

B.A./B.Sc. I (SEMESTER-II) PAPER-I Matrices and Differential Equations & Geometry

Programme: Certificate		Year: First	Semester: Second
Class: B.A./B.Sc.			
Subject: Mathematics			
Course Code: B030201T		Course Title: Matrices and Differential Equations & Geometry	
Course outcomes:			
CO1: The subjects of the course are designed in such a way that they focus on developing mathematical skills in algebra, calculus and analysis and give in depth knowledge of geometry, calculus, algebra and other theories.			
CO2: The student will be able to find the rank, eigen values of matrices and study the linear homogeneous and non-homogeneous equations. The course in differential equation intends to develop problem solving skills for solving various types of differential equation and geometrical meaning of differential equation.			
CO3: The subjects learn and visualize the fundamental ideas about coordinate geometry and learn to describe some of the surface by using analytical geometry.			
CO4: On successful completion of the course students have gained knowledge about regular geometrical figures and their properties. They have the foundation for higher course in Geometry.			
Credits: 6		Core Compulsory / Elective	
Max. Marks: 25+75		Min. Passing Marks:	
Total No. of Lectures-Tutorials-Practical (in hours per week): L-T-P: 6-0-0			
PART-A			
Matrices and Differential Equations			
Unit	Topics		No. of Lectures
I	Types of Matrices, Elementary operations on Matrices, Rank of a Matrix, System of linear homogeneous and non-homogeneous equations, Theorems on consistency of a system of linear equations. Echelon form of a Matrix, Normal form of a Matrix, Inverse of a Matrix by elementary operations.		12
II	Eigen values, Eigen vectors and characteristic equation of a matrix, Caley-Hamilton theorem, and its applications in finding inverse of a matrix, Diagonalization of matrices.		11
III	Formation of differential equations, Geometrical meaning of a differential equation, Equation of first order and first degree, Equation in which the variables are separable, Homogeneous equations, Exact differential equations and equations reducible to the exact form, Linear differential equations.		11
IV	First order higher degree equations solvable for x, y, p, Clairaut's equation and singular solutions, orthogonal trajectories, Linear differential equation of order greater than one with constant coefficients, Cauchy- Euler form.		11

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PART-B		
Geometry		
Unit	Topics	No. of Lectures
V	General equation of second degree, System of conics, Tracing of conics, Confocal conics, Polar equation of conics and its properties.	12
VI	Three-Dimensional Coordinates, Projection and Direction Cosine, Plane (Cartesian and vector form), Straight line in three dimensions.	11
VII	Sphere, Cone and Cylinder.	11
VIII	Central conicoid, Paraboloids, Plane section of conicoid, Generating lines, Confocal conicoid, Reduction of second degree equations.	11
Suggested Readings (PART-A Matrices and Differential Equations):		
1. Shanti Narayan, A Textbook of Matrices , S. Chand, 2010		
2. Fuzhen Zhang, Matrix Theory- Basic Results and Techniques , Springer, 1999		
3. B. Rai, D.P. Choudhary & H. J. Freedman, A Course in Differential Equations , Narosa, 2002		
4. William E Boyce and Richard C Di Prima, Elementary Differential Equations and Boundary Value Problems , John Wiley and Sons, 2009		
5. D.A. Murray, Introductory Course in Differential Equations , Orient Longman, 1967		
6. Suggested digital platform: NPTEL/SWAYAM/MOOCs		
Suggested Readings (Part-B Geometry):		
1. Robert J.T Bell, An Elementary Treatise on Coordinate Geometry of three dimensions , Macmillan India Ltd., 1923		
2. P.R. Vittal, Analytical Geometry 2d & 3D , Pearson, 2013		
3. S.L. Loney, The Elements of Coordinate Geometry , McMillan and Company, London. 2018		
4. Suggested digital platform: NPTEL/SWAYAM/MOOCs		
This course can be opted as an elective by the students of following subjects: Engg. and Tech. (UG), Economics (UG/PG), Commerce (UG), BBA/BCA, B.Sc. (C.S.)		
Suggested Continuous Evaluation Methods: Max. Marks: 25		
SN	Assessment Type	Max. Marks
1	Class Tests	10
2	Online Quizzes/ Objective Tests	5
3	Presentation	5
4	Assignment	5
Course prerequisites: To study this course, a student must have subject Mathematics in class 12 th		
Suggested equivalent online courses:		
Further Suggestions:		

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