Rayat Shikshan Sanstha's

Annasaheb Awate Arts, Commerce and Hutatma Babu Genu Science College, Manchar

Department of Mathematics

Course Outcomes of Offered Courses:

Sr.No.	Course	Course Outcomes
1	F.Y.B.Sc. -Algebra and Analytical Geometry	Upon successful completion of this course the student will be able to: • Solve results involving divisibility and greatest common divisors; • Solve systems of linear equations • Apply Euler-Fermat's Theorem to prove relations involving prime numbers; • Polynomial addition, subtraction, division, multiplication, roots of polynomials. • Transformation, translation and reflection; • To find nature of general conics. • Find equation of spheres, cylinders and cones
2	F.Y.B.Sc.- Calculus I and Calculus II	Upon successful completion of this course the student will be able to: • Prove simple identities and inequalities • Be able to calculate limits • Be able to calculate limits at infinity • Be able to discuss the continuity • Be able to calculate limits in

		indeterminate forms by a repeated use of L'Hospital's rule • Be able to use derivatives to find intervals on which the given function is increasing or decreasing • Understand the concept of Differential Equation • Be able to use Differential Equation to find Orthogonal Trajectories.
3	S.Y.B.Sc. (Sem III) Calculus of several variables	Upon successful completion of this course the student will be able to: • Compute domain and range of functions • Draw level curves of functions • Find limits and continuity of functions • Find partial derivatives • Find higher derivatives • Compute chain rule in differentiation • Define functions of several variables and their limits • Calculate the partial derivatives of functions of several variables • Apply the chain rule for functions of several variables • Calculate the gradients and directional derivatives of functions of several variables • Solve problems involving tangent planes and normal lines • Determine the extrema of functions of several variables • Use the Lagrange multiplier method to find extrema of functions with constrains.

4	S.Y.B.Sc. (Sem III) Numerical methods and its Applications	On successful completion of this course unit students will be able to: • Find errors • To rounding off numbers n significant digits, to n decimal places. • To find Solution of Algebraic and Transcendental Equations. • Use Interpolation to fit tabular data in algebraic equation. • Fit straight line, second degree polynomial from tabular data. • Find area under the curve by using Numerical Integration. • Find solution of first order ordinary differential equations.
5	S.Y.B.Sc. (Sem IV) Linear Algebra	On successful completion of this course unit students will be able to: • Understand the basic ideas of vector algebra: linear dependence and independence and spanning; • Know how to find the row space, column space and null space of a matrix, and be familiar with the concepts of dimension of a subspace and the rank and nullity of a matrix, and to understand the relationship of these concepts to associated systems of linear equations; • Be familiar with the notion of a linear transformation and its matrix; • Find the Gram-Schmidt orthogonalization of a matrix.

6	S.Y.B.Sc. (Sem IV) Vector Calculus	On successful completion of this course unit students will be able to: • Find limit and continuity of vector valued functions • Find derivatives of vector valued functions • Find integrals of vector valued functions • Find arc length along a space curve • Find line integral of scalar functions • Find line integrals of vector fields • Find work done and flow • Study divergence theorem, stokes theorem • Find surface integrals
7	T.Y.B.Sc. (Sem V) Metric space	The course will enable the students to: • understand the introductory concepts of metric spaces • correlate these concepts to their counter parts in modern analysis by studying examples • learn to analyze mappings between spaces • attain background for advanced courses in real analysis, functional analysis, and topology. • appreciate the abstractness of the concepts such as open balls, closed balls, compactness, connectedness etc. beyond their geometrical imaginations.

8	T.Y.B.Sc. (Sem V) Real Analysis I	By the end of the course, students will be able to: • learn the basic facts in logic and set theory • learn to define sequence in terms of functions from N to a subset of R and to understand several properties of the real line • recognize bounded, convergent, divergent, Cauchy and monotonic sequences and to calculate their limit superior, limit inferior, and the limit of a bounded sequence • use the ratio, root, alternating series and limit comparison tests for convergence and absolute convergence of an infinite series of real numbers
9	T.Y.B.Sc. (Sem V) Group theory	On completion of this unit successful students will be able to: • recognize the mathematical objects that are groups, and classify them as abelian, cyclic and permutation groups • analyze consequences of Lagrange's theorem • learn about structure preserving maps between groups and their consequences • explain the significance of the notion of cosets, normal subgroups, and factor groups

10	T.Y.B.Sc. (Sem V) Ordinary Differential equation	On completion of this unit successful students will be able to: • understand the genesis of ordinary differential equations. • learn various techniques of getting exact solutions of solvable first order differential equations and linear differential equations of higher order. • grasp the concept of a general solution of a linear differential equation of an arbitrary order and also learn a few methods to obtain the general solution of such equations.
11	T.Y.B.Sc. (Sem V) Operations research	The course will enable the students to: • Analyze and solve linear programming models of real-life situations. • The graphical solution of LPP with only two variables, and illustrate the concept of convex set and extreme points. The theory of the simplex method is developed. • The relationships between the primal and dual problems and their solutions with applications to transportation, assignment and two-person zero-sum game problem.
12	T.Y.B.Sc. (Sem V) Number theory	On completion of this unit successful students will be able to: • some of the open problems related to prime numbers. • about number theoretic functions and

		modular arithmetic. • the Law of Quadratic Reciprocity and other methods to classify numbers as primitive roots, quadratic residues, and quadratic non-residues.
13	T.Y.B.Sc (Sem VI) Complex analysis	Upon successful completion Complex Analysis, a student will be able to: • Understand the significance of differentiability of complex functions leading to the understanding of Cauchy-Riemann equations. • Evaluate the contour integrals and understand the role of Cauchy-Goursat theorem and the Cauchy integral formula. • Expand some simple functions as their Taylor and Laurent series, classify the nature of singularities, find residues and apply Cauchy Residue theorem to evaluate integrals. • Represent functions as Taylor, power and Laurent series, classify singularities and poles, find residues and evaluate complex integrals using the residue theorem.
14	T.Y.B.Sc (Sem VI) Real Analysis II	Upon successful completion of this course, students will be able to • some of the families and properties of Riemann integrable functions, and the applications of the fundamental theorems of integration. • beta and gamma functions and their

		properties. • recognize the difference between pointwise and uniform convergence of a sequence of functions. • illustrate the effect of uniform convergence on the limit function with respect to continuity, differentiability, and integrability.
15	T.Y.B.Sc (Sem VI) Ring theory	The course will enable the students to: • The fundamental concept of Rings, Fields, subrings, integral domains and the corresponding morphisms. • Learn in detail about polynomial rings, fundamental properties of finite field extensions, and classification of finite fields. • Appreciate the significance of unique factorization in rings and integral domains.
16	T.Y.B.Sc (Sem VI) Partial differential equation	Upon successful completion of this course, students will be able • formulate, classify and transform partial differential equations into canonical form. • solve linear partial differential equations using various methods and apply these methods in solving some physical problems. • solve Laplace equations using various analytical methods demonstrate uniqueness of solutions of certain kinds of these equations.

17	T.Y.B.Sc (Sem VI) Optimization techniques	Upon successful completion of this course, students will be able to • understand fundamentals of Network Analysis using CPM and PERT. • solve a sequencing Problem for various jobs and machines.
18	T.Y.B.Sc (Sem VI) Computational geometry	Upon successful completion of this course, students should • construct algorithms for simple geometrical problems. • characterize invariance properties of Euclidean geometry by groups of transformations. • describe and construct basic geometric shapes and concepts by computational means.
19	Programming in Python	At the end of the course: • The student will be able to explain basic principles of Python programming language. • The student will implement object oriented concepts. • Demonstrate the use of Python in Mathematics such as operations research and computational Geometry etc. • Study graphics and design and implement a program to solve a real world problem. • The students will implement the

		concepts of data with python and database connectivity.
20	LaTeX for Scientific Writing	After studying this course the student will be able to: • Write a simple LaTeX input document based on the article class. • Turn the input document into pdf with the pdflatex program. • Format Words, Lines, and Paragraphs. • Understand how to present data using tables. • typeset mathematical formulas, use nested list, tabular and array environments. • import figures and pictures that are stored in external files.