<u>Department of Mathematics</u>
<u>Govt. College jind</u>

1. <u>Vision:-</u>
To strive in becoming a globally recognized department for academic excellence by imparting in-depth inter-disciplinary quality education in the subject of Mathematics along with ethical values.

2. <u>Mission:-</u>
To impart quality education and train students in the discipline of Mathematics.

3. <u>Programme Out comes:-</u>
The programme helps learners in building a solid foundation for higher studies in Mathematics.

4. <u>Course Outcomes:-</u>

<u>Algebra</u>

CO 1: Algebra provides the foundation for high school mathematics, critical thinking and problem solving, Algebra helps students transfer their mathematical knowledge to more algebraic generalizations.
CO 2: Students will solve problems using equations, graphs and tables to investigate linear relationships. Technology will be used to introduce and expand upon the areas of study listed above.

<u>Calculus</u>

CO 1: learn the general concept of function and its applications to real-world situations and work with exponential, logarithmic and trigonometric function and their applications in applied problems.
CO 2: learn the concepts of the derivative and its underlying concepts such as limits and continuity and to calculate derivative for various type of functions suing definition and rules.
CO 3: learn the various concept of derivative to completely analyze graph of a function. And learn about various applications of the derivative in applied problems.
CO 4: learn about anti-derivative and the Fundamental Theorem of Calculus and its applications and to use concept of integration to evaluate geometric area and solve other applied problems.

<u>Solid Geometry</u>
CO 1: learn the various concept of Sphere, Cylinder, Cone, Parabola, Hyperbola

<u>Number Theory And Trigonometry</u>
CO 1: learn the various concept of Divisiblity, Fermat, Wilson, Chinees Remainder Theorems

<u>Ordinary Differential Equations</u>

CO 1: Show an awareness of initial and boundary conditions to obtain particular values of constants in the general solution of second-order differential equations.
CO 2: Identify a general method for constructing solutions to inhomogeneous linear constant coefficient second-order equations.

Vector Calculus
CO 1: Vector Calculus helps us to understand how to mathematically describe physical & abstract quantities that have both magnitude & direction, increases knowledge of properties of functions whose domain consists of real no's & range consists of vectors including differential & integration.
CO 2: Students will be able to find length of a vector, the unit vector i direction of a given vector & the cosine of the angle between two vectors in 3-space.
CO 3: Calculate scalar product, vector product of two vectors & scalar triple product of three vectors; write vector equation & symmetric equation for a line & vector equation & scalar equation of a plane.

Advanced Calculus

CO 1: The students are expected to learn about the basic principles of multi variable calculus with proof. Advanced Calculus is a bridge between Calculus and more advanced real analysis.
CO 2: Student will learn Completeness axiom, Archimedean property, Triangle inequality, Convergence of sequence, Sum product and Quotient of convergence sequence.
CO 3: Monotonic sequence, Bolzano Weierstrass Theorem, Monotone convergence Theorem, Uniform continuity on a closed and bounded interval, limits of function, Derivative of polynomial, Derivative of inverse function, Chain rule, Mean value theorem, Rolle's theorem.

Partial Differential Equations

CO 1: PDE describes relations between continuously changing quantities which depends on two
or more variables. The main goal of this course is that student should be able to solve Boundary value problem for Laplace equation, Heat equation, wave equation by separation of variables in Cartesian, polar spherical & cylindrical coordinates.

Statics
CO1 :learn the various concept of Virtual Work, Friction, Parallel law of forces, three dimensional geometry, wrenches.

Sequence And Series
CO1 : learn the various concept of Interior Point, Open Set, Closed Set, Compact set
CO2: learn the various concept of Convergence of Sequence and series

Special Functions And Integral Transformations

CO 1: Recognize the proper technique and solve initial value problem for first order equations. Solving of initial value problems for higher order linear homogeneous and non homogeneous equations

CO 2: Students will be able to expand one variable function in series along basis of orthogonal function, for example Fourier series, Bessel's series, Legendre's series.

CO 3: They will be able to find weight function, Eigen values and Orthogonal function system (Eigen function for a given strum-Liouville problem and used the Fourier and Laplace Transform as part of solving a Boundary Value Problem.

Programming in C And Numerical Methods

CO 1: Students will understand the basics of C Programming language, like history of C, development of C, syntax of C. They will also learn about the strength of C

CO 2: Students will learn about decision making and branching statements. They also learn about how to use different looping, and branching statements in different situations.

CO 3: Students will learn about the usage of system functions. They also learn about how to create user functions as per the requirement of user to solve a specific problem.

CO 4: Students will understand array, pointer, and string concepts. How they are created and used. They will be comfortable in Programming fundamentals like algorithms and flowcharts.

Real Analysis

CO 1: Student will be able to define and recognize the basic properties of real numbers and improve an outline logical thinking.

CO 2: They will be able to define and understand the series of real numbers and their convergence. Students will be able to use the Bolzano Weistrass Theorem.

CO 3: Recognition and knowledge of basic topological properties of real numbers. Understanding of real functions and its limits.

CO 4: Understanding of continuity of real functions and differentiability of real functions with its related theorems.

Groups And Rings

CO 1: Students will be able to learn the meaning and properties of Groups, Subgroups, Lagrange's theorem, Cauchy's theorem, Cyclic Groups.

CO 2: Students will have understanding of Cosets, Quotient groups, Homomorphisms, Isomorphism, Automorphism, inner automorphism of cyclic groups, Cayleys theorem, centre of a group and derived subgroup of a group.

CO 3: Recognition of Rings, Sub rings, Integral domain and fields, characteristics of a ring, ring of homomorphism, ideals and quotient rings.

CO 4: Understanding Euclidean rings, Polynomial rings, Polynomial over rational field, Eisenstein's criteria.

Numerical Analysis

CO 1: To provide suitable and effective methods called Numerical Methods, for obtaining approximate representative numerical results of the problems. To solve problems in the field of Applied Mathematics, Theoretical Physics and Engineering this requires computing of numerical results using certain raw data

CO 2: To solve complex mathematical problems using only simple arithmetic operations. The approach involves formulation of mathematical models of physical situations that can be solved with arithmetic operations

CO 3: To deal with various topics like finding roots of equations, solving systems of linear algebraic equations, interpolation and regression analysis, numerical integration & differentiation, solution of differential equation, boundary value problems, solution of matrix problems.

Mathematics Lab
Programs based on Numerical methods and finding the errors and order of convergence and developing logics

Real And Complex Analysis

CO 1: Develop an in-depth mathematical understanding of the theory of calculus. Read mathematical results and proofs as well as formulate her own proofs to various problems. CO 2: Use and explain the importance of the axioms of real numbers the definition of convergent and divergent sequences the definition of the limit of a function at a point the definition of continuity the definition of the derivative the definition of the Riemann integral.

CO 3: Perform basic mathematical operations (arithmetic, powers, roots) with complex numbers in Cartesian and polar forms. Determine continuity/differentiability/analyticity of a function and find the derivative of a function. Work with functions (polynomials, reciprocals, exponential, trigonometric, hyperbolic, etc) of single complex variable and describe mappings in the complex plane.

Linear Algebra

CO 1: To understand model and systematically solve systems of linear equations using matrix notation. Demonstrate factual knowledge of the fundamental concepts of spanning, linear independence, and linear transformations

CO 2: Use of matrix algebra to analyze and solve equations arising in many applications that require a background in linear algebra. Utilize vector space terminology and describe how closely other vector spaces resemble R^n

CO 3: Dissect the action of a linear transformation into elements that are easily visualized using the basic concepts of eigenvectors and eigen values.

Dynamics

CO 1: Students will be able to draw the free-body diagram for a particle or for a rigid body in plane motion. Students will be able to understand the basic concepts of force, mass and acceleration, of work and energy, and of impulse and momentum.

CO 2: Students will be able to apply these three basic methods and to understand their respective advantages. Students will be able to explain the geometry of the motion of particles and plane motion of rigid bodies.

CO 3: Students learn to apply the principles of static equilibrium to particles and rigid bodies. Students learn to analyze truss and frame structures. Students apply the principles of equilibrium for analyzing beams. Students analyze problems involving frictional forces.

Students learn to draw shear force and bending moment diagram

CO 4: Students analyze planar rigid body kinematics and kinetics. Students learn to write technical laboratory reports. Students apply measurement techniques and formulate experiments based on laboratory handouts.

Computer-Oriented Statistical Methods

CO1. Recognize the error in the number generated by the solution.

CO2. Compute solution of algebraic and transcendental equation by numerical methods like Bisection method and Newton Rapshon method.

CO3. Apply method of interpolation and extrapolation for prediction.

CO4. Recognize elements and variable in statistics and summarize qualitative and quantitative data.

CO5. Calculate mean, median and mode for individual series.

CO6. Outline properties of correlation and compute Karl-Pearson's coefficient of correlation.

Mathematical Foundations-II

Upon completion of this course, students will be able to:

1. Apply knowledge of computing and mathematics appropriate to the discipline using matrices.
2. Analyze a problem and identify and define the computing requirements to solution using binary operations.

Understand some aspects of computer programming

CO 1: Students will understand the basics of C' Programming language, like history of C, development of C, syntax of C. They will also learn about the strength of 'C'.

CO 2: Students will learn about decision making and branching statements. They also learn about how to use different looping, and branching statements in different situations. CO 3: Students will learn about the usage of system functions. They also learn about how to create user functions as per the requirement of user to solve a specific problem.

CO 4: Students will understand array, pointer, and string concepts. How they are created and used. They will be comfortable in Programming fundamentals like algorithms and flowcharts.

Elements of Business Mathematics-I

CO1: Helps the students in understanding and use of Sets in daily life problems.

CO2: Enable the students to solve complicated arithmetic expressions using log tables.
CO3: Enable the students to arrangement & selection of the data regarding the Permutation and combination, Arithmetic and Geometric Progression in daily life problems. CO4: Helps the students to collect & interpret the data

Elements of Business Mathematics-II

CO 1: Enable students to analyze real world scenarios to recognize when simple and compound
interest, annuities, payroll preparation, pricing and depreciation are appropriate, formulate problems about the scenarios, creatively model these scenarios.
CO 2: Enable students to demonstrate the ability to think critically, research, and reason. CO 3: Will help students to gain the ability to analyze data and draw appropriate statistical conclusions.
CO 4: Will demonstrate an understanding of the common body of knowledge in mathematics.

5. Programme Duration and Intake:-

     B.Sc (Non Medical)- 3 Years durations-Intake-240
     B.Sc (Computer Science)- 3 Years durations-Intake-60
     B.A. (with Mathematics)- 3 Years durations-Intake-240
     B.Com (Mathematics in First Year)-Intake-300
     B.C.A. (Mathematics in First Year)-Intake-40

6. Department Achievement for the session 2019-20:-
- Ms Indu got admitted in M.Sc Mathematics in Central University of Rajasthan
- Ms Meenu got admitted in M.Sc Mathematics in Central University of Rajasthan
- Ms Preeti got admitted in M.Sc Mathematics in M.D. University Rohtak
- Ms Jyoti got admitted in M.Sc Mathematics in CRS University Jind
- Mr Anil got admitted in M.Sc Mathematics in in CRS University Jind

7. Activity Calender for the session 2019-20 & 2020-21:-
- Participation in Distt level Science Quiz in September –October 2019
- Organize Department Level Intra-College Maths Quiz & Poster making competition in march 2020.
- Organize Webinar to promote Science in colleges in February 2021.

8. Teachers Profile:-
   1. Dr. Raj Kamal
   Designation: Assistant Professor
   Qualifications- M.Sc., Ph.D., CSIR-JRF
   Research Area: Fixed Point Theory(Topology & Real Analysis)
        Total no. of Research Publications:- 10
        Workshops / In-Service Trainings :-   07
        Paper Presentations in Seminar/Conferences:-
        03 International + 08 National

Attended Seminars / Conferences :-
01 International + 02 National
Books and Chapter Edited :-   02

2. **Mrs. Mukesh Kumari**
    Designation: Assistant Professor
    Qualification: M.Sc., M.Phil
        Workshops / In-Service Trainings :-05
        Paper Presentations in Seminars/Conferences:-08
        Attended Seminars / Conferences :-02
    Member of CBCS Syllabus formation committee
    Member of Board of study in CRSU ,Jind

3. **Ms Poonam Devi**
        Designation: Assistant Professor
        Qualification: M.Sc., NET
        Workshops / In-Service Trainings :-02
        No. of paper presented in conferences -01
        No. of attended conferences – 03.

4. **Mr. Bhagwan Dass**
        Designation:- Assistant Professor
        Qualification:- M.Sc., CSIR-JRF, Ph.D (Pursuing)
        Research Area:- Fuzzy Entropy Measure
    Total no. of Research Publications:- 04
    Paper Presentations in Seminar/Conferences:-02
    Workshops/training:- 02

5. **Ms. Neeru**
        Designation:- Guest Lecturer
        Qualification:- M.Sc.

6. **Mr. Ajay Singh**
        Designation:- Extension Lecturer
        Qualification:- M.Sc. , NET

7. **Mr. Gurdeep**
        Designation:- Extension Lecturer
        Qualification:- M.Sc. , NET

8. **Mr. Mannu Arya**
        Designation:- Extension Lecturer
        Qualification:- M.Sc. , NET

9. **Ms. Reena Devi**
        Designation:- Extension Lecturer
        Qualification:- M.Sc. , NET

10. **Ms. Reena Rani**
        Designation:- Extension Lecturer

Qualification:- M.Sc. , NET

11. Ms. Anil Kumari
Designation:- Extension Lecturer
Qualification:- M.Sc.