Course code: Course Title	Course Structure			Pre-Requisite
	L	T	P	
CE102: Statistical Methods for Engineers	3	1	0	NIL

Course Objective: The objective of the course is to use and understand the principal numeric and graphical techniques to display and summarize Experimental/ Engineering/ Natural phenomena /economical data and to discuss and explain how statistics can be used to interpret the results. Also, the course aims to understand the common statistical techniques and terminology used in various studies that are presented in the various reports and journals.The course helps in designing sampling requirements and organize the data for appropriate statistical analysis/modelling and train students with essential tools for statistical analyses and fostering understanding through real-world statistical applications, and to familiarize with the common probability distributions.

S. NO	Course Outcomes (CO)
CO1	Generate stem & leaf plot and box plot and differentiate various aspects of data in term of central tendency, dispersion, Asymmetric and peakedness.
CO2	Describe various aspects of normal distributions and to estimate confidence intervals in relation to level of significance. To test the data for normal distribution assumption and for identification of outliers.
CO3	Develop of null and alternative hypothesis and to perform test of Hypothesis.
CO4	Apply regression/correlation technique for drawing statistical inference about the underline causative phenomena.

CO5	Generate simple univariate time series models and analyze the errors in the model by carrying out analysis of residuals.

S. NO	Contents	Contact Hours
UNIT 1	Primary & Secondary data, Collection of data, Source of secondary data; Methods of Sampling, Random sampling, Table of Random numbers and its uses, Stratified sampling. Frequency distribution, discrete grouped and continuous data, graphical depiction of data, stem and leaf plot, Box plot. Concept of Mathematical expectation, Measure of central tendency, moments, variance, standard deviation and Coefficient of variation, measure of Asymmetric and peakedness.	**8**
UNIT 2	Binomial distribution (for discrete data), Means and standard deviation of binomial distribution. Normal distribution (for continuous data), Probability density function of normal distribution, standardized normal distribution, Estimating the population mean using 'Z' statistic, Estimation of confidence intervals in relation to level of significance, solving normal curve problems.	**9**
UNIT 3	Sampling theory and sampling distributions, test of significance for large samples, Testing of hypothesis, Null hypothesis, Alternate hypothesis, Level of significance, Type I and Type II errors, one tailed and two tailed test, testing the difference of means of two samples. Probability plotting for normal distribution, Identification, and accommodation of outliers.	**9**
UNIT 4	Causation Versus Correlation, Types of correlation, positive and negative correlation, linear and non-linear correlation, Pearson coefficient, Simple regression analysis , Curve fitting by method of least square, Residual analysis, Standard error of estimate, coefficient of determination, goodness of fit using MAE,RMSE, MAPE.	**8**
UNIT 5	Stochastic variables, Time series data, stationary series, Introduction to Box Jenkins modeling, auto correlation function, Auto Regressive model development for a given univariant time series data.	**8**
	TOTAL	**42**

REFERENCES

S.No.	Name of Books/Authors/Publishers	Year of Publication / Reprint
1	Mathematical Statistics, John E. Freund and R. Mohan, Pearson,8th Edition (2015)	2015

2	Statistics for Management, Richard I. Levin, David S. Rubin, Masood H Siddiqui & SanjayRastogi, Pearson,8th Edition (2017)	2017
3	Probability and Statistics for Engineers, Richard L. Scheaffer, Madhuri S. Mulekar, and James T. McClave, Brooks/Cole, 5th Edition (2010)	2010
4	An Introduction to probability and Statistics, Vijay K Rohatgi & A K Md.Ehsanes Saleh, Wiley, 2nd Edition (2008)	2008
5	Statistical Methods, S P Gupta, Sultan Chand & Sons, 49th Edition (2019)	2019
6	Fundamentals of Mathematical Statistics, S C Gupta & V K Kapoor, Sultan Chand & Sons, 12th Edition (2020)	2020

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