बिरसा मुंडा ट्रायबल युनिवर्सिटी
Birsa Munda Tribal University

राजपिपला, जि. नर्मदा   Rajpipla, Dist. Narmada
Established by Tribal Development Department, Govt. of Gujarat

School of Science
B.Sc. (Zoology) Programme
Subject Code & Name: - BS02MIZOO3 Mathematics-II

Teaching and Evaluation Scheme:

Teaching Scheme				Examination Scheme			
Credits				Component Weightage			
				CCE		SEE	
L	T	P	Total	TH	PWE	TH	PWE
3	0	1	4	37.5 %	12.5 %	37.5 %	12.5 %

Programme Name	B.Sc.
Semester	II
Course Code	BS02MIZOO3
Course Title	Mathematics – II
Course Content Type(Th./Pr.)	Theory & Practical
Course Credit	3 + 1
Sessions+ Lab. Per Week	3+2
Total Teaching/Lab. Hours	45 Theory Hours + 30 Practical Hours
* 2 Laboratory = 1 Session	

Learning Objectives

Students will able to study

1. Understanding the concept of differentiation and its applications.
2. Developing the ability to find derivatives of various functions using differentiation rules.
3. Exploring differential equations and their real world applications.

Prerequisites (if any)

12th Science passed with Mathematics as a subject.

Learning Outcomes

On the Completion of this course, students will able to:

1. Apply the knowledge of differential equation and its application.
2. Recall and understand limit and continuity of functions of several variables.
3. Recall Young's and Schwartz's theorem without proof.
4. Understand partial differentiation.
5. Solve problems related to partial differentiation.

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Detailed Contents

UNIT	TOPIC/SUB-TOPIC	TEACHING HOURS
I	Revision of Ordinary differential equation , Order and degree of differential equation, Variable separable equation, Homogeneous differential equation and Non- homogeneous differential equations. Differential Equations of First Order and First Degree: Definition and method of solving of Linear differential equations of first order and first degree. Definition and method of solving of Bernoulli's differential equation and Definition and methods of solving of Exact differential equation. Differential equations of first order and higher degree: Differential equations of first order and first degree solvable for x, solvable for y, solvable for p.	15
II	Clairaut's form of differential equation and Lagrange's form of differential equations. Linear differential equations of higher order Linear differential equations of higher order with constant coefficients. Operator D, Meaning of auxiliary equation, Roots of auxiliary equation and solution of auxiliary equation $f(D)y = 0$ for real roots and complex roots, Operator $1/D$. Solution of differential equations of the type $f(D)y = X$. Meaning of complimentary function (C.F.) and Particular integral (P.I.). Methods to obtain Particular integral(P.I.) when $X = e^{ax}$, X =Sin mx, X= Cos mx, X= Sin (ax+b), X=Cos(ax+b), X= x^m, X= e^{ax} V , V is the function of x.	15

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III	Limit and continuity of function of several variables. Partial derivatives, Partial derivatives of higher order, Partial differentiation of composite function , Homogeneous function, Euler's theorem on homogeneous function of two and three variables, Total differential and chain rule, Change of variables, Partial differentiation of implicit function ,Total differential Young's and Schwartz's theorem (without proof). Errors and approximate values, Jacobians, Taylor's theorem of function of two variables, Maxima, Minima, Saddle points of function of several variables, Lagrange's method of undetermined multipliers.	15

Unit – IV Practical(s) 30 Hours

1. Practical problem based on homogeneous differential equation.

2. Practical problem based on non-homogeneous differential equation.

3. Practical problem based on linear differential equations of first order and first degree.

4. Practical problem based on method of solving of Bernoulli's differential equation.

5. Practical problem based on method of solving Exact differential equation.

6. Practical problem based on method of solving Lagrange's differential equations.

7. Practical problem based on method of solving differential equations of the type $f(D)y = e^{ax}$.

8. Practical problem based on method of solving differential equations of the type $f(D)y = \sin(ax+b)$.

9. Practical problem based on method of solving differential equations of the type $f(D)y = \cos(ax+b)$.

10. Practical problem based on method of solving differential equations of the type $f(D)y = x^n$

11. Practical problem based on method of solving differential equations of the type $f(D)y = e^{ax} x^n$

12. Practical problem based on method of solving differential equations of the type $f(D)y = \sin(ax + b)$.

13. Practical problem based on method of solving differential equations of the type $f(D)y = \cos(ax + b)$.

14. Practical problem based on method of solving Linear differential equations with variable coefficient

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Text Books
Unit 1 & 2: Mathematical Physics,- H.K.Dass, S.Chand.
Unit 3 : Differential Calculus by Shanti Narayan. 15th Edition (2004).

Reference Books
1. Differential Calculus by Shanti Narayan
2. Differential Calculus by Gorakh Prasad
3. Differential Equations by D. A. Murray
4. A Text book of Calculus, S. C. Arora and Ramesh Kumar, Pitamber Publishing, New Delhi

Web Resources
1. https://math.libretexts.org/
2. https://archive.nptel.ac.in/courses/111/104/111104144/
3. https://archive.nptel.ac.in/courses/111/106/111106146/

L: Lecture, **T:**Tutorial , **P:**Practical

CCE: Continuous and Comprehensive Evaluation

(CCE Theory includes Mid Semester Examination, Assignment, MCQ quizzes, Seminar, Reflective notes, class participation, case analysis and presentation, slip tests (announced/ surprised), attendance etc. or any combination of these)

PWE: Practical Work Examination

(PWE includes Laboratory practical work, project work, viva simulation exercise work etc.)

SEE: Semester End Evaluation