Govt. Lal Chakradhar Shah PG College, Ambagarh Chowki

Dist. – Mohla-Manpur-Ambagarh Chowki (C.G.)

Department of Mathematics

NEP 2020

Program Outcomes (PO)

PO 1- Ability to develop scientific temper and acquire in depth knowledge of algebra, calculus, real analysis , complex analysis, topology and several other branches of Mathematics. This Program helps learners in building a solid foundation for higher studies in mathematics .

PO2 – Utilize mathematics to solve theoretical and applied problems by critical thinking, understanding , analysis and synthesis.

PO3 – The skills and knowledge gained has intrinsic beauty, which also lead to proficiency in analytical reasoning. This can be utilized in modeling and solving real life problem .

PO 4- Ability to apply mathematical tools in physics , Economics , Optimization and other subjects it will also develop understanding the architecture of curves and surfaces in plane and spaces etc.

PO 5- This program will also enable the learners to join teaching profession in schools and this will help the students to enhance their employability for government jobs, jobs in banking insurance and investment sectors , data analyst jobs and jobs in various other public and private enterprises .

Course learning outcome (CLO) :-

MASC -01 Elementary Calculus :-

This Course will enable the students to:

- Know about ancient Indian Mathematicians and their contribution
- Calculate the limit and examine the continuity and understand the geometrical interpretation of differentiability. Apply various tests to determine convergence.
- Understand the consequences of various mean value theorems.
- Understand concepts of Curvature and Asymptotes.
- Draw curves in Cartesian and polar coordinate systems
- Understand the elementary integration of transcendental function and understand applications of reduction formulae.

MASC -02 ALGEBRA :-

This Course will enable the students to:

- Learn about the Matrix algebra.
- Understand Set theory, Function and Relation
- Learn about the theory of equations.
- Learn about the fundamental concepts of groups, Subgroups.
- Understand cosets and normal subgroups

MASC-03 :- DIFFERENTIAL EQUATIONS

This Course will enable the students to:

- Learn various techniques of getting exact solutions of certain solvable first order differential equations and linear differential equations of second order.
- Understand the genesis of ordinary as well as partial differential equations.
- Learn about solution of first order linear partial differential equations using Lagrange's method.
- Know how to solve second order linear partial differential equations with constant coefficients.

MASC-04 :- ABSTRACT ALGEBRA

This Course will enable the students to:

- Understand of Homomorphism, Isomorphism of Group
- Understand Cyclic and Permutation Groups.
- Understand vector spaces, subspaces, basis, dimension and their properties.
- Learn about properties of linear transformation and isomorphism theorems.
- Understand the concept of linear transformations.

MASC-05 :- REAL ANALYSIS

This Course will enable the students to:

- Understand basic properties of real number system such as least upper bound property and Order property.
- Realize importance of bounded, convergent, Cauchy and monotonic sequences of real numbers, find their limit superior and limit inferior.
- Learn about Riemann integrability of bounded functions and algebra of R-integrable functions.
- Determine various applications of the fundamental theorem of integral calculus.
- Relate concepts of uniform continuity, differentiation, integration and uniform convergence..

MASC-06 :- METRIC SPACES

This Course will enable the students to-

- Understand concepts of metric, distance, convergence, completeness, compactness, connectedness, Bolzano-Weierstrass property.
- Apply these concepts to key classes of spaces.
- Learn to analyze mapping between spaces.
- Identify the continuity of a function defined on metric spaces homeomorphism.
- Attain background for advanced courses in real analysis, functional analysis and topology.

MASC-07:- ADVANCED REAL ANALYSIS

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

- Understand the concept of sequences and series of functions, power series apply the test for their convergence, divergence and apply Abel's and Tauber's theorems.
- Understand the concept of functions of several variables and properties of sets of vectors in R", maxima and minima of real valued functions from R to Rand from R to R, concept of Integration theory that is closely related to the theory of Euclidean spaces and derivatives of functions of several variables.
- Understand the concept of Riemann-Stieltjes integral and apply it to evaluate definite integrals arising in different fields of science and engineering.

MASC-08:- ADVANCED ABSTRACT ALGEBRA

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

- Demonstrate capacity for mathematical reasoning through analyzing, Proving and explaining concepts from advanced algebra.
- Understand the concept of Normal and subnormal series, solvable group, state and prove Jordan-Holder theorem.
- Understand the concepts of fields, extension of fields and splitting fields of polynomials
- . Create, select and apply appropriate algebraic structures such as Galois extensions, Automorphisms of groups and fixed fields, Fundamental theorem of Galois theory to understand and use the Fundamental theorem of Algebra, solvability of polynomials.
- Understand the concepts of modules, Noetherian and artinian modules. Prove Wedderburns theorem on finite division rings.

MAGE -01 :- ELEMENTARY CALCULUS

This Course will enable the students to:

- Know about ancient Indian Mathematicians and their contribution
- Calculate the limit and examine the continuity and understand the geometrical interpretation of differentiability. Apply various tests to determine convergence.
- Understand the consequences of various mean value theorems.
- Understand concepts of Curvature and Asymptotes.
- Draw curves in Cartesian and polar coordinate systems

- Understand the elementary integration of transcendental function and understand applications of reduction formulae.

MAGE -02:- ALGEBRA

This Course will enable the students to:

- Learn about the Matrix algebra.
- Understand Set theory, Function and Relation
- Learn about the theory of equations.
- Learn about the fundamental concepts of groups, Subgroups.
- Understand cosets and normal subgroups

MASE -01 :- ADVANCED CALCULUS

This Course will enable the students to:

- Calculate the limit and examine the continuity and understand the concepts of limit, continuity and differentiability of functions of more than one variable with geometrical interpretation.
- To Understand the concepts of mean value theorems with their applications.
- To understand the concept of maxima and minima for functions of two and three variables with their uses and techniques
- Understand conceptual variations while advancing from one variable to several variables in calculus.
- Understand the concept of integration of functions of two and three variables and their evaluation technique with emphasis on beta and gamma functions

MASE – 02:- MECHANICS

This Course will enable the students to:

- The object of the paper is to give students knowledge of basic mechanics such as simple harmonic motion, motion under other laws and forces.
- Learn about a nul point, a nul line, and a nul plane with respect to a system of forces acting on a rigid body together with the idea of central axis.
- Understand necessary conditions for the equilibrium of particles acted upon by various forces and learn the principle of virtual work for a system of coplanar forces acting on a rigid body. Determine the centre of gravity of some materialistic systems and discuss the equilibrium of a uniform cable hanging freely under its own weight.
- Deal with the kinematics and kinetics of the rectilinear and planar motions of a particle including the constrained oscillatory motions of particles. Learn that a particle moving under a central force describes a plane curve and know the Kepler's laws of the planetary motions, which were deduced by him long before the mathematical theory given by Newton.
- Understand the reduction of force system in three dimensions to a resultant force acting at a base point and a resultant couple, which is independent of the choice of base of reduction.

MASE – 03 :- NUMERICAL METHODS

This Course will enable the students to:

- The aim of this course is to teach the student the application of various numerical techniques for variety of problems occurring in the daily life.
- The main outcome will be that student will be able to handle problems and finding approximated solution.
- Obtain numerical solutions of algebraic and transcendental equations.
- Find numerical solutions of system of linear equations and to check the accuracy of the solutions.
- Learn about various interpolating and extrapolating methods to find numerical solutions.

MASE – 04 :- NUMBER THEORY

This Course will enable the students to:

- Know about distribution of prime and congruence.
- Solve Number theoretic functions
- Learn primitive, Quadratic Reciprocity Law and Public Key Encryption

MASE – 05 :- INTEGRAL TRANSFORMS

- This Course will enable the students to:

- Know about piece wise continuous functions, Dirac delta function, Laplace transforms and its properties.
- Solve ordinary differential equations using Laplace transforms.
- Explain Parseval's identity, Plancherel's theorem and applications of Fourier transforms to boundary value problems.

MASE – 06 :- TOPOLOGY

This Course will enable the students to:

- Understand the concept of countable and uncountable sets and its properties. Understand the concept of topological spaces and its examples, bases, sub-bases, subspaces and relative topology.
- Understand the concept of countable, separable spaces and separation axioms with their characterizations and basic properties.
- Understand the concept and properties of compactness, continuous functions.
- Understand the concept and properties of countable compactness in metric spaces.
- Understand the concept and properties of connectedness, continuous functions.

MASE – 07 :- COMPLEX ANALYSIS-I

This Course will enable the students to:

- Understand Complex number and their properties.
- Learn about properties of linear transformation and isomorphism theorems.
- Understand the concept of Limit, Continuity, Differentiability of Complex and Analytic function.
- Obtain various variants of Mobius transformations.
- Obtain various Conformal mapping and types of transformations.

MASE – 08 :- DISCRETE MATHEMATICS

This Course will enable the students to:

- The course aims at introducing the concepts of Lattices, sub Lattices and Homomorphisms between Lattices.
- Understand the uses of Boolean algebra in daily life.
- Understand the uses of grammer and languages in daily life.
- Learn about the Finite state machines in different fields.
- Solve real-life problems using finite-state and Tuning machines.

MASE – 09 :- MEASURE THEORY

This Course will enable the students to:

- Understand development of measure and integration theory and Borel, Lebesgue measurability, and compare integration theory of Lebesgue and Riemann with examples and counter examples.
- Understand the concept and properties of functions of bounded variation.

MASE – 10 :- GENERAL AND ALGEBRIC TOPOLOGY

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

- Understand the concept of products in different topological spaces.
- Understand embedding, metrization and its related theorems.
- Understand the concept of net, filter and its various topological properties and their inter-relations.
- Understand fundamental group and covering spaces.

MASE – 11 :- COMPLEX ANALYSIS- II

This Course will enable the students to:

- Understand the fundamental Complex integration.
- Understand the concept of residues and apply Cauchy's residue theorem to evaluate integrals. Understand the concept of conformal mappings, bilinear transformations, their properties and classifications. Understand the concept about the spaces of analytic functions.
- Understand the concept of Weierstrass' factorization theorem, Riemann Zeta function, Gamma function and its properties. Understand the concept of Analytic Continuation and its properties. Gain knowledge of power series of analytic function. Understand the concept and properties of Harmonic functions on a disc.
- Understand the concept of Canonical products, entire function and exponent of Convergence.
- Understand the advanced concepts of Analytic functions and its properties

MASE – 12:- GRAPH THEORY

This Course will enable the students to:

- Appreciate the definition and basics of graphs along with types and their examples.
- Understand the definition of a tree and learn its applications to fundamental circuits.
- Know the applications of graph theory to network flows.
- Understand the notion of planarity of a graph.
- Relate the graph theory to the real-world problems.

MASEC – 01:- INTRODUCTION TO LATEX

This Course will enable the students to:

- Make different Alignments in a document and an Application for a job.
- Generate Bio-Data, and Table Structures.
- Create Mathematical Statements using LaTex.
- Prepare Articles and Inserting Pictures.
- Prepare Question paper and PowerPoint presentation in LaTeX format.

MASEC – 02:- PYTHON

This Course will enable the students to:

- To write python programs, develop a small application .and logic for problem solving.
- To be familiar about the basic constructs of programming such as data, operations, conditions, loops, functions etc.
- To be familiar with string and its operation.
- To develop basic concepts of function and terminology.
- To determine the methods to create and develop Python programs by
- Utilizing the data structures like lists and tuples.

MAVAC – 01 :- BASIC MATHEMATICS AND LOGIC

This Course will enable the students -

- To orient them towards life-long learning, to develop power of concentration and to overcome the fear of mathematics from their mind.
- To cultivate scientific temper through systematic, critical and lateral thinking.
- To enhance their logical, analytical and reasoning skills useful for competitive exams.
- To make understand the relevance and need of quantitative methods for making business decisions.