

## MATH-101 Calculus and Analytic Geometry

<b>Semester No</b> 1	<b>Code</b> MATH-101	<b>Credit Hours</b> 3 – 0
-------------------------	-------------------------	------------------------------

### COURSE DESCRIPTION:

The objective of the course is to introduce basic concepts of single variable Calculus and analytical geometry.

### TEXT AND MATERIAL

- Text Book:
- Calculus: The Classic Edition (5<sup>th</sup> edition) by Swokowski; PWS-Kent Publishing Company (January 1, 1991) (OR)
  - Calculus (6<sup>th</sup> edition) by Swokowski, Olinick & Pence; Brooks Cole (September 25, 1996)
- Reference Books:
- Calculus by Howard Anton, Irl C. Bivens, Stephen Davis, 10<sup>th</sup> edition.
  - Thomas' Calculus, 11<sup>th</sup> edition (or any other edition)

### COURSE LEARNING OUTCOMES:

Upon successful completion of the course, the student should be able to:

CLO No.	CLO	PLO	Level of Learning (Cognitive Domain)
CLO-1	Understand the concepts of limit / continuity / derivatives / apply the derivatives to find extrema.	PLO-1	C2
CLO-2	Understand the notions of definite and indefinite integration / techniques of integration / apply the definite integrals to compute lengths of curves / area of regions / volume of solids.	PLO-1	C2
CLO-3	Develop an understanding of sequences and series /use different tests to check the convergence of the series.	PLO-2	C3

### ASSESSMENT SYSTEM:

Quizzes	10-15%
Assignments	5-10%
OHTs	30-40%
ESE	40-50%

### TOPICS COVERED WITH THEIR CONTRIBUTION TO PLOs:

<b>Week No</b>	<b>Description</b>	<b>Quizzes</b>	<b>Assignment</b>	<b>CLO No</b>
1	Functions 1. Functions and their graphs			
2	Functions 2. Inverse functions 3. Trigonometric and hyperbolic functions			
3	Limits 1. Introduction to limits			
4	Limits 2. Techniques for finding limits 3. Limits involving infinity			
5	Limits 1. Indeterminate forms and L'Hopital rule			
6	Continuity 2. Continuous functions and Intermediate Value Theorem (IVT)			
7	<b>OHT-1</b>	02	01	1
8	Derivative 3. Tangent lines, rates of change & definition of the derivative 4. Techniques of differentiation 5. Derivatives of trigonometric functions, chain rule, implicit 6. Differentiation 7. Related rates			
9	Derivative 1. Extrema of functions, first derivative test, concavity and second derivative test, Rolle's theorem and mean value theorem 2. Graphs of Rational functions and absolute functions 3. Optimization problems			
10	Integration Techniques 1. Integration by parts, trigonometric integrals, trigonometric & other substitutions, integrals of rational functions			

11	<b>Integration Techniques</b> 2. Integrals involving quadratic expressions 3. Miscellaneous substitutions 4. Improper integrals			
12	<b>Definite Integrals</b> 1. Area, definite integrals and their properties, fundamental theorem of Calculus			
13	<b>OHT-2</b>			
14	<b>Definite Integrals</b> 2. Area between curves, volume of solids of revolution 3. Arc length and area of surface of revolution			
15	<b>Infinite Series</b> 1. Definition of sequence, series, their convergence and divergence. 1. Comparison test 2. Integral test			
16	<b>Infinite Series</b> <ul style="list-style-type: none"> <li>• The ratio and root tests</li> <li>• Alternating series</li> <li>• Power series</li> <li>• Power series representations of function</li> <li>• Maclaurin and Taylor Series</li> </ul>	02	01	3
17	<b>Analytic Geometry</b> <ul style="list-style-type: none"> <li>• Review of vectors</li> <li>• Three-dimensional coordinate system, equation of straight line and plane</li> </ul>			
18	<b>END SEMESTER EXAMINATION</b>			