MATHEMATICS AND STATISTICS
(C.S.E)

Instruction	4 Periods per week
	(3 Theory + 1 Tutorial)
Duration of SEE	3 Hours
SEE	70 Marks
CIE	30 Marks
Credits	3

Course objectives:

➢ To introduce transforms like Laplace, Fourier transforms and to study their properties
➢ To introduce number theory and its applications
➢ To provide the knowledge of probability distributions like uniform, normal and exponential distributions, tests of significance, correlation and regression.

Outcomes: At the end of the course students will be able to

• solve differential equations using Laplace and Fourier transforms
• solve problems in elementary number theory
• apply various probability distributions to solve practical problems, to estimate unknown parameters of populations and apply the tests of hypotheses

• perform a regression analysis and to compute and interpret the coefficient of correlation

UNIT- I
Laplace transforms:
 Introduction of Laplace transforms, sufficient condition for existence of Laplace transform, Laplace transform of Derivatives, Laplace transform of integrals, Translation theorems (I & II shifting theorems), Differentiation of Laplace transform (Multyplication by t), Integration of Laplace transform(Division by t), convolution theorem, Solving initial value problems using Laplace transform.

UNIT- II
Fourier transforms:
Introduction, Fourier integrals, Fourier sine and cosine integrals, Complex form of Fourier integral, Fourier transform, Fourier sine and cosine transforms, Finite Fourier sine and cosine transforms, Properties of Fourier transforms, Convolution theorem for Fourier transforms.

UNIT- III
Number Theory:
Divisibility and Modular arithmetic, integer representation, primes and gcd, solving congruences and applications, Introduction to cryptography.

UNIT- IV
Probability:
Random variables, Uniform, Normal, Exponential distributions, Mean, median, mode and standard deviation, Conditional probability and Baye's theorem, Tests of significance, t-test, F-test and χ^2 test.

UNIT- V
Curve fitting:
Curve fitting by method of least squares**,** correlation and regression, types of correlations, Karl Pearson's coefficient of correlation, Spearman's rank correlation coefficient, equal ranks, equations to the lines of regression.

Suggested Reading:

1. R.K.Jain & S.R.K. Iyengar, *Advanced Engineering Mathematics*, Narosa Publications, 4th Edition, 2014.
2. B.S.Grewal, *Higher Engineering Mathematics*, Khanna Publications, 43rd Edition, 2014.
3. S.C. Gupta and V.K.Kapoor, *Fundamentals of Mathematical Statistics,* Sultan Chand& Sons, 2014.
4. Erwin Kreyszig, *Advanced Engineering Mathematics*, John Wiley & Sons ,9th Edition, 2012.
5. James S.Kraft and Lawrence C.Washington, *An Introduction to Number theory with Cryptography*, CRC press, 2014.

* * * * *