INSTITUTE OF AERONAUTICAL ENGINEERING
(Autonomous)
Dundigal - 500 043, Hyderabad, Telangana

COURSE CONTENT

PROBABILITY AND STATISTICS								
III Semester: AE / ME / / CE / CSE / CSE(AIML) / CSE(DS) / CSE(CS) / IT								
Course Code	**Category**	**Hours / Week**			**Credits**	**Maximum Marks**		
		L	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
AHSD11	**Foundation**	3	1	0	4	40	60	100
Contact Classes: 48	**Tutorial Classes: 16**	**Practical Classes: Nil**				**Total Classes: 64**		
Prerequisite: Matrices and Calculus								

I. COURSE OVERVIEW:
Probability theory is the branch of mathematics that deals with modelling uncertainty. The course includes: Baye's theorem, random variables, probability distributions, hypothesis testing, confidence interval and linear regression. The use of probability models and statistical methods is for analyzing data, designing, manufacturing a product and the observed class frequencies for engineering and sciences.

II. COURSES OBJECTIVES:
The students will try to learn

I. The theory of random variables, basic random variate distributions and their applications.
II. The methods and techniques for quantifying the degree of closeness among two or more variables and the concept of linear regression analysis.
III. The estimation statistics and hypothesis testing which play a vital role in the assessment of the quality of the materials, products and ensuring the standards of the engineering process.
IV. The statistical tools which are essential for translating an engineering problem into probability model.

III. COURSE OUTCOMES:
At the end of the course students should be able to:

CO 1 Explain the probability elementary theorems on probability conditional, multiplication, Baye's theorem under randomized probabilistic conditions.
CO 2 Apply the role of random variables and types of random variables, expected values of the discrete and continuous random variables under randomized probabilistic conditions.
CO 3 Apply the parameters of random variable Probability distributions such as Binomial, Poisson by using their probability functions.
CO 4 Interpret the parameters of random variate Probability distributions such as Binomial, Poisson and Normal distribution by using their probability functions, expectation and variance.
CO 5 Make Use of estimation statistics in computing confidence intervals by Correlation Analysis, Regression analysis.
CO 6 Identify the role of statistical hypotheses, types of errors, confidence intervals, the tests of hypotheses for large and small sample, in making decisions over statistical claims in hypothesis testing.

IV. COURSE CONTENT:
MODULE-I: PROBABILITY (10)
Probability, axiomatic approach, elementary theorems on probability, conditional probability, multiplication theorem, Bayes theorem (without proof).

MODULE-II: RANDOM VARIABLES (09)
Random variables: Discrete and continuous random variables, probability distribution, probability mass function and probability density function.

MODULE – III: PROBABILITY DISTRIBUTION (10)
Binomial distribution: Mean and variance of Binomial distribution, Poisson distribution: Poisson distribution as a

limiting case of Binomial distribution, mean and variance of Poisson distribution.

Normal distribution: mean, variance, mode, median of Normal distribution.

MODULE – IV: CORRELATION AND REGRESSION (09)
Correlation- Karl Pearson's coefficient of correlation, rank correlation, repeated ranks. Regression: Lines of regression, regression coefficient, angle between two regression lines.

MODULE – V: TEST OF HYPOTHESIS (10)
Population, Sample, standard error; Test of significance: Null hypothesis, alternate hypothesis. Types of errors, level of significance. Large sample tests: Test of hypothesis for single mean, difference between means, single proportion and difference between proportions. Small sample tests: Student's t-distribution, F-distribution and Chi-square distribution.

V. TEXT BOOKS:

1. Erwin Kreyszig, "Advanced Engineering Mathematics", John Wiley and Sons Publishers, 9th edition, 2014.
2. B. S. Grewal, Higher Engineering Mathematics, 44/e, Khanna Publishers, 2017.

VI. REFERENCE BOOKS:

1. S. C. Gupta, V. K. Kapoor, "Fundamentals of Mathematical Statistics", S. Chand and Co., 10^{th} edition, 2000.
2. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.
3. Richard Arnold Johnson, Irwin Miller and John E. Freund, "Probability and Statistics for Engineers", Prentice Hall, 8^{th} edition, 2013.

VII. ELECTRONIC RESOURCES:

1. http://e4uhu.com/down/Applied/9th.
2. https://toaz.info/32fa2f50-8490-42cf-9e6a-f50cb7ea9a5.
3. http://www.mathworld.wolfram.com.

VIII. MATERIALS ONLINE:

1. Course template
2. Tutorial question bank
3. Tech talk topics
4. Open end experiments
5. Definitions and terminology
6. Assignments
7. Model question paper - I
8. Model question paper - II
9. Lecture notes
10. E-learning readiness videos (ELRV)
11. Power point presentation