

Devi Ahilya Vishwavidhyalaya, Indore, India Institute of Engineering & Technology				II Year B.Tech. (Civil Engineering)		
Course Code & Name	Instructions Hours per Semester and Credits					
3RVBS1 Applied Mathematics-III	Classroom Instruction (CI)		Lab Instruction (LI)	Term Work (TW) and Self Learning (SL)	Total no. of Hours Per semester	Total Credits (Total Hours/30)
	L	T	P	TW+SL	90	3
	20	10	0	60		

Learning Objectives:

1. To develop an understanding of the underlying mathematics as preparation for a specialist study of applications areas like, Laplace transform; converts a given ordinary or partial differential equation into a polynomial.
2. Statistics useful in risk assessment, random decrement analysis, to monitor remotely the structural health of a structure (such as a bridge, tall building, dams etc); Fourier analysis relevant for PDE-solving and probably the heat equation in three dimensions.
3. Numerical approach enables solutions of a complex problem with a great number of very simple operations. It is useful to find the solution with use of computers making calculation easy and fast.

Prerequisites: Basic knowledge of determinants, matrices, differentiation and integration of functions and probability theory.

COURSE CONTENTS

UNIT-1:

Laplace transform: Definition and properties of Laplace transform, convolution theorem, Application of Laplace transform in solution of ordinary differential equations, Simultaneous differential equations with constant coefficients.

UNIT-2:

Statistics: Brief idea of sampling, t, F and χ^2 distributions and their applications, ANOVA, Statistical Quality Control (SQC), Control Charts, Sampling inspection, Acceptance sampling, Producer's and Consumer's risk, O.C. curve.

UNIT-3:

Numerical solutions of algebraic and transcendental equations, Numerical solution of system of linear algebraic equation. Numerical Solutions of ordinary and partial differential equations.

UNIT-4:

Finite difference operators, Interpolation formula with equal and unequal intervals, Numerical differentiation and Numerical integration.

UNIT-5:

Fourier series, integral and transforms, Parseval's theorem, solution of partial differential equations with constant and variable coefficients.

Course Outcome (CO):

CO No.	CO	PO
CO1	Laplace Transform is used to simplify calculations in system modeling, where large number of differential equations are used. It can be used in solving the free vibration problems of structural beams.	PO-1, PO-2, PO-3, PO-4, PO-5
CO2	Stochastic processes can be used as mathematical models of systems and phenomena that vary in a random manner. Markov processes can be used to determine the future behaviour of the process by its present state. Reliability helps to create the most reliable and fail-safe system.	PO-1, PO-2, PO-3, PO-4, PO-5
CO3	Interpolation techniques will help to fill in the blanks, that is use interpolation helps to understand how things behaved in the past or in future, rate of change etc. even when one do not have full information (about the related function or formula).	PO-1, PO-2, PO-3, PO-4, PO-5
CO4	Numerical method techniques will help to approximate Mathematical procedures, because either the procedure cannot be solved analytically or the analytical method is inflexible.	PO-1, PO-2, PO-3, PO-4, PO-5
CO5	Fourier series and Integrals can be used to analyse the frequency components of signal data, signal filtering, noise removal, compression of audio signals etc.	PO-1, PO-2, PO-3, PO-4, PO-5

Books recommended:

1. B.S. Grewal, Engineering Mathematics, Khanna Publishers, 42/e, 2015.
2. Erwin. Kreyszig, Advanced Engineering Mathematics, 8th edition, John Willy and sons Publications, 1999.
3. Gupta P.P. & Malik G.S., Calculus of Finite Differences and Numerical Analysis, Krishna Prakashan Mandir, Meerut, 21/e, 2006.
4. S.C.Gupta, Fundamentals of Statistics, Himalaya Publishing House, Mumbai, 6th Ed., 2009.
5. Freund John E, Mathematical Statistics, PHI, N.D., 7th Ed., 2010.
6. A.R. Vasishtha and R.K. Gupta, Integral Transforms, Krishna Prakashan Media Ltd, Meerut, India, 2000.
7. Murray R. Spiegel, Schaum's Outline of Fourier Analysis, McGraw-Hill, New York, 2004.
8. J. F. James, A Student's Guide to Fourier Transforms with Applications in Physics and Engineering, 3rd Edition, Cambridge University Press, 2011.

CO-PO-PSO Relationship

CO	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PSO 1	PSO 2	PSO 3
3RVBS1.CO1	3	3	2	2	3	-	-	-	-	-	-	2	1	
3RVBS1.CO2	3	3	2	2	3	-	-	-	-	-	-	2	1	
3RVBS1.CO3	3	3	2	2	3	-	-	-	-	-	-	1		1
3RVBS1.CO4	3	3	2	2	3	-	-	-	-	-	-	1	1	
3RVBS1.CO5	3	3	2	2	3	-	-	-	-	-	-	1		1