TEACHING PLAN
BACHELOR OF EDUCATION IN BUILDING ENGINEERING (BE-BE) STUDY PROGRAM
DEPARTMENT OF CIVIL ENGINEERING, FACULTY OF ENGINEERING, UNIVERSITAS NEGERI PADANG

COURSE	CODE	COURSE CLUSTER	CREDITS Theory	CREDITS Practice	SEM	VERSION
Engineering Mechanic	SIP1.61.2304	Study Program Compulsory Course	3	0	2	1

Lecturer in Charge		Lecturer in Charge
	Drs. Juniman Silalahi, M.Pd.	Drs. Juniman Silalahi, M.Pd.

Remarks	Dean of Faculty of Engineering	Head of Civil Engineering Department	Coordinator of BEVE
	Dr. Fahmi Rizal, M.Pd., M.T NIP. 195912041985031004	Faisal Ashar, Ph.D. NIP. 19750103 200312 1001	Drs. Revian Body, MSA. NIP. 19600103 198503 1003

Program Learning Outcomes	**Program Learning Outcomes**
	By considering input from all stake holders and the minimum requirements set by ASIIN, the PLO's that must be possessed by graduates from the Bachelor of Education in Building Engineering Study Program are determined as follows: 1. Master *basic knowledge of science* (mathematics, natural sciences) and other scientific disciplines that form the basis of building engineering vocational education field for carrying out professional work *(Knowledge and Understanding).* 1.1. Able to implement basic concepts of mathematics and physics to master subjects matter in the field of building engineering vocational education. 1.2. Mastering Statics, Mechanics, Statistics, Technology Materials, and Engineering Drawings as the basic knowledge in the field of building engineering vocational education. 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 *(Engineering analysis, investigation and assessment)* .

    2.1. Able to identify, formulate, solve, and evaluate technical problems in the field of geotechnical and 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).*
	
	   6.1. Able to design curriculum and learning process of building engineering vocational education.
	   6.2. Able to implement, control, evaluate and improve the quality of learning process through research in the field of building engineering vocational education.
	   6.3. Able to develop an effective, efficient, and attractive learning media in the field of building engineering vocational education.

Course Learning Outcomes	**Course Learning Outcomes (CLO): Engineering Mechanic** {TABLE2}
Course Description	This course provides knowledge about the basic concepts of indefinite static, beam deflection, analysis of continuous beam and portal structures using the Clayperon method, and the moment distribution method (Cross).
Literature	{TABLE3}

Course Learning Outcomes (CLO) table:

Course LO	PLO
1. Able to basic concepts of indefinite static structures	1.1, 1.2, 1.3
1. Able to calculate continuous beam reaction moment using the Clapayron method	1.1, 1.2, 1.3
2. Able to calculate continuous beam reaction moment using the Cross method	1.1, 1.2, 1.3, 6.1, 6.2, 6.3
3. Able to calculate the moment of reaction for the portal without swaying using the Cross method	1.1, 1.2, 1.3, 6.1, 6.2, 6.3
4. Able to calculate the moment of reaction to the portal swaying using the Cross method	1.1, 1.2, 1.3, 6.1, 6.2, 6.3

Literature table:

Main:
1. Juniman Silalahi, 2010, *Mekanika Struktur Jilid 2*, Penerbit UNP Press, Padang

Supporting:
1. Istimawan Dipohusodo, 2001, *Analisis Struktur Jilid 1*, Penerbit PT Gramedia Pustaka Utama, Jakarta
2. Daniel L. Schodek, 1999, *Struktur*, Penerbit Erlangga, Jakarta.
3. E.P. Popov, 1989, *Mekanika Teknik*, Penerbit Erlangga, Jakarta.
4. Chu-Kia Wang. 1989. *Struktur Statis Taktentu*. Penerbit Erlangga: Jakarta.
5. J. Kwantes, 1985, *Mekanika Bangunan 1*, Penerbit Erlangga, Jakarta.

	6. Soemono, 1985, *Ilmu Gaya*, Penerbit Djambatan, Bandung. 7. J.D. Todd, 1984, *Teori dan Analisis Struktur*, Penerbit Erlangga, Jakarta 8. Heinz Frick, 1983, *Mekanika Teknik 2*, Penerbit Yayasan Kanisius, Jakarta.	
Teaching Media	**Software:**	**Hardware:** Computer, LCD Projector and White Board
Team Teaching		
Assessment	MID Semester Exam, Final Semester Exam, Independent Task & Group, Assigments, Group Presentations.	
Prerequisite	N/A	

TEACHING MATERIAL

Week	Expected Competency	Study Material	Teaching Method and Strategy	Assignment	Teaching Method and Strategy	Reference
(1) (2)	Have Knowledge about beam deflection	Beam deflection with the moment area method and the second load method: - Deflection - The angle of inclination of the deflection	Lecturer, discussion, question and answer, exercise	- Group Discusse - Homework	Able to calculate deflection and beam deflection angle correctly	RU-1, RP-1, RP-2, RP-3, RP-4, RP-5, RP-6, RP-7, RP-8
(3) (4)	Ability to apply deflection equations and deflection tilt angles to indefinite static beams	Application of the deflection equation and the angle of deflection to an indefinite static beam	Lecturer, discussion, question and answer, exercise	- Group Discusse - Homework	Able to apply the deflection equation and the deflection angle of an indefinite static beam correctly	RU-1, RP-1, RP-2, RP-3, RP-4, RP-5, RP-6, RP-7, RP-8
(5)	Ability to calculate the moment of continuous beam reaction with the three moment equation method (Clapeyron)	Calculating the moment of continuous beam reaction with the three moment equation method (Clapeyron)	Lecturer, discussion, question and answer, exercise	- Group Discusse - Homework	Able to calculate the moment of continuous beam reaction using the three moment equation method	RU-1, RP-1, RP-2, RP-3, RP-4, RP-5, RP-6, RP-7, RP-8

Week	Expected Competency	Study Material	Teaching Method and Strategy	Assignment	Teaching Method and Strategy	Reference
					(Clapeyron) correctly	
(6) (7)	Ability to calculate the continuous beam reaction moment with the Cross method	Calculating the continuous beam reaction moment due to the load combination with the Cross method	Lecturer, discussion, question and answer, exercise	- Group Discusse - Homework	Able to calculate reaction moment on continuous beam using the Cross method correctly	RU-1, RP-1, RP-2, RP-3, RP-4, RP-5, RP-6, RP-7, RP-8
(8)	**MID Semester Exam**					
(9) (10)	Ability to calculate reaction moments on unshakeable portals using the Cross method	Calculating the reaction moment of the shaking portal due to the combined load using the Cross method	Lecturer, discussion, question and answer, exercise	- Group Discusse - Homework	Able to calculate reaction moments on shaking portals correctly	RU-1, RP-1, RP-2, RP-3, RP-4, RP-5, RP-6, RP-7, RP-8
(11) (12) (13)	Ability to calculate reaction moments on a single swing portal using the Cross method	Calculating the reaction moment of single swing portal due to combination load using the Cross method	Lecturer, discussion, question and answer, exercise	- Group Discusse - Homework	Able to correctly calculate reaction moments on single swing portals	RU-1, RP-1, RP-2, RP-3, RP-4, RP-5, RP-6, RP-7, RP-8
(14) (15)	Ability to calculate reaction moments on multiple swing portals using the Cross method	Calculating the reaction moment of multiple oscillation portals due to the combined load using the Cross method	Lecturer, discussion, question and answer, exercise	- Group Discusse - Homework	Able to correctly calculate the reaction moment of multiple sway portals	RU-1, RP-1, RP-2, RP-3, RP-4, RP-5, RP-6, RP-7, RP-8

Week	Expected Competency	Study Material	Teaching Method and Strategy	Assignment	Teaching Method and Strategy	Reference
(16)	Final Semester Evaluation (Evaluation which is intended to find the final achievement of student learning outcomes)					

Notes :

Relations of CLO and PLO with Assesment Method

SIP1.61.1102	Assesment	Weight (%)	PLO-1			PLO -2				PLO -3				PLO -4			PLO -5			PLO -6		
			1	2	3	1	2	3	4	1	2	3	4	1	2	3	1	2	3	1	2	3
CPMK-1,2	MID Exam. 1	5	■	■	■																	
CPMK-3,4	MID Exam. 2	5	■	■	■																	
CPMK-5	MID Exam. 3	10	■	■	■																	
CPMK-6,7	MID Exam. 4	15	■	■	■															■	■	■
CPMK-9,10	Final Exam.1	10	■	■	■															■	■	■
CPMK-11,12,13	Final Exam.2	10	■	■	■															■	■	■
CPMK-14,15	Final Exam.3	15	■	■	■															■	■	■
Assignment		20																				
Presence		10																				
TOTAL		100																				

Assesment Components

Mid-Semester Exam	:35 %
Final Exam	: 35 %
Assignment	: 20 %
Presence	: 10 %

Total   : 100 %

Description of Assessment Level

	Excellent	Good	Satisfy	Fail
Description	Able to describe correctly and completely	Able to describe correctly but incomplete	Able to describe but less clear and incomplete	Unable to describe
Formulation	Able to formulate correctly and completely	Able to formulate correctly but incomplete	Able to formulate but less clear and incomplete	Unable to formulate
Calculation	Able to calcutate correctly and completely	Able to calculate correctly but not complete	Able to count but less clear and incomplete	Unable to calculate
Analysis	Able to analyze correctly and completely	Able to analyze correctly but incomplete	Able to analyze but less clear and incomplete	Unable to analyze

Assessment System

Score Range	Grade Letter	Grade Point	Notes	Score Range	Grade Letter	Grade Point	Notes
85 – 100	A	4.0	Exceptional	55 – 59	C	2.0	Quite Satisfactory
80 – 84	A-	3.6	Excellent	50 – 54	C-	1.6	Poor

75 – 79	B+	3.3	Very Good	40 – 49	D	1.0	Very Poor
70 – 74	B	3.0	Good	≤ 39	E	0.0	Fail
65 – 69	B-	2.6	Fairly Good	-	T	-	Delayed
60 – 64	C+	2.3	Satisfactory				

MID SEMESTER EXAM

Course	: Engineering Mechanic
Code / Credit	: **SIP1.61.2304**
Type of Exam	: Open Book
Lecturer	: Drs. Juniman Silalahi, M.Pd.
Time Allocation	: 120 minuets
Maximum Grade	: 100

| No	Question	Weight
1.	You are given a simple block as shown in the picture. Asked: 1. Calculate the support reaction 2. Calculate and paint the bending moment diagram 3. Calculate the slope angle of the deflection on supports A and B 4.Calculate the deflections at points 1, 2, and 3 5. q = 4 kN/m' P1 = 6 kN P2 = 8 kN	30
2.	The indefinite static beam is known as in the picture. Asked: Calculate the MA and MB using the slope angle of the deflection formula. q = 4 kN/m' P1 = 6 kN P2 = 8 kN	30
3.	It is known that an indefinite static beam is known as in the picture. If q = 4 kN / m ', and P1 = 6 kN, P2 = 8 kN. Calculate MB with the three-moment equation method and draw a diagram of the shear force and bending moment.	40
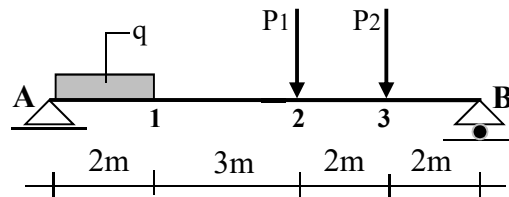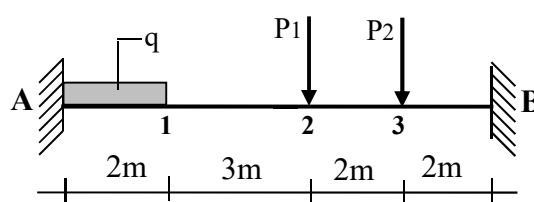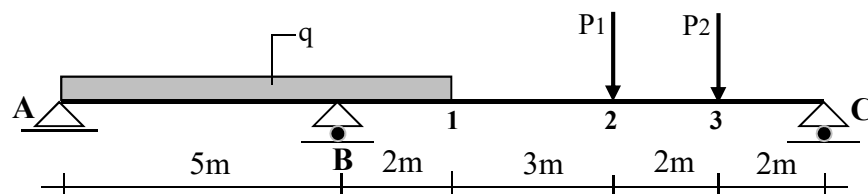
KEMENTERIAN PENDIDIKAN DAN KEBUDAYAAN

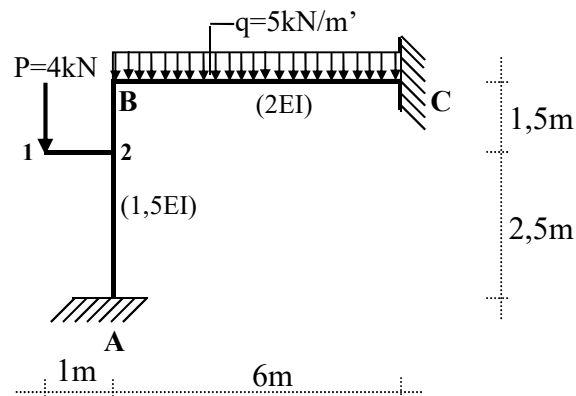# UNIVERSITAS NEGERI PADANG

JURUSAN TEKNIK BANGUNAN

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

FINAL SEMESTER EXAM

Course   : Engineering Mechanic
Code / Credit   : **SIP1.61.2304**
Type of Exam   : Open Book
Lecturer   : Drs. Juniman Silalahi, M.Pd.
Time Allocation   : 120 minutes
Maximum Grade   : 100

No	Question	Weight

1. It is known that the structure of the rod with an indefinite static angle with shape, dimensions, and loading as shown in the figure.

   Asked:
   a. Calculate the reaction moment at the end of the rod / node with the Moment Distribution method (Cross method).
   b. Calculate and draw diagrams of shear forces, normal forces, and bending moments with the help of equilibrium static equations.

   Weight: 50

2. It is known that the structure of the rod with an indefinite static angle with shape, dimensions, and loading as shown in the figure. Calculate the reaction moment at the end of the rod / node with the Moment Distribution method (Cross method).

50
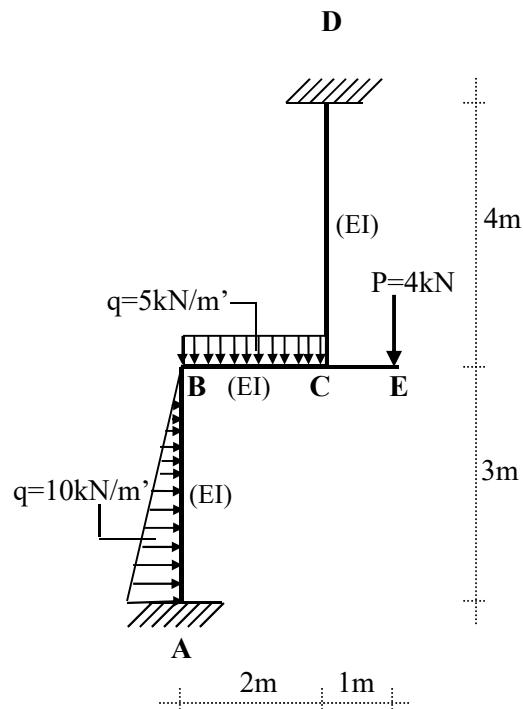
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Assigment

Course	: Engineering Mechanic
Code / Credit	: **SIP1.61.2304**
Type of Task	: Discussion and Group Presentation
Lecturer	: Drs. Juniman Silalahi, M.Pd.
Time Allocation	: 60 minutes
Score	: 100

Group	Question	Maximum Grade
1.	It is known that the structure of a single swaying portal with the shape, dimensions and loading as shown in Figure. Calculate the reaction moments at the fulcrum and vertices using the Moment Distribution (Cross) method, and determine the internal forces and draw the diagram.	100