

GDC Memorial College
Bahal (Bhiwani)
Affiliated to Ch. Bansi Lal University, Bhiwani
NAAC Accredited Grade "B" (Second Cycle)
Recognized under Section 2(f) & 12B of the UGC Act, 1956

M. Sc-(Mathematics)

Programme Learning Outcomes

PLO No.	Component	Outcomes
PLO No.1	Basic Knowledge and critical thinking	Capable of delivering basic disciplinary knowledge and able to understand critically the results.
PLO No.2	In- depth knowledge and problem solving abilities	Capable of describing advance knowledge gained during the programme and applying acquired knowledge to solve the problems.
PLO No.3	Creativity, analytical innovation and computation skills	Capable to identify, formulate, investigate and analyse the scientific problems innovatively to design through mathematical software and solutions to real life problems.
PLO No.4	Research aptitude and global competency	Ability to cultivate a research aptitude and use information to solve demanding research issues in the relevant and related fields globally.
PLO No.5	Holistic, multidisciplinary skill enhancement	Ability to learn through a multidisciplinary & holistic approach in various subjects, acquiring specialized talents and advanced methods consequently applying them to enhanced humanity.
PLO No.6	Ethical and professional responsibility	Encourage a moral, professional mind-set and the capacity to connect to societal issues.
PLO No.7	Leadership and team work abilities	The capacity to learn, collaborate with multidisciplinary teams and even take charge of a group.

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**M. Sc-(Mathematics)
Program Specific Learning Outcomes (PSLO)**

Students will be able to

PSLO1: Understand the mathematical concepts and applications in the field of algebra, analysis, computational techniques, optimization, differential equations, engineering, finance and actuarial science.

PSLO2: Handle the advanced techniques in algebra, analysis, computational techniques, optimization, differential equations, engineering, finance and actuarial science to analyze and design algorithms solving variety of problems related to real life problems.

PSLO3: Adopt changing scientific environment in the process of sustainable development by using mathematical tools.

PSLO-4: Have necessary skills and expertise in the field of research and development through seminar and dissertation.

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Course Learning Outcomes (CLO)

M. Sc-(Mathematics): Sem-1st

Name of the Course: Real Analysis-I Course Code: 25PN-MTH101 Credits: 4

Course Learning Outcomes (CLO):

After completing this course, student is expected to learn the following:

CLO1 Understand the concepts of continuity, uniform continuity and their related theorems.

CLO2 Describe the concepts of limit, continuity and differentiability of real valued function of two variables.

CLO3 Explain maxima, minima and saddle points of two variables and Lagrange's method of multipliers.

CLO4 Understand Riemann integral and fundamental theorems of integral Calculus.

Name of the Course: Modern Algebra Course Code: 25PN-MTH102 Credits: 4

Course Learning Outcomes (CLO):

After completing this course, student is expected to learn the following:

CLO1. Demonstrate understanding of the idea of a group, subgroup, cyclic groups, normal groups and quotient groups.

CLO2. Understand and apply the concepts of homomorphism, isomorphism, auto morphisms and inner auto morphisms of a group.

CLO3. Understand rings, sub rings, ring homomorphisms and field of quotients,

CLO4. Demonstrate capacity for mathematical reasoning through analyzing, proving and explaining concepts from advanced algebra.

Name of the Course: ODE

Course Code: 25PN-MTH103

Credits: 4

Course Learning Outcomes (CLO):

After completing this course, student is expected to learn the following:

CLO 1: Many fundamental laws of physics and chemistry can be formulated as differential equations. CLO 2: Learn to illustrate the concept of identification of differential equations, some analytical techniques to find solutions.

CLO 3 Demonstrate and understand the autonomous system and stability theory.

CLO 4: Use various methods to get qualitative information about the general behavior of the solutions of various problems.

Name of the Course: Mechanics

Course Code: 25PN-MTH104

Credits: 4

Course Learning Outcomes (CLO):

After completing this course, student is expected to learn the following:

CLO1: Understand the notion of moment & product of inertia and its applications

CLO2: Use the Lagrangian and Hamiltonian functions to formulate the equation of motion for mechanical systems

CLO3: Understand Poisson Bracket along with principle of least action.

CLO4: Understand the concept of attraction and potential along with equipotential surfaces.

Name of Course: FORTRAN 90/95

Course Code: 25PN-MTH105

Credits: 3

Course Learning Outcomes (CLO):

After completing this course, student is expected to learn the following:

CLO1: Students would be able to understand Fortran programming

CLO2: Be familiar with the concepts of loops, arrays, and functions.

CLO3: Students would be able to create algorithm and program to solve a real world problem.

Name of the Course: Mathematical Statistics Course Code: 25PN-MTH106 Credits: 4

Course Learning Outcomes (CLO):

After completing this course, student is expected to learn the following:

CLO1: Students will learn about the concept of probability, statistical distributions.

CLO2: Students will be able to illustrate the concept of testing of hypothesis.

CLO3: Students gets to learn the application of mathematics and its relation to the real world.

Name of the Course: Mathematical Modeling Course Code: 25PN-MTH107 Credits: 4

Course Learning Outcomes (CLO):

After completing this course, student is expected to learn the following:

CLO1: Be familiar the concept of mathematical modeling.

CLO2: Derive solutions of various problems using different techniques to describe and explore real world data and phenomena.

CLO3: Learn about application of mathematics using ODE in various fields.

CLO4: Solving real life problems using mathematical modeling.

Name of the Course: Discrete Mathematics Course Code: 25PN-MTH108 Credits: 4

Course Learning Outcomes (CLO):

After completing this course, student is expected to learn the following:

CLO1: Understand and apply discrete numeric functions, generating functions, and solve recurrence relations using both algebraic and generating function methods.

CLO2: Analyze algebraic structures such as groups, rings, and lattices, and demonstrate understanding of their fundamental properties.

CLO3: Apply Boolean algebra to simplify logic expressions and design efficient digital circuits using Karnaugh maps and switching theory.

CLO4: Develop problem-solving skills in number theory, including divisibility, modular arithmetic, and congruence's.

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Programme Learning Outcomes (CLO)

PLO NO.	COMPONENT	OUTCOMES
PLO 1.	Basic Knowledge and critical thinking	Capable of delivering basic disciplinary knowledge and able to understand critically the results.
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PLO 3.	Creativity, analytical innovation and computation skills	Capable to identify, formulate, investigate and analyse the scientific problems innovatively to design through mathematical software and solutions to real life problems.
PLO 4.	Research aptitude and global competency	Ability to cultivate a research aptitude and use information to solve demanding research
PLO 5.	Holistic, multidisciplinary skill enhancement	Ability to learn through a multidisciplinary & holistic approach in various subjects, acquiring specialized talents and advanced methods consequently applying them to enhanced humanity.
PLO 6.	Ethical and professional responsibility	Encourage a moral, professional mind-set and the capacity to connect to societal issues.
PLO 7.	Employment-ready and entrepreneurial skills	Ability to adapt to the future of work by responding to rapid technological developments and innovations that continuously reshape employers' skill demands and work processes.

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Course Learning Outcomes (CLO)

M. Sc-(Mathematics): Sem-2nd

Name of the Course: Real Analysis-II Course Code: 25PN-MTH201 Credits: 4

CLO1: Students would be able to explain the fundamental concepts of Reimann-Stieltjes integral.

CLO2: Analyze the geometric interpretation of metric space, construct and interpret various proper and improper integrals and operate with real numbers, real functions.

CLO3: By use of characteristics of study of metric spaces in the related fields such as geometry and complex analysis etc.

CLO4: Understand continuity, uniform continuity and compactness of metric spaces and properties.

Name of the Course: Linear Algebra Course Code: 25PN-MTH202 Credits: 4

CLO 1 Get familiar with vector spaces, subspaces and existence theorem for basis of a finitely generated vector space.

CLO 2 Describe the concepts of homomorphism, isomorphism and dual spaces.

CLO 3 Learn singular and non-singular linear transformations, eigen values and eigen vectors of linear transformations.

CLO 4 Understand the Gram Schmidt orthogonalization process, inner product spaces, orthogonal and orthogonal sets.

Name of the Course: PDE & Fourier Analysis Course Code: 25PN-MTH203 Credits: 4

CLO1 Solve Lagrange's linear equations using Charpit's general method and Jacobi's method.

CLO2 Classify partial differential equations and transform them into canonical forms. And Solution of partial differential equations of second order by Monge's method.

CLO3 Understand the characteristic equations and characteristic curves of second order partial differential equations and solution of Laplace equation, Wave equation and diffusion equation.

CLO4: Understand to expand the function as Fourier series and evaluation of Fourier transformation.

Name of the Course: Complex Analysis Course Code: 25PN-MTH204 Credits: 4

CLO 1: Be familiar with function of complex variables and represent the sum function of a power series as an analytic function with radius of convergence.

CLO 2: Understand complex integration, integral formulas and Liouville theorem.

CLO 3: Demonstrate the ideas of singularities and understanding the argument principle along with fundamental theorem of algebra.

CLO 4: Understand concept of residues, evaluate contour integrals and solve polynomial equations,

Name of the Course: Computational work using R-Programming Course Code: 25PN-MTH205 Credits: 3.

CLO1: Students would be able to carry out mathematical formulations of the given real problems as LPPs, solve R language.

CLO2: Solve different types of transportation problems, assignment problems, crew assignment problems, travelling salesman problems, game problems for the given data using R..

Name of the Course: Operation Research Techniques Course Code: 25PN-MTH206
Credits: 4

CLO 1: Students will be able to illustrate the concept of optimization techniques and LPP.

CLO 2: Students will be familiar with transportation problems and assignments problems.

CLO3: Student will be able to understand the application of queuing models in practical problems.

CLO 4: Student will be able to learn the application of Economic order quantity model in different

Name of the Course: Vedic Mathematics and its application Course Code: 25PN-MTH-VAC201
Credits: 2

CLO1: Student will be able to Describe the multiplication of polynomials by Vedic sutras.

CLO2: Student will be able to Understand and Apply meaning of 6 to 11 Vedic sutras

CLO3: Student will be able to Examine division of polynomials, Quotient & Remainder

CLO4: Student will be able to Evaluate complex sums with Division algorithm and also be able to Construct problems, develop algorithms and implement for various applications.