type,nfile);
%****end data-----------------------------------------------
%
      FRAME2D_xplot
%
```

Tabel A.12.2 Output Data Soal Gable Frame

Displacement of Joints of Members :

Member	Dx1	Dy1	Rz1	Dx2	Dy2	Rz2
1	0.0000e+000	0.0000e+000	0.0000e+000	-6.1938e+003	-3.7270e+002	-8.8743e+003
2	-6.1938e+003	-3.7270e+002	-8.8743e+003	3.4593e+004	-1.5642e+005	1.5797e+004
3	3.4593e+004	-1.5642e+005	1.5797e+004	7.5476e+004	-1.0467e+002	-1.1918e+004
4	7.5476e+004	-1.0467e+002	-1.1918e+004	0.0000e+000	0.0000e+000	0.0000e+000

Member End Forces :

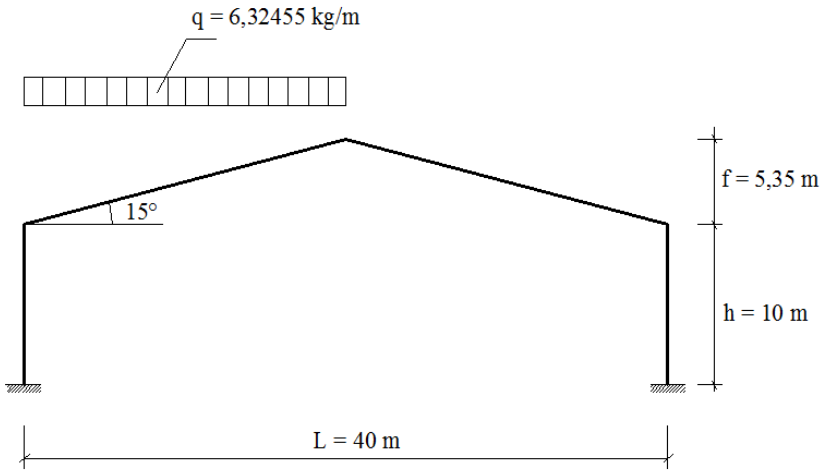
[AM]mx4 = [AML]mx6 + [AML]mx6[Sm]6x6[RT]6x6[Dj]6x6

Member	Fx1	Fy1	Mz1	Fx2	Fy2	Mz2
1	98.757	-72.110	-174.117	-98.757	72.110	-306.619
2	95.182	76.769	306.619	-62.443	45.412	17.967
3	76.777	-8.172	-17.967	-76.777	8.172	-151.219
4	27.734	72.057	151.219	-27.734	-72.057	329.166

Reaction of Supports :

{AR}IFx1 = -{ARC}IRx1 + [SRF]IRxIF {DF}IFx1

1	7.211e+001
2	9.876e+001
3	-1.741e+002
13	-7.206e+001
14	2.773e+001
15	3.292e+002



Gambar A13. Plane Frame

Tabel A.13.1 Input Data Soal Gable Frame

```
 %****PORTAL 2D---TEKNIK SIPIL UNISSULA SEMARANG----
%****nama file : bebanatassetengah10m ----oleh :luludia---
%****struktur : portal 2 kolom 2 balok miring
     clear all
     clc
%****General Data---
     type='FRAME2D'
     nfile=' bebanatassetengah10m '
%****Material Properties---i,E,A,I---
     prop = [   1   210  0.008412  0.000237];

%****Coordinates---
%****--- Joint   X    Y  ---
     coord=[ 1   0      0
             2   0      10
             3   20     15.35
             4   40     10
             5   40     0];
%****Elemet data---
%****--- Element  J1 J2  prop---
     element=[ 1   1   2    1
               2   2   3    1
               3   3   4    1
               4   4   5    1];
%****Nodal Restraint---
%****---- Joint  JR1   JR2  JR3---
     Support=[ 1    1     1   1
               5    1     1   1  ];
%****Joint Load---
%****---Joint   FX   FY    MZ---
     JL=[ 3     0     0   0];
%****Gaya & Momen Jepit---
     q=6.10904618;  L=20;
     Fox1(1)=16.3691395;   Fox2(1)= Fox1(1);
     Foy1(1)=q*L/2;         Foy2(1)=Foy1(1);
     Moz1(1)=q*L^2/12;      Moz2(1)=-Moz1(1);
%****Matriks Beban Batang------
     AML=[ 2  Fox1(1) Foy1(1) Moz1(1)  Fox2(1) Foy2(1) Moz2(1) ];
%****Call function for analysis portal 2d--------------------
[dof,index,coord,element]=FRAME2D_sdata(prop,element,coord,type);
[S,Sm,SmS,Cx,Cy,RT,L,A,Joint,Xj,Xk,Yj,Yk]=FRAME2D_stiff...
    (prop,element,coord,index,nfile);
[IR,IF,Support]=FRAME2D_ldata(Support,dof);
[DF,AR,AM]=FRAME2D_analysis_result...
    (element,dof,index,IF,IR,S,Sm,JL,AML,RT,Support,type,nfile);
[joint_disp,support_reaction,beam_endforces]=FRAME2D_print_result...
    (JL,AML,dof,Support,element,IF,IR,DF,AR,AM,type,nfile);
%****end data-----------------------------------------------
%
      FRAME2D_xplot
%
```

Tabel A.13.2 Output Data Soal Gable Frame

Displacement of Joints of Members :

Member	Dx1	Dy1	Rz1	Dx2	Dy2	Rz2
1	0.0000e+000	0.0000e+000	0.0000e+000	-1.0219e+004	-5.5472e+002	-1.5307e+004
2	-1.0219e+004	-5.5472e+002	-1.5307e+004	6.2459e+004	-2.7492e+005	1.6860e+004
3	6.2459e+004	-2.7492e+005	1.6860e+004	1.3526e+005	-1.6133e+002	-9.7192e+003
4	1.3526e+005	-1.6133e+002	-9.7192e+003	0.0000e+000	0.0000e+000	0.0000e+000

Member End Forces :

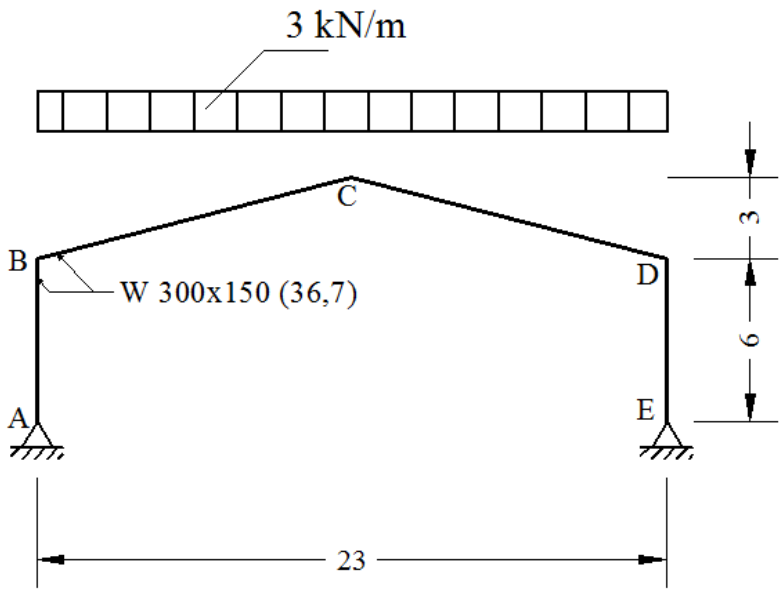
[AM]mx4 = [AML]mx6 + [AML]mx6[Sm]6x6[RT]6x6[Dj]6x6

Member	Fx1	Fy1	Mz1	Fx2	Fy2	Mz2
1	97.992	-51.813	-182.883	-97.992	51.813	-335.250
2	75.377	81.275	335.250	-42.639	40.906	82.638
3	57.368	-14.156	-82.638	-57.368	14.156	-210.430
4	28.499	51.760	210.429	-28.499	-51.760	307.174

Reaction of Supports :

{AR}IFx1 = -{ARC}IRx1 + [SRF]IRxIF {DF}IFx1

1	5.181e+001
2	9.799e+001
3	-1.829e+002
13	-5.176e+001
14	2.850e+001
15	3.072e+002



Gambar A14. Gable Frame

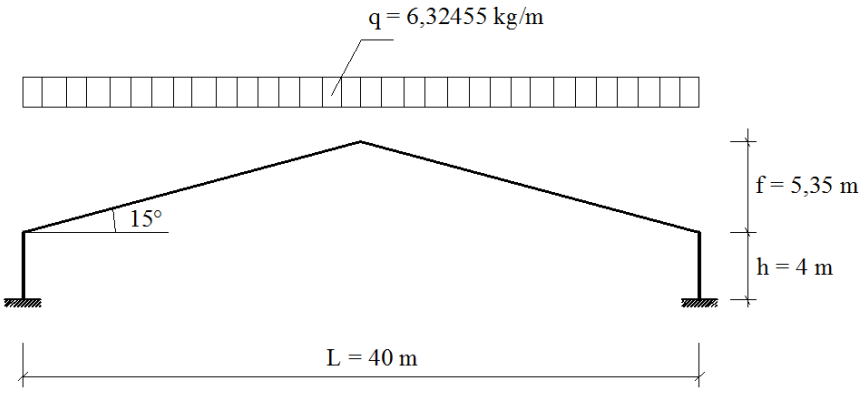
Tabel A.14.1 Input Data Soal Gable Frame

```
 %****PORTAL 2D---TEKNIK SIPIL UNISSULA SEMARANG----
%****nama file : kasus6bebanfull5 ----oleh :luludia23/07/2018---
%****struktur : Gable Frame
     clear all
     clc
%****General Data---
     type='FRAME2D'
     nfile=' kasus6bebanfull5 '
%****Material Properties---i,E,A,I---
     prop = [   1   200  0.004678  0.0000721];

%****Coordinates---
%****--- Joint   X    Y  ---
     coord=[ 1   0      0
             2   0      6
             3   11.5   9
             4   23     6
             5   23     0];
%****Elemet data---
%****--- Element  J1 J2  prop---
     element=[ 1   1   2    1
               2   2   3    1
               3   3   4    1
               4   4   5    1];
%****Nodal Restraint---
%****---- Joint  JR1   JR2  JR3---
     Support=[ 1    1     1   0
               5    1     1   0  ];
%****Joint Load---
%****---Joint   FX   FY    MZ---
     JL=[ 3     0     0   0];
```

```
%****Gaya & Momen Jepit---
     q=0;  L=0;
     Fox1(1)=0;   Fox2(1)= Fox1(1);
     Foy1(1)=q*L/2;         Foy2(1)=Foy1(1);
     Moz1(1)=q*L^2/12;      Moz2(1)=-Moz1(1);
%****Matriks Beban Batang------
     AML=[ 2  4.4602   16.6458  32.9719   4.4602    16.6458    -
32.9719
           3  -4.4602  16.6458  32.9719  -4.4602    16.6458 -
32.9719];%****Call function for analysis portal 2d-------------------
-
[dof,index,coord,element]=FRAME2D_sdata(prop,element,coord,type);
[S,Sm,SmS,Cx,Cy,RT,L,A,Joint,Xj,Xk,Yj,Yk]=FRAME2D_stiff...
    (prop,element,coord,index,nfile);
[IR,IF,Support]=FRAME2D_ldata(Support,dof);
[DF,AR,AM]=FRAME2D_analysis_result...
    (element,dof,index,IF,IR,S,Sm,JL,AML,RT,Support,type,nfile);
[joint_disp,support_reaction,beam_endforces]=FRAME2D_print_result...
    (JL,AML,dof,Support,element,IF,IR,DF,AR,AM,type,nfile);
%****end data-----------------------------------------------
%
      FRAME2D_xplot
%
```

Tabel A.14.2 Output Data Soal Gable Frame

```
Displacement of Joints of Members :
Member         Dx1           Dy1           Rz1           Dx2           Dy2           Rz2
     1  0.0000e+000  0.0000e+000  1.3678e+004 -4.0848e+004 -2.2103e+002 -6.9312e+003
     2 -4.0848e+004 -2.2103e+002 -6.9312e+003  4.2946e-009 -1.5782e+005  2.3701e-010
     3  4.2946e-009 -1.5782e+005  2.3701e-010  4.0848e+004 -2.2103e+002  6.9312e+003
     4  4.0848e+004 -2.2103e+002  6.9312e+003  0.0000e+000  0.0000e+000 -1.3678e+004

Member End Forces :
[AM]mx4 = [AML]mx6 + [AML]mx6[Sm]6x6[RT]6x6[Dj]6x6
Member          Fx1          Fy1          Mz1          Fx2          Fy2          Mz2
     1       34.465      -16.510       -0.000      -34.465       16.510      -99.059
     2       24.675       29.182       99.058      -15.755        4.110       49.934
     3       15.755        4.110      -49.934      -24.675       29.182      -99.058
     4       34.465       16.510       99.059      -34.465      -16.510        0.000

Reaction of Supports :
{AR}IFx1 = -{ARC}IRx1 + [SRF]IRxIF {DF}IFx1
     1     1.651e+001
     2     3.447e+001
    13    -1.651e+001
    14     3.447e+001
```



Gambar A15. Plane Frame

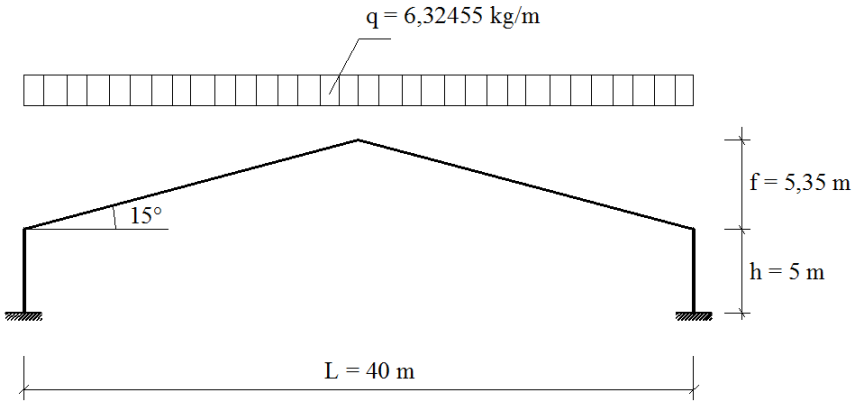
Tabel A.15.1 Input Data Soal Gable Frame

```
 %****PORTAL 2D---TEKNIK SIPIL UNISSULA SEMARANG----
%****nama file : bebanatasfull4 ----oleh :luludia23/07/2018---
%****struktur : gable frame beban atas full
     clear all
     clc
%****General Data---
     type='FRAME2D'
     nfile=' bebanatasfull4 '
%****Material Properties---i,E,A,I---
     prop = [   1   210  0.008412  0.000237];

%****Coordinates---
%****--- Joint   X    Y  ---
     coord=[ 1   0      0
             2   0      4
             3   20     9.35
             4   40     4
             5   40     0];
%****Elemet data---
%****--- Element  J1 J2  prop---
     element=[ 1   1   2    1
               2   2   3    1
               3   3   4    1
               4   4   5    1];
%****Nodal Restraint---
%****---- Joint  JR1   JR2  JR3---
     Support=[ 1    1     1   1
               5    1     1   1  ];
%****Joint Load---
%****---Joint   FX   FY    MZ---
     JL=[ 3     0     0   0];
%****Gaya & Momen Jepit---
     q=0;  L=20;
     Fox1(1)=16.3691395;   Fox2(1)= Fox1(1);
     Foy1(1)=q*L/2;        Foy2(1)=Foy1(1);
     Moz1(1)=q*L^2/12;      Moz2(1)=-Moz1(1);
%****Matriks Beban Batang------
     AML=[ 2  16.3691 61.0904 203.633  16.3691 61.0904 -203.633
           3  -16.3691  61.0904  203.633  -16.3691 61.0904  -203.633];
```

```
%****Call function for analysis portal 2d--------------------
[dof,index,coord,element]=FRAME2D_sdata(prop,element,coord,type);
[S,Sm,SmS,Cx,Cy,RT,L,A,Joint,Xj,Xk,Yj,Yk]=FRAME2D_stiff...
    (prop,element,coord,index,nfile);
[IR,IF,Support]=FRAME2D_ldata(Support,dof);
[DF,AR,AM]=FRAME2D_analysis_result...
    (element,dof,index,IF,IR,S,Sm,JL,AML,RT,Support,type,nfile);
[joint_disp,support_reaction,beam_endforces]=FRAME2D_print_result...
    (JL,AML,dof,Support,element,IF,IR,DF,AR,AM,type,nfile);
%****end data-----------------------------------------------
%
      FRAME2D_xplot
%
```

Tabel A.15.2 Output Data Soal Gable Frame

```
Displacement of Joints of Members :
Member         Dx1          Dy1          Rz1          Dx2          Dy2          Rz2
     1  0.0000e+000  0.0000e+000  0.0000e+000 -2.9395e+004 -2.8642e+002  4.3707e+003
     2 -2.9395e+004 -2.8642e+002  4.3707e+003 -8.1504e-011 -1.1936e+005 -1.3298e-011
     3 -8.1504e-011 -1.1936e+005 -1.3298e-011  2.9395e+004 -2.8642e+002 -4.3707e+003
     4  2.9395e+004 -2.8642e+002 -4.3707e+003  0.0000e+000  0.0000e+000  0.0000e+000

Member End Forces :
[AM]mx4 = [AML]mx6 + [AML]mx6[Sm]6x6[RT]6x6[Dj]6x6
Member          Fx1          Fy1          Mz1          Fx2          Fy2          Mz2
     1      126.491     -192.738     -439.859     -126.491      192.738     -331.093
     2      218.879       72.389      331.094     -186.141       49.792      -97.186
     3      186.141       49.792       97.186     -218.879       72.389     -331.094
     4      126.491      192.738      331.093     -126.491     -192.738      439.859

Reaction of Supports :
{AR}IFx1 = -{ARC}IRx1 + [SRF]IRxIF {DF}IFx1
     1     1.927e+002
     2     1.265e+002
     3    -4.399e+002
    13    -1.927e+002
    14     1.265e+002
    15     4.399e+002
```



Gambar A16. Plane Frame

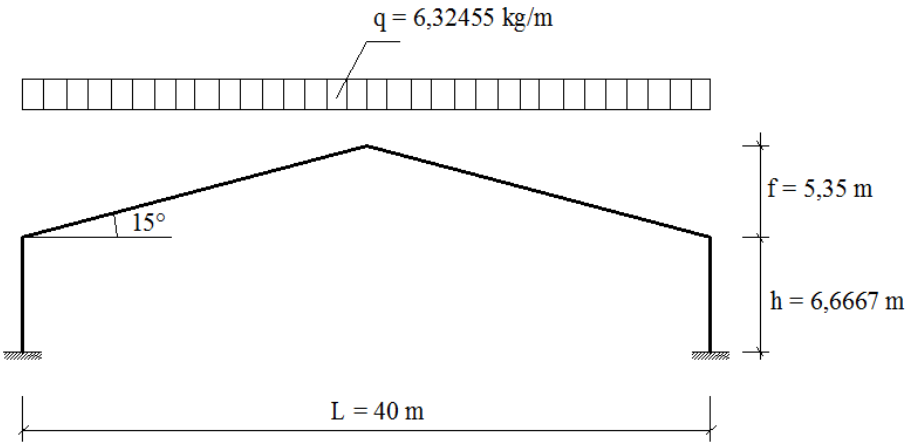
Tabel A.16.1 Input Data Soal Gable Frame

```
 %****PORTAL 2D---TEKNIK SIPIL UNISSULA SEMARANG----
%****nama file : bebanatasfull5 ----oleh :luludia23/07/2018---
%****struktur : gable frame beban atas full

     clear all
     clc
%****General Data---
     type='FRAME2D'
     nfile=' bebanatasfull5 '
%****Material Properties---i,E,A,I---
     prop = [   1   210  0.008412  0.000237];

%****Coordinates---
%****--- Joint   X    Y  ---
     coord=[ 1   0      0
             2   0      5
             3   20     10.35
             4   40     5
             5   40     0];
%****Elemet data---
%****--- Element  J1 J2  prop---
     element=[ 1   1   2    1
               2   2   3    1
               3   3   4    1
               4   4   5    1];
%****Nodal Restraint---
%****---- Joint  JR1   JR2  JR3---
     Support=[ 1    1     1   1
               5    1     1   1  ];
%****Joint Load---
%****---Joint   FX   FY    MZ---
     JL=[ 3     0     0   0];
%****Gaya & Momen Jepit---
     q=0;  L=20;
     Fox1(1)=16.3691395;   Fox2(1)= Fox1(1);
     Foy1(1)=q*L/2;        Foy2(1)=Foy1(1);
     Moz1(1)=q*L^2/12;      Moz2(1)=-Moz1(1);
%****Matriks Beban Batang------
     AML=[ 2  16.3691 61.0904 203.633  16.3691 61.0904 -203.633
           3  -16.3691  61.0904  203.633  -16.3691 61.0904  -203.633];
```

```
%****Call function for analysis portal 2d--------------------
[dof,index,coord,element]=FRAME2D_sdata(prop,element,coord,type);
[S,Sm,SmS,Cx,Cy,RT,L,A,Joint,Xj,Xk,Yj,Yk]=FRAME2D_stiff...
    (prop,element,coord,index,nfile);
[IR,IF,Support]=FRAME2D_ldata(Support,dof);
[DF,AR,AM]=FRAME2D_analysis_result...
    (element,dof,index,IF,IR,S,Sm,JL,AML,RT,Support,type,nfile);
[joint_disp,support_reaction,beam_endforces]=FRAME2D_print_result...
    (JL,AML,dof,Support,element,IF,IR,DF,AR,AM,type,nfile);
%****end data-----------------------------------------------
%
      FRAME2D_xplot
%
```

Tabel A.16.2 Output Data Soal Gable Frame

```
Displacement of Joints of Members :
Member         Dx1           Dy1           Rz1           Dx2           Dy2           Rz2
     1  0.0000e+000  0.0000e+000  0.0000e+000 -4.8139e+004 -3.5802e+002  4.7741e+003
     2 -4.8139e+004 -3.5802e+002  4.7741e+003 -2.5162e-010 -1.8863e+005 -3.1331e-011
     3 -2.5162e-010 -1.8863e+005 -3.1331e-011  4.8139e+004 -3.5802e+002 -4.7741e+003
     4  4.8139e+004 -3.5802e+002 -4.7741e+003  0.0000e+000  0.0000e+000  0.0000e+000

Member End Forces :
[AM]mx4 = [AML]mx6 + [AML]mx6[Sm]6x6[RT]6x6[Dj]6x6
Member          Fx1          Fy1          Mz1          Fx2          Fy2          Mz2
     1      126.491     -172.978     -479.966     -126.491      172.978     -384.923
     2      199.790       77.495      384.924     -167.052       44.686      -45.296
     3      167.052       44.686       45.296     -199.790       77.495     -384.924
     4      126.491      172.978      384.923     -126.491     -172.978      479.966

Reaction of Supports :
{AR}IFx1 = -{ARC}IRx1 + [SRF]IRxIF {DF}IFx1
     1     1.730e+002
     2     1.265e+002
     3    -4.800e+002
    13    -1.730e+002
    14     1.265e+002
    15     4.800e+002
```



Gambar A17. Plane Frame

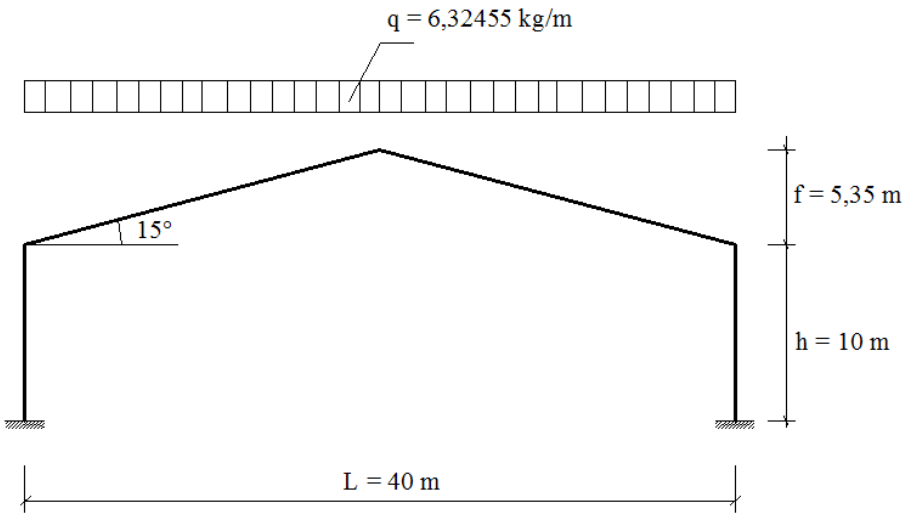
Tabel A.17.1 Input Data Soal Gable Frame

```
 %****PORTAL 2D---TEKNIK SIPIL UNISSULA SEMARANG----
%****nama file : bebanatasfull6 ----oleh :luludia23/07/2018---
%****struktur : gable frame beban atas full

     clear all
     clc
%****General Data---
     type='FRAME2D'
     nfile=' bebanatasfull6 '
%****Material Properties---i,E,A,I---
     prop = [   1   210  0.008412  0.000237];

%****Coordinates---
%****--- Joint   X    Y  ---
     coord=[ 1   0      0
             2   0      6.6667
             3   20     12.0167
             4   40     6.6667
             5   40     0];
%****Elemet data---
%****--- Element  J1 J2  prop---
     element=[ 1   1   2    1
               2   2   3    1
               3   3   4    1
               4   4   5    1];
%****Nodal Restraint---
%****---- Joint  JR1   JR2  JR3---
     Support=[ 1    1     1   1
               5    1     1   1  ];
%****Joint Load---
%****---Joint   FX   FY    MZ---
     JL=[ 3     0     0   0];
%****Gaya & Momen Jepit---
     q=0;  L=20;
     Fox1(1)=16.3691395;   Fox2(1)= Fox1(1);
     Foy1(1)=q*L/2;        Foy2(1)=Foy1(1);
     Moz1(1)=q*L^2/12;      Moz2(1)=-Moz1(1);
%****Matriks Beban Batang------
     AML=[ 2  16.3691 61.0904 203.633  16.3691 61.0904 -203.633
           3  -16.3691  61.0904  203.633  -16.3691 61.0904  -
203.633];
```

```
%****Call function for analysis portal 2d--------------------
[dof,index,coord,element]=FRAME2D_sdata(prop,element,coord,type);
[S,Sm,SmS,Cx,Cy,RT,L,A,Joint,Xj,Xk,Yj,Yk]=FRAME2D_stiff...
    (prop,element,coord,index,nfile);
[IR,IF,Support]=FRAME2D_ldata(Support,dof);
[DF,AR,AM]=FRAME2D_analysis_result...
    (element,dof,index,IF,IR,S,Sm,JL,AML,RT,Support,type,nfile);
[joint_disp,support_reaction,beam_endforces]=FRAME2D_print_result...
    (JL,AML,dof,Support,element,IF,IR,DF,AR,AM,type,nfile);
%****end data-------------------------------------------------
%
      FRAME2D_xplot
%
```

Tabel A.17.2 Output Data Soal Gable Frame

```
Displacement of Joints of Members :
Member         Dx1          Dy1          Rz1          Dx2          Dy2          Rz2
     1  0.0000e+000  0.0000e+000  0.0000e+000 -8.1670e+004 -4.7737e+002  3.0438e+003
     2 -8.1670e+004 -4.7737e+002  3.0438e+003 -1.2263e-009 -3.1284e+005 -1.1099e-010
     3 -1.2263e-009 -3.1284e+005 -1.1099e-010  8.1670e+004 -4.7737e+002 -3.0438e+003
     4  8.1670e+004 -4.7737e+002 -3.0438e+003  0.0000e+000  0.0000e+000  0.0000e+000

Member End Forces :
[AM]mx4 = [AML]mx6 + [AML]mx6[Sm]6x6[RT]6x6[Dj]6x6
Member         Fx1          Fy1          Mz1          Fx2          Fy2          Mz2
     1      126.491     -144.167     -503.282     -126.491      144.167     -457.836
     2      171.958       84.940      457.836     -139.220       37.240       35.936
     3      139.220       37.240      -35.936     -171.958       84.940     -457.836
     4      126.491      144.167      457.836     -126.491     -144.167      503.282

Reaction of Supports :
{AR}IFx1 = -{ARC}IRx1 + [SRF]IRxIF {DF}IFx1
     1     1.442e+002
     2     1.265e+002
     3    -5.033e+002
    13    -1.442e+002
    14     1.265e+002
    15     5.033e+002
```



Gambar A18. Plane Frame

Tabel A.18.1 Input Data Soal Gable Frame

```
 %****PORTAL 2D---TEKNIK SIPIL UNISSULA SEMARANG----
%****nama file : bebanatasfull10 ----oleh :luludia23/07/2018---
%****struktur : gable frame beban atas full

     clear all
     clc
%****General Data---
     type='FRAME2D'
     nfile=' bebanatasfull10 '
%****Material Properties---i,E,A,I---
     prop = [   1   210  0.008412  0.000237];

%****Coordinates---
%****--- Joint   X    Y  ---
     coord=[ 1   0      0
             2   0      10
             3   20     15.35
             4   40     10
             5   40     0];
%****Elemet data---
%****--- Element  J1 J2  prop---
     element=[ 1   1   2    1
               2   2   3    1
               3   3   4    1
               4   4   5    1];
%****Nodal Restraint---
%****---- Joint  JR1   JR2  JR3---
     Support=[ 1    1     1   1
               5    1     1   1  ];
%****Joint Load---
%****---Joint   FX   FY    MZ---
     JL=[ 3     0     0   0];
%****Gaya & Momen Jepit---
     q=0;  L=20;
     Fox1(1)=16.3691395;   Fox2(1)= Fox1(1);
     Foy1(1)=q*L/2;        Foy2(1)=Foy1(1);
```

```
  Moz1(1)=q*L^2/12;      Moz2(1)=-Moz1(1);
%****Matriks Beban Batang------
     AML=[ 2  16.3691 61.0904 203.633  16.3691 61.0904 -203.633
           3  -16.3691  61.0904  203.633  -16.3691 61.0904  -203.633];
%****Call function for analysis portal 2d--------------------
[dof,index,coord,element]=FRAME2D_sdata(prop,element,coord,type);
[S,Sm,SmS,Cx,Cy,RT,L,A,Joint,Xj,Xk,Yj,Yk]=FRAME2D_stiff...
    (prop,element,coord,index,nfile);
[IR,IF,Support]=FRAME2D_ldata(Support,dof);
[DF,AR,AM]=FRAME2D_analysis_result...
    (element,dof,index,IF,IR,S,Sm,JL,AML,RT,Support,type,nfile);
[joint_disp,support_reaction,beam_endforces]=FRAME2D_print_result...
    (JL,AML,dof,Support,element,IF,IR,DF,AR,AM,type,nfile);
%****end data-----------------------------------------------
%
      FRAME2D_xplot
%
```

Tabel A.18.2 Output Data Soal Gable Frame

```
Displacement of Joints of Members :
Member         Dx1           Dy1           Rz1           Dx2           Dy2           Rz2
     1  0.0000e+000  0.0000e+000  0.0000e+000 -1.4548e+005 -7.1605e+002 -5.5878e+003
     2 -1.4548e+005 -7.1605e+002 -5.5878e+003 -2.0264e-009 -5.4985e+005 -1.0987e-010
     3 -2.0264e-009 -5.4985e+005 -1.0987e-010  1.4548e+005 -7.1605e+002  5.5878e+003
     4  1.4548e+005 -7.1605e+002  5.5878e+003  0.0000e+000  0.0000e+000  0.0000e+000

Member End Forces :
[AM]mx4 = [AML]mx6 + [AML]mx6[Sm]6x6[RT]6x6[Dj]6x6
Member         Fx1          Fy1          Mz1          Fx2          Fy2          Mz2
     1      126.491     -103.573     -490.056     -126.491      103.573     -545.677
     2      132.745       95.431      545.678     -100.006       26.750      165.278
     3      100.006       26.750     -165.278     -132.745       95.431     -545.678
     4      126.491      103.573      545.677     -126.491     -103.573      490.056

Reaction of Supports :
{AR}IFx1 = -{ARC}IRx1 + [SRF]IRxIF {DF}IFx1
     1     1.036e+002
     2     1.265e+002
     3    -4.901e+002
    13    -1.036e+002
    14     1.265e+002
    15     4.901e+002
```