15MA301	PROBABILITY AND STATISTICS	L	T	P	C
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Co-requisite:	NOT APPLICABALE				
Prerequisite:	15MA202 and 15MA206				
Data Book / Codes/Standards	STATISTICAL TABLES				
Course Category	B CORE MATHEMATICS				
Course designed by	Department of Mathematics				
Approval	-- Academic Council Meeting -- , 2016				

PURPOSE	To impart analytical ability in solving mathematical problems as applied to the respective branches of engineering							
INSTRUCTIONAL OBJECTIVES		**STUDENT OUTCOMES**						
At the end of the course, student will be able to								
1.	To apply the basic rules and theorems of probability theory such as Baye's Theorem, to determine probabilities that help to solve engineering problems and to determine the expectation and variance of a random variable from its distribution.	a	e					
2.	To appropriately choose, define and/or derive probability distributions such as the Binomial, Poisson and Normal etc to model and solve engineering problems.	a	e					
3.	To learn how to formulate and test hypotheses about means, variances and proportions and to draw conclusions based on the results of statistical tests.	a	e					
4.	To understand how regression analysis can be used to develop an equation that estimates how two variables are related and how the analysis of variance procedure can be used to determine if means of more than two populations are equal.	a	e					
5.	To understand the fundamentals of quality control and the methods used to control systems and processes.	a	e					

Session	Description of Topic	Contact hours	C-D-I-O	IOs	Reference
	UNIT I: PROBABILITY & RANDOM VARIABLES	**12**			
1.	Introduction to probability concepts, Types of Events, axioms, theorems,	1	C,1	1	1-5
2.	Conditional probability, Multiplication theorem, Applications.	1	C,1	1	1-5
3.	Characteristics of random variables – Discrete case, Probability Mass function, Cumulative distribution function, Applications	2	C,1	1	1-5
4.	Characteristics of random variables – Continuous case, , Probability density function, Cumulative distribution function, Applications	2	C,1	1	1-5
5.	Central and Raw Moments	2	C,1	1	1-5
6.	Expectation, variance, Applications	2	C,1	1	1-5

7.	Moment generating function of discrete and continuous random variable	2	C,1	1	1-5
	UNIT II: Theoretical Distributions	**12**			
8.	Discrete distribution: Binomial distribution – MGF, Mean, Variance, Applications of Binomial distribution, Fitting a binomial distribution	2	C,1	2	1-5
9.	Poisson distribution – MGF, Mean, Variance, Applications of Poisson distribution, Fitting a poisson distribution	2	C,1	2	1-5
10.	Geometric distribution – MGF, Mean, Variance, Memoryless Property , Applications of Geometric distribution	1	C,1	2	1-5
11.	Continuous distribution: Uniform distribution – MGF, Mean, Variance & applications	2	C,1	2	1-5
12.	Exponential distribution - MGF, Mean, Variance, Memoryless Property Applications of Exponential distribution	2	C,1	2	1-5
13.	Normal distribution – MGF, Mean, Variance	2	C,1	2	1-5
14.	Applications of Normal distribution and Problems	1	C,1	2	1-5
	UNIT-III Testing of Hypothesis	**12**			
15.	Introduction to sampling distributions, population and sample, null hypothesis and alternative hypothesis, Testing of hypothesis, level of significance, critical region, Procedure for testing of hypothesis	1	C,1	3	1-5
16.	Large sample test- test for single proportion, two proportions	2	C,1	3	1-5
17.	Large sample test- test for single mean, two means	2	C,1	3	1-5
18.	Small sample tests – ‘t’ test for a single mean	1	C,1	3	1-5
19.	‘t’ test for the difference of means, ‘t’ test for the paired observations	2	C,1	3	1-5
20.	F test – Test of significance of the difference between population variances	2	C,1	3	1-5
21.	Chi square test for goodness of fit, independence of Attributes	2	C,1	3	1-5
	UNIT IV:CORRELATION, REGRESSION AND ANALYSIS OF VARIANCE	**12**			
22.	Correlation and Properties, Karl pearsons correlation coefficient	2	C,1	4	1-5
23.	Rank correlation coefficient	2	C,1	4	1-5
24.	Linear Regression lines and Properties, regression coefficient, Problems	2	C,1	4	1-5

25.	Analysis of Variance – One way Classification	2	C,1	4	1-5
26.	Two way Classification	2	C,1	4	1-5
27.	Introduction to Non parametric Test – Wilcoxon signed rank test(one sample test) – Wilcoxon Mann-Whitney rank test (Two sample test)	2	C,1	4	1-5
	UNIT V: STATISTICAL QUALITY CONTROL	**12**			
28.	Introduction and Process Control	2	C,1	5	1-5
29.	Control Charts for X and R,	2	C,1	5	1-5
30.	Control Charts for X and S.	2	C,1	5	1-5
31.	p chart	2	C,1	5	1-5
32.	np chart	2	C,1	5	1-5
33.	c chart	2	C,1	5	1-5
	Total contact hours	60			

LEARNING RESOURCES	
Sl. No.	**TEXT BOOKS**
1.	Veerarajan T., Probability, Statistics and Random Processes, Tata McGraw Hill,1st Reprint 2004.
2.	S.C. Gupta and V.K. Kapoor, Fundamentals of Mathematical Statistics, 9th extensively revised edition, Sultan Chand & Sons, 1999.
	REFERENCE BOOKS/OTHER READING MATERIAL
3.	Ross. S., "A first Course in Probability", Fifth Edition, Pearsons Education, Delhi 2002.
4.	Johnson. R. A., "Miller & Freund's Probability and Statistics for Engineers"' Sixth Edition, Pearson Education, DSelhi, 2000.
5.	Walpole, R. W., Myers, R. H. Myers R. S. L. and Ye. K, "Probability; and Statistics for Engineers and Scientists", Seventh Edition, Pearsons Education, Delhi, 2002.

Course nature				**Theory**			
Assessment Method (Weightage 100%)							
In-semester	**Assessment tool**	Cycle test I	Cycle test II	Cycle Test III	Surprise Test	Quiz	**Total**
	Weightage	**10%**	**15%**	**15%**	**5%**	**5%**	**50%**
					End semester examination Weightage :		**50%**