



VIJAYANAGARA SRI KRISHNADEVARAYA UNIVERSITY

JNANASAGARA CAMPUS, BALLARI-583105

**Department of Studies in
Mathematics**

III Semester Syllabus

Bachelor of Science

With effect from 2021-22 and onwards

Approved in BOS dated on 23-09-2022

Name of the Department: Mathematics
Semester-III
DSC3: Ordinary Differential Equations & Real Analysis-I

Course Title: Ordinary Differential Equations & Real Analysis-I	Course code: 21BSC3C3MTL
Total Contact Hours: 56	Course Credits: 04
Internal Assessment Marks: 40	Duration of SEE: 3 hours
Semester End Examination Marks: 60	

Course Outcomes (CO's):

At the end of the course, students will be able to:

1. Distinguish between linear, nonlinear, partial and ordinary differential equations.
2. Recognize and solve an exact differential equation.
3. Recognize and solve a linear differential equation by use of an integrating factor.
4. Make a change of variables to reduce a differential equation to a known form.
5. Find particular solutions to initial value problems.
6. Solve basic application problems described by first order differential equations and total Differential Equations.

DSC3: Ordinary Differential Equations & Real Analysis-I

Unit	Description	Hours
1	Recapitulation of differential equations, Linear and Bernoulli's equations, exact equations, equations reducible to exact form., simple equations of first order and higher degree equations: solvable for p,x,y. Clairauts equations and their singular solutions.	11
2	Second and higher order ordinary linear differential equations with constant coefficients, complementary functions, particular integrals (Standard types), Cauchy- Euler differential equation of order two, simultaneous differential equations with constant coefficients.	11
3	Solutions of ordinary second order linear differential equation by the following methods: when a part of complementary function is given, Changing the independent variable. Changing the dependent variable, When first integral is given (Exact equation), variation of parameters, Sturm-Liouville boundary value problem, Green's function.	11
4	Total Differential Equations: Necessary condition for the equation $Pdx+Qdy+Rdz=0$ to integral problems there on, Solution of the equation of the form	11

5	Riemann Integration: Recapitulation of real number system, postulates and their consequences, inequalities and absolute values, lower and upper bounds. The upper and lower sums, necessary and sufficient conditions for integrability. Algebra of integrable functions. Integrability of continuous and monotonic functions. Fundamental theorem of calculus, change of variables. Integration by parts. The first and second mean value theorems of integral calculus.	12
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References:

1. M.D Raisinghania: Advanced Differential equations (S.Chand & co).
2. B.S Grewal: Higher Engineering Mathematics (Khanna Publishers).
3. Rudraiah et al: College Mathematics, Vol. I & II, (Sapna Book House, Bang
4. Simmens G.F: Differential equations (TMH)
5. S C Malik: Mathematical Analysis (New Age International Pvt Ltd).
6. Sharma and Vasistha: Real Analysis (Krishna Prakashan Mandir, Meerut).

Date

Course Coordinator

Subject Committee Chairperson

DSC3 Lab: Practical on Ordinary Differential Equations & Real Analysis – I

Course Title: Practical on Ordinary Differential Equations & Real Analysis – I	Course code: 21BSC3C3MTP
Total Contact Hours: 56	Course Credits: 04
Internal Assessment Marks: 25	Duration of SEE: 3 hours
Semester End Examination Marks: 25	

Course Outcomes (CO's):

At the end of the course, students will be able to:

1. Gain hands-on experience of Free and Open Source software (FOSS) tools or computer programming.
2. Solve exact differential equations
3. Plot orthogonal trajectories
4. Find complementary function and particular integral of linear and homogeneous differential equations.
5. Acquire knowledge of applications of real analysis and differential equations.
6. Verify convergence/divergence of different types of series

DSC3 Lab: Practical on Ordinary Differential Equations & Real Analysis – I

Unit	Description	Hours
1	<p>List of Programs:</p> <p>Use open-source software to execute the practical problems. (Maxima/Scilab/MatLab/Mathematica/Python)</p> <ol style="list-style-type: none"> 1. Fundamentals of Ordinary differential equations and Real analysis using FOSS 2. Verification of exactness of a differential equation 3. Plot orthogonal trajectories for Cartesian and polar curves 4. Solutions of differential equations that are solvable for x, y, p. 5. To find the singular solution by using Clairaut's form. 6. Finding the Complementary Function and Particular Integral of linear and homogeneous differential equations with constant coefficients and plot the solutions. 7. Finding the Particular Integral of differential equations up to second order and plot the solutions. 8. Solutions to the Total and Simultaneous differential equations and plot the solutions. 9. Test the convergence of sequences 10. Verification of exponential, logarithm and binomial series. 11. Verification of geometric series, p-series, Cauchy's Integral test, root test, and D Alembert's Test 	56

	12. Examples on a series of positive terms. 13. Examples on alternating series using Leibnitz's theorem. 14. Finding the convergence of series using Cauchy's criterion for partial sums.	
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References:

1. M.D Raisinghania: Advanced Differential equations (S.Chand & co).
2. B.S Grewal: Higher Engineering Mathematics (Khanna Publishers).
3. Rudraiah et al: College Mathematics, Vol. I & II, (Sapna Book House, Bang
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