



TEACHING-LEARNING CONTRACT
LEARNING PROGRAM OUTLINE
LEARNING UNIT PROGRAM

CALCULUS I
PAS 102

UPI-PUSLIK-UNDP

No. Daft: 0066/BA/EMPA/G

Tgl. : 16-6-07

STATISTICS STUDY PROGRAM OF MATHEMATICS DEPARTMENT
MATHEMATICS AND SCIENCE FACULTY
DIPONEGORO UNIVERSITY
SEMARANG
2007

TEACHING-LEARNING CONTRACT

Course Title : Calculus I
Code : PAS 102
SKS : 3 SKS
Semester : I

1. Course Advantage

Calculus represent course elementary very require to well posted by every science student and engineering, including in it statistical student so that student have critical erudite patterned thinking, systematic and logical, skillful and also in is technical of standard mathematics pickaback by concept, real correct method and formula

2. Course Description

This course represent pre course for calculus II and calculus III which studying gathering, number system of real, function, function limit and continuous, differential and application, integral and integral technique.

This course as far as give theory bases which is very needed by other course in the form of definition, theorem and accompanied by existing problem example its bearing with statistics along with solution and also equiped by problem practice

3. General Instructional Aim

After studying this course, the student are expected have real correct conceptual understanding about especial topics in calculus (limit, continuous, differential, integral) along with theorem and nature of and also important techniques in it

4. Lecture Strategic

This method lecturing use discourse, problem practice and discussion. Every participant expected to earn active to ask concepts or things which still not yet been comprehended active and also in doing problem practice

5. References

- Edwin J. Purcell, Dale Varberg. 1987. *Calculus With Analytic Geometry*. Prentice-Hall Inc, New York
- Frank Ayres. 1964. *Calculus*. Mac. Graw Hills

6 Scoring Criteria

Criteria of scoring in this course is

A	4
AB	3,5
B	3
BC	2,5
C	2
CD	1,5
D	1
E	0

Final score decision is based on this scoring indicator such as :

Quiz	20 %
Task	20 %
Midterm	30 %
Final exam	30 %

7. Lecture Schedule

Week	Material	Reference
1	Set	Purcell dan Ayres
2	System Number of Real	Purcell dan Ayres
3	Inequality	Purcell dan Ayres
4	Limit Function	Purcell dan Ayres
5	Continuous Function	Purcell dan Ayres
6	Differential, function and definition	Purcell dan Ayres
7	Differential of Implisit	Purcell dan Ayres
8	Midterm	

9	Application of Differential	Purcell dan Ayres
10	Calculation of Limit with Differential	Purcell dan Ayres
11	Integral	Purcell dan Ayres
12	Integral Parsial	Purcell dan Ayres
13	Integral Trigonometri	Purcell dan Ayres
14	Integral with Substitution Trigonometri	Purcell dan Ayres
15	Integral of Rational Function	Purcell dan Ayres
16	Final Exam	

LEARNING PROGRAM OUTLINE

Course Title : Calculus I
 Code / Credit : PAS 102 / 3 SKS
 Course Description : This course represent studying gathering, number system of real, function, function limit and continuous, differential and application, integral and integral technique

General Instructional Aim : After studying this course, the student are expected have real correct conceptual understanding about especial topics in calculus (limit, continuous, differential, integral) along with theorem and nature of and also important techniques in it

No.	Specific Instructional Aim	Subject	Sub Subject	Duration	References
1.	After studying this course student are expected to have ability to explain definition of set and operations sets	Sets	<ul style="list-style-type: none"> ▪ Definition of set ▪ Relationship and operation set 	150 minutes	[1] [2]
2.	After studying this course student are expected to have ability to explain number system of real axioms and in it and also finish problems inequality and absolute inequality	Real-Number System	<ul style="list-style-type: none"> ▪ Component Number of Real ▪ Axiom Field ▪ Axiom Sequence ▪ Axiom Equipment ▪ Inequality ▪ Absolute Inequality 	300 minutes	[1] [2]
3.	After studying this course student are expected to have ability to explain function definition, function types, correct concept about and limit of continuous a	Function, Limit and Continuous Function	<ul style="list-style-type: none"> ▪ Definition of Function ▪ Types Function ▪ Concept Limit Function ▪ Characteristic of 	300 minutes	[1] [2]

	function and also relation of limit and of continuous		<p>Limit Function</p> <ul style="list-style-type: none"> ▪ Limit Function in Point ▪ Forms of Limit ▪ Continuous Function in Point ▪ Continuous Function at Interval 		
4.	After studying this course student are expected to have ability to explain definition of differential as a function limit, differential and continuous, order enchain, trigonometri function differential and differential of implisit	Differential	<ul style="list-style-type: none"> ▪ Differential of rate Change ▪ Definition and Formula Differential ▪ Differential Function Trigonometri ▪ Order Enchain ▪ Differential of Implisit 	300 minutes	[1] [2]
5.	After studying this course student are expected to have ability to applications differential concept to finish problem	Applications of Differential	<ul style="list-style-type: none"> ▪ Maximum and Minimum Value ▪ Drawing Graph ▪ Rate of differential ▪ Calculation of limit with differential 	300 minutes	[1] [2]
6.	After studying this course student are expected to have ability to use differential concept and of limit to explain integral definition	Integral	<ul style="list-style-type: none"> ▪ Indefinite Integral ▪ Finite Integral 	150 minutes	[1] [2]

7.	After studying this course student are expected to have ability to differentiate integral problem forms and finishing it by using integration technique	Integral Technique	<ul style="list-style-type: none"> ▪ Integral Parsial ▪ Integral Trigonometri ▪ Integral with Substitution Trigonometri ▪ Integral of Rational Function 	600 minutes	[1] [2]
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References :

1. Edwin J. Purcell, Dale Varberg. 1987. *Calculus With Analitic Geometry*. Prentice-Hall Inc, New York
2. Frank Ayres. 1964. *Calculus*. Mac. Graw Hills

LEARNING UNIT PROGRAM

COURSE TITLE : Calculus I
CODE / CREDIT : PAS 102 / 3 SKS
DURATION : 150 minutes
WEEK : 1

A. INSTRUCTIONAL AIM :

1. **GENERAL** : After studying this course student are expected to have ability to explain definition of set and operations sets
2. **SPECIFIC** : After studying this course student are expected to have ability to explain definition of set and operations sets

B. SUBJECT : Sets

C. SUB SUBJECT : Definition of set and Relationship and operation set

D. TEACHING-LEARNING ACTIVITIES

STAGE	LECTURER ACTIVITIES	STUDENT ACTIVITIES	LEARNING MEDIA
INTRODUCTION	<ul style="list-style-type: none"> ▪ Describing about matter at the first meeting ▪ Explaining purpose of matter ▪ Describing about general and specific objectives competence 	Observing	OHP, transparency
PRESENTATION	<ul style="list-style-type: none"> ▪ Explaining set definition with example and way of its presentation ▪ Explaining operation and relationship sets by graph in diagram of venn and relationship which possible happened 	Observing, discuss Observing,	OHP, transparency, white board OHP, transparency, white board

CLOSING	<ul style="list-style-type: none"> ▪ Giving opportunity student to ask ▪ Giving description about matter on the next meeting 	Asking Observing	White board Paper
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E. ASSESSMENT

: Giving problems to the students

F. REFERENCE

: Edwin J. Purcell, Dale Varberg. 1987. *Calculus With Analytic Geometry*. Prentice-Hall Inc, New York
 Frank Ayres. 1964. *Calculus*. Mac. Graw Hills

LEARNING UNIT PROGRAM

COURSE TITLE : Calculus I
CODE / CREDIT : PAS 102 / 3 SKS
DURATION : 150 minutes
WEEK : 2

A. INSTRUCTIONAL AIM :

1. **GENERAL** : After studying this course student are expected to have ability to explain number system of real axioms and in it and also finish problems inequality and absolute inequality
2. **SPECIFIC** : After studying this course student are expected to have ability to explain number system of real axioms and in it

B. SUBJECT : Real-Number System

C. SUB SUBJECT : Component Number of Real, Axiom Field, Axiom Sequence and Axiom Equipment

D. TEACHING-LEARNING ACTIVITIES

STAGE	LECTURER ACTIVITIES	STUDENT ACTIVITIES	LEARNING MEDIA
INTRODUCTION	<ul style="list-style-type: none"> ▪ Describing about matter at the second meeting 	Observing	OHP, transparency
PRESENTATION	<ul style="list-style-type: none"> ▪ Explaining component number of real, axioms field, axiom sequence and axiom equipment ▪ Giving examples ▪ Giving similar practice and show student to finish 	Observing, asking, taking notes Observing, asking, taking notes Active do	OHP, transparency, white board White board White board

CLOSING	<ul style="list-style-type: none"> ▪ Giving comment of work of student ▪ Giving problems ▪ Giving description about matter on the next meeting 	Discuss Taking notes Observing	White board Paper
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E. ASSESSMENT

: Giving problems to the students

F. REFERENCE

: Edwin J. Purcell, Dale Varberg. 1987. *Calculus With Analytic Geometry*. Prentice-Hall Inc, New York

 Frank Ayres. 1964. *Calculus*. Mac. Graw Hills

LEARNING UNIT PROGRAM

COURSE TITLE : Calculus I
CODE / CREDIT : PAS 102 / 3 SKS
DURATION : 150 minutes
WEEK : 3

A. INSTRUCTIONAL AIM :

1. **GENERAL** : After studying this course student are expected to have ability to explain number system of real axioms and in it and also finish problems inequality and absolute inequality
2. **SPECIFIC** : After studying this course student are expected to have ability to finish problems inequality and absolute inequality

B. SUBJECT : Real-Number System

C. SUB SUBJECT : Inequality and Absolute Inequality

D. TEACHING-LEARNING ACTIVITIES

STAGE	LECTURER ACTIVITIES	STUDENT ACTIVITIES	LEARNING MEDIA
INTRODUCTION	<ul style="list-style-type: none"> ▪ Discussing problems at the second meeting ▪ Describing about matter at the third meeting 	Discuss Observing	White board OHP, transparency
PRESENTATION	<ul style="list-style-type: none"> ▪ Explaining about forms of inequality and definition absolute with finished absolute inequality ▪ Giving examples ▪ Giving similar practice and show student to finish 	Observing, asking, taking notes Observing, asking, taking notes Active do	OHP, transparency, white board White board White board

CLOSING	▪ Giving comment of work of student	Discuss	White board
	▪ Giving problems	Taking notes	Paper
	▪ Giving task	Taking notes	Paper
	▪ Giving description about matter on the next meeting	Observing	

E. ASSESSMENT

: Giving problems to the students

F. REFERENCE

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LEARNING UNIT PROGRAM

COURSE TITLE : Calculus I
CODE / CREDIT : PAS 102 / 3 SKS
DURATION : 150 minutes
WEEK : 4

A. INSTRUCTIONAL AIM :

1. **GENERAL** : After studying this course student are expected to have ability to explain function definition, function types, correct concept about and limit of continuous a function and also relation of limit and of continuous
2. **SPECIFIC** : After studying this course student are expected to have ability to explain definition of set and operations sets

B. SUBJECT : Function, Limit and Continuous Function

C. SUB SUBJECT : Definition of Function, Types Function, Concept Limit Function, Characteristic of Limit Function and Limit Function in Point

D. TEACHING-LEARNING ACTIVITIES

STAGE	LECTURER ACTIVITIES	STUDENT ACTIVITIES	LEARNING MEDIA
INTRODUCTION	▪ Discussing problems at the third meeting	Discuss	White board
	▪ Describing about matter at the fourth meeting	Observing	OHP, transparency
PRESENTATION	▪ Explaining definition of function, and types function with examples	Observing, asking, taking notes	OHP, transparency, white board
	▪ Explaining concept limit function, right and left limit function in one point and characteristic of limit	Observing, asking, taking notes	OHP, transparency, white board

	function with examples ■ Giving similar practice and show student to finish	Active do	White board
CLOSING	■ Giving comment of work of student ■ Giving problems ■ Giving description about matter on the next meeting	Discuss Taking notes Observing	White board Paper

E. ASSESSMENT

: Giving problems to the students

F. REFERENCE

: Edwin J. Purcell, Dale Varberg. 1987. *Calculus With Analytic Geometry*. Prentice-Hall Inc, New York

Frank Ayres. 1964. *Calculus*. Mac. Graw Hills

LEARNING UNIT PROGRAM

COURSE TITLE : Calculus I
 CODE / CREDIT : PAS 102 / 3 SKS
 DURATION : 150 minutes
 WEEK : 5

A. INSTRUCTIONAL AIM :

1. GENERAL : After studying this course student are expected to have ability to explain function definition, function types, correct concept about and limit of continuous a function and also relation of limit and of continuous
2. SPECIFIC : After studying this course student are expected to have ability to explain function definition, function types, correct concept about and limit of continuous a function

B. SUBJECT : Function, Limit and Continuous Function

C. SUB SUBJECT : Forms of Limit, Continuous Function in Point and Continuous Function at Interval

D. TEACHING-LEARNING ACTIVITIES

STAGE	LECTURER ACTIVITIES	STUDENT ACTIVITIES	LEARNING MEDIA
INTRODUCTION	▪ Discussing problems at the fourth meeting	Discuss	White board
	▪ Describing about matter at the fifth meeting	Observing	OHP, transparency
PRESENTATION	▪ Explaining about forms of limit with examples	Observing, asking, taking notes	OHP, transparency, white board
	▪ Explaining definition continuous function in one point and continuous function at interval with	Observing, asking, taking notes	OHP, transparency, white board

	<p>examples</p> <ul style="list-style-type: none"> ▪ Giving similar practice and show student to finish 	Active do	White board
CLOSING	<ul style="list-style-type: none"> ▪ Giving comment of work of student ▪ Giving problems ▪ Giving task ▪ Giving description about matter on the next meeting 	<p>Discuss</p> <p>Taking notes</p> <p>Taking notes</p> <p>Observing</p>	<p>White board</p> <p>Paper</p> <p>Paper</p>

E. ASSESSMENT

: Giving problems to the students

F. REFERENCE

: Edwin J. Purcell, Dale Varberg. 1987. *Calculus With Analytic Geometry*. Prentice-Hall Inc, New York

Frank Ayres. 1964. *Calculus*. Mac. Graw Hills

LEARNING UNIT PROGRAM

COURSE TITLE : Calculus I
CODE / CREDIT : PAS 102 / 3 SKS
DURATION : 150 minutes
WEEK : 6

A. INSTRUCTIONAL AIM :

1. GENERAL : After studying this course student are expected to have ability to explain definition of differential as a function limit, differential and continuous, order enchain, trigonometri function differential and differential of implisit
2. SPECIFIC : After studying this course student are expected to have ability to explain definition of differential as a function limit, differential and continuous, order enchain, trigonometri function differential and differential of implisit

B. SUBJECT : Differential

C. SUB SUBJECT : Differential of Rate Change, Definition and Formula
Differential and Differential Function Trigonometri

D. TEACHING-LEARNING ACTIVITIES

STAGE	LECTURER ACTIVITIES	STUDENT ACTIVITIES	LEARNING MEDIA
INTRODUCTION	<ul style="list-style-type: none"> ▪ Discussing problems at the fifth meeting ▪ Describing about matter at the sixth meeting 	Discuss Observing	White board OHP, transparency
PRESENTATION	<ul style="list-style-type: none"> ▪ Explaining about differential of rate change with examples ▪ Explaining definition and 	Observing, asking, taking notes Observing,	OHP, transparency, white board OHP, transparency,

	formula differential and differential function trigonometri ■ Giving examples ■ Giving similar practice and show student to finish	asking, taking notes Observing, asking, taking notes Active do	white board White board White board
CLOSING	■ Giving comment of work of student ■ Giving problems ■ Giving description about matter on the next meeting	Discuss Taking notes Observing	White board Paper

E. ASSESSMENT

: Giving problems to the students

F. REFERENCE

: Edwin J. Purcell, Dale Varberg. 1987. *Calculus With Analitic Geometry*. Prentice-Hall Inc, New York
 Frank Ayres. 1964. *Calculus*. Mac. Graw Hills

LEARNING UNIT PROGRAM

COURSE TITLE : Calculus I
CODE / CREDIT : PAS 102 / 3 SKS
DURATION : 150 minutes
WEEK : 7

A. INSTRUCTIONAL AIM :

1. GENERAL : After studying this course student are expected to have ability to explain definition of differential as a function limit, differential and continuous, order enchain, trigonometri function differential and differential of implisit
2. SPECIFIC : After studying this course student are expected to have ability to explain definition of differential as a function limit, differential and continuous, order enchain, trigonometri function differential and differential of implisit

B. SUBJECT : Differential

C. SUB SUBJECT : Order Enchain and Differential of Implisit

D. TEACHING-LEARNING ACTIVITIES

STAGE	LECTURER ACTIVITIES	STUDENT ACTIVITIES	LEARNING MEDIA
INTRODUCTION	▪ Discussing problems at the fifth meeting	Discuss	White board
	▪ Describing about matter at the seventh meeting	Observing	OHP, transparency
PRESENTATION	▪ Explaining about order enchain and differential of implisit	Observing, asking, taking notes	OHP, transparency, white board
	▪ Giving examples	Observing, asking, taking	White board

	<ul style="list-style-type: none"> ▪ Giving similar practice and show student to finish 	notes Active do	White board
CLOSING	<ul style="list-style-type: none"> ▪ Giving comment of work of student ▪ Giving problems ▪ Giving task ▪ Giving description about matter to be tested at midterm 	Discuss Taking notes Taking notes Observing	White board Paper Paper

E. ASSESSMENT

: Giving problems to the students

F. REFERENCE

: Edwin J. Purcell, Dale Varberg. 1987. *Calculus With Analytic Geometry*. Prentice-Hall Inc, New York

Frank Ayres. 1964. *Calculus*. Mac. Graw Hills

LEARNING UNIT PROGRAM

COURSE TITLE : Calculus I
 CODE / CREDIT : PAS 102 / 3 SKS
 DURATION : 150 minutes
 WEEK : 9

A. INSTRUCTIONAL AIM :

1. GENERAL : After studying this course student are expected to have ability to applications differential concept to finish problem
2. SPECIFIC : After studying this course student are expected to have ability to applications differential concept to finish problem

B. SUBJECT : Applications of Differential

C. SUB SUBJECT : Maximum and Minimum Value, Drawing Graph and Rate of differential

D. TEACHING-LEARNING ACTIVITIES

STAGE	LECTURER ACTIVITIES	STUDENT ACTIVITIES	LEARNING MEDIA
INTRODUCTION	<ul style="list-style-type: none"> ▪ Describing about matter at the 9 meeting 	Observing	OHP, transparency
PRESENTATION	<ul style="list-style-type: none"> ▪ Explaining application of differential to obtain minimum and maximum value function with examples 	Observing, asking, taking notes	OHP, transparency, white board
	<ul style="list-style-type: none"> ▪ Explaining application of differential for graph with examples 	Observing, asking, taking notes	OHP, transparency, white board
	<ul style="list-style-type: none"> ▪ Explaining application of differential for rate of 	Observing, asking, taking	OHP, transparency, white board

	<p>differential</p> <ul style="list-style-type: none"> ▪ Giving similar practice and show student to finish 	<p>notes</p> <p>Active do</p>	<p>White board</p>
CLOSING	<ul style="list-style-type: none"> ▪ Giving comment of work of student ▪ Giving problems ▪ Giving description about matter on the next meeting 	<p>Discuss</p> <p>Taking notes</p> <p>Observing</p>	<p>White board</p> <p>Paper</p>

E. ASSESSMENT

: Giving problems to the students

F. REFERENCE

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LEARNING UNIT PROGRAM

COURSE TITLE : Calculus I
CODE / CREDIT : PAS 102 / 3 SKS
DURATION : 150 minutes
WEEK : 10

A. INSTRUCTIONAL AIM :

1. **GENERAL** : After studying this course student are expected to have ability to applications differential concept to finish problem
2. **SPECIFIC** : After studying this course student are expected to have ability to applications differential concept to finish problem

B. SUBJECT : Applications of Differential

C. SUB SUBJECT : Calculation of limit with differential

D. TEACHING-LEARNING ACTIVITIES

STAGE	LECTURER ACTIVITIES	STUDENT ACTIVITIES	LEARNING MEDIA
INTRODUCTION	▪ Discussing problems at the 9 meeting	Discuss	White board
	▪ Describing about matter at the 10 meeting	Observing	OHP, transparency
PRESENTATION	▪ Explaining application of differential to count limit (de L'hospital rule)	Observing, asking, taking notes	OHP, transparency, white board
	▪ Giving examples	Observing, asking, taking notes	White board
	▪ Giving similar practice and show student to finish	Active do	White board
CLOSING	▪ Giving comment of work of	Discuss	White board

	student <ul style="list-style-type: none"> ▪ Giving problems ▪ Giving task ▪ Giving description about matter on the next meeting 	Taking notes Taking notes Observing	Paper Paper
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E. ASSESSMENT : Giving problems to the students

F. REFERENCE : Edwin J. Purcell, Dale Varberg. 1987. *Calculus With Analytic Geometry*. Prentice-Hall Inc, New York
 Frank Ayres. 1964. *Calculus*. Mac. Graw Hills

LEARNING UNIT PROGRAM

COURSE TITLE : Calculus I
 CODE / CREDIT : PAS 102 / 3 SKS
 DURATION : 150 minutes
 WEEK : 11

A. INSTRUCTIONAL AIM :

1. GENERAL : After studying this course student are expected to have ability to use differential concept and of limit to explain integral definition
2. SPECIFIC : After studying this course student are expected to have ability to explain definition of set and operations sets

B. SUBJECT : Integral

C. SUB SUBJECT : Indefinite Integral and Finite Integral

D. TEACHING-LEARNING ACTIVITIES

STAGE	LECTURER ACTIVITIES	STUDENT ACTIVITIES	LEARNING MEDIA
INTRODUCTION	▪ Discussing problems at the 10 meeting	Discuss	White board
	▪ Describing about matter at the 11 meeting	Observing	OHP, transparency
PRESENTATION	▪ Explaining definition of indefinite integral and finite integral	Observing, asking, taking notes	OHP, transparency, white board
	▪ Giving examples	Observing, asking, taking notes	White board
	▪ Giving similar practice and show student to finish	Active do	White board
CLOSING	▪ Giving comment of work of	Discuss	White board

	student <ul style="list-style-type: none"> ▪ Giving problems ▪ Giving description about matter on the next meeting 	Taking notes Observing	Paper
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E. ASSESSMENT

: Giving problems to the students

F. REFERENCE

: Edwin J. Purcell, Dale Varberg. 1987. *Calculus With Analytic Geometry*. Prentice-Hall Inc, New York

York

Frank Ayres. 1964. *Calculus*. Mac. Graw Hills

LEARNING UNIT PROGRAM

COURSE TITLE : Calculus I
CODE / CREDIT : PAS 102 / 3 SKS
DURATION : 150 minutes x 4
WEEK : 12, 13, 14 and 15

A. INSTRUCTIONAL AIM :

1. **GENERAL** : After studying this course student are expected to have ability to differentiate integral problem forms and finishing it by using integration technique
2. **SPECIFIC** : After studying this course student are expected to have ability to differentiate integral problem forms and finishing it by using integration technique

B. SUBJECT : Integral Technique

C. SUB SUBJECT : Integral Parsial, Integral Trigonometri, Integral with Substitution Trigonometri and Integral of Rational Function

D. TEACHING-LEARNING ACTIVITIES

STAGE	LECTURER ACTIVITIES	STUDENT ACTIVITIES	LEARNING MEDIA
INTRODUCTION	▪ Discussing problems at the 11 meeting	Discuss	White board
	▪ Describing about matter at 12, 13, 14 and 15 meeting	Observing	OHP, transparency
PRESENTATION	▪ Explaining integral technique : integral parsial, integral trigonometri, integral with substitution trigonometri and integral of rational function	Observing, asking, taking notes	OHP, transparency, white board
	▪ Giving examples	Observing,	White board

	<ul style="list-style-type: none"> ▪ Giving similar practice and show student to finish 	asking, taking notes Active do	White board
CLOSING	<ul style="list-style-type: none"> ▪ Giving comment of work of student ▪ Giving problems ▪ Giving task ▪ Giving description about matter to be tested at final exam 	Discuss Taking notes Taking notes Observing	White board Paper Paper

E. ASSESSMENT

: Giving problems to the students

F. REFERENCE

: Edwin J. Purcell, Dale Varberg. 1987. *Calculus With Analytic Geometry*. Prentice-Hall Inc, New York

Frank Ayres. 1964. *Calculus*. Mac. Graw Hills