Department of Liberal Education
Era University, Lucknow
Course Outline
Effective From: 2023-24

Name of the Program	**B.A. / B.Sc. (LIBERAL EDUCATION)**			**Year/ Semester:**	**2nd / 3rd**
Course Name	**Partial Differentiation and Differential Equation**	**Course Code:**	**MT201**	**Type:**	**Theory**
Credits	**05**			**Total Sessions Hours:**	**75 Hours**
Evaluation Spread	**Internal Continuous Assessment:**	**50 Marks**		**End Term Exam:**	**50 Marks**
Type of Course	○ Compulsory	◉ Core		○ Creative	○ Life Skill
Course Objectives	1. To familiarize students with mathematical concepts and terminology involved in partial differentiation. 2. Use of partial differentiation to introduce Jacobian and their properties. 3. The objective of this class is to take your existing knowledge of calculus and apply it towards the construction. 4. Learn the solution of mathematical models in the form of differential equations (i.e. equations with derivatives in them).				

Course Outcomes (CO): *After the successful course completion, learners will develop following attributes:*

Course Outcome (CO)	**Attributes**
CO1	Student will understand the basic concept of partial differentiation and ordinary differential equations.
CO2	Recognize linear differential equation of higher order linear differential equation with constant coefficient.
CO3	Able to determine complementary functions and particular integrals.
CO4	Understand the partial differential equation and Jacobian and their use.
Pedagogy	Interactive, discussion-bases, student-centered, presentation.
Internal Evaluation Mode	Mid-term Examination: 20 Marks Activity: 10 Marks Class test: 05 Marks Online Test/Objective Test: 05 Marks Assignments/Presentation: 05 Marks Attendance: 05 Marks

Session Details	**Topic**	**Hours**	**Mapped CO**
Unit 1	**Partial Differentiation:** Partial differentiation, Homogeneous functions, Euler's theorem, Expansion of functions of one variable. Jacobian, Properties of Jacobian, Jacobian of Implicit functions, Approximation of errors, Extrema of functions of several variables. **Activity:** Graph of Homogeneous and Non Homogeneous function.	17	CO1

Unit 2	**Ordinary Differential Equation:** Introduction, Order and Degree of a differential equation, Ordinary differential equation, Formation of differential equations, Linearly dependent and independent solutions by Wronskian method, Differential equation of the first order and first degree, Variable separable form, Homogeneous differential equation, Equations reducible to homogeneous form. Application of ordinary differential equations. **Activity:** Assignment based on application of ordinary differential equations.	20	CO1
Unit 3	**Linear differential equations:** Introduction, Linear differential equation, Equations reducible to linear form(Bernoulli's Equations). Exact Differential equation, Integrating factor, Change of variables. Linear differential equations of higher with constant coefficients, Complete solution (complementary function + Particular integral), Homogeneous linear differential equations (Euler-Cauchy equation), Application of linear differential equations. **Activity:** Draw the type of Linear differential equation on chart paper.	20	CO2,CO3
Unit 4	**Partial Differential Equation:** Definition; order and degree of a partial differential equation, Formation of partial differential equation, Equations easily integrable; Classification of partial differential equations. Linear homogeneous partial differential equations, Linear partial differential equations of the first order, Lagrange's linear equations. Non-linear equations of the first order, Standard form of first order partial differential equation, Charpit's methods. Application of partial differential equations. **Activity:** Application of partial differential equations in real life.	18	CO4

CO-PO and PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	1								1					2
CO2					2				1		2			2
CO3	1	1		1	2				1			2	1	
CO4				1	1			1	1					

Strong contribution-3, Average contribution-2 , Low contribution-1,

Suggested Readings:

Text- Books	1. Mittal, P. K., Differential equations and Transformation. Delhi: S. Chand Publication. 2. Dass, H. K., Introduction to Engineering Mathematics (Volume 1*)*. Delhi: S. Chand & Company Pvt. Ltd.
Reference Books	1. Goel M., Engineering Mathematics II. Delhi: University Science Press(An Imprint of Laxmi Publications Pvt. Ltd.) 2. Kreyszig, E., Advanced Engineering Mathematics. John Wiley and sons, Inc.
Para Text	**Unit 1:** 1. https://www.youtube.com/watch?v=eTp5wq-cSXY 2. https://www.youtube.com/watch?v=YXmeH1yevkk **Unit 2:** 1. https://www.youtube.com/watch?v=abHQMVXVIAA **Unit 3:** 1. https://www.youtube.com/watch?v=MwitOvQxpfY

	Unit 4: 1. https://www.youtube.com/watch?v=g4Zn3IzXSkc 2. https://www.youtube.com/watch?v=jUIIm5C-xFs

Recapitulation & Examination Pattern

Internal Continuous Assesment:

Component	**Marks**	**Pattern**
Mid Semester	20	**Section A:** Contains **10** MCQs/Fill in the blanks/One Word Answer/ True-False type of questions. Each question carries **0.5 mark.** **Section B:** Contains **07** descriptive questions out of which **05** questions are to be attempted. Each question carries **03 marks**.
Activity	10	Will be decided by subject teacher.
Class Test	05	Contains **05 descriptive questions.** Each question carries **01** mark.
Online Test/ Objective Test	05	Contains **10 multiple choice questions.** Each question carries **0.5** mark.
Assignment/ Presentation	05	Assignment to be made on topics and instruction given by subject teacher.
Attendance	05	As per policy.
Total Marks	**50**	

Course created by: **Dr. Sheeba Rizvi**

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Signature:

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Signature: