BVM ENGINEERING COLLEGE [AN AUTONOMOUS INSTITUTION]

2BS01: ORDINARY DIFFERENTIAL EQUATIONS AND STATISTICS
CREDITS - 4 (LTP:3,1,0)
2nd **Year, B. Tech. (CP, EL, EE, EC, IT)**

Course objective:
To introduce differential equations and statistics techniques used in engineering analysis.

Teaching and Assessment Scheme:

Teaching Scheme (Hours per Week)			Credits	Assessment Scheme				Total Marks
				Theory Marks		Practical Marks		
L	T	P	C	ESE	CE	ESE	CE	150
3	1	0	4	60	40	20	30	

Course Contents:

Unit No.	Topics	Teaching Hours
1	**Ordinary differential equations of higher orders** Second order linear differential equations with variable coefficients, method of variation of parameters, Cauchy-Euler equation; Power series solutions; Legendre polynomials, Bessel functions of the first kind and their properties.	8
2	**Transform Calculus -1** Laplace Transform, Properties of Laplace Transform, Laplace transform of periodic functions. Finding inverse Laplace transform by different methods, convolution theorem. Evaluation of integrals by Laplace transform, solving ODEs by Laplace Transform method.	10
3	**Transform Calculus-2** Fourier transforms: properties, methods, inverses and their applications.	4
4	**Basic Statistics:** Measures of Central tendency: Moments, skewness and Kurtosis - Probability distributions: Binomial, Poisson and Normal - evaluation of statistical parameters for these three distributions, Correlation and regression – Rank correlation.	8
5	**Applied Statistics*:*** Curve fitting by the method of least squares- fitting of straight lines, second degree parabolas and more general curves. Test of significance: Large sample test for single proportion, difference of proportions, single mean, difference of means, and difference of standard deviations.	8
6	**Small samples*:*** Test for single mean, difference of means and correlation coefficients, test for ratio of variances - Chi-square test for goodness of fit and independence of attributes.	4
	TOTAL	**42**

List of References:

1. Erwin Kreyszig, "*Advanced Engineering Mathematics"*, 9th Edition, John Wiley & Sons, 2006.
2. Chandrika Prasad and Reena Garg, *"Advanced Engineering Mathematics*", Khanna Book Publishing Co. (P) Ltd., Delhi
3. N.P. Bali and Manish Goyal, "*A text book of Engineering Mathematics"*, Laxmi Publications, Reprint, 2010.
4. B.S. Grewal, "*Higher Engineering Mathematics"*, Khanna Publishers, 35th Edition, 2000.
5. W. E. Boyce and R. C. Di Prima, *"Elementary Differential Equations and Boundary Value Problems*", 9th Edition, Wiley India, 2009.
6. S. C. Gupta, V. K. Kapur, *"Fundamental of Statistics"*, Sultan Chand & Sons, India,
7. S. Ross, "*A first course in Probability"*, Pearson Education India, 2002.
8. Richard A. Johnson, Miller and Freund's – *"Probability and Statistics for Engineers"*, Prentice Hall of India, 2011.

Course Outcome:

At the end of this course students will be able to

1. Understand effective mathematical tools for the solutions of ordinary differential equations.
2. Analyze and solve ordinary differential equations using various techniques including transform techniques.
3. Apply effective mathematical tools of ordinary differential equations, Laplace and Fourier transform.
4. Understand the concepts and tools of Statistics.
5. Analyze and solve various engineering problems through the tools of Statistics.
6. Adapt tools of applied statistics and sampling theory and apply them in engineering problems.