DEPARTMENT OF MATHEMATICS
B.A./B.Sc. Degree Course in Mathematics

PROGRAM OUTCOMES:-

After successful completion of the three years B.A./B.Sc. Degree Course in Mathematics, students will be able to :

i) Improve a positive attitude towards Mathematics as an interesting and valuable subject of study.

ii) Gain a strong foundation in various branches of Mathematics to formulate real life problems into mathematical models.

iii) Communicate appropriately and effectively in a scientific context using perfect technology and new findings.

iv) Improve logical thinking and expertise required in various techniques for proving or disproving the facts after mathematical formulation.

v) Gain basic practical skills and technical knowledge's in various fields such as Astronomy, Astrology, Education, Planning, Accounts, Finance, Economics, Statistics, computing and in all science and technology.

vi) Improve and enhance students overall activity and to equip them with mathematical modelling abilities, problems solving skills, creative talents and power of communications etc., which are necessary for various kind of employment.

vii) Create awareness to become an enlightened citizen with commitment to deliver one's responsibility within the scope of bestowed rights and privileges.

viii) Attain a relational understanding of mathematical concepts and concerned structures and follow the patterns involved, mathematical reasoning.

ix) Attain adequate exposure to global and local concerns that explore them many aspects of mathematical sciences.

Semester – I (Elective Paper)

Course/Subject Code: B.Math – 101
Name of the course: Classical Algebra, Modern Algebra and Trigonometry.

COURSE OUTCOMES:

After completion of the these courses, students will be able to:

i) Specify the mathematical logic which is very useful for solving mathematical reasoning problems.

ii) Understand the roots of polynomial over rational.

iii) Draw graphs and to find roots and prime integers using maxima software.

iv) Apply divergence test to determine divergence of an infinite series.

v) Understand methods for knowing convergence/divergence of some basis series.

vi) Know what is meant by infinite series and its divergence.

vii) Find the solution of cubic equations by Cardan's method.

viii) Apply Euler-Fermat's Theorem to prove relations involving prime numbers.

ix) Gain the notion of ideals and factor rings with examples.

x) Learn the construction of field of quotients of an integral domains.

xi) Understand the algebraic structure ring in detail through various examples.

xii) Understand the details of unique Factorisation domain, Euclidean domain and related results.

xiii) Convert among the decimal degrees, degree minute second, and radian measure of an angle.

xiv) Calculate six trigonometric functions using a calculator and also to determine exact values for some special angles without a calculation.

xv) Know and apply identities involving the trigonometric functions.

Semester – II (Elective Paper)

Course/Subject Code: B.Math – 202

Name of the course:- Differential Calculus, Integral Calculus and Ordinary Differential Equation.

COURSE OUTCOMES:

After completion of these courses, students will be able to:

i) Understand basic properties of real numbers and its subsets which are backbones of real analysis.

ii) Apply notion of derivative in Mean Value Theorem and also in Higher Order derivatives.

iii) Find curves in polar and Cartesian co-ordinate systems and how to calculate arc length, area and volume of evolution of a curve.

iv) Find the volumes of solids using cross sections.

v) Determine the area and volume by applying the techniques of double and triple integrals.

vi) Identify different types of differential equations and solving them.

vii) Develop the application of integration in evaluating arc length, area and volume of revolution of a curve etc.

viii) Solve first order differential equation utilizing the standard technique for separable, exact, linear, homogeneous or Bernoulli's cases.

ix) Possess a working knowledge of basic application problems described by second order linear differential equations with constant co-efficients.

x) Develop problems solving skills for solving various types of differential equation.

xi) Evaluate the complete solution of non-homogeneous differential equation as a linear combination of the complementary function and a particular solution.

Semester – III (Elective Paper)

Course/Subject Code: B.Math – 303

Name of the course:- Geometry, Vectors and Theory of probability).

COURSE OUTCOMES:

After completion of these course, students will be able to:

i) Introduce the analytical geometry of two and three dimensions.

ii) Study the straight lines in two and three dimensions.

iii) Attain acquaintance with typical problem on centre of gravity and existence solution.

iv) Discuss the figures of paraboloid, ellipsoid, hyperboloid and cylindroids.

v) Find integrals by using Green's Theorem, Stokes' Theorem and Gauss's Theorem.

vi) Interpret the gradient, curl, divergent for a function at a given point.

vii) Find the area of a triagle, a parallelogram and the volume of a solid figure.

viii) Find limits, derivatives, tangent lines, integrals, arc length, curvature and torsion etc. of a vector function.

ix) Explain probability density function, probability distribution.

x) Discuss the moment generating functions, chi-square distribution.

xi) Calculate the analysis of variance, one way and two way classifications, latin square design.

xii) Derive mathematical expectation, binomial, poission, normal distribution.

Semester – IV (Elective Paper)

Course/Subject Code: B.Math – 404
Name of the course:- Dynamics, Statics, Rigid Dynamics.
COURSE OUTCOMES:
   After completion of these courses, students will be able to:
   i)   Demonstrate the composition of Simple Harmonic Motion and the differential equation of a central orbit.
   ii)   Find the law of force, if the orbit is given and vice-versa.
   iii)   Apply Kepler's Laws of planetary motion to solve the problems.
   iv)   Understand the general principles of dynamics.
   v)   Describe energy methods for particles and systems of particles.
   vi)   Prove the parallelogram of forces, triangle of forces, converse of the triangle of forces, polygon of forces, Lami's Theorem, Varignon's Theorem of moments.
   vii)   Explain catenary and obtain the equation to the common catenary.
   viii)   Find the resultant of coplanar couples, equilibrium of couples and the equation to the line of action of the resultant.
   ix)   Identify an ability to calculate centroids and moments of inertia.
   x)   Identify internal forces and moments of a rigid body.
   xi)   Apply the principles of static equilibrium to particles and rigid bodies.
   xii)   Utilize the equations of linear momentum and angular momentum for a system of particles or a rigid body under the action of external force.
   xiii)   Utilize the parallel axes theorem for a rigid body and the perpendicular axes theorem for a plain lamina.
   xiv)   Determine equations of motion of rigid bodies and motion relative to centre of inertia.
   xv)   Determine D' Alembut's principle of internal forces.

Semester – V (Honours Paper)

Course/Subject Code: B.Math – 505
Name of the course:- Abstract Algebra, Linear Algebra.
COURSE OUTCOMES:
   After completion of these courses, students will be able to:
   i)   Determine the properties of groups, rings and different types of groups and rings.
   ii)   Examine the properties of Ideals-Maximal and prime ideals, cossets-order of an element.
   iii)   Apply the theory of groups and rings and solve problems.
   iv)   Develop proof of results on permutation group, cyclic groups, quotient groups, subgroups, subrings, quotient rings.
   v)   Explain rings, zero divisors of a ring integral domain, field and prove theorems.
   vi)   Prove Cayley's theorem, the fundamental theorem of homomorphism for groups.
   vii)   Demonstrate the linear transformations, rank, nullity.
   viii)   Introduce the concept of vector spaces and linear transformations in their abstract generality.
   ix)   Solve the system of simultaneous linear equations.
   x)   State linear transforms in other forms, such as matrix equations and vector equations.
   xi)   Characterize linear transformations as onto, one-to-one.
   xii)   Apply the properties of linear transformation to linearity of transformations, kernel and rank of linear transformation, inverse transformations to solve the problems of matrix transformations, change of basis.

Course/Subject Code: B.Math – 506

Name of the course:- Analysis – I (Real Analysis).

COURSE OUTCOMES:

After completion of this course, students will be able to:

i) Describe the primary concepts of sequences and series of real numbers.

ii) Relate the behaviour of monotonic and geometric sequences and series.

iii) Learn the function of several variables and its applications.

iv) Study Riemann Integral and its properties in detail, leading to fundamental theorem of calculus and Mean value theorem.

v) Study different tests for solving improper integrals of first and second kind.

vi) Assign integrals by using Beta and Gamma functions.

vii) Verify the given sequence in convergent and divergent by using behaviours of Monotonic sequence.

viii) Prove Bolzano-Weierstrass theorem, Heine-Borel theorem and Newton interval theorem and understand their applications.

ix) Specify properties of continuous functions on a closed interval.

x) Use Green's theorem, Stoke's theorem and Gauss divergence theorem to compute integrals.

Semester – V (Honours Paper)

Course/Subject Code: B.Math – 507

Name of the course:- Numerical Analysis and computer programming.

COURSE OUTCOMES:

After completion of these courses, students will be able to:

i) Obtain Gauss's formula and stirling formula using Newton forward formula and Newton backward formula.

ii) Obtain Simpson's 1/3, 3/8 rules using trapezoidal rule.

iii) Know the theoretical and practical aspects of numerical analysis.

iv) Derive numerical methods for various mathematical operations and tasks, such as interpolation, differentiation, integration, the solution of linear and non-linear equations.

v) Understand the common numerical analysis and how they are used to obtain approximate solutions to otherwise and intractable mathematical problem.

vi) Read, understand and trace the execution of programs written in C language.

vii) Write the C code for a given algorithm.

viii) Develop confidence for self education and ability for life-long learning needed for computer language.

ix) Implement the algorithms and drawing of flow charts for solving mathematical problem.

x) Explain data types and use them in simple data processing applications. Students will be able not only to use the concept of array of structures, but also to define union and enumeration user defined data types.

xi) Understand a defensive programming concept and handle possible errors during program execution.

Course/Subject Code: B.Math – 605
Name of the course:- Partial differential equation, Leplace transform, Calculus of variation.
COURSE OUTCOMES:
    After completion of these courses, students will be able to:
i)   Learn different methods to solve first order partial differential equation.
ii)   Formulate appropriate numerical methods for solving various problems in partial differential equations.
iii)   Analyze the fundamental principles of partial differential equation to solve hyperbolic, parabolic and elliptic equations.
iv)   Learn the evaluation of inverse Laplace transform of functions, their derivative and integrations and applications of Convolution theorem.
v)   Learn the evaluation of Laplace transform of different types of function, their derivative and integrations.
vi)   Apply Laplace transform to solve ordinary differential equations.
vii)   Learn the methods and prospective of Laplace transform and inverse Laplace Transform and apply them to solve Linear Differential Equations.
viii) Apply Laplace Transform to find the solutions of initial value problems for linear ordinary differential equations.
ix)   Explain the properties of Laplace Transform which may be solved by application of special functions.
x)   Obtain the Euler-language equations for variational problems including the case of general variations.
xi)   Give an account of the foundation of calculus of variations and of its applications in mathematics and physics.
xii)   Solve simple initial and boundary value problems by using several variable calculus.
xiii) Derive conserved quantities from symmetries and use them to solve the Euler Language equation.
xiv) Explain the Brachistochron problem mathematically and solve it.

Course/Subject Code: B.Math – 606
Name of the course:- Metric Space and Complex Analysis.
COURSE OUTCOMES:
    After completion of these courses, students will be able to:
i)   Learn the basic ideas of open sets, closed sets, limit point, adherent point, interior, exterior and frontier point, boundary points, subspace, product metric spaces and apply them to study the nature of sets.
ii)   Learn the theorems an compactness, completeness, connectedness and use them to solve the problems, identity the continuity of a function which is defined on metric spaces, at a given point and identify the set of points on which a function is continuous, by using different theorems.
iii)   Possess with basic mathematical tests such as open and close sets, continuity connectedness, compactness which can be used to study real and complex analyses.
iv)   Know the concepts of completeness, continuity and discontinuity of metric spaces.
v)   State the definition of continuity of a function between two metric spaces.

vi) Distinguish between open and closed balls in a metric space and determine them for given metric spaces.

vii) Describe convergence for sequences in a metric space and determine whether a given sequence in a metric space converges.

viii) Calculate sums, products, quotients, conjugates, modulus, and argument of complex numbers.

ix) Calculate exponentials and integral powers of complex numbers.

x) Examine the significance of differentiability for complex functions and be familiar with the Cauchy-Riemann equations.

xi) Evaluate whether a given function is an analytic.

xii) Follow the concept of the differentiability of real valued function and be familiar with the statements and proofs of the standard results about differentiable real functions.

xiii) Classify Bilinear transformation, cross ratio, fixed point.

xiv) Create the bilinear transformation which maps real line to real line, unit circle to unit circle, real line to unit circle.

Semester – VI (Honours Paper)

Course/Subject Code: B.Math – 60707

Name of the course:- Special theory of Relativity and Tensors.

COURSE OUTCOMES:

After completion of these courses, students will be able to:

i) Apply an inertial frame is one in which Newton's first law of motion holds and transforms one inertial frame to another by Galilean transformations.

ii) Understand the new concept of space and time, any velocity is less than the velocity of light, addition of any velocity of light is simply equal to velocity of light etc.

iii) Understand that the two fundamental conceptions of mass and energy are identical by Einstein formula ($E=mc^2$).

iv) Describe the meaning and significance of the postulate special theory of relativity.

v) Perform basic calculations in relativistic kinematics and dynamics.

vi) Study the generalization of a vector of two or three dimensions to n-dimentional entity.

vii) Demonstrate an understanding of the basic principles of the special theory of relativity.

viii) Derive Lorentz transformation equations by using special theory of relativity.

ix) Study the transformations of co-ordinates of tensors.