10ABTEC22111: LINEAR ALGEBRA & CALCULUS		
Course Frame Work		
Credits: L-T-P: 3 – 0 – 0		Total Credits: 3
Contact Hours/Week: 3	Direct Teaching Hours: 45	Total Contact Hours: 45

Course Learning Objectives: This course will enable the students to

- Cover differential and integral calculus for functions of one and more than one variable.
- Apply mathematical tools and methods in physical sciences, engineering, and computer graphics.
- Familiarize the prospective engineers with techniques in calculus, multivariate analysis and linear algebra.
- Equip the students with standard concepts and tools at an intermediate to advanced level.
- Apply Mathematics and applications in their Engineering disciplines.

Course Outcomes: On completion of the course, student would be able to:

COs	Course outcomes	Levels
CO1	Identify the rank of a Matrix Algebra to solve the linear equations.	L2
CO2	Determine the solutions for the problems related to polar curves and its applications.	L2
CO3	Solve problems related to composite functions and Jacobins and partial differentiation	L2
CO4	Describe higher order differential equations appearing in Engineering fields.	L2
CO5	Determine reduction formulae and beta, Gamma functions using Mathematical tool to solve the improper integrals of engineering fields.	L2

Syllabus	Hours
Module-1	09
Matrices and its Operations: Rank of a matrix, Echelon form, creating matrices in MATLAB. System of linear equations- Consistency, Solution by Gauss elimination with the help of toolbox. Eigen values and Eigen vectors of square matrices using inbuilt function in the tool.	
Module – 2	09
Differential Calculus –I: Polar curves, angle between the radius vector and tangent, angle between two curves. Pedal Equation, Radius of curvature in Cartesian form.	

Plotting polar curve using Python.	
Module – 3	09
Differential Calculus –II: Taylor's and Maclaurin's series expansion for one variable (no proof) - problems. Partial derivatives, Total derivative, Jacobians, Maxima & Minima for function of two variables. Finding derivatives and its understanding with the help of symbolic math tool box	
Module-4	09
Ordinary Differential Equations: Solution of system of linear differential equations by diagonalization method and discuss the stability of the system. Higher order linear differential equations with constant coefficients, Interpretation of the solution, plotting techniques in MATLAB.	
Module-5	09
Integral Calculus: Reduction formulae with standard limits (without proof), Evaluation of definite and improper integrals Beta and Gamma functions and their properties (without proof) and problems, Evaluation of integrals using symbolic math tool box.	

Scheme of Evaluation:

A. Continuous Internal Assessment(CIA) Scheme:

THEORY (L= 3 Credits)						
Components	Work sheets	Assignments	S/W based learning	Preparatory Exam	IAT	Theory Total
Max. Marks	10	10	10	10	10	50

Note: A student has to obtain a minimum of 40% in theory of the subject to be eligible to appear for ESE.

B. End Semester Exam (ESE) Scheme: 50 marks

Question paper pattern:

a) Question paper shall have 5 main questions corresponding to 5 modules.
b) Each main question will have two full questions carrying 10 marks each.
c) A full question may have a maximum of four sub questions, covering the topics under a module.
d) The students will have to answer all 5 main questions, selecting one full question from each module.

Text Books:

1. B.S. Grewal; Higher Engineering Mathematics; Khanna Publishers; 44th Edition, 2018.
2. B V Ramana; Higher Engineering Mathematics, 12th Reprint Edition, 2018.

Reference Books:

1. Erwin Kreyszig; Advanced Engineering Mathematics; 9th Edition, 2012;
2. Dennis G Zill & Michael R Cullen; Advanced Engineering Mathematics;
3. Second Edition; Jones & Barlett Publishers.

e-Material:

Web links and Video Lectures (e-Resources):

https://nptel.ac.in/courses/115/102/115102124/
https://nptel.ac.in/courses/122101003
https://nptel.ac.in/courses/122107036
https://swayam.gov.in
https://onlinecourses.nptel.ac.in/noc23_ma33/

Activity Based Learning/Practical Based Learning

http://nptel.ac.in
https://swayam.gov.in