

Hukum Singh Bora Govt. Post Graduate College, Someshwar (Almora)

B.Sc. Mathematics

Program Outcome:

PO – 1 : Knowledge domain: Demonstrate an understanding of the basic concepts in mathematics, statistics, operations research and their importance in the solution of some real- world problems.

PO – 2 : Problem analysis: Analyze and solve the well-defined problems in mathematics statistics, and operations research. Utilize the principles of scientific enquiry, thinking analytically, clearly and critically, while solving problems and making decision. Find, analyze, evaluate and apply information systematically and shall make defensible decisions.

PO – 3 : Presentation and Interpretation of Data: Demonstrate the ability to manipulate and visualize data and to compute standard statistical summaries.

PO – 4 : Modern tool usage: Learn, select, and apply appropriate methods and procedures, resources and computing tool such as Excel, MATLAB, MATHEMATICA, SPSS etc with an understanding of the limitations.

PO – 5 : Ethics: Analyze relevant academic, professional and research ethical problems and commit to professional ethics and responsibilities with applicable norms of the data analysis and research practices.

PO – 6 : Communication: Effectively communicate about their field of expertise on their activities, with their peer and society at large. Such as, being able to comprehend and write effective reports and design documentation, make effective presentations.

Programme Specific Outcome (PSOs) After the successful completion of graduation programs in Mathematics the students will be able to:

PSO – 1 : Understand the mathematical concepts and application in the field of algebra / analysis, Differential equations.

PSO – 2 : Get jobs in public / private sectors and pursuing higher studies at national and international level.

PSO – 3 : To apply knowledge of Mathematics in all the fields of learning including higher research and extensions.

PSO – 4 : To provide a systematic understanding of the concepts and theories of mathematics and analyze the situations

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Course Outcomes

B. Sc. Semester I

PAPER I: Elementary Algebra and Trigonometry

CO 1- To make students able to understand numbers and their diversification. Identification of utility of numbers in day-to-day life as well as their application in the field of engineering and computational advancements. Concept of complex numbers specially the deliberations of imaginary part

CO 2- To make students able to understand binary compositions against the very concept of traditional operations of summation, subtraction, multiplication and division. The concept of congruent modulo will ensure the advancement of students towards mathematical modeling.

CO 3- Few problems may have limited solutions or infinite number of solutions whereas there exist problems with no solution. Solution and study of system of equations will facilitate students to distinguish among the options available to find the solution of problems.

CO 4- The concept of matrices will enable students to understand two-dimensional calculation in the form of an array and systematic placement of data in a particular position.

CO 5- Having understood the concept of complex numbers the understanding of their computation and applicability as a function will be facilitated by the introduction of Exponential, Logarithmic, Circular and hyperbolic functions together with their inverses, Gregory's series, Summation of Trigonometric series

PAPER II: DIFFERENTIAL CALCULUS

CO 1- To understand the concept of Limit, Continuity and Differentiability and usage of epsilon and delta.

CO 2- To make students able to formulate differentiation of higher order in general way
CO 3- Study of tangents and normal to understand the smoothness of curve at the micro level.

CO 3- The concept of Curvature and Asymptotes to understand the tilt of the curve at micro level.

CO 4- There are certain points acting as exception to a definition in terms of curves the concept will be developed by the study of Singular Points and the students will be made to find the geometrical perspective of functions by the study of Curve Tracing.

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PAPER III: GEOMETRY AND VECTOR ANALYSIS MM 60

CO 1- To make students able to measure the location of a point in terms of angle and distance by means of the knowledge of Polar Equation of conics.

CO 2- To make students able to understand the algebra of vectors and their application to geometry

CO 3 – To make students able to differentiate functions keeping the directions in view. Study of Vector Differentiation will enable students to differentiate the components of functions with directions:

CO 4- The introduction to Vector Integration so as to make students able to integrate functions over the given surfaces and volume.

B. Sc. Semester II

PAPER I: GROUP THEORY

CO 1- Basic concept of sets so as students will be able to define operations in sets and relations and mappings.

CO 2- To make students understand the sets with infinite number of elements and understand the cardinality instead of simple counting.

CO 3- To make students able to understand the grouping of the sets and to define binary composition within the sets.

CO 4- To understand the concept of relations and mappings among the groups. One-one and onto concept to give rise to homeomorphism and isomorphism.

PAPER II: INTEGRAL CALCULUS

CO 1- To make the concept of integration vivid and to understand the Definition of integration as the sum over the given set

CO 2- To clear the concept of the functions arising out of infinite integrations and their applicability.

CO 3- To develop the concept of multiple integrations so as to make students able to integrate over surface and volume.

CO 4- To make students able to apply the concept of integration to find the volume and surface coming out of the revolution of surfaces and curves.

PAPER III: ANALYTICAL GEOMETRY

CO 1- To make students understand the concept of coordinate systems, apart from Cartesian system the study of spherical and cylindrical coordinate systems.

CO 2- To make students able to understand the function defining various geometrical structures like sphere, cone, plane and other conics.

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B. Sc. Semester III

PAPER I: ADVANCED ALGEBRA

CO 1- To make students understand the concept of space with two binary compositions such as ring, integral domain and field.

CO 2- To make students understand the characteristics of the rings by studying Ideals, Quotient rings, Principal ideals, Maximal ideals, Prime ideals, Principal ideal domains,

CO 3- To make students understand the concept of polynomials in terms of the rings.

PAPER II: DIFFERENTIAL EQUATIONS

CO 1- Introduction to Differential equations will enable students to understand the equations where variables are derivatives.

CO 2- The concept of the order and degree of differential equation leads to the linear and polynomial equations and their solutions.

CO 3- The study of boundary value problems will enable students to apply the knowledge of differential equations to different problems arising in the field of engineering, mechanics and physics.

PAPER III: MECHANICS

CO 1- Basic understanding of motion of a body and Newton's Laws of Motion.

CO 2- To understand the Kinematics in two-dimension, acceleration and components of angular motion.

CO 3- Understanding of the motion under constraints and to understand the orbits of such motion.

CO 4- Understanding of various forces acting on the body to make it in the state of equilibrium and to understand the concept of virtual work.

B. Sc. Semester IV

PAPER I: VECTOR SPACES AND MATRICES

CO 1- Understanding of Vector spaces, Bases and Dimension of such spaces.

CO 2- Basic understanding of Matrices and their representation as vector spaces Idempotent, nilpotent, involutory, orthogonal and unitary matrices, singular and nonsingular matrices.

CO 3- To understand the Rank of a matrix and applications of matrices to find and understand the nature of the solutions of system of linear equations.

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PAPER II: REAL ANALYSIS

CO 1- Understanding of Continuity and Differentiability of functions

CO 2- To understand the meaning of integration of functions and their applicability in various real-life problems.

CO 3- Understanding of improper integrals and study of the conditions under which a function can be integrated.

CO 4- Understanding of sequences and series their progression, convergence and divergence, the concept of uniform convergence.

PAPER III: MATHEMATICAL METHODS

CO 1- Understanding of Integral Transforms, Laplace Transforms and their Kernel.

CO 2 – Understanding of Inverse Laplace transforms their convolution and applications to the solutions of differential and integro-differential equations.

CO 3- Understanding of Fourier Transforms, Fourier sine and cosine transforms and their properties.

B. Sc. Semester V

PAPER I: LINEAR ALGEBRA

CO 1- Understanding of Linear Transformations from one space to another and Linear functional in same space.

CO 2- Understanding of Dual space and dual basis, Double dual space, Annihilators, Hyperspace

CO 3- Understanding of Eigen vectors and Eigen values of a matrix and product and characteristic roots of a matrix.

PAPER II: COMPLEX ANALYSIS

CO 1- Understanding of Complex Variables and Limit, continuity differentiability of the functions of complex variables.

CO 2- Understanding of Analytic functions

CO 3- Understanding of Complex Integration of the functions of complex variables Poles and singularities

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PAPER III: FUNCTIONS OF SEVERAL VARIABLES AND PARTIAL DIFFERENTIAL EQUATIONS

CO 1- Understanding of Functions of several variables and Limit, continuity, differentiability of functions of several variables.

CO2 – Understanding of Partial Derivatives their geometrical interpretation.

CO 3- Understanding of Maxima and Minima of functions of several variables

CO 4- Understanding of Partial differential equations.

B. Sc. Semester VI

PAPER I: NUMERICAL METHODS

CO 1- To make students able to find Errors in numerical Calculations

CO 2- Understanding of Solutions of Algebraic and Transcendental Equations by numerical methods

CO 3- Understanding of Linear systems of equations and their solutions by numerical methods.

CO 4- Understanding of numerical methods for Interpolation and curve fitting

CO 5- Understanding of numerical methods for differentiation and integration of functions.

PAPER II: MATHEMATICAL STATISTICS

CO 1- Understanding of Descriptive Statistics and Exploratory Data Analysis including various Frequency distributions and their Graphical Representation.

CO 2- Understanding of Correlation and regression and Concept of Partial and Multiple correlation in case of distribution of three variables.

CO 3- Understanding of the concept of Probability, Random experiment, sample space, Mathematical and statistical definitions of Probability of an event.

CO 4- Understanding of the Concept of random variables and various theorems based on them.

Paper III: Operations Research

CO 1- Understanding of Basics of OR, mathematical formulation of Linear Programming Problems arising out of real world.

CO 2- Understanding of the basic feasible solution and its refinement to optimum solution under given constraints.

CO 3- Understanding of the applicability of the programming methods to the solution of problems related to Transportation and assignment Models.