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nowledge	NO. OF THE PARTY O	on and variance	g	1	2	3	4	5	6	7	8	9	10	11	12
CLR-2: Gain knowledge of theoretical distributions. Understand how to develop Null and Alternate hypothesis and draw conclusions using hypothesis tests.  CLR-4: Apply the knowledge of regression lines and analysis of variance.  CLR-5: Acquire knowledge to solve the problems of process control.  CLR-6: Interpret random variables and statistics in engineering problems.  Course Outcomes  At the end of this course, learners will		ms Level (1-6)	neering Knowledge	lem Analysis	zn & Development	vsis, Design, Research	ern Tool Usage	ty & Culture	onment & Sustainability	S	idual & Team Work	munication	ct Mgt. & Finance	Long Learning	
b	e able to:		Bloo	Engi	Prob	Desi	Anal	Mode	Socie	Envii	Ethic	Indiv	Сот	Proje	Life I
variables.		4	3	3	-	-	-		-	-	-	-	-	-	
CO-2: Identify the random variables and model them using various distributions.		4	3	3	-	-		-	-	-	-	-	-	-	
CO-3: Infer results by using hypothesis testing on large and small samples.		4	3	3	-	-	-	-	-	-	-	-	-	-	
Examine the regression lines and interpret the results i the analysis of variance.		n 4	3	3	-	-	-	-	-	-	-	-	-	-	
Utilize quality control techniques to solve real-world problems.			4	3	3	-	-	-	-	-	-	-	-	-	-
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#### Unit-1: Probability and One-dimensional random variable

Apply the probability techniques and statistics in science

Probability concepts, Types of Events, Axioms and theorems - Conditional probability, Baye's theorem – without proof- Applications of Baye's Theorem. Random variables – Discrete case and continuous case- Mathematical expectation, Variance –discrete case and continuous case - Raw Moments - Central Moments - Moment generating function - MGF- discrete and continuous random variable.

### Unit-2: Theoretical Distributions

and engineering.

CO-6:

Discrete distributions – Introduction- Mean and Variance of Binomial Distribution- Fitting a Binomial distribution- M.G.F of Binomial Distribution- Poisson Distribution- Mean and Variance of Poisson Distribution- Fitting a Poisson distribution- MGF of Poisson distribution- Geometric distribution- mean and variance, Memoryless property- Continuous distributions – Introduction- Uniform distribution – MGF, Mean and Variance- Exponential distribution - MGF, Mean and Variance, Memoryless property- Normal distribution.

## Unit-3: Testing of Hypothesis

Sampling Distributions – Type I and Type II errors- large sample test-Test of significance for single proportion- Test of significance for difference of proportions- Test of significance for single mean- Test of significance for difference of means- Small sample tests-Student's t- test for single mean- t- test for the difference of means- Fisher's F-test- Test of significance for two sample variances- Chi-square test- for the goodness of fit- Chi-square test- for the independence of attributes.

# Unit-4: Correlation, Regression and ANOVA

Correlation and its Properties- Karl Pearson's coefficient of correlation- Spearman's rank correlation coefficient for repeated and non-repeated ranks- Linear Regression lines and Properties- Relation between correlation and regression coefficient- Introduction to Analysis of Variance (ANOVA) - One-way Classification – two-way classification.

## **Unit-5: Statistical Quality Control**

Introduction – Process control – control charts for variables -  $\bar{X}$  and R,  $\bar{X}$  and S charts control charts for attributes: p-chart, np-chart, cchart and their applications in process control.

1. S. Ross, A Firs	t Course in Probability.	8 <sup>th</sup> Ed., Pearson	Education India, 2010.

2. Johnson. R.A., Miller & Freund's, Probability and Statistics for Engineers, 8th Edition, Prentice Hall India, 2011.

### Learning Resources

3. Veerarajan T., Probability and Statistics, Tata McGraw-Hill, New Delhi, 2010.

4. Devore (JL), Probability and Statistics for Engineering and the Sciences, 8<sup>th</sup> Edition, Cengage Learning, 2012. 5. S.C. Gupta, V.K. Kapoor, Fundamentals of Mathematical Statistics, Sultan Chand & Sons, 11<sup>th</sup> Edition, 2015.

6. Vijay K. Rohatgi., A.K. Md. Ehsanes Saleh, An Introduction to Probability and Statistics, 2nd Edition, Wiley, 2008

Student learning shall be assessed with a weightage of 60% for internal assessment and 40% for end semester examination

		Con	tinuous Learnin - By the Co	By The CoE  Summative Final Examination (40% weightage)					
	Bloom's Level of Thinking	Kormative					Ziii Ziii Ziii Ziii Ziii Ziii Ziii Zii		
		Theory	Practice	Theory	Practice	Theory	Practice		
Level 1	Remember	20%	-	20%	-	20%	-		
Level 2	Understand	20%		20%	- ,	20%	-		
Level 3	Apply	30%	-	30%	-	30%	-		
Level 4	Analyze	30%	-	30%	-	30%	-		
Level 5	Evaluate	-	-	-	-	-	-		
Level 6	Create	-	-	-	-	-	=		
	Total		100 %		100 %		100 %		

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