RSET
RAJAGIRI SCHOOL OF ENGINEERING & TECHNOLOGY
(Autonomous)

RAJAGIRI SCHOOL OF ENGINEERING & TECHNOLOGY (AUTONOMOUS)

B.TECH. DEGREE PROGRAMME

FIRST SEMESTER

(2020 ADMISSIONS)

100908/MA100A	**LINEAR ALGEBRA & CALCULUS**

SYLLABUS

Rajagiri Valley, Kakkanad,
Kochi 682 039, Kerala, INDIA
www.rajagiritech.ac.in

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COURSE CODE	COURSE NAME	L	T	P	CREDIT	YEAR OF INTRODUCTION
100908/MA100A	LINEAR ALGEBRA & CALCULUS	3	1	0	4	2020

1. **Preamble:** This course introduces students to some basic mathematical ideas and tools which are at the core of any engineering course. A brief course in Linear Algebra familiarizes students with some basic techniques in matrix theory which are essential for analyzing linear systems. The calculus of functions of one or more variables taught in this course are useful in modelling and analyzing physical phenomena involving continuous change of variables or parameters and have applications across all branches of engineering.

2. **Prerequisite:** A basic course in one-variable calculus and matrix theory**.**

3. **Syllabus**

Module 1

Systems of linear equations, Solution by Gauss elimination, row echelon form and rank of a matrix, fundamental theorem for linear systems (homogeneous and non-homogeneous, without proof), Eigen values and eigen vectors. Diagonaliztion of matrices, orthogonal transformation, quadratic forms and their canonical forms.

Module 2

Concept of limit and continuity of functions of two variables, partial derivatives, Differentials, Local Linear approximations, chain rule, total derivative, Relative maxima and minima, Absolute maxima and minima on closed and bounded set.

Module 3

Double integrals (Cartesian), reversing the order of integration, Change of coordinates (Cartesian to polar), finding areas and volume using double integrals, mass and centre of gravity of inhomogeneous laminas using double integral. Triple integrals, volume calculated as triple integral, triple integral in cylindrical and spherical coordinates (computations involving spheres, cylinders).

Module 4

Convergence of sequences and series, convergence of geometric series and p-series(without proof), test of convergence (comparison, ratio and root tests without proof); Alternating series and Leibnitz test, absolute and conditional convergence.

Module 5

Taylor series (without proof, assuming the possibility of power series expansion in appropriate domains), Binomial series and series representation of exponential, trigonometric, logarithmic functions (without proofs of convergence); Fourier series, Euler formulas, Convergence of Fourier series (without proof), half range sine and cosine series, Parseval's theorem (without proof).

4. Text Books

1. H. Anton, I. Biven,S.Davis, "Calculus", Wiley, 10th edition, 2015.
2. Erwin Kreyszig, "Advanced Engineering Mathematics", John Wiley & Sons, 10th edition, 2016.

5. Reference Books

1. J. Stewart, "Essential Calculus", Cengage, 2nd edition, 2017
2. G.B. Thomas and R.L. Finney, "Calculus and Analytic Geometry", Pearson, 9th edition, 2002.
3. Peter V. O'Neil, "Advanced Engineering Mathematics" , Cengage, 7th Edition, 2012.
4. Veerarajan T., "Engineering Mathematics for first year", Tata McGraw-Hill, New Delhi, 2008.
5. B.S. Grewal, "Higher Engineering Mathematics", Khanna Publishers, 36th edition, 2010.

6. Course Outcomes: After the completion of the course the student will be able to

CO1: solve systems of linear equations, diagonalize matrices and characterise quadratic forms.
CO2: compute the partial and total derivatives and maxima and minima of multivariable functions.
CO3: compute multiple integrals and apply them to find areas and volumes of geometrical shapes, mass and centre of gravity of plane laminas.
CO4: perform various tests to determine whether a given series is convergent, absolutely convergent or conditionally convergent.

CO5: determine the Taylor and Fourier series expansion of functions and learn their applications.

7. Mapping of course outcomes with program outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	3	2	1			1	2		2
CO2	3	3	3	3	2	1			1	2		2
CO3	3	3	3	3	2	1			1	2		2
CO4	3	2	3	2	1	1			1	2		2
CO5	3	3	3	2	1	1			1	2		2

8. Assessment Pattern(marginal changes can be made according to the question paper pattern):

Learning Objectives	Continuous Internal Evaluation (CIE)		End Semester Examination (ESE out of 100)
	Internal Examination 1 (25)	Internal Examination 2 (25)	
Remember	4	4	20
Understand	4	4	25
Apply	7	7	25
Analyse	5	5	20
Evalaute	5	5	10

9. Mark Distribution

Total	CIE				ESE
	Attendance	Internal Examination	Assignment/Quiz/Course Project	Total	
150	10	25 (Average of two exam scores)	15	50	100

10. End Semester Examination Pattern

There will be two parts; Part A and Part B. Part A contains 10 questions with 2 questions from each module, having 3 marks for each question. Students should answer all questions. Part B contains 2 questions from each module of which student should answer any one. Each question will have 2 sub-divisions (7 marks each)and carry 14 marks.