Goswami Tulsidas Govt. P.G. College, Karwi, Chitrakoot

SUBJECT: Mathematics

B.Sc. (Mathematics)

Programme Outcome:

[1] It is to give foundation knowledge for the students to understand basics of mathematics including applied aspect for the same.
[2] It is to develop enhanced quantitative skills and pursuing higher mathematics and research as well.
[3] Students will be able to develop solution oriented approach towards various issues related to their environment.
[4] Students will become employable in various govt. and private sectors
[5] Scientific temper in general and mathematical temper in particular will be developed in students.

Programme Specific Outcome:

[1] Student should be able to possess recall basic idea about mathematics which can be displayed by them.
[2] Student should have adequate exposure to many aspects of mathematical sciences.
[3] Student is equipped with mathematical modeling ability, critical mathematical thinking, and problem solving skills etc.
[4] Student should be able to apply their skills and knowledge in various fields of studies including, science, engineering, commerce and management etc.

Course outcomes:

B.Sc. 1st Semester (Mathematics)

Course Title: Differential Calculus & Integral Calculus:
Course outcomes:
   ✓ The programme outcome is to give foundation knowledge for the students to understand basics of mathematics including applied aspect for developing enhanced quantitative skills and pursuing higher mathematics and research as well.
   ✓ By the time students complete the course they will have wide ranging application of the subject and have the knowledge of real valued functions such as sequence and series. They will also be able to know about convergence of sequence and series. Also, they

have knowledge about curvature, envelope and evolutes and trace curve in polar, Cartesian as well as parametric curves.

✓ The main objective of the course is to equip the student with necessary analytic and technical skills. By applying the principles of integral he learns to solve a variety of practical problems in science and engineering.

✓ The student is equipped with standard concepts and tools at an intermediate to advance level that will serve him well towards taking more advance level course in mathematics.

Course Title: Practical:

Course outcomes:

❖ The main objective of the course is to equip the student to plot the different graph and solve the different types of equations by plotting the graph using different computer software such as Mathematica /MATLAB /Maple /Scilab/Maxima etc.

❖ After completion of this course student would be able to know the convergence of sequences through plotting, verify Bolzano-Weierstrass theorem through plotting the sequence, Cauchy's root test by plotting nth roots and Ratio test by plotting the ratio of nth and $(n + 1)$th term.

❖ Student would be able to plot Complex numbers and their representations, Operations like addition, subtraction, Multiplication, Division, Modulus and Graphical representation of polar form.

❖ Student would be able to perform following task of matrix as Addition, Multiplication, Inverse, Transpose, Determinant, Rank, Eigenvectors, Eigenvalues, Characteristic equation and verification of the Cayley-Hamilton theorem, solving the systems of linear equations.

B.Sc. 2nd Semester (Mathematics)

Course Title: Matrices and Differential Equations & Geometry:

Course outcomes:

✓ The subjects of the course are designed in such a way that they focus on developing mathematical skills in algebra, calculus and analysis and give in depth knowledge of geometry, calculus, algebra and other theories.

✓ The student will be able to find the rank, eigen values of matrices and study the linear homogeneous and non-homogeneous equations. The course in differential equation intends to develop problem solving skills for solving various types of differential equation and geometrical meaning of differential equation.

✓ The subjects learn and visualize the fundamental ideas about coordinate geometry and learn to describe some of the surface by using analytical geometry.

✓ On successful completion of the course students have gained knowledge about regular geometrical figures and their properties. They have the foundation for higher course in Geometry.

B.Sc. 3rd Semester (Mathematics)

Course Title: Algebra & Mathematical Methods:

Course outcomes:
- ✓ Group theory is one of the building blocks of modern algebra. Objective of this course is to introduce students to basic concepts of Group, Ring theory and their properties.
- ✓ A student learning this course gets a concept of Group, Ring, Integral Domain and their properties. This course will lead the student to basic course in advanced mathematics and Algebra.
- ✓ The course gives emphasis to enhance students' knowledge of functions of two variables, Laplace Transforms, Fourier Series.
- ✓ On successful completion of the course students should have knowledge about higher different mathematical methods and will help him in going for higher studies and research.

B.Sc. 4th Semester (Mathematics)

Course Title: Differential Equations & Mechanics:
Course outcomes:
- ✓ The objective of this course is to familiarize the students with various methods of solving differential equations, partial differential equations of first order and second order and to have qualitative applications.
- ✓ A student doing this course is able to solve differential equations and is able to model problems in nature using ordinary differential equations. After completing this course, a student will be able to take more courses on wave equation, heat equation, diffusion equation, gas dynamics, non linear evolution equation etc. These entire courses are important in engineering and industrial applications for solving boundary value problem.
- ✓ The object of the paper is to give students knowledge of basic mechanics such as simple harmonic motion, motion under other laws and forces.
- ✓ The student, after completing the course can go for higher problems in mechanic such as hydrodynamics, this will be helpful in getting employment in industry.

B.Sc. 5th Semester (Mathematics)

Course Title: Group and Ring Theory & Linear Algebra:
Course outcomes:
- ✓ Liner algebra is a basic course in almost all branches of science. The objective of this course is to introduce a student to the basics of linear algebra and some of its applications.
- ✓ Students will be able to know the concepts of group, ring and other related properties which will prepare the students to take up further applications in the relevant fields.
- ✓ The student will use this knowledge in computer science, finance mathematics, industrial mathematics and bio mathematics. After completion of this course students appreciate its interdisciplinary nature.

Course Title: Number Theory & Game Theory:
Course outcomes:

- ✓ Upon successful completion, students will have the knowledge and skills to solve problems in elementary number theory and also apply elementary number theory to cryptography.
- ✓ This course provides an introduction to Game Theory. Game Theory is a mathematical framework which makes possible the analysis of the decision making process of interdependent subjects. It is aimed at explaining and predicting how individuals behave in a specific strategic situation, and therefore help improve decision making.
- ✓ A situation is strategic if the outcome of a decision problem depends on the choices of more than one person. Most decision problems in real life are strategic.
- ✓ To illustrate the concepts, real-world examples, case studies, and classroom experiments might be used.

Course Title: Graph Theory & Discrete Mathematics:
Course outcomes:
- ✓ Upon successful completion, students will have the knowledge of various types of graphs, their terminology and applications.
- ✓ After Successful completion of this course students will be able to understand the isomorphism and homomorphism of graphs. This course covers the basic concepts of graphs used in computer science and other disciplines. The topics include path, circuits, adjacency matrix, tree, coloring.. After successful completion of this course the student will have the knowledge graph coloring, color problem, vertex coloring.
- ✓ After successful completion, students will have the knowledge of Logic gates, Karnaugh maps and skills to proof by using truth tables. After
- ✓ Successful completion of this course student will be able to apply the basics of the automation theory, transition function and table.
- ✓ This course covers the basic concepts of discrete mathematics used in computer science and other disciplines that involve formal reasoning. The topics include logic, counting, relations, hasse diagram and Boolean algebra. After successful completion of this course the student will have the knowledge in Mathematical reasoning, combinatorial analysis, discrete structures and Applications.

Course Title: Differential Geometry & Tensor Analysis:
Course outcomes:
- ✓ After Successful completion of this course, students should be able to determine and calculate curvature of curves in different coordinate systems.
- ✓ This course covers the Local theory of Curves, Local theory of surfaces, Geodesics, Geodesics curvature, Geodesic polars, Curvature of curves on surfaces, Gaussian curvature, Normal curvature etc.
- ✓ After Successful completion of this course, students should have the knowledge of tensor algebra, different types of tensors, Riemannian space, Ricci tensor, Einstein space and Einstein tensor etc.

Course Title: METRIC SPACES & COMPLEX ANALYSIS:
Course outcomes:

- ✓ The course is aimed at exposing the students to foundations of analysis which will be useful in understanding various physical phenomena and gives the student the foundation in mathematics.
- ✓ After completion of this course the student will have rigorous and deeper understanding of fundamental concepts in Mathematics. This will be helpful to the student in understanding pure mathematics and in research.
- ✓ Students will be able to know the concepts of metric space, basic concepts and developments of complex analysis which will prepare the students to take up further applications in the relevant fields.

B.Sc. 6th Semester (Mathematics)

Course Title: METRIC SPACES & COMPLEX ANALYSIS:
Course outcomes:
- ✓ The course is aimed at exposing the students to foundations of analysis which will be useful in understanding various physical phenomena and gives the student the foundation in mathematics.
- ✓ After completion of this course the student will have rigorous and deeper understanding of fundamental concepts in Mathematics. This will be helpful to the student in understanding pure mathematics and in research.
- ✓ Students will be able to know the concepts of metric space, basic concepts and developments of complex analysis which will prepare the students to take up further applications in the relevant fields.

Course Title: Numerical Analysis & Operations Research:
Course outcomes:
- ✓ The aim of this course is to teach the student the application of various numerical technique for variety of problems occurring in daily life. At the end of the course the student will be able to understand the basic concept of Numerical Analysis and to solve algebraic and differential equation.
- ✓ The main outcome will be that students will be able to handle problems and finding approximated solution. Later he can opt for advance course in Numerical Analysis in higher Mathematics.
- ✓ The student will be able to solve various problems based on convex sets and linear programming. After successful completion of this paper will enable the students to apply the basic concepts of transportation problems and its related problems to apply in further concepts and application of operations research.

Course Title: Practical:
Course outcomes:
- ❖ The main objective of the course is to equip the student to solve the transcendental and algebraic equations, system of linear equations, ordinary differential equations,

Interpolation, Numerical Integration, Method of finding Eigen value by Power method (up to 4×4), Fitting a Polynomial Function (up to third degree).