



# TEACHING PLAN

## BACHELOR OF EDUCATION IN BUILDING ENGINEERING (BE-BE) STUDY PROGRAM

DEPARTMENT OF CIVIL ENGINEERING, FACULTY OF ENGINEERING, UNIVERSITAS NEGERI PADANG

COURSES	CODE	GROUP OF COURSES	SCU		SEM	VERSI ON
			Theory	Pract		
Statika	SIP1.61.1102	Study Program Compulsory Courses	3	0	1	1
Responsible Lecturer	Drs. Juniman Silalahi, M.Pd.			the signature of the responsible lecturer  Drs. Juniman Silalahi, M.Pd.		
<u>Information</u>	<b>Dean of the Faculty of Engineering</b>	<b>Head of the Civil Engineering Department</b>	<b>Study Program Coordinator Building Engineering Education</b>			
	<u>Dr. Fahmi Rizal, M.Pd., M.T</u> NIP. 195912041985031004	<u>Faisal Ashar, Ph.D.</u> NIP. 19750103 200312 1001	Drs. Revian Body, MSA. NIP. 19600103 198503 1003			
<b>Graduate Learning Outcomes</b>	<b>Learning Achievement of Graduate Study Programs</b>					
	<ol style="list-style-type: none"> <li>1. Master <i>basic knowledge of science</i> (mathematics, natural sciences) and other scientific disciplines that form the basis of building engineering vocational education field for carrying out professional work (<i>Knowledge and Understanding</i>).               <ol style="list-style-type: none"> <li>1.1. Able to implement basic concepts of mathematics and physics to master subjects matter in the field of building engineering vocational education.</li> <li>1.2. Mastering Statics, Mechanics, Statistics, Technology Materials, and Engineering Drawings as the basic knowledge in the field of building engineering vocational education.</li> </ol> </li> <li>2. Able to identify, formulate, solve, and evaluate various technical problems of buildings as the basic ability for teaching in the field of building engineering vocational education (<i>Engineering analysis, investigation and assessment</i>).               <ol style="list-style-type: none"> <li>2.1. Able to identify, formulate, solve, and evaluate technical problems in the field of geotechnical and</li> </ol> </li> </ol>					

- transportation as the basic ability for teaching in the field of building engineering vocational education.
- 2.2. Able to identify, formulate, solve, and evaluate technical problems in the field of structure and construction management as the basic ability for teaching in the field of building engineering vocational education.
  - 2.3. Able to identify, formulate, solve, and evaluate technical problems in the field of hydrology as the basic ability for teaching in the field of building engineering vocational education.
3. Possess the ability to design building by taking into account environmental, social, health and work safety issues as the basis for teaching in the field of building engineering vocational education (*Engineering design*).
    - 3.1. Able to make design programming by taking into account environmental, social, health and work safety issues, in cooperation with various party related.
    - 3.2. Able to analyze the design by taking into account environmental, social, health and work safety aspects.
    - 3.3. Able to produce design by taking into account environmental, social, health and work safety aspects.
  4. Possess social, managerial, team work, and effective communication competencies, entrepreneurial character, environmental insight and life-long learning habits. (*Transferable and soft skills*).
    - 4.1. Possess religious character implemented in personal and professional activities.
    - 4.2. Possess the spirit of nationalism, social sensitivity and environmental insight
    - 4.3. Able to communicate effectively and work in a team.
    - 4.4. Able to transfer science and technology to the community to improve the quality of life
    - 4.5. Possess entrepreneurial character
  5. Possess the ability to innovate and adapt to the development of science and technology, and implement it into the learning process of building engineering vocational education field by taking into account non-technical risks that may occur (ethical, ecological, commercial, and industrial impact) (*Engineering practice*).
    - 5.1. Able to innovate and use information technology (software) in the field of building engineering vocational education by taking into account the ethical, ecological, commercial and industrial impact.
    - 5.2. Able to use information technology-based equipment (hardware) in field of building engineering vocational education.
  6. Possess a good ability to design, implement and evaluate the learning process in the field of building engineering vocational education (*Educational design*).

	<p>6.1. Able to design curriculum and learning process of building engineering vocational education.</p> <p>6.2. Able to implement, control, evaluate and improve the quality of learning process through research in the field of building engineering vocational education.</p> <p>6.3. Able to develop an effective, efficient, and attractive learning media in the field of building engineering vocational education.</p>	
<b>Course Learning Outcomes</b>	<b>Learning Achievement of Course (CPMK)</b>	
	<b>CPMK</b>	<b>CPL</b>
	1. Have basic knowledge of Statics	1.1, 1.2, 1.3
	2. Understand the basic concepts of specific static structures	1.1, 1.2, 1.3
	3. Able to calculate the forces in specific static structures	1.1, 1.2, 1.3, 4.1, 4.2, 4.3
	4. Able to calculate stress on a beam cross-section	1.1, 1.2, 1.3, 4.1, 4.2, 4.3
	5. Able to calculate rod forces	1.1, 1.2, 1.3, 4.1, 4.2, 4.3
<b>Short descriptions of course</b>	This course provides basic knowledge of statics, basic concepts of specific static structures, calculating and painting forces in certain static structures, calculating stresses in beam sections, and calculating rod forces in frame structures.	
<b>References</b>	<b>Utama (RU) :</b>	
	1. Juniman Silalahi, 2009, <i>Mekanika Struktur Jilid 1</i> , Penerbit UNP Press, Padang	
	<b>Pendukung (RP)</b>	
	<p>1. Istimawan Dipohusodo, 2001, <i>Analisis Struktur Jilid 1</i>, Penerbit PT Gramedia Pustaka Utama, Jakarta</p> <p>2. Daniel L. Schodek, 1999, <i>Struktur</i>, Penerbit Erlangga, Jakarta.</p> <p>3. E.P. Popov, 1989, <i>Mekanika Teknik</i>, Penerbit Erlangga, Jakarta.</p> <p>4. J. Kwantes, 1985, <i>Mekanika Bangunan 1</i>, Penerbit Erlangga, Jakarta.</p> <p>5. Soemono, 1985, <i>Ilmu Gaya</i>, Penerbit Djambatan, Bandung.</p> <p>6. J.D. Todd, 1984, <i>Teori dan Analisis Struktur</i>, Penerbit Erlangga, Jakarta</p> <p>7. Heinz Frick, 1983, <i>Mekanika Teknik 1</i>, Penerbit Yayasan Kanisius, Jakarta.</p>	
<b>Learning Media</b>	<b>Software:</b>	<b>Hardware:</b>
		Komputer, LCD Projector dan Papan tulis dan perangkatnya
<b>Team Teaching</b>		
<b>Assessment</b>	Mid Semester Assessment, Final Assessment, Personal & Group task, Group Presentation	
<b>Requirements Subject</b>	None	

## LEARNING MATERIALS

Weeks	Competence to be achieved	Study Materials	Learning Methods and Strategies	Assignments / task	Assessment Criteria / Indicators	Rreference
(1)	Have basic knowledge about Statics.	Basic knowledge of Statics, the system of units, styles and moments, and moments of style and moments of coupling	Lectures, discussion, questions & answers and exercises	Make a summary and description of the material presented.	Be able to explain the meaning and principles of force and moment.	RU-1, RP-2, RP-3, RP-4, RP-7
(2) (3)	Has the ability to calculate the resultant force analytically and graphically	Force resultant with allied catch points, graphically and analytically.	Lectures, discussion, questions & answers and exercises	- Group discussion working on practice questions - Homework	Be able to determine the resultant force analytically and graphically correctly.	RU-1, RP-1, RP-5, RP-7
(4)	Have an understanding of a specific static structure.	The basic concept of specific static structures, Load, Support, Support reaction, Shear force, Normal force, The moment of bending	Lectures, discussion, questions & answers and exercises	Make a summary and description of the material presented.	Able to distinguish specific static structures with indefinite static. Able to explain the meaning of imposition, support, Support reaction, Shear force, Normal force, and The moment of bending	RU-1, RP-1, RP-2, RP-3, RP-4, RP-5, RP-6, RP-7
(5)	Have the ability to calculate and depict a diagram of the internal forces of a cantilever beam	Cantilever beam: Calculates bearing reaction, shear force, normal force and bending moment.	Lectures, discussion, questions & answers and exercises	- Group discussion working on practice questions - Home work	Be able to calculate and paint diagram of cantilever beam internal forces correctly.	RU-1, RP-1, RP-2, RP-3, RP-4, RP-5, RP-6, RP-7
(6) (7)	Has the ability to calculate and depict a simple block diagram of internal forces	Simple beam with centred and even load: Calculate bearing reaction, shear force, normal force and bending moment	Lectures, discussion, questions & answers and exercises	- Group discussion working on practice questions - Home work	Be able to calculate and paint diagram of simple block internal forces correctly.	RU-1, RP-1, RP-2, RP-3, RP-4, RP-5, RP-6, RP-7

Weeks	Competence to be achieved	Study Materials	Learning Methods and Strategies	Assignments / task	Assessment Criteria / Indicators	Rreference
(8)	<b>Mid-Semester Evaluation through Mid-Semester Examination</b>					
(9)	Have the ability to calculate and paint diagrams of angular beam internal forces	Angle beam with combined load: Calculates bearing reaction, shear force, normal force and bending moment.	Lectures, discussion, questions & answers and exercises	- Group discussion working on practice questions - Home work	Be able to calculate and paint diagram of angular beam internal forces correctly.	RU-1, RP-1, RP-2, RP-3, RP-4, RP-5, RP-6, RP-7
(10) (11)	Has the ability to calculate and paint a simple portal, internal force diagrams	Simple portal with combined load: Calculate bearing reaction, shear force, normal force and bending moment.	Lectures, discussion, questions & answers and exercises	- Group discussion working on practice questions - Home work	Be able to calculate and paint simple portal, internal forces diagrams correctly	RU-1, RP-1, RP-2, RP-3, RP-4, RP-5, RP-6, RP-7
(12)	Have the ability to calculate and print a diagram of the internal forces of a Gerber continuous beam.	Gerber continuous beam: Calculate the bearing reaction, shear force, normal force, and bending moment.	Lectures, discussion, questions & answers and exercises	- Group discussion working on practice questions - Home work	Be able to calculate and print a diagram of the internal forces of a Gerber continuous beam correctly	RU-1, RP-1, RP-2, RP-3, RP-4, RP-5, RP-6, RP-7
(13)	Has the ability to calculate the centre of gravity of regular objects and the moment of inertia of the cross-section	The point of gravity of regular objects; Moment of Inertia	Lectures, discussion, questions & answers and exercises	- Group discussion working on practice questions - Home work	Mampu menghitung titik berat benda beraturan serta momen inersia penampang dengan benar	RU-1, RP-3, RP-4, RP-7
(14)	Has the ability to calculate the stress of a section due to regular, shear and bending forces	tension: Normal, shear and bending	Lectures, discussion, questions & answers and exercises	- Group discussion working on practice questions - Home work	Mampu menghitung tegangan suatu penampang akibat gaya normal, geser, dan lentur dengan benar	RU-1, RP-3, RP-4, RP-7
(15)	Have the ability to calculate the rod forces on the truss.	Trunk frame: Method Balance styles, Cremona, and Ritter cut	Lectures, discussion, questions & answers and exercises	- Group discussion working on practice questions	Be able to calculate the rod forces of a frame (Truss)	RU-1, RP-3, RP-4, RP-7

Weeks	Competence to be achieved	Study Materials	Learning Methods and Strategies	Assignments / task	Assessment Criteria / Indicators	Rreference
				- Home work	correctly.	
(16)	<b>Final Semester Evaluation (Evaluation which is intended to determine the final achievement of student learning outcomes)</b>					

**Catatan :**

**Keterkaitan CPMK dengan CPL dan Metode Assesment**

SIP1.61.1102	Assesment	Bobot (%)	CPL-1			CPL-2				CPL-3				CPL-4					CPL-5			CPL-6				
			1	2	3	1	2	3	4	1	2	3	4	1	2	3	4	5	1	2	3	1	2	3		
CPMK-1	UTS.1	5																								
CPMK-2,3	UTS.2																									
CPMK-4	UTS.3	10																								
CPMK-5	UTS.3	10																								
CPMK-6,7	UTS.3	10																								
CPMK-9	UAS.1	5																								
CPMK-10,11	UAS.2	10																								
CPMK-12	UAS.3	5																								
CPMK-13	UAS.4	5																								
CPMK-14	UAS.5	5																								
CPMK-15	UAS.6	5																								
Kehadiran		10																								
TOTAL		100																								

**Komponen Penilaian**

Ujian Tengah Semester	:35 %
Ujian Akhir Semester	: 35 %
Tugas	: 20 %
<u>Kehadiran</u>	: 10 %
Total	: 100 %

## Deskripsi Tingkat Penilaian

	<b>Excellent</b>	<b>Good</b>	<b>Satisfy</b>	<b>Fail</b>
Deskripsi	Mampu mendeskripsikan dengan benar dan lengkap	Mampu mendeskripsikan dengan benar tapi kurang lengkap	Mampu mendeskripsikan tapi kurang jelas dan kurang lengkap	Tidak mampu mendeskripsikan
Formulasi	Mampu memformulasikan dengan benar dan lengkap	Mampu memformulasikan dengan benar tapi kurang lengkap	Mampu memformulasikan tapi kurang jelas dan kurang lengkap	Tidak mampu memformulasikan
Menghitung	Mampu menghitung dengan benar dan lengkap	Mampu menghitung dengan benar tapi kurang lengkap	Mampu menghitung tapi kurang jelas dan kurang lengkap	Tidak mampu menghitung
Analisis	Mampu menganalisis dengan benar dan lengkap	Mampu menganalisis dengan benar tapi kurang lengkap	Mampu menganalisis tapi kurang jelas dan kurang lengkap	Tidak mampu menganalisis

## Sistem Penilaian

Nilai Angka	Nilai Mutu	Angka Mutu	Sebutan Mutu	Nilai Angka	Nilai Mutu	Angka Mutu	Sebutan Mutu
85 – 100	A	4.0	Dengan pujian	55 – 59	C	2.0	Cukup
80 – 84	A-	3.6	Sangat baik sekali	50 – 54	C-	1.6	Kurang cukup
75 – 79	B+	3.3	Baik sekali	40 – 49	D	1.0	Kurang
70 – 74	B	3.0	Baik	≤ 39	E	0.0	Gagal
65 – 69	B-	2.6	Cukup Baik	-	T	-	Tertunda
60 – 64	C+	2.3	Lebih dari cukup				



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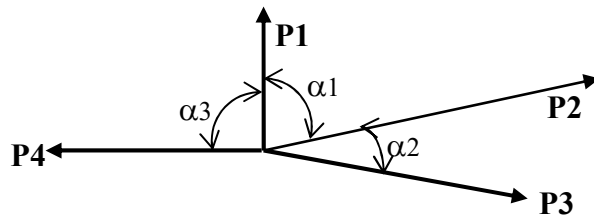
Alamat: Jl. Prof. Dr. Hamka, Kampus UNP Air Tawar, Padang 25131  
Telp. (0751) 7055644, Fax (0751) 7055628, website: [www.ft.unp.ac.id](http://www.ft.unp.ac.id), e-mail: [info@ft.unp.ac.id](mailto:info@ft.unp.ac.id)

**SOAL UJIAN TENGAH SEMESTER**

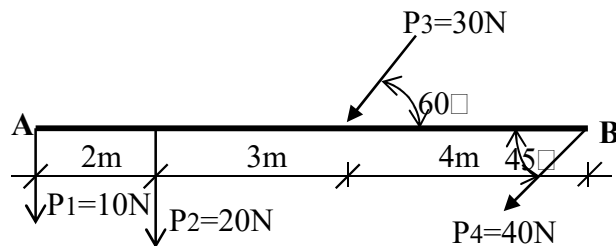
Matakuliah : Statika  
Kode / SKS : SIP1.61.1102  
Sifat Ujian : Buka Buku  
Dosen : Drs. Juniman Silalahi, M.Pd.  
Waktu : 120 menit  
Bobot nilai maksimal : 100

No Soal Bobot

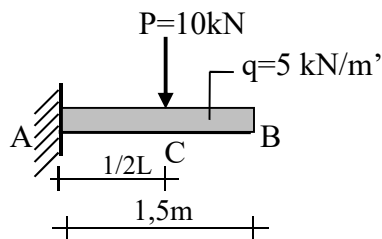
1. Diketahui empat gaya berasal dari satu titik tangkap bersekutu dengan arah dan besaran yang berbeda  $P_1=2$  kN,  $P_2=4$  kN,  $P_3=3$  kN dan  $P_4=5$  kN dengan  $\alpha_1=60^\circ$ ,  $\alpha_2=30^\circ$ , dan  $\alpha_3=90^\circ$ , seperti gambar. Hitung besar dan arah resultan gaya  $R$  secara grafis dan analitis. 15



2. Diketahui empat buah gaya  $P$  bekerja di sepanjang balok dengan bentuk, besaran, dan arah seperti pada gambar. Hitunglah besar resultan gaya  $R$ , dan tentukan letak titik tangkapnya secara grafis dan analitis. 15



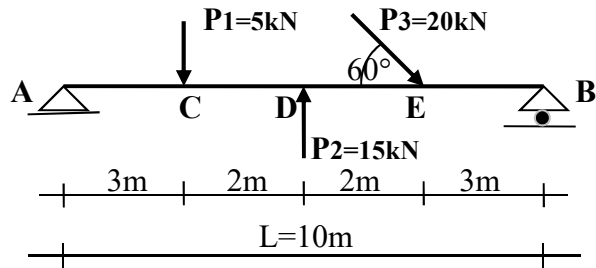
3. Suatu balok kantilever dengan bentuk, dimensi, dan pembebanan seperti pada gambar. Hitung reaksi tumpuan, gaya geser  $V_A$ ,  $V_C$ ,  $V_B$ , dan momen lentur  $M_A$ ,  $M_C$ ,  $M_B$ . Lukis bidang gaya geser, dan momen lentur. 10



4. Suatu balok sederhana dengan bentuk, dimensi, dan pembebanan seperti pada gambar. Hitung reaksi tumpuan, gaya geser  $V_{A-C}$ ,  $V_{C-D}$ ,  $V_{D-E}$ ,  $V_{E-B}$ , gaya normal  $N_{A-E}$ , dan 30

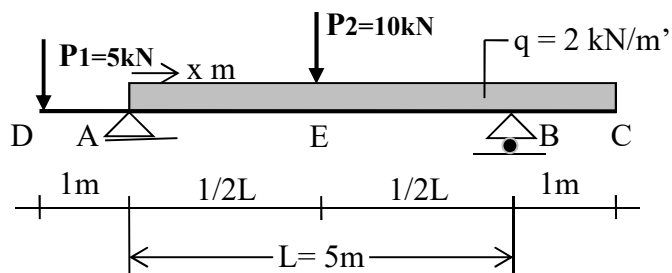


momen lentur  $M_A$ ,  $M_C$ ,  $M_D$ ,  $M_E$ ,  $M_B$ . Lukis bidang gaya geser, bidang gaya normal, dan momen lentur.



5. Suatu balok sederhana dengan bentuk, dimensi, dan pembebanan seperti pada gambar. Hitung reaksi tumpuan, gaya geser  $V_{D-A}$ ,  $V_A$ ,  $V_D$ ,  $V_B$ ,  $V_C$ , dan momen lentur  $M_D$ ,  $M_A$ ,  $M_E$ ,  $M_B$ ,  $M_C$ . Lukis bidang gaya geser, dan momen lentur.

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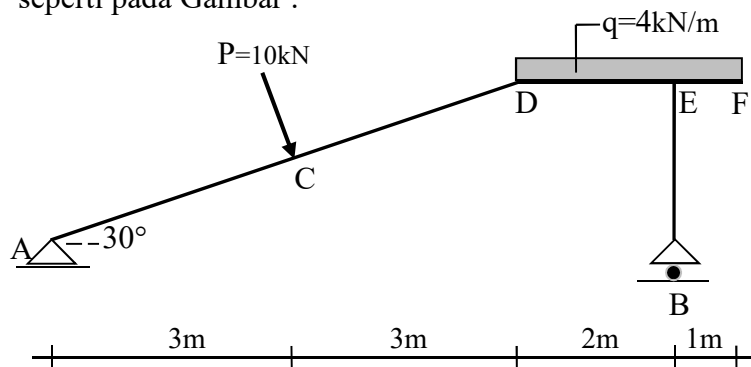
Alamat: Jl. Prof. Dr. Hamka, Kampus UNP Air Tawar, Padang 25131  
Telp. (0751) 7055644, Fax (0751) 7055628, website: [www.ft.unp.ac.id](http://www.ft.unp.ac.id), e-mail: [info@ft.unp.ac.id](mailto:info@ft.unp.ac.id)

### SOAL UJIAN AKHIR SEMESTER

Matakuliah : Statika  
Kode / SKS : SIP1.61.1102  
Sifat Ujian : Buka Buku  
Dosen : Drs. Juniman Silalahi, M.Pd.  
Waktu : 120 menit  
Bobot nilai maksimal : 100

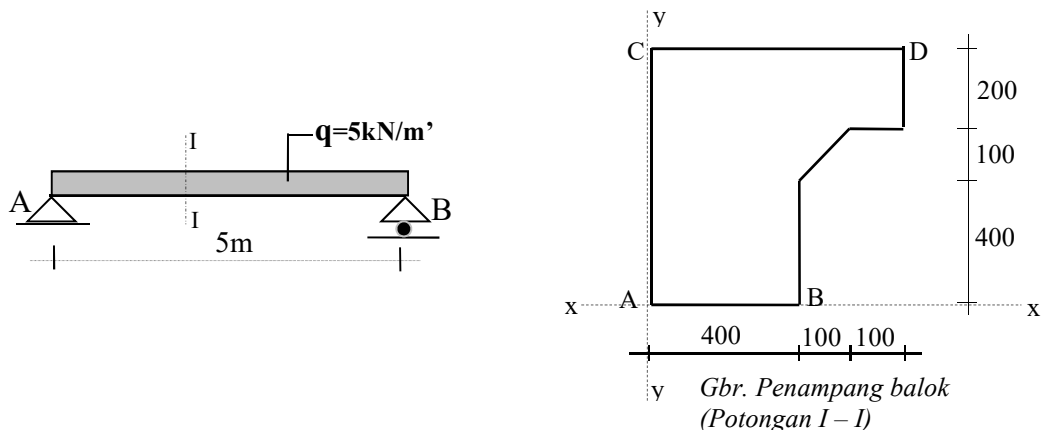
No	Soal	Bobot
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1. Diketahui struktur portal statis tertentu dengan bentuk, dimensi, dan pembebanan seperti pada Gambar .



Ditanya:

- a. Hitung Reaksi tumpuan ( $R_{Ah}$ ,  $R_{Av}$ , dan  $R_B$ )
  - b. Hitung gaya geser ( $V_{A-C}$ ,  $V_{C-D}$ ,  $V_D$ ,  $V_E$ (kiri),  $V_E$ (kanan),  $V_F$ , dan  $V_{E-B}$ )
  - c. Hitung momen lentur ( $M_A$ ,  $M_C$ ,  $M_D$ ,  $M_E$ ,  $M_F$ , dan  $M_B$ )
  - d. Lukis diagram gaya geser, dan momen lentur.
2. Diketahui balok sederhana dengan tumpuan sendi dan rol, menerima beban seperti pada Gambar.



Gbr. Penampang balok  
(Potongan I – I)

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Ditanya:

- a. Hitung momen lentur ( $M_{maks}$ ), dan gaya geser ( $V_{maks}$ )
- b. Tentukan letak titik berat penampang balok ( $Z_x$  dan  $Z_y$ )
- c. Hitung momen Inersia ( $I_z$ ,  $I_{AB}$ , dan  $I_{CD}$ )
- d. Hitung Tegangan lentur maksimum ( $\sigma_{maks}$ )
- e. Hitung tegangan geser pada garis netral penampang ( $\tau_{maks}$ )



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### SOAL TUGAS MATA KULIAH

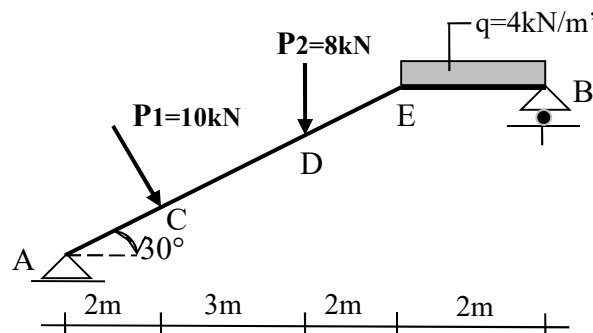
Matakuliah : Statika  
Kode / SKS : SIP1.61.1102  
Sifat Tugas : Diskusi dan Presentase Kelompok  
Dosen : Drs. Juniman Silalahi, M.Pd.  
Waktu presentasi : 60 menit  
Bobot nilai : 100

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Kelompok	Soal	Nilai maks
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1. Hitunglah gaya-gaya internal (reaksi tumpuan, gaya geser, gaya normal, dan momen lentur) dari balok bersudut dengan beban kombinasi seperti pada Gambar, serta gambarkan diagramnya. 50



2. Hitunglah gaya-gaya internal (reaksi tumpuan, gaya geser, gaya normal, dan momen lentur) portal sederhana seperti pada Gambar, serta gambarkan diagramnya. 50

