

BS-134 A		Probability & Statistics					
L	T	P	Credit	Major Test	Minor Test	Total	Time
4	1	-	4.5	75	25	100	3 h
Purpose		To familiarize the prospective students with techniques of probability and statistics.					
Course Outcomes							
CO1	Probability theory provides models of probability distributions( theoretical models of the observable reality involving chance effects) to be tested by statistical methods which has various engineering applications.						
CO 2	Probability theory provides models of probability distributionsto be used in testing materials, control of production processes, robotics, and automatization in general, production planning and so on.						
CO 3	Application of probability to check the feasibility of the complex problems.						
CO 3	To develop the essential tool of statistics in a comprehensive manner.						
CO 4	To familiarize the student with the problem of discussing universe of which they in which complete enumeration is impractical						
CO 5	Test of significance plays a vital role in hypothesis testing.						

#### UNIT-I

(10 Hrs)

**Basic Probability:** Introduction, additive law of probability, Conditional Probability, Independent Events, Bayes' Theorem.

Random Variables: Discrete random variables, probability distribution, Probability mass function and distribution function, Expectation, Moments, Variance and standard deviation of discrete random variables.

#### UNIT-II

(10 Hrs)

**Continuous Probability distribution:**

Continuous random variables, probability distribution, Probability density function and distribution function, Expectation, Moments, Variance and standard deviation of Continuous random variables.

Probability distributions: Binomial, Poisson and Normal - evaluation of statistical parameters for these three distributions.

#### UNIT-III

(10 hrs)

**Basic Statistics:**

Measures of Central tendency: Mean, median, quartiles, mode, Geometric mean, Harmonic mean, Measures of dispersion: Range, Quartile deviation, mean deviation, standard deviation, coefficient of variation, Moments, Skewness and Kurtosis, Correlation, Coefficient of correlation, methods of calculations, Lines of regression, Rank correlation.

#### UNIT-IV

(10 hrs)

**Applied Statistics:**

Curve fitting by the method of least squares: Introduction, Fitting of a straight line, fitting of second degree curve, fitting of a polynomial of degree m, fitting of a geometric or power curve of the form  $y = ax^b$ , fitting of an exponential curve of the form  $y = ab^x$ .

**Test of significance:** Basic terminology, Large sample test for single proportion, difference of proportions, single mean, difference of means, Small samples test for single mean, difference of means, Chi-square test for goodness of fit.

**Suggested Books:**

1. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
2. P. G. Hoel, S. C. Port and C. J. Stone, Introduction to Probability Theory, Universal Book Stall, 2003 (Reprint).
3. S. Ross, A First Course in Probability, 6th Ed., Pearson Education India, 2002.

4. W. Feller, An Introduction to Probability Theory and its Applications, Vol. 1, 3rd Ed., Wiley, 1968.
5. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2010.
6. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11<sup>th</sup> Reprint, 2010.
7. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.
8. Veerarajan T., Engineering Mathematics (for semester III), Tata McGraw-Hill, New Delhi, 2010.

**Note: The paper setter will set the paper as per the question paper templates provided.**

## LECTURE PLAN

<b>Subject Name</b>	<b>Probability &amp; Statistics</b>
<b>Subject Code</b>	<b>BS-134 A</b>
<b>Course:-</b>	<b>B.Tech.</b>
<b>Semester:-</b>	<b>2nd Semester</b>

Lecture	Topic
L1	Probability: Introduction, additive law of probability
L2	Probability: Introduction, additive law of probability
L3	Conditional Probability
L4	Independent Events.
L5	Bayes' Theorem
L6	Random Variables: Discrete random variables
L7	Probability distribution
L8	Probability mass function and distribution function
L9	Expectation, Moments
L10	Variance and standard deviation of discrete random variables.
L11	Continuous random variables, probability distribution
L12	Continuous random variables, probability distribution
L13	Probability density function and distribution function
L14	Probability density function and distribution function
L15	Expectation, Moments
L16	Variance and standard deviation of Continuous random variables
L17	Binomial Probability distributions and evaluation of statistical parameters
L18	Poisson Probability distributions and evaluation of statistical parameters
L19	Poisson Probability distributions and evaluation of statistical parameters
L20	Normal Probability distributions and evaluation of statistical parameters
L21	Measures of Central tendency: Mean, median, quartiles, mode
L22	Measures of Central tendency: Mean, median, quartiles, mode
L23	Geometric mean, Harmonic mean
L24	Geometric mean, Harmonic mean
L25	Measures of dispersion: Range, Quartile deviation
L26	Mean deviation, standard deviation
L27	Coefficient of variation, Moments, Skewness and Kurtosis
L28	Coefficient of variation, Moments, Skewness and Kurtosis

L29	Correlation, Coefficient of correlation, methods of calculations
L30	Correlation, Coefficient of correlation, methods of calculations
L31	Lines of regression, Rank correlation.
L32	Lines of regression, Rank correlation
L33	Curve fitting by the method of least squares: Introduction
L34	Fitting of a straight line, fitting of second degree curve
L35	Fitting of a polynomial of degree m
L36	Fitting of a geometric or power curve of the form $y = ax^b$
L37	Fitting of an exponential curve of the form $y = ab^x$
L38	Fitting of an exponential curve of the form $y = ab^x$
L39	Basic terminology
L40	Large sample test for single proportion
L41	Difference of proportions
L42	Single mean, difference of means
L43	Small samples test for single mean, difference of means
L44	Chi-square test for goodness of fit.

## Tutorial Sheet-1

- Q1) An urn contains 5 red and 10 black balls. 8 of them are placed in another urn. What is the probability that the latter then contains 2 red and 6 black balls?
- Q2) A bag contains 8 white and 6 red balls. Find the probability of drawing two balls of the same colour.
- Q3) A die is tossed thrice. A success is 'getting 1 or 6' on a toss. Find the mean and variance of the number of success.
- Q4) The probability that a pen manufactured by a company will be defective is  $\frac{1}{10}$ . If 12 such pens are manufactured, Find the probability that
- Exactly two will be defective.
  - at least two will be defective.
  - None will be defective.
- Q5) A bag contains 6 white and 9 black balls. Four balls are drawn at random at a time. Find the probability for the first draw to give four white and second draw to give four black balls if the balls are replaced.
- Q6) Three urns contain 6 red, 4 black ; 4 red , 6 black ; 5 red, 5 black balls respectively. One of this urn is selected at random and a ball is drawn from it. If the ball drawn is red, find the probability that it is drawn from first urn.

## Tutorial Sheet-2

Q1) If the probability of a bad reaction from a certain injection is 0.001, determine the chance that out of 2000 individuals more than two will get a bad injection.

Q2) Fit a Poisson distribution to the set of observations:

X:	0	1	2	3	4
F:	122	60	15	2	1

Q3) In a test on 2000 electric bulbs, it was found that the life of a particular make, was normally distributed with an average life of 2040 hours and S.D. of 60 hours. Estimate the number of bulbs likely to burn for

- (a) more than 2150 hours.
- (b) less than 1950 hours.
- (c) more than 1920 hours and but less than 2160 hours.

Q4) Fit a normal curve to the following distribution:

X:	2	4	6	8	10
F:	1	4	6	4	1

Q5) Six dice are thrown 729 times. How many times do you expect at least three dice to show five or six?

## Tutorial Sheet-3

Q1) The average weight of 150 students in a class is 80 kg. The average weight of boys in the class is 85 kg and that of girls is 70 kg. Find the number of boys and girls in the class.

Q2) Find the G.M. of the following:

Marks obtained	10	20	30	40	50
No. of students	12	27	72	92	100

Q3) Calculate the mean, variance and standard deviation for the following distribution:

Class	30-40	40-50	50-60	60-70	70-80	80-90	90-100
Frequency	3	7	12	15	8	3	2

Q4) The first four moments of a distribution about the value 4 of the variable are -1, 5, 17, -30 and 108. Find the moments about mean.

Q5) Calculate the first four moments about the mean of the following data:

Wages	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80
No. of persons	15	23	35	49	32	28	12	6

## Tutorial Sheet-4

Q1) Find the coefficient of correlation between X and Y :

X	65	66	67	68	69	70	71
y	67	68	66	69	72	72	69

Q2) Calculate Karl Pearson Coefficient of correlation from the following data:

X	20	21	22	23	24	25	26
y	17	18	19	20	21	22	23

Q3) Find the coefficient of rank correlation:

Marks in statistics	31	45	39	48	24	33	42	36	29	41
Marks in mathematics	41	47	27	38	29	37	40	30	35	39

Q4) Find the line of regression of y on x:

X	10	9	8	7	6	4	3
y	8	12	7	10	8	9	6

Q5) In a hospital 480 female babies and 520 male babies were born in a week. Do these figures confirm that males and females are born in equal number.