Annexure - 1

Linear Algebra and Differential Equations

(Common to CE, EEE, ME, ECE, CSE & IT)

I B. Tech I Semester

Course Category	Basic Sciences	**Course Code**	
Course Type	Theory	**L-T-P-C**	3-0-0-3
Prerequisites	Basics of matrices, Differentiation, Integration	**Internal Assessment** **Semester End Examination** **Total Marks**	40 60 100

COURSE OBJECTIVES	
1	The course is designed to equip the students with the necessary mathematical skills and techniques that are essential for an engineering course.
2	The skills derived from the course will help the student form a necessary base to develop analytic and design concepts.

COURSE OUTCOMES		
Upon successful completion of the course, the student will be able to:		**Cognitive Level**
CO1	solve systems of linear equations, determine the rank, find the eigenvalues and eigenvectors, diagonalization of a matrix.	K3
CO2	identify special properties of a matrix, such as positive definite, etc., and use this information to facilitate the calculation of matrix characteristics.	K2
CO3	solve first order differential equations and its applications	K3
CO4	solve the linear differential equations with constant coefficients by appropriate method	K3
CO5	find partial derivatives of multivariable functions and apply them to find extreme values of a function.	K3

K1: Remember, K2: Understand, K3: Apply, K4: Analyze, K5: Evaluate, K6: Create.

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)												
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	3	2	-	-	-	-	-	-	-	-	-
CO2	3	3	1	-	-	-	-	-	-	-	-	-
CO3	3	3	2	-	-	-	-	-	-	-	-	-
CO4	3	3	2	-	-	-	-	-	-	-	-	-
CO5	3	3	2	-	-	-	-	-	-	-	-	-

COURSE CONTENT	
UNIT I	**Solving system of linear equations, Eigen Values and Eigen vectors** Rank of a matrix by echelon form and normal form – Solving system of homogeneous and non-homogeneous linear equations – Gauss elimination method for solving system of equations – Eigenvalues and Eigen vectors and their properties.
UNIT II	**Cayley-Hamilton Theorem and Quadratic forms** Cayley-Hamilton theorem (without proof) – Finding inverse and powers of a matrix by Cayley-Hamilton theorem – Reduction to diagonal form-Quadratic forms-nature of the quadratic form - reduction of quadratic form to canonical form by orthogonal transformation.
UNIT III	**Differential equations of first order and first degree** Linear – Bernoulli – Exact – Reducible to exact. **Applications:** Newton's Law of cooling – Law of natural growth and decay – Orthogonal trajectories.
UNIT IV	**Linear differential equations of higher order** Non-homogeneous equations of higher order with constant coefficients with RHS term of the type e^{ax}, $\sin ax$, $\cos ax$, polynomials in x^n, $e^{ax}V(x)$, $x^mV(x)$ - Method of Variation of parameters.
UNIT V	**Partial differentiation** Introduction – Homogeneous function – Euler's theorem – Total derivative – Chain rule – Generalized Mean value theorem for single variable (without proof) – Taylor's and Maclaurin's series expansion of functions of two variables – Jacobian – Functional dependence. **Applications:** Maxima and Minima of functions of two variables without constraints and Lagrange's method (with constraints).

TEXT BOOKS	
1.	**B.S.Grewal**, Higher Engineering Mathematics, 43rd Edition, Khanna Publishers.
2.	**Erwin Kreyszig**, Advanced Engineering Mathematics, 10th Edition, Wiley-India
REFERENCE BOOKS	
1.	**Micheael Greenberg**, Advanced Engineering Mathematics, 9th edition, Pearson edn
2.	**Dean G. Duffy**, Advanced engineering mathematics with MATLAB, CRC Press
3.	**Peter O'neil**, Advanced Engineering Mathematics, Cengage Learning.
4.	**Srimanta Pal, Subodh C.Bhunia**, Engineering Mathematics, Oxford University Press.
5.	**T.K.V. Iyengar et. al.,** Engineering Mathematics Volume I & III S Chand Publications.
WEB RESOURCES	
1.	**UNIT I: Solving system of linear equations, Eigen Values and Eigen vectors** https://en.wikipedia.org/wiki/System_of_linear_equations https://en.wikipedia.org/wiki/Eigenvalues_and_eigenvectors
2.	**UNIT II: Cayley-Hamilton Theorem and Quadratic forms** https://www.math.hmc.edu/calculus/tutorials/eigenstuff/ https://en.wikipedia.org/wiki/Quadratic_form

3.	**UNIT III: Differential equations of first order and first degree** https://en.wikipedia.org/wiki/Differential_equation http://um.mendelu.cz/maw-html/index.php?lang=en&form=ode https://www.khanacademy.org/math/differential-equations/first-order-differential-equations
4.	**UNIT IV: Linear differential equations of higher order** https://en.wikipedia.org/wiki/Differential_equation http://um.mendelu.cz/maw-html/index.php?lang=en&form=ode https://nptel.ac.in/courses/122107037/20
5.	**UNIT V: Partial Differentiation** https://en.wikipedia.org/wiki/Partial_derivative https://www.whitman.edu/mathematics/calculus_online/section14.03.html

Annexure - 2

Numerical Methods and Multi-variable Calculus

(For EEE Only)

I B. Tech I Semester

Course Category	Basic Sciences	**Course Code**	
Course Type	Theory	**L-T-P-C**	3-0-0-3
Prerequisites	Differentiation, Integration	**Internal Assessment** **Semester End Examination** **Total Marks**	40 60 100

COURSE OBJECTIVES	
1	The course is designed to equip the students with the necessary mathematical skills and techniques that are essential for an engineering course.
2	The skills derived from the course will help the student form a necessary base to develop analytic and design concepts.

COURSE OUTCOMES		
Upon successful completion of the course, the student will be able to:		**Cognitive Level**
CO1	apply Newton, Gauss and Lagrange interpolation formulae to find interpolating polynomials for the given data.	K3
CO2	find the approximate roots of transcendental equations by using different numerical methods	K2
CO3	solve initial value problems by using different numerical schemes	K3
CO4	find areas and volumes using double and triple integrals	K2
CO5	apply a range of techniques to find solutions of standard PDEs	K3

K1: Remember, K2: Understand, K3: Apply, K4: Analyze, K5: Evaluate, K6: Create.

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)												
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	3	2	-	-	-	-	-	-	-	-	-
CO2	3	3	2	-	-	-	-	-	-	-	-	-
CO3	3	3	2	-	-	-	-	-	-	-	-	-
CO4	3	3	2	-	-	-	-	-	-	-	-	-
CO5	3	3	2	-	-	-	-	-	-	-	-	-

COURSE CONTENT	
UNIT I	**Interpolation** Introduction– Errors in polynomial interpolation – Finite differences – Forward differences– Backward differences –Central differences –properties – Differences of a polynomial- Newton's formulae for interpolation –Gauss formulae for interpolation- Interpolation with unequal intervals – Lagrange's interpolation formula.
UNIT II	**Solution of Algebraic and Transcendental Equations** Introduction- Bisection method – Method of false position – Secant method- Iteration method – Newton-Raphson method (One variable).
UNIT III	**Numerical Integration and solution of Ordinary Differential equations** Trapezoidal rule- Simpson's 1/3rd and 3/8th rule-Solution of ordinary differential equations by Taylor's series-Picard's method of successive approximations-Euler's method - Runge-Kutta method (second and fourth order).
UNIT IV	**Multiple integrals** Multiple integrals: Double and triple integrals – Change of variables – Change of order of integration. **Applications:** Finding Areas and Volumes.
UNIT V	**Partial Differential Equations** Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions –solutions of first order linear (Lagrange) equation and nonlinear (standard types) equations.

TEXT BOOKS	
1.	**B.S.Grewal**, Higher Engineering Mathematics, 43rd Edition, Khanna Publishers.
2.	**Erwin Kreyszig**, Advanced Engineering Mathematics, 10th Edition, Wiley-India
REFERENCE BOOKS	
1.	**Micheael Greenberg**, Advanced Engineering Mathematics, 9th edition, Pearson edn
2.	**Dean G. Duffy**, Advanced engineering mathematics with MATLAB, CRC Press
3.	**Peter O'neil**, Advanced Engineering Mathematics, Cengage Learning.
4.	**Srimanta Pal, Subodh C. Bhunia**, Engineering Mathematics, Oxford University Press.
5.	**T.K.V. Iyengar et. al.,** Engineering Mathematics Volume I & III S Chand Publications.
6.	**T. Amarnath,** An Elementary Course in Partial Differential Equations, Narosa Publications
WEB RESOURCES	
1.	**UNIT I: Interpolation** https://en.wikibooks.org/wiki/Introduction_to_Numerical_Methods/Interpolation
2.	**UNIT II: Solution of Algebraic and Transcendental Equations** https://en.wikibooks.org/wiki/Numerical_Methods/Equation_Solving https://www.slideshare.net/100005232690054/algebraic-and-transcendental-equations
3.	**UNIT III: Numerical Integration and solution of Ordinary Differential Equations** https://nptel.ac.in/courses/111107063/

4.	**UNIT III: Multiple Integrals** https://en.wikipedia.org/wiki/Multiple_integral http://tutorial.math.lamar.edu/Classes/CalcIII/MultipleIntegralsIntro.aspx
5.	UNIT V: **Partial Differential Equations** https://en.wikipedia.org/wiki/Partial_differential_equation

Annexure - 3

Numerical Methods and Multi-variable Calculus

(Common to CE, ME, ECE, CSE, &IT)

I B. Tech II Semester

Course Category	Basic Sciences	**Course Code**	
Course Type	Theory	**L-T-P-C**	3-0-0-3
Prerequisites	Differentiation, Integration	**Internal Assessment** **Semester End Examination** **Total Marks**	40 60 100

COURSE OBJECTIVES	
1	The course is designed to equip the students with the necessary mathematical skills and techniques that are essential for an engineering course.
2	The skills derived from the course will help the student form a necessary base to develop analytic and design concepts.

COURSE OUTCOMES		
Upon successful completion of the course, the student will be able to:		**Cognitive Level**
CO1	apply Newton, Gauss and Lagrange interpolation formulae to find interpolating polynomials for the given data.	K3
CO2	find the approximate roots of transcendental equations by using different numerical methods	K2
CO3	solve ordinary differential equations by using different numerical schemes	K3
CO4	Find areas and volumes using double and triple integrals	K2
CO5	apply a range of techniques to find solutions of standard PDEs	K3

K1: Remember, K2: Understand, K3: Apply, K4: Analyze, K5: Evaluate, K6: Create.

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)												
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	3	2	-	-	-	-	-	-	-	-	-
CO2	3	3	2	-	-	-	-	-	-	-	-	-
CO3	3	3	2	-	-	-	-	-	-	-	-	-
CO4	3	3	2	-	-	-	-	-	-	-	-	-
CO5	3	3	2	-	-	-	-	-	-	-	-	-

COURSE CONTENT	
UNIT I	**Interpolation** Introduction– Errors in polynomial interpolation – Finite differences – Forward differences– Backward differences –Central differences – Symbolic relations and separation of symbols – Differences of a polynomial-Newton's formulae for interpolation –Gauss formulae for interpolation- Interpolation with unequal intervals – Lagrange's interpolation formula.
UNIT II	**Solution of Algebraic and Transcendental Equations** Introduction- Bisection method – Method of false position – Secant method- Iteration method – Newton-Raphson method (One variable).
UNIT III	**Numerical Integration and solution of Ordinary Differential equations** Trapezoidal rule- Simpson's 1/3rd and 3/8th rule-Solution of ordinary differential equations by Taylor's series-Picard's method of successive approximations-Euler's method - Runge-Kutta method (second and fourth order).
UNIT IV	**Multiple integrals** Multiple integrals: Double and triple integrals – Change of variables – Change of order of integration. **Applications:** Finding Areas and Volumes.
UNIT V	**Partial Differential Equations** Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions –solutions of first order linear (Lagrange) equation and nonlinear (standard types) equations.

TEXT BOOKS	
1.	**B. S. Grewal**, Higher Engineering Mathematics, 43rd Edition, Khanna Publishers.
2.	**Erwin Kreyszig**, Advanced Engineering Mathematics, 10th Edition, Wiley-India
REFERENCE BOOKS	
1.	**Micheael Greenberg**, Advanced Engineering Mathematics, 9th edition, Pearson edn
2.	**Dean G. Duffy**, Advanced engineering mathematics with MATLAB, CRC Press
3.	**Peter O'neil**, Advanced Engineering Mathematics, Cengage Learning.
4.	**Srimanta Pal, Subodh C. Bhunia**, Engineering Mathematics, Oxford University Press.
5.	**T.K.V. Iyengar et. al.,** Engineering Mathematics Volume I & III S Chand Publications.
6.	**T.Amarnath,** An Elementary Course in Partial Differential Equations, Narosa Publications
WEB RESOURCES	
1.	**UNIT I: Interpolation** https://en.wikibooks.org/wiki/Introduction_to_Numerical_Methods/Interpolation
2.	**UNIT II: Solution of Algebraic and Transcendental Equations** https://en.wikibooks.org/wiki/Numerical_Methods/Equation_Solving https://www.slideshare.net/100005232690054/algebraic-and-transcendental-equations
3.	**UNIT III: Numerical Integration and solution of Ordinary Differential Equations** https://nptel.ac.in/courses/111107063/
4.	**UNIT III: Multiple Integrals**

	https://en.wikipedia.org/wiki/Multiple_integral http://tutorial.math.lamar.edu/Classes/CalcIII/MultipleIntegralsIntro.aspx
5.	UNIT V: **Partial Differential Equations** https://en.wikipedia.org/wiki/Partial_differential_equation

Annexure - 4

Integral Transforms and Vector Calculus

(Common to CE, EEE, ME, ECE, CSE & IT)

I B. Tech II Semester

Course Category	Basic Sciences	**Course Code**	
Course Type	Theory	**L-T-P-C**	3-0-0-3
Prerequisites	NIL	**Internal Assessment** **Semester End Examination** **Total Marks**	40 60 100

COURSE OBJECTIVES	
1	The course is designed to equip the students with the necessary mathematical skills and techniques that are essential for an engineering course.
2	The skills derived from the course will help the student form a necessary base to develop analytic and design concepts.

COURSE OUTCOMES		
Upon successful completion of the course, the student will be able to:		**Cognitive Level**
CO1	examine the properties of Laplace transformation	K3
CO2	solve ordinary differential equations by using Laplace transformation technique	K2
CO3	expand a periodic function as a Fourier series and find Fourier transform of a given function.	K3
CO4	understand vector differential properties of scalar and vector point functions and their applications.	K2
CO5	apply Green's, Stokes and Divergence theorem to evaluate line, surface and volume integrals.	K3

K1: Remember, K2: Understand, K3: Apply, K4: Analyze, K5: Evaluate, K6: Create.

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)												
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	3	2	-	-	-	-	-	-	-	-	-
CO2	3	3	2	-	-	-	-	-	-	-	-	-
CO3	3	3	2	-	-	-	-	-	-	-	-	-
CO4	3	3	2	-	-	-	-	-	-	-	-	-
CO5	3	3	2	-	-	-	-	-	-	-	-	-

COURSE CONTENT	
UNIT I	**Laplace transforms:** Laplace transforms of standard functions – Properties - Periodic functions - Unit step function – Dirac's delta function.
UNIT II	**Inverse Laplace transforms:** Inverse Laplace transforms – Properties – Convolution theorem (without proof). **Applications:** Solving ordinary differential equations (initial value problems) using Laplace transforms.
UNIT III	**Fourier Analysis:** Introduction- Periodic functions – Dirichlet's conditions - Fourier series of a function, even and odd functions –Change of interval – Half-range sine and cosine series. Fourier integral theorem (without proof) – Fourier sine and cosine integrals – sine and cosine transforms – Inverse transforms.
UNIT IV	**Vector Differentiation:** Gradient - Directional derivative - Divergence – Curl – Laplacian and second order operators – Vector identities.
UNIT V	**Vector Integration:** Line integral – Work done – Potential function – Area, Surface and volume integrals - Vector integral theorems: Greens, Stokes and Gauss Divergence theorems (without proof) and related problems.

TEXT BOOKS	
1.	**B.S.Grewal**, Higher Engineering Mathematics, 43rd Edition, Khanna Publishers.
2.	**Erwin Kreyszig**, Advanced Engineering Mathematics, 10th Edition, Wiley-India
REFERENCE BOOKS	
1.	**Micheael Greenberg**, Advanced Engineering Mathematics, 9th edition, Pearson edn
2.	**Dean G. Duffy**, Advanced engineering mathematics with MATLAB, CRC Press
3.	**Peter O'neil**, Advanced Engineering Mathematics, Cengage Learning.
4.	**Srimanta Pal, Subodh C.Bhunia**, Engineering Mathematics, Oxford University Press.
5.	**T.K.V. Iyengar et. al.,** Engineering Mathematics Volume I & III S Chand Publications.
6.	**Murray R Speigel,** Schaum's Outline of Vector Analysis, Schaum's Outline.
7.	**Shanti Narayan**, Integral Calculus – Vol. 1 & II
WEB RESOURCES	
1.	**UNIT I: Laplace transforms** https://en.wikipedia.org/wiki/Laplace_transform https://web.stanford.edu/~boyd/ee102/laplace.pdf
2.	**UNIT II: Inverse Laplace transforms** https://www.intmath.com/laplace-transformation/7-inverse-laplace-transform.php
3.	**Unit – III: Fourier Series** https://www.mathsisfun.com/calculus/fourier-series.html

	https://lpsa.swarthmore.edu/Fourier/Xforms/FXformIntro.html
4.	**UNIT IV: Vector Differentiation** https://en.wikipedia.org/wiki/Vector_calculus
5.	**UNIT V: Vector Integration** https://en.wikipedia.org/wiki/Divergence_theorem http://tutorial.math.lamar.edu/Classes/CalcIII/StokesTheorem.aspx

Annexure - 5

Probability & Statistics
(Common to CE, CSE & IT)

II B. Tech I Semester

Course Category	Basic Sciences	**Course Code**	
Course Type	Theory	**L-T-P-C**	3-0-0-3
Prerequisites	NIL	**Internal Assessment** **Semester End Examination** **Total Marks**	40 60 100

COURSE OBJECTIVES	
1	The course is designed to equip the students with the necessary mathematical skills and techniques that are essential for an engineering course.
2	The skills derived from the course will help the student form a necessary base to develop analytic and design concepts.

COURSE OUTCOMES		
Upon successful completion of the course, the student will be able to:		**Cognitive Level**
CO1	apply Binomial and Poisson distributions for real data to compute probabilities, theoretical frequencies	K3
CO2	interpret the properties of normal distribution and its applications	K2
CO3	find the confidence intervals for a statistic from the given population	K3
CO4	apply the concept of hypothesis testing to real world problems	K2
CO5	find a curve which approximate the given data, coefficient of correlation and lines of regression.	K3

K1: Remember, K2: Understand, K3: Apply, K4: Analyze, K5: Evaluate, K6: Create.

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)												
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	3	-	2	-	-	-	-	-	-	-	-
CO2	3	3	1	2	-	-	-	-	-	-	-	-
CO3	3	3	1	2	-	-	-	-	-	-	-	-
CO4	3	3	3	2	-	-	-	-	-	-	-	-
CO5	3	3	2	2	-	-	-	-	-	-	-	-

COURSE CONTENT	
UNIT I	**Discrete Distributions:** Introduction – Discrete Random variables – Distribution function – Discrete distribution: Binomial and Poisson distributions.
UNIT II	**Continuous distributions:** Introduction -Continuous Random variables – Normal distributions, standard normal distribution, normal approximation to Binominal, Gamma and Weibull distributions.
UNIT III	**Sampling Theory:** Introduction – Population and samples – Sampling distribution of means for large and small samples (with known and unknown variance) – Proportion, sums and differences of means – Sampling distribution of variance – Point and interval estimation.
UNIT IV	**Test of Hypothesis:** Introduction – Type I and Type II errors – Maximum error – One tail and two tail tests –Tests concerning single mean, two means and several means. Tests concerning single, two and several proportions – Problems using Z-test, t-test, F-test and Chi –square test.
UNIT V	**Curve fitting and Correlation:** Introduction- Method of least squares – Fitting a straight line – Second degree curve – exponential curve – power curve. Simple correlation and regression – rank correlation – multiple linear regression.

TEXT BOOKS	
1.	**Miller and John E. Freund,** Probability and Statistics for Engineers, Prentice Hall of India.
2.	**B.V. Ramana,** Higher Engineering Mathematics, Tata Mcgraw Hill.
REFERENCE BOOKS	
1.	**Micheael Greenberg**, Advanced Engineering Mathematics, 9th edition, Pearson edn
2.	**Peter O'neil**, Advanced Engineering Mathematics, Cengage Learning.
3.	**Srimanta Pal, Subodh C.Bhunia**, Engineering Mathematics, Oxford University Press.
4.	**S.L. Myers, K. Ye, Ronald E Walpole,** Probability and Statistics for Engineers and Scientists, Pearson, 8th Edition.
WEB RESOURCES	
1.	**UNIT I: Discrete Distributions** https://en.wikipedia.org/wiki/List_of_probability_distributions https://en.wikipedia.org/wiki/Binomial_distribution
2.	**UNIT II: Continuous distribution** https://en.wikipedia.org/wiki/Normal_distribution
3.	**UNIT III: Sampling Theory** https://en.wikipedia.org/wiki/Sampling_(statistics) https://nptel.ac.in/courses/111104073/
4.	**UNIT IV: Test of Hypothesis** https://en.wikipedia.org/wiki/Statistical_hypothesis_testing https://machinelearningmastery.com/statistical-hypothesis-tests/
5.	**UNIT V: Curve fitting and Correlation** https://en.wikipedia.org/wiki/Regression_analysis https://www.surveysystem.com/correlation.htm

Annexure - 6

Complex Variables & Statistical Methods

(For ME only)

II B. Tech I Semester

Course Category	Basic Sciences	**Course Code**	
Course Type	Theory	**L-T-P-C**	3-0-0-3
Prerequisites	NIL	**Internal Assessment** **Semester End Examination** **Total Marks**	40 60 100

COURSE OBJECTIVES	
1	The course is designed to equip the students with the necessary mathematical skills and techniques that are essential for an engineering course.
2	The skills derived from the course will help the student form a necessary base to develop analytic and design concepts.

COURSE OUTCOMES		
Upon successful completion of the course, the student will be able to:		**Cognitive Level**
CO1	discuss the continuity, differentiability and analyticity	K3
CO2	evaluate the integrals over a domain, Taylor and Laurent expansions of simple functions, determining the nature of the singularities and calculating residues	K2
CO3	find the confidence intervals for a statistic from the given population	K3
CO4	apply the concept of hypothesis testing to real world problems (large samples)	K2
CO5	apply the concept of hypothesis testing to real world problems (small samples)	K3

K1: Remember, K2: Understand, K3: Apply, K4: Analyze, K5: Evaluate, K6: Create.

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)												
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	3	2	-	-	-	-	-	-	-	-	-
CO2	3	3	2	-	-	-	-	-	-	-	-	-
CO3	3	3	1	2	-	-	-	-	-	-	-	-
CO4	3	3	3	2	-	-	-	-	-	-	-	-
CO5	3	3	2	2	-	-	-	-	-	-	-	-

COURSE CONTENT	
UNIT I	**Functions of a complex variable: I**ntroduction – Continuity – Differentiability – Analyticity – Properties – Cauchy-Riemann equations in Cartesian and polar coordinates. Harmonic and conjugate harmonic functions – Milne – Thompson method.
UNIT II	**Complex Integration and Power Series:** Line integral – Cauchy's integral theorem, Cauchy's integral formula, Generalized integral formula (all without proofs)- Radius of convergence – Expansion in Taylor's series, Maclaurin's series and Laurent series – Residue theorem
UNIT III	**Sampling Distributions:** Review of Normal distribution – Population and samples – Sampling distribution of mean (with known and unknown variance), proportion, variances – Sampling distribution of sums and differences -Point and interval estimators for means, variances, proportions.
UNIT IV	**Tests of Hypothesis (Large Samples):** Type I and Type II errors -Maximum error- One tail, two-tail tests – Tests concerning one mean and proportion, two means- Proportions and their differences using Z-test.
UNIT V	**Tests of Hypothesis (Small Samples):** Tests concerning one mean and proportion, two means- Proportions and their differences using Student's t-test – F-test and Chi -square test.

TEXT BOOKS	
1.	**Probability and Statistics for Engineers: Miller and John E. Freund, Prentice Hall of India.**
2.	**Murugesan.K,** Probability and Statistics & Random processes, Anuradha Publications
REFERENCE BOOKS	
1.	**T.K.V. Iyengar et. al.,** Probability and Statistics, S Chand Publications.
2.	**Erwin Kreyszig,** Advanced Engineering Mathematics, 10th Edition, Wiley-India.
3.	**B.S. Grewal**, Higher Engineering Mathematics, 43rd Edition, Khanna Publishers.
4.	**Jay L. Devore,** Probability and Statistics for Engineering and Sciences, 8th Edition, Cengage Learning. ISBN 13: 978-81-315-1839-7.
5.	**Ronald E. Walpole, Sharon L. Mayers and Keying Ye**, Probability and statistics for Engineers and Scientists, Perarson.
WEB RESOURCES	
1.	**UNIT I: Functions of a complex variable** https://en.wikipedia.org/wiki/Complex_analysis
2.	**UNIT II: Integration and Series Expansions:** https://en.wikipedia.org/wiki/Contour_integration http://mathonline.wikidot.com/complex-power-series
3.	**UNIT III: Sampling Theory** https://en.wikipedia.org/wiki/Normal_distribution https://en.wikipedia.org/wiki/Sampling_(statistics) https://nptel.ac.in/courses/111104073/
4.	**UNIT IV: Tests of Hypothesis (Large Samples)** https://en.wikipedia.org/wiki/Statistical_hypothesis_testing
5.	**UNIT V: Tests of Hypothesis (Small Samples)** https://machinelearningmastery.com/statistical-hypothesis-tests/