

22STA01- ADVANCED MATHEMATICS FOR STRUCTURAL ENGINEERING					
		L	T	P	C
		3	0	0	3
PRE REQUISITE : NIL					
Course Objectives			Course Outcomes		
1.0	To acquire knowledge on random variable and moments & moments generating functions	1.1	The students will be able to infer expectation, variance, standard deviation moments and moment generating function for discrete and continuous random variables.		
2.0	To gain knowledge on calculus of variance.	2.1	The students will be able to solve problems involving functional, that occurs in various branches of engineering disciplines.		
3.0	To comprehend the concepts of parameter estimation.	3.1	The students will be able to use a sample data to compute point estimate.		
4.0	To evaluate mathematical expressions to compute quantities that deal with linear systems and eigenvalue problems	4.1	The students will be able to understand the concept of eigen value problems		
5.0	To introduce numerical solution methods for solving partial differential equations	5.1	The students will be able to solve elliptic partial differential equations by using finite difference methods.		
UNIT I - PROBABILITY AND RANDOM VARIABLES					(9)
Random variables - Probability mass function - Probability density function - Properties - Moments - Moment generating functions.					
UNIT II - CALCULUS OF VARIATIONS					(9)
Calculus of Variations: Concept of variation and its properties - Euler's equation - Functional dependent on first and higher order derivatives - Functional dependent on functions of several independent variables - Direct methods : Ritz and Kantorovich methods.					
UNIT III - PARAMETER ESTIMATION					(9)
Point Estimation - Characteristics of estimators - Unbiasedness - Consistency - Efficiency - Sufficiency - Methods of point estimation - Method of moments.					
UNIT IV - EIGEN VALUE PROBLEMS					(9)
Methods of solutions: Faddeev - Leverrier Method & Power Method with deflation - Approximate Methods: Rayleigh - Ritz method.					
UNIT V - NUMERICAL SOLUTION OF PARTIAL DIFFERENTIAL EQUATIONS					(9)
Numerical Solution of Partial Differential Equations: Solution of one dimensional wave equation - Explicit and implicit methods (Crank-Nicolson, Bender Schmidt methods) - Solution of Elliptic equation: Solution of Laplace equation (Liebmann's iteration process).					
TOTAL (L:45) : 45 PERIODS					

REFERENCES:

1. Richard A. Johnson and Miller & Freund's, "Probability and Statistics for Engineers", 8th Edition, Prentice Hall of India Pvt. Ltd., New Delhi, 2010.
2. Gupta, A.S., "Calculus of Variations with Applications", Prentice Hall of India Pvt. Ltd., New Delhi, 1997.
3. Smith, G. D., "Numerical Solutions of Partial Differential Equations: Finite Difference Methods", 3rd Edition, Clarendon Press, 1985.
4. Sankara Rao K, "Introduction to Partial Differential Equations", PHI Learning Pvt. Ltd, 3rd ed., 2011.
5. Curtis F. Gerald, Patrick O. Wheatley, "Applied Numerical Analysis", 7th Edition, Pearson Education India, 2007.
6. Richard I. Levin, H. Siddiqui Masood, David S. Rubin, Rastogi Sanjay, "Statistics for Management", Pearson Education, 8th ed., 2017.

Mapping of COs with POs / PSOs

COs	POs						PSOs	
	1	2	3	4	5	6	1	2
1	3		2	3	2	1		1
2	3		1	2	1		2	
3	3	2		1		2		2
4	3		2	2	1	2	1	1
5	3		2	1	2	2	1	2
CO (W.A)	3	2	1.75	1.8	1.5	1.75	1.33	1.5

