

B.A. General in Mathematics

Programme Specific Outcome (PSO)

At the beginning, Mathematics had been offered in graduation with Bachelor of Arts by our college. After implementation of CBCS this course is no longer available since there is no another subject for running the Bachelor of Science with mathematics. Now, in session 2023-24 this subject has been included in the course **BACHELOR OF SCIENCE IN MATHEMATICAL & COMPUTER SCIENCES with MATHEMATICS**.

After completing the program **BACHELOR OF SCIENCE IN MATHEMATICAL & COMPUTER SCIENCES with MATHEMATICS**, the student will be able to:

- Sometimes theory may be difficult to realize we need some fruitful example and sometimes calculation is very difficult so we applying theorem for easy. In the time of teaching we try to relate theory and calculation of the problems.
- Students should formulate, analyze and solve complex and diverse problems through analytical and computational techniques and apply them to other disciplines when appropriate.
- Recognize the need for and have the preparation and ability to engage in independent and lifelong learning in the broadest context of technological challenges.
- Analyses, test, and interpret technical arguments, and form independent judgments.
- Gather and organize relevant qualitative and quantitative information such as related problems, examples, and counterexamples.
- A Graduate will be able to communicate mathematical ideas via extended, clear, and well-organized written presentations.
- The mathematics degree will prepare students for careers in the corporate sector, industry, and government agencies.
- Students will be able to manipulate and calculate the big numbers and huge data by the programming with MATLAB.

COURSE OUTCOME

Calculus, Geometry & Ordinary Differential Equation:

Outcomes:

- Students will learn about concepts about the Limit and Continuity (with ε and δ definition), Types of discontinuities, Differentiability of functions, Successive differentiation, Leibnitz's rule, Partial differentiation, and Euler's theorem on homogeneous functions.
- Students can solve problems on Tangents and Normals, Curvature, Asymptotes, Singular Points.
- Students can trace various curves and are able to understand about Parametric representation of curves and tracing of parametric curves, Polar coordinates.
- Students will know about Rolle's theorem, Mean Value theorems, Lagrange and Cauchy Theorems, Taylor's theorem with Lagrange's and Cauchy's forms of the remainder, Power series and its convergences. Taylor's series, Maclaurin's series of $\sin x$, $\cos x$, e^x , $\log(1+x)$, $(1+x)^n$, Maxima and Minima, and Indeterminate forms.
- They can apply the calculus in business, economics and life sciences.
- Using integral calculus they can calculate the arc length of a curve, arc length of parametric curves, area under a curve, area and volume of surface of revolution, techniques of sketching conics.
- Students will learn the reflection properties of conics, rotation of axes and second degree equations, classification of conics using the discriminant, polar equations of conics.
- They can imagine the shape and perhaps draw of Spheres, cylindrical surfaces, central conicoids, paraboloids, plane sections of conicoids, generating lines, classification of quadrics, illustrations of graphing standard quadric surfaces like cone, ellipsoid.
- Students will learn about General, particular, explicit, implicit and singular solutions of a differential equation. They can solve first order but not first degree differential equations. They are aware about which is exact differential equations and integrating factors, and equations reducible to this form. They can solve Bernoulli equation and special integrating factors and transformations.

Algebra:

Outcomes:

- Students will know the definition of complex number and its polar representation and number corresponding in argand plane.
- They can find the n th root of a number applying D'Moivres theorem.
- They can relate the between the roots and coefficients of a polynomial equation.
- Students will learn about the equivalence relations, functions, composition of functions, Invertible functions, one to one correspondence and cardinality of a set.
- They can realize the Well-ordering property of positive integers, division algorithm, divisibility and Euclidean algorithm. Congruence relation between integers. Principles of Mathematical induction, statement of Fundamental Theorem of Arithmetic.
- Students will be able to define a group , subgroup, cyclic groups etc.
- Students can learn definitions and properties of Rings, Fields, Subring, Sub Field, Integral Domain, and Ideals.
- They can solve a systems of linear equations, row reduction and echelon forms, vector equations, the matrix equation $Ax=b$. they can find the solution sets of linear systems, applications of linear systems.
- Students will know the linear in/dpendence of the vectors. They can imagine the higher dimensional Euclidean space.
- They can define the linear operator and its matrix representation with respect to bases. They can find eigen values and eigen vectors and its applications. They can find an inverse of a matrix using Cayley Hamilton theorem.

MATLAB:

Outcomes:

- Mainly we use the programming through any language like FORTRAN, C++, Python, MATLAB to overcome the computational load that is we can evaluate and arrange so many big data as well as so small numbers. Sometimes exact calculation may not be possible in that time we use the programming with a predefined error.
- MATLAB is a most appropriate programming software through which a student can plot 2D and 3D figure, multiple plots, matrix plots, polar plot etc.
- There are some library function inbuilt in the MATLAB, but without this they can Find the sum, product, max, min of a list of number in an array, in a sub-array.
- They can product of matrices of higher order.
- They can fit a curve of given data. They can evaluate the surface of revolution.
- They can create M-file.
- They can study the convergence of sequences through plotting.
- They can verify Bolzano-Weierstrass theorem through plotting of sequences and hence identify convergent subsequences from the plot.
- Students will know the convergence/divergence of an infinite series by plotting their sequences of partial sum.
- They can apply Cauchy's root test by plotting n th roots and Ratio test by plotting the ratio of n th and $(n+1)$ th term.