Part A: Introduction

Program: **Diploma Course**		Class: **B.A/ B.Sc. II Year**	Year: **2022**	Session: **2023-2024**
1	Course Code	**MATH-2P (I)**		
2	Course Title	I - Lab 02 - Differential Equations and Real Analysis		
3	Course Type	**Practical**		
4	Pre-requisite (if any)	No		
5	Course Learning Outcomes (CLO)	This course will enable the students to • Learn Free and Open Source Software (FOSS) tools for computer programming • Solve problem on differential equations and real analysis theory studied in Mathematics Paper 1 and 2 by using FOSS software's. • Acquire knowledge of applications of Differential Equations and Real Analysisthrough FOSS.		
6	Credit Value	2		
7	Total Marks	Max. Marks: 50		Min Passing Marks : 17

Part B: Content of the Course

Total Periods: 30

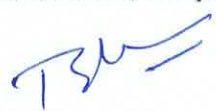| Tentative Practical List	Mathematics practical with Free and Open Source Software (FOSS) tools for computer programs, such as GeoGebra/Maxima/Scilab/ Octave /Python/R. **Course Objectives:** • To learn Free and Open Source Software (FOSS) tool for computerprogramming • Acquire knowledge of applications of differential equations and real analysisthrough FOSS **List of Practicals**: (At least 10 practicals) • Solution of differential equation and plotting the graph of the solution: Variable separable. • Solution of differential equation and plotting the graph of the solutionHomogeneous equations. • Solution of differential equation and plotting the graph of the solution:Linear differential equations.

- Solution of differential equation and plotting the solution: Bernoulli's equations

- Solution of second and higher order ordinary differential equations with constant coefficients

- Solution of second order ordinary differential equations with variable coefficients by i) Method of variation of parameters ii) When the equation is exact.

- Finding complementary function and particular integral of constant coefficient second and higher order ordinary differential equations.

- Solving second order linear partial differential equations in two variables with constant coefficient.

- Solutions to the problems on total and simultaneous differential equations.

- Solutions to the problems on different types of Partial differential equations.

- Illustration of convergent, divergent and oscillatory sequences.

- Using Cauchy's criterion to determine convergence of a sequence (simple examples).

- Illustration of convergent, divergent and oscillatory series.

- Programs to find the sum of the series and its radius of convergence.

- Using Cauchy's criterion on the sequence of partial sums of the series to determine convergence of series.

- Testing the convergence of binomial, exponential and logarithmic series and finding the sum.

- To verify the given function is Riemann integrable or not over arbitrary closed interval [a, b].

Part C - Learning Resource
Text Books, Reference Books, Other Resources

SUPPORT FROM THE GOVT FOR STUDENTS AND TEACHERS IN UNDERSTANDING AND LEARNING FOSS TOOLS:

As a national level initiative towards learning FOSS tools, IIT Bombay for MHRD, government of India is giving free training to teachers interested in learning open source software's like scilab, maxima, octave, geogebra and others. (Website: http://spoken-tutorial.org;)

(email: info@spokentutorial.org; contact@spoken-tutorial.org)

Part D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:
Maximum Marks: 50
Continuous Comprehensive Evaluation (CCE): Not Applicable
University Exam(UE): 50 Marks

Internal Assessment: Continuous Comprehensive Evaluation (CCE)	Class Test/Assignment/Presentation	Not Applicable

Declaration

This is to certify that the syllabus is framed by the Central Board of Studies (Mathematics) as per the guidelines (TOR) of the Department of Higher Education, Raipur Chhattisgarh.

1. Dr. Premlata Verma   -   Chairman
   Asst. Prof.
   Govt. Bilasa Girls PG College, Bilaspur
2. Prof. R.R. Sahu   -   Member
   Asst. Prof.
   Govt. MMR PG College, Champa
3. Mr. Yetendra Upadhyay   -   Member
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   Govt. N.K. College, Kota
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5. Dr. Arun Kumar Mishra   -   Member
   Professor

Govt. DT PG College, Utai

6. Dr. Shabnam Khan   -   Member

Professor
Govt. Digvijay PG College, Rajnandgaon

7. Dr. Padmavati   -   Member

Professor
Govt. VYT PG Auto. College, Durg

8. Dr. Anjali Chandravanshi   -   Member

Asst. Prof.
Govt. J.Y. Chhattisgarh College, Raipur

9. Manisha Gupta   -   Member

Asst. Prof.
GNA Govt. PG College, Bhatapara, Raipur

10. Mrs. Sangeeta Pandey   -   Member

Asst. Prof.
R.G. Govt. PG College, Ambikapur

11. Dr. S.K. Bohre   -   Member

Asst. Prof.
I.G. Govt. PG College, Vaishalinagar, Bhilai

12. Dr. Samir Dashputre   -   Member

Asst. Prof.
Govt. College, Arjunda, Balod

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Govt. Jajwalyadev Naveen Girls PG College, Janjgir

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K. Govt. Arts & Science College, Raigarh

15. Dr. Raghu Nandan Patel   -   Member

Asst. Prof.
Govt. MLS College, Seepat