B.M.S. COLLEGE OF ENGINEERING, BENGALURU-19

Autonomous Institute, Affiliated to VTU

DEPARTMENT OF MATHEMATICS

SYLLABUS (2019 - 2020)

THIRD SEMESTER B.E COURSE

(Common to All Branches)

Course Title	**Additional Mathematics-I**	**Course Code**	**19MA3IMMAT**
Credits	**00**	**L – T – P**	**3 – 1 – 0**
Contact hours	**48 hours (36L+12T)**	**III semester Lateral Entry students**	

Prerequisites: Basic concepts of Trigonometry, Trigonometric formulas, concept of differentiation, concept of integration.

Course Objectives: To provide students with a solid foundation in mathematical fundamentals such as differentiation, differential equations, vectors and orthogonal curvilinear coordinates for different branches of engineering.

UNIT 1

DIFFERENTIAL AND INTEGRAL CALCULUS [9 Hours]

List of standard derivatives including hyperbolic functions, rules of differentiation. Taylor's and Maclaurin's series expansion for functions of single variable. List of standard integrals, integration by parts. Definite integrals – problems. **(7L+2T)**

UNIT 2

POLAR COORDINATES AND PARTIAL DERIVATIVES [10 Hours]

Polar curves: Polar coordinates, angle between radius vector and tangent, angle between two polar curves. Partial differentiation. Total differentiation-Composite and Implicit functions. Jacobians and their properties (without proof) – Problems. **(7L+3T)**

UNIT 3

VECTOR CALCULUS AND ORTHOGONAL CURVILINEAR COORDINATES [10 Hours]

Recapitulation of scalars, vectors and operation on scalars and vectors. Scalar and vector point functions. Del operator, gradient-directional derivative, divergence, curl and Laplacian operator. Vector identities (without proof). Cylindrical and Spherical polar coordinate systems. Expressing a vector point function in cylindrical and spherical systems. Expressions for gradient, divergence, curl and Laplacian in orthogonal curvilinear coordinates. **(7L+3T)**

UNIT 4

FIRST ORDER ORDINARY DIFFERENTIAL EQUATIONS [9 Hours]

Introduction to first order differential equations. Linear equation and its solution. Bernoulli's equation and its solution. Exact differential equation and its solution. Orthogonal Trajectories.

(7L+2T)

UNIT 5

SECOND AND HIGHER ORDER ORDINARY DIFFERENTIAL EQUATIONS [10 Hours]

Ordinary differential equations with constant coefficients: Homogeneous differential equations, non-homogeneous differential equations – Particular integral for functions of the type $f(x) = e^{ax}$, $\sin(ax)$, $\cos(ax)$, x^n, method of variation of parameters, Cauchy's and Legendre linear differential equations.

(8L+2T)

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On completion of the course, students will have the ability to:

Course Code	CO #	COURSE OUTCOME (CO)	PO
19MA3IMMAT	CO 1	Understand the basic concepts of differentiation and integration.	1
	CO 2	Apply the concepts of polar curves and multivariate calculus.	
	CO 3	Apply analytical techniques to compute solutions of first and higher order ordinary differential equations.	
	CO 4	Apply techniques of vector calculus to engineering problems.	
	CO 5	Comprehend the generalization of vector calculus in curvilinear coordinate system.	

Text Book:

1. Higher Engineering Mathematics, B. S. Grewal, 43rd edition, 2014, Khanna Publishers
2. Advanced Engineering Mathematics, 4th edition, 2011, by Dennis G. Zill and Cullen, Jones and Bartlett India Pvt. Ltd.

Reference Book:

1. Advanced Engineering Mathematics, Erwin Kreyszig, Wiley Precise Textbook series, Vol. 1 and Vol. 2, 10th edition, 2014, Wiley- India.
2. Higher Engineering Mathematics, B. V. Ramana, 2007, Tata McGraw Hill.

E books and online course materials:

1. Engineering Mathematics, K. A. Stroud, Dexter J. Booth, Industrial Press, 2001
2. http://books.google.co.in/books/about/Engineering_Mathematics.html?id=FZncL-xB8dEC&redir_esc=y.
3. Advanced Engineering Mathematics, P. V. O'Neil, 5th Indian reprint, 2009, Cengage learning India Pvt. Ltd.
4. http://ocw.mit.edu/courses/mathematics/ (online course material)

Online Courses:

1. https:// www.khanacademy.org/Math
2. https:// www.class-central.com/subject/math (MOOCS)

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