CHOICE BASED CREDIT SYSTEM SCHEME AT UNDER-GRADUATE LEVEL PROGRAMME: BACHLOR OF ARTS/SCIENCE (GENERAL): APPLIED MATHEMATICS FOR 2018, 2019 ONWARDS

SEMESTER	COURSE CODE	TYPES OF COURSE	TITLE OF COUSRE	CREDITS		
				THEORY	PRACTICAL 2 or 0	TUTORIAL 0 or 2
I	AMM119C	DSC-1(6 CREDITS)	CALCULUS AND COMPLEX TRIGNOMTERY	4		2
II	AMM219C	DSC-2(6 CREDITS)	DIFFRENTIAL EQUATIONS AND THEORY OF EQUATIONS	4		2
III	AMM319C	DSC-3(6 CREDITS)	REAL ANALYSIS	4		2
IV	AMM419C	DSC-4(6 CREDITS)	ALGEBRA	4		2
VA or VB	AMM519DA AMM519DB	DSE(6 CREDITS) DSE(6 CREDITS)	METHODS OF APPLIED MATHEMATICS-I MECHANICS	4 4		2 2
V1A or V1B	AMM619DA AMM619DB	DSE(6 CREDITS) DSE(6 CREDITS)	METHODS OF APPLIED MATHEMATICS-II LAPLACE AND FOURIER TRANSFOMATIONS	4 4		2 2

Generic Elective Courses for V & VI Semesters

SEMESTER	COURSE CODE	TYPES OF COURSE	TITLE OF COUSRE	CREDITS		
				THEORY	PRACTICAL 2 or 0	TUTORIAL 0 or 2
V	AMM519GA	GE(6 Credits)	Mathematics-I	4		2
VI	AMM519GB	GE(6 Credits)	Mathematics-II	4		2

*** To expose the students having no background in mathematics to mathematical thinking and make them understand the basic concepts of the mathematics and their applications in day to day problems.**

Bachelor of Arts/Science

1st SEMESTER

DISCIPLINE SPECIFIC COUSRE –1 (CORE-1)

AMM119C: CALCULUS AND COMPLEC TRIGNOMETRY CREDITS THEORY-4, TUTORIAL: 2
THEORY (4 CREDITS: 60 HOURS) MAXIMUM MARKS: 60, MINIMUM MARKS: 24

Objectives: The aim of this course is to prepare the students:

i) To know the basic concepts in Mathematics

ii) To apply the concepts/rules of differentiation and integration in the day to day problems.

iii) To identify the situations where the limits fail to exist.

iv) To study/extend the complex analogues of plane trigonometry.

v) To use these concepts day to day life.

UNIT-1 (15 HOURS)

Limit and Continuity ($\in$ and δ definition), types of discontinuities, properties of continuous functions on closed intervals, Uniform Continuity and Hein's theorem, differentiability of functions, Successive differentiation, Leibnitz's theorem, partial differentiation, total differentials, Euler's theorem on homogenous functions.

UNIT-2 (15 HOURS)

Tangents and normals (polar coordinates only), pedal equations, curvature and radius of curvature, asymptotes, singular points, tracing of curves in cartesian and polar coordinates.

UNIT-3 (15 HOURS)

Review of complex number system, triangle inequality, equation of a circle and ellipse in complex form, De Moivere's theorem and its applications, expansion of sin nθ, cos nθ etc. in terms of powers of sin θ, cos θ and expansion of $\sin^n \theta$ and $\text{sos}^n \theta$ in terms of multiples of θ.

UNIT-4 (15 HOURS)

Functions of a complex variable, exponential, circular, hyperbolic, inverse hyperbolic and logarithmic functions of a complex variable and their properties, summation of trigonometric series, difference method, C + iS method, C-R equations, definition of analytic functions.

TUTORIALS (2 CREDITS: 30 HOURS) Maximum Marks: 30 Minimum Marks: 12

- **Credit-1**: Applications of Rolle's Theorem, Mean Value Theorems, Maclaurin's Theorem, Taylor's Theorem with different remainders.
- **Credit-2**: Maxima and Minima and their determination, Indeterminate forms and Reduction formulae for integrals.

Books recommended

1. G.B. Thomas and R. L. Finney, *Calculus*, Pearson Education, 2007.
2. H. Anton, I. Birens and S. Davis, *Calculus*, John Wiley and Sons, Inc., 2002.
3. S. D. Chopra, M. L. Kochar and A.Aziz, *Differential Calculus*, Kapoor Publications.
4. A.Aziz, and Nissar.A.Rather, Complex Trigonometry, Kapoor Publications.

5. E. G. Philips, Functions of a Complex Variable.

Bachelor of Arts/Science

2nd SEMESTER

DISCIPLINE SPECIFIC COUSRE –2 (CORE-2)

AMM219C: DIFFRENTIAL EQUATIONS AND THEORY OF EQUATIONS **CREDITS THEORY-4, TUTORIAL: 2**

THEORY (4 CREDITS: 60 HOURS) **MAXIMUM MARKS: 60, MINIMUM MARKS: 24**

Objectives: The aim of this course is:

i) To learn the techniques of solving differential equations.

ii) To apply these techniques in the problems of other subjects.

iii) To study the properties of polynomial equations and their solutions upto degree 4.

At the end a student should be able to translate the real life problems into mathematical language and give the solutions.

UNIT-1 (15 HOURS)

Differential equations, integrating factors, Bernoulli's equation, exact differential equations, necessary and sufficient conditions for exactness, symbolic operators, homogeneous and non-homogeneous linear differential equations with constant and variable coefficients.

UNIT-2 (15 HOURS)

Miscellaneous forms of differential equations, first order higher degree equations solvable for X, Y, Z, P equations from which one variable is explicitly absent, Clairaut's form, equations reducible to Clairaut's form.

UNIT-3 (15 HOURS)

General properties of polynomials, Synthetic division, relation between the roots and the coefficients of an equation, transformation of equations, diminishing of roots of an equation by a given number, removal of terms of an equation, formation of equations whose roots are functions of the roots of a given equation, equation of squared difference.

UNIT-4 (15 HOURS)

Symmetric functions, Newton's method for finding the sum of the powers of the roots of an equation, Cardan's solution of the cubic, nature of the roost of a cubic, Descartes solution of a biquadratic, Descartes rule of signs, rational roots of an integral polynomial, location of roots of an equation (simple cases).

TUTORIALS (2 CREDITS: 30 HOURS) Maximum Marks: 30 Minimum Marks: 12

- Tutorials based on Unit I & II - **1 credit**

- Tutorials based on Unit III & IV – **1 credit**.

Books recommended

1. M. D. Raisinghania, *Ordinary Differential Equations.*
2. S. D. Chopra and M.L.Kochar, *Integral Calculus*, Kapoor Publications.
3. Shepley L. Ross, *Differential Equations*, 3rd Ed., John Willey and Sons, 1984.
4. Schaum Series, *Differential Equations*.
5. A.Aziz, Nissar A.Rather and B.A.Zargar, Theory of Equations, Kapoor Publications.
6. W.S.Burnside and A.W.Panton, The Theory of Equations, Dublin University Press, 1954.
7. C.C.MacDuffee, Theory of Equations, John Wiley and Sons Inc., 1954.

Bachelor of Arts/Science

3rd SEMESTER

DISCIPLINE SPECIFIC COUSRE –3 (CORE-3)

AMM319C: REAL ANALYSIS **CREDITS THEORY-4, TUTORIAL: 2**

THEORY (4 CREDITS: 60 HOURS) **MAXIMUM MARKS: 60, MINIMUM MARKS: 24**

Objectives: The objective of this course is:

i) To analyse the validity of the fundamental concepts and scope.

ii) To apply the concepts in other branches of the subject.

UNIT-1 (15 HOURS)

Finite and infinite sets, countable and uncountable sets, countability of rationals, uncountability of reals, bounded sets, suprema and infima, completeness property of R, Archimedean property of R, Cluster points, Nested interval Theorem, Bolzano-Weierstrass theorem.

UNIT-2 (15 HOURS)

Sequences, types of sequences (bounded, unbounded, Cauchy, convergent, divergent, oscillatory sequences), Cauchy convergence criterion of sequences and related results, limit superior and limit inferior, Cauchy's theorem on limits, monotone sequences and their convergence.

UNIT-3 (15 HOURS)

Infinite series, convergence and divergence of an infinite series, Cauchy convergence criterion for series, positive term series, geometric series, comparison tests, Root test, Ratio test, Integral test, Raabe's test, Gauss's test, alternating series, Leibnitz's test, absolute and conditional convergence.

UNIT-4 (15 HOURS)

Riemann integration, lower and upper sums, refinement of a partition, behaviour of lower and upper sums under refinement, definition and existence of the Reimann integral, necessary and sufficient condition for R-integrability of a bounded function, R-inetgrability of sum, difference, product and quotient of two functions, R-inetgarbilty of continuous, monotone and discontinuous functions (having finite number of discontinuity) in an interval, Mean value Theorem for integrals.

TUTORIALS (2 CREDITS: 30 HOURS) **Maximum Marks: 30 Minimum Marks: 12**

- Tutorials based on Unit I & II - **1 credit**
- Tutorials based on Unit III & IV – **1 credit**.

Books recommended

1. T.M.Apostol, *Calculus* (Vol I), John Wiley and Sons (Asia) P. Ltd., 2002.
2. R.G.Bartle and D.R. Sherbert, *Introduction to Real Analysis*, John Wiley and Sons (Asia) P. Ltd., 2000.
3. S.C Malik, Mathematical Analysis, Narosa publications.
4. K.A.Ross, *Elementary Analysis – The Theory of Calculus Series*- Undergraduate Texts in Mathematics, Springer Verlag 2003.

Bachelor of Arts/Science

4th SEMESTER

DISCIPLINE SPECIFIC COUSRE –4 (CORE-4)

AMM419C: ALGEBRA **CREDITS THEORY-4, TUTORIAL: 2**
THEORY (4 CREDITS: 60 HOURS) **MAXIMUM MARKS: 60, MINIMUM MARKS: 24**

Objectives: The aim of this course is to learn the concepts of algebraic structures and their applications in other sciences.

UNIT-1 (15 HOURS

Groups, Semi-groups and sub-groups, Cyclic groups and their sub-groups, Cosets and Lagrange's theorem, product of sub-groups, counting principle for the number of elements in HK, normaliser ad centre.

UNIT-2 (15 HOURS

Normal subgroups and various criteria for normality of a sub-group, Qoutient Groups, Group homomorphism and isomorphism, Examples.

UNIT-3 (15 HOURS

Fundamental theorem of homomorphism, Correspondence theorem, second and third theorems of isomorphism, Permutation Group, Even and odd Permutations, Symmetric group of degree n, alternating group, simple group, Cayley's theorem.

UNIT-4 (15 HOURS

Rings, Division rings and Fields, Sub-rings and Sub-fields, Ideals, Quotient rings, Principal ideals, Prime ideals, Maximal ideals and characterisations in terms of their associated quotient rings, Ring homomorphism and isomorphism, theorems on ring isomorphisms.

TUTORIALS (2 CREDITS: 30 HOURS) **Maximum Marks: 30 Minimum Marks: 12**

- Tutorials based on Unit I & II - **1 credit**
- Tutorials based on Unit III & IV – **1 credit**.

Books recommended

1. John B. Fraleigh, *A First Course in Abstract Algebra*, 7th Ed., Pearson 2002.
2. M.Artin, *Abstract Algebra*, 2nd Ed., Pearson 2011.
3. Joseph A Gallian, *Contemporary Abstract Algebra*, 4th Ed., Narosa 1999.
4. I. N. Herstien, Topics in Algebra.
5. S. Singh and Q. Zameer Din, Modern Algebra.

Bachelor of Arts/Science

VA SEMESTER

DISCIPLINE SPECIFIC COUSRE –5 (CORE-5)

AMM519DA: METHODS OF APPLIED MATHEMATICS-I CREDITS THEORY-4, TUTORIAL: 2

THEORY (4 CREDITS: 60 HOURS) MAXIMUM MARKS: 60, MINIMUM MARKS: 24

Objectives: To study the different sections of a cone (as conic section) and properties.

ii).To study the properties of sphere, cone and cylinder.

iii). To introduce the students to the basic concepts of graph theory and its applications.

UNIT-1 (15 HOURS)

Parabola, tangents and normals, pole and polar, parametric equations of a parabola, ellipse, tangents and normals, pole and polar, parametric equations of ellipse, diameters, conjugate diameters and their properties. Hyperbola, tangents and normals, equation of hyperbola referred to asymptotes as axes, rectangular and conjugate diameters and their properties, tracing of conics (Cartesian co-ordinates only), general second degree equation in x and y, conditions under which a general second degree equation represents a conic and determination of equation of the corresponding conic.

UNIT-2 (15 HOURS)

Sphere, radical plane, coaxial system, cone, vertex, guiding curve, generator, equation of cone with vertex as origin or a given vertex and guiding curve, condition that the general equation of the second degree should represent a cone, necessary and sufficient conditions for a cone to have three mutually perpendicular generators, cylinder, equation of the cylinder whose generators intersect a given conic and are parallel to given line.

UNIT-3 (15 HOURS)

Introduction to graphs, paths and cycles, operations on graphs, bipartite graphs and Konig's Theorem, Euler graphs and Euler's Theorem, Konigsberg bridge problem, Hamiltonian graphs, degree sequences.Tress and their properties, centers in tress, binary and spanning trees, cut vertex and cut edge in graphs, incidence and adjacency matrix in graphs, directed graphs.

UNIT-4 (15 HOURS)

Definition, examples and basic properties of ordered sets, maps between ordered sets, duality principle, maximal and minimal elements, lattices ordered sets, complete lattices, lattices as algebraic structures, sublattices, products and homomorphisms. Definition, examples and properties of modular and distributive lattices, lattices, Boolean Algebras, Boolean polynomials, minimal forms of Boolean

polynomials, Quinn-McCluskey method, Karnaugh diagrams, switching circuits and applications of switching circuits.

TUTORIALS (2 CREDITS: 30 HOURS) Maximum Marks: 30 Minimum Marks: 12

Credit 1: Tutorials based on Unit I & II and **Credit 2**: Tutorials based on Unit III & IV.

Text Books Recommended

1. P. Balasubrahamanyam, K.G. Subramanian and G.R. Venkataraman, Coordinate Geometry of two and three Dimensions.
2. S.Pirzada and T.A.Chishti, Analytical Solid Geometry, Universities Press, Orient Blackswan, 2007.
3. Shanti Narayan, Analytical Solid Geometry.
4. Scham's Outline Series, Discrete Mathematics.
5. J.E. Whitesitt, Boolean Algebra and its Applications.

Bachelor of Arts/Science

VB SEMESTER

DISCIPLINE SPECIFIC COUSRE –5 (CORE-5

AMM519DB: MECHANICS **CREDITS THEORY-4, TUTORIAL: 2**

THEORY (4 CREDITS: 60 HOURS) **MAXIMUM MARKS: 60, MINIMUM MARKS: 24**

Objectives: To develop the capacity to predict the effects of force and motion while carrying out the creative design functions of the engineering.

UNIT-1 (15 HOURS)

Resultant forces, acting at a point, parallelogram law of forces, resultant of two forces, components of a force, Triangle law of forces, Lame's Theorem, Polygon law of forces, Theorem of resolved parts, resultant of a number of forces acting at a point, conditions for equilibrium of any number of forces acting on a particle, equilibrium of bodies resulting on a smooth inclined plane.

UNIT-2 (15 HOURS)

Parallel forces, resultant of two parallel forces, equilibrium of three parallel forces, moments, geometrical representations, Varignon's Theorem, resultant of a number of co-planer forces acting on a rigid body, centre of a number of parallel forces, moments of a force about a line couples, equilibrium of two couples, couples in parallel planes, resultant of a number of coplanar couple, resultant of a force and a couple, resultant of a system of a coplanar forces.

UNIT-3 (15 HOURS)

Velocity and Acceleration, motion in a straight line, motion with constant acceleration, Bodies falling vertically, Bodies projected vertically upward, space average and time average, Newton's Laws of motion, motion of connected particles, motion with variable acceleration.

UNIT-4 (15 HOURS)

Simple Harmonic motion of a particle attached to an electric string, motion on an inclined plane, equation of motion of a particle varying in a plane, motion of a projectile, range on an inclined plane.

TUTORIALS (2 CREDITS: 30 HOURS) Maximum Marks: 30 Minimum Marks: 12

- Tutorials based on Unit I & II - **1 credit**
- Tutorials based on Unit III & IV – **1 credit**.

Books recommended

1. S.R.Gupta, Elementary Analytical Dynamics of a Particle of Rigid bodies.
2. K.R.Chaudhary and D.R.Jain, Elements of Statistics.
3. M.K. Jain, S.R.K. Iyengar and R.K. Jain, Numerical methods for scientific and Engineering computation, Wiley Eastern (1993)

Bachelor of Arts/Science

V1A SEMESTER

DISCIPLINE SPECIFIC COUSRE –6(CORE-6)

AMM619DA: METHODS OF APPLIED MATHEMATICS-II CREDITS THEORY-4, TUTORIAL: 2

THEORY (4 CREDITS: 60 HOURS) MAXIMUM MARKS: 60, MINIMUM MARKS: 24

Objectives: i). To study the different types of matrices and to find the solutions of systems of equations and their consistency rising from various branches of science and social science.

ii). To study the properties of limits, continuity, differentiation and integration of vector functions.

iii). To learn the techniques and approximations to solve numerical problems arising in physical and engineering sciences.

UNIT-1 (15 HOURS)

Types of matrices, Inverse of a square matrix, reversal law and its generalization, trace of a matrix, matrix polynomials, characteristic equation, matrix polynomials, Cayley-Hamilton Theorem, rank of a matrix, invariance of rank matrix under elementary row and column transformations. Reduction of matrix to normal form, elementary matrices, equivalence of matrices, linear dependence and linear independence of row(column) vectors, conditions for columns of a matrix to be linearly dependent, matrix A has rank r iff it has r linearly independent columns, analogous results for rows.

UNIT-2 (15 HOURS)

Linear homogeneous and non-homogeneous equations with number of equations and unknowns upto four. Inner product of two vectors, orthogonal and unitary matrices, determination of orthogonal matrices, eigen values and eigen vectors and their determination.

UNIT-3 (15 HOURS)

Parametric representation of curves and surfaces; limit, continuity and differentiability of vector functions, derivative of sum, dot product and cross product of two vectors, gradient of a scalar field and directional derivative, geometrical representation. Divergence of vector field, curl of vector field, physical interpretation of divergence and curl, line integrals and Green's Theorem, surface area and surface integrals, Divergence Theorem of Gauss, Stoke's Theorem.

UNIT-4 (15 HOURS)

Introduction to numerical methods, Bisection method, False position method, Fixed point iteration method, Newton's method, Secant method, LU decomposition,

Gauss-Jacobi, Gauss-Seidel and SOR iterative methods. Algorithms and Convergence of solution. Lagrange and Newton interpolation, linear and higher order, finite difference operators, numerical differentiation, Forward difference, backward difference and central difference. Integration: trapezoidal rule, Simpson's rule, Euler's method.

TUTORIALS (2 CREDITS: 30 HOURS) Maximum Marks: 30 Minimum Marks: 12

- Tutorials based on Unit I & II - **1 credit**
- Tutorials based on Unit III & IV – **1 credit**.

Text Books Recommended:

1 A.Aziz, Nissar A.Rather & B.A.Zargar, A Text Book of Matrices, KBD.

2. Shanti Narayan, A Text Book of Matrices.

3. S. S. Sastry, Introductory Numerical Methods, Prentice- Hall of India,

New Delhi (1998).

4. M.K.Jain, S.R.K, Iyengar and R.K.Jain, *Numerical Methods for Scientific and Engineering Computatio*n, 5th Ed., New age International Publisher, India, 2007.

5.G.B.Thomas and R.L. Finney, calculus, 9th Ed., Pearson Education, Delhi, 2005.

6. Shanti Narayan, Vector Calculus.
7. Schaum's Outline Series, Vector Analysis.

Bachelor of Arts/Science

V1B SEMESTER

DISCIPLINE SPECIFIC COUSRE –6 (CORE-6)

AMM619DB: LAPLACE AND FOURIER TRANSFORMATIONS CREDITS THEORY-4, TUTORIAL: 2

THEORY (4 CREDITS: 60 HOURS) MAXIMUM MARKS: 60, MINIMUM MARKS: 24

Objectives:

UNIT-1 (15 HOURS)

Laplace transform-definition, Laplace transform of some elementary functions, piecewise continuity, functions of exponential order, sufficient conditions for existence of Laplace transform, linearity property, first and second translation (shifting property), Laplace transform of derivatives, Laplace transform of integrals, periodic functions, initial and final value theorems and their generalizations, methods of finding Laplace transform, differential equations, evaluation of integrals, the Gamma function, Bessel functions, the error function, sine and cosine integrals, exponential integral, unit step function, Dirac delta function, null functions, Laplace transform of special functions.

UNIT-2 (15 HOURS)

Definition and uniqueness of inverse Laplace transform, Lerch's theorem, some inverse Laplace transform, some properties of Laplace transform, inverse Laplace transform of derivatives and integrals, the convolution property, methods of finding inverse Laplace transform, the complex inversion formula, the Heaviside expansion formula, the beta function, evaluation of integrals, ordinary differential equations with constant coefficients and with variable coefficients, simultaneous ordinary differential equations,

UNIT-3 (15 HOURS)

Periodic functions, Fourier series, determination of Fourier coefficients, even and odd functions and their Fourier expansion, change of interval, half range series (sine and cosine series), Riemann-Lebesgue Lemma, Dirichlet's conditions.

UNIT-4 (15 HOURS)

Fourier transform, inverse Fourier transform, Fourier sine and cosine transforms and their inversion, properties of Fourier transforms, Fourier transform of the derivative, convolution theorem, discrete Fourier transform and fast Fourier transform and their properties, applications of Fourier transform in partial differential equations with special reference to heat and wave equation.

TUTORIALS (2 CREDITS: 30 HOURS) Maximum Marks: 30 Minimum Marks: 12

- Tutorials based on Unit I & II - **1 credit**

- Tutorials based on Unit III & IV – **1 credit**.

Recommended Books:

1. I

2. . Murrey R. Spiegel, Laplace Transforms, Schaum's outline series.

3. I. N. Sneddon: The use of Integral Transforms, McGraw-Hill, Singapore 1972.
4. R. R. Goldberg, Fourier Transforms, Cambridge University Press, 1961.
5. D. Brain, Integral Transforms and their applications, Springer, 2002
6. L. Debnath and F. A. Shah, Wavelet Transforms and their applications, Springer, 2015.
7. R.V. Charchill, Foruier Series and Boundary Value Problems.

Bachelor of Arts/Science

V SEMESTER

Generic Elective Course –6 (GE-6)

AMM519G: Mathematics-I **CREDITS THEORY-4, TUTORIAL: 2**

THEORY (6 CREDITS: 60 HOURS) **MAXIMUM MARKS: 60, MINIMUM MARKS: 24**

Objectives: To understand the notions of limit, continuity, differentiation and integration of a function and techniques of solving differential equations.

UNIT-1 (15 HOURS)

Cartesian Product of Sets, Relations, Types of relations, Functions, Types of functions, Composition of functions, Inverse of a function , Limit of a function, Left hand and right hand limits, Properties and evaluation of limits, Continuity of a function, Tests of continuity, Types of discontinuities.

UNIT-2 (15 HOURS)

Differentiation of a function, Rules of differentiation, Differentiation of $x^n, (ax+b)^n$, trigonometric and inverse trigonometric functions, exponential, logarithmic, hyperbolic and inverse hyperbolic functions, Successive differentiation, Leibnitz's Theorem, Partial Differentiation, Total differentiations, Euler's Theorem.

UNIT-3 (15 HOURS)

Integration as inverse process of differentiation, Indefinite and definite integrals, Integration by substitution , by parts and by partial fractions methods, Integrals of the types $\sqrt{a^2-x^2}, \sqrt{a^2+x^2}$ and $\sqrt{x^2-a^2}$, trigonometric and inverse trigonometric functions, exponential, logarithmic, hyperbolic and inverse hyperbolic functions, Reduction Formulae.

UNIT-4 (15 HOURS)

Differential equations, Order and degree of a differential equation, Differential equations of the first order and their solutions by Variables Separable Method, Solutions of homogeneous and non-homogeneous differential equations of first order, Solution of the linear differential Equation dy/dx + Py = Q, Equations reducible to linear form, Change of variables method, Bernoulli's differential equation.

TUTORIALS (2 CREDITS: 30 HOURS) **Maximum Marks: 30 Minimum Marks: 12**

- Tutorials based on Unit I & II - **1 credit**
- Tutorials based on Unit III & IV – **1 credit**.

Books Recommended

1. S.D. Chopra, M.L.Kochar and A.Aziz, Differential Calculus, Kapoor Publications.

2. S.D. Chopra and M.L.Kochar, Integral Calculus, Kapoor Publications.

Bachelor of Arts/Science

VI SEMESTER

Generic Elective Course –6 (GE-6)

AMM619G: Mathematics-II **CREDITS THEORY-4, TUTORIAL: 2**

THEORY (6 CREDITS: 60 HOURS) **MAXIMUM MARKS: 60, MINIMUM MARKS: 24**

Objectives: i).To study/extend the complex analogues of plane trigonometry.
ii). To learn techniques for solving equations of degree upto four.
iii). To use matrix methods for solving equations.
iv). To study different sections of a cone.

UNIT-1 (15 HOURS)

Review of complex number system, triangle inequality, geometrical representations of sum, difference, product and quotient of the complex numbers, equation of a circle, Cross-ration, De Moivere's theorem and its applications, expansion of sin nθ, cos nθ etc. in terms of powers of sin θ, cos θ and expansion of $\sin^n \theta$ and $\text{sos}^n \theta$ in terms of multiples of cosθ and sin θ, nεN. Functions of a complex variable, exponential, circular, hyperbolic, inverse hyperbolic and logarithmic functions of a complex variable and their properties, summation of trigonometric series, difference and C + iS methods.

UNIT-2 (15 HOURS)

General properties of polynomials, Remainder and Factor Theorem, relation between the roots and the coefficients of a polynomial equations, transformation of equation, symmetric function and their applications, solutions of the cubic and biquadratic equations, Descarte's rule of signs, upper bounds for positive and negative root of an equation.

UNIT-3 (15 HOURS)

Types of matrices, inverse of a square matrix, matrix polynomials, matrix and characteristics polynomial, eigen values and eigen vectors of matrix and their determination, rank of a matrix, invariance of rank through elementary transformation, reduction of matrix to normal form, elementary matrices, linear dependence and linear independence of row (column) vectors, conditions for columns of a matrix to be linearly dependant, A matrix has rank r iff it has r linearly independent columns, analogous results for rows, linear homogenous and non-homogenous equations, orthogonal and unitary matrices.

UNIT-4 (15 HOURS)

Pair of equations, joint equation of two straight lines, equations of angle bisectors, condition for general equation of 2^{nd} degree to represents two straight lines, circle equation of tangent and normal to the circle, chord of contact, orthogonality of circles, parabola equation of parabola, tangent and normal, parametric equations, ellipse, tangent and normal, pole and polar, Parametric equations of an ellipse, conjugate diameters and their properties, Hyperbola, equation of tangent and normal, equation of asymptotes axes, rectangular hyperbola, conjugate diameters and their properties.

TUTORIALS (2 CREDITS: 30 HOURS) Maximum Marks: 30 Minimum Marks: 12

- Tutorials based on Unit I & II - **1 credit**
- Tutorials based on Unit III & IV – **1 credit**.

Books recommended

1. W.S.Burnside and A.W.Panton, The Theory of Equations, Dublin University Press, 1954.
2. C.C.MacDuffee, Theory of Equations, John Wiley and Sons Inc., 1954.
3. A..Aziz and N.A.Rather, Complex Trigonometry, KBS.
4. A. Aziz, N. A. Rather and B. A. Zargar, Elementary Matrix Algebra, KBD.
5. Coordinate Geormetry, KBD.