Lalit Narayan Mithila University, Darbhanga

Multidisciplinary Course (MDC)
Mathematics for All Streams (Semester I)

Course Details

Course Code: MDC-01
Title: Basic Mathematics for Multidisciplinary Applications
Credits: 3 (Lecture: 30)
Objective: Introduce fundamental mathematical concepts and tools, tailored for students from diverse disciplines.

Course Structure

Unit 1: Fundamentals of Arithmetic and Algebra (10 Lectures)
- Basic operations on real numbers and properties
- Introduction to linear and quadratic equations
- Factorization of polynomials
- Concept of HCF, LCM, and divisors
- Simplification of algebraic expressions and identities

Unit 2: Basics of Matrices and Determinants (10 Lectures)
- Introduction to matrices and types of matrices
- Operations on matrices: Addition, subtraction, multiplication
- Determinant of a 2x2 and 3x3 matrix
- Properties of determinants
- Solution of systems of linear equations using matrices (up to 2 variables)

Unit 3: Basics of Geometry and Trigonometry (10 Lectures)
- Distance formula and section formula
- Introduction to slope and equations of a straight line
- Basics of trigonometric ratios and identities
- Applications of trigonometry in solving triangles
- Introduction to coordinate geometry concepts

Evaluation

Internal Assessment: 30 Marks
End-Semester Examination: 70 Marks

Structure of 70-Mark Exam:
Part A: 10 Objective/True-False Questions (20 Marks)
Part B: 4 Short Answer Questions (5 Marks each, Total: 20 Marks)
Part C: 3 Long Answer Questions (10 Marks each, Total: 30 Marks)

References

1. Sharma, R. C., *Basic Algebra*, Bharti Prakashan, Patna.
2. Strang, G., *Introduction to Linear Algebra.*
3. Rosen, K. H., *Discrete Mathematics and Its Applications.*
4. Thomas, G. B., *Calculus and Analytic Geometry.*
5. Loney, S. L., *Plane Trigonometry, Part I.*

Syllabus Committee

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Dean
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Resolution

The syllabus committee of Lalit Narayan Mithila University, Darbhanga, under the guidance of the Dean, Faculty of Science, has approved the above syllabus for the Multidisciplinary Course (MDC) in Mathematics for all streams. This resolution is passed on the date: **December 15, 2024**.

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Dean
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Lalit Narayan Mithila University, Darbhanga

Multidisciplinary Course (MDC)
Mathematics for All Streams (Semester-II)

Course Details

Course Code: MDC-02
Title: Calculus & Geometry
Credits: 3 (Lecture: 30)
Objective: To introduce the basic tools of calculus and geometric properties of different conic sections which are helpful in their applications in planetary motion, design of telescope and to real-world problems.

Course Structure

Unit 1: Basics of Differential Calculus (10 Lectures)

- Successive differentiation & Leibnitz's theorem (without proof)
- Maclaurin's & Taylor's series of expansion
- Partial differentiation & Euler's theorem
- Total differential

Unit 2: Basics of Integral Calculus (10 Lectures)

- Evaluation of definie integrals
- Reduction formulae
- Length of plane curve
- Area bounded by plane curves

Unit 3: Geometrical Properties of Conic Section (10 Lectures)

- Transformation of rectangular axes
- General equations of conics
- Normal form of conics
- Equations of the tangents and normal at a point of the Conic

Evaluation

Internal Assessment: 30 Marks
End-Semester Examination: 70 Marks

References

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Lalit Narayan Mithila University, Darbhanga

Multidisciplinary Course (MDC)
Mathematics for All Streams (Semester-II)

1. Anton, Howard, Bivens, Irl, & Davis, Stephen (2013), Calculus (10th ed.). John Wiley & Sons, Singapore Pte. Ltd. Indian Reprint (2016) by Wiley India Pvt.Ltd. Delhi.
2. Osborne, George, A. (1906). Differential & Integral Calculus with Examples and Applications Revised Edition. D.C. Health & Co. publishers. Boston, U.S.A.
3. Lalji Prasad, Integral Calculus, Paramount Publications Patna.
4. S.L. Loney, Coordinate Geometry.

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Lalit Narayan Mithila University, Darbhanga

Multidisciplinary Course (MDC)
Mathematics for All Streams (Semester-II)

Resoluton

The syllabus committee of Lalit Narayan Mithila University, Darbhanga, under the guidance of the Dean, Faculty of Science, has approved the above syllabu for the Multidisciplinary Course (MDC) in Mathematics for all streams. This resolution is passed on the date: December 12, 2024.

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Lalit Narayan Mithila University, Darbhanga
Multidisciplinary Course (MDC)
Mathematics for All Streams (Semester III)

Course Details

Course Code: MDC-03
Title: Ordinary Differential Equations
Credits: 3 (Lecture: 30)
Objective: Understand the concept of Ordinary Differential Equation

Course Structure

Unit 1 : Differential equations of first order and first degree (12 Lecturers)
Formulation of Differential equations
Order and degree of Differential equations
Variable separable Differential equations
Equations reducible to Variable separable
Homogeneous Differential equations
Equations reducible to Homogeneous forms
Linear Differential equations
Equations reducible to Linear forms
Bernoulli equation
Exact Differential equations
Equations reducible to Exact forms

Unit 2 : Differential equations of first order but not first degree (8 Lecturers)
Equation solvable for x
Equation solvable for y
Equation solvable for p
Claiaraut's form
Singular Solutions
General and Particular solutions
Orthogonal Trajectories of family of curves
Wornskian and its properties

Unit 3 : Linear Differential equations order greater than one with constant coefficients (6 Lecturers)
Complementary Functions
Particular Inegrals

Unit 4 : Second order Linear Differential equations with variable coefficients (4Lecturers)
Use of a known solution to find another
Normal form
Method of undetermined coefficient
Variation of parameter

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Evaluation
Internal Assessment: 30 Marks
End-Semester Examination: 70 Marks

References

1. Simmons, George F. (2016). Differential Equations with Application and Historical Notes. Tata-McGraw Hill Publishing Company Limited, New Delhi
2. Raisinghania, M. D. (2020). Ordinary and Partial Differential Equations(20th ed.). S. Chand Publication.
3. Bronson, R. & Coasta, Gabriel B. (2021). Schaum's Outline of Differential Equations (5th ed.). McGraw Hill
4. Prasad, Lalji. (2019). Differential Equations. Paramount Publication.

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