COURSE STRUCTURE

Course Code	SCI103B			
Course Category	Basic Sciences			
Course Title	Integral Calculus			
Teaching Scheme and Credits	L	T	Laboratory	Credits
Weekly load hrs	03 hours	1hour	---	2+1+0=3

Pre-requisites: HSC (Mathematics), Linear Algebra and Differential Calculus

Course Objectives:

1) To learn Basic Concepts of Mathematics useful for Engineering.
2) To apply mathematical tools in various Engineering problems.

Course Outcomes:

After completion of this course, students will be able to

1) solve the differential equations which occur as models in Electrical circuits andheat transfer .(CL-II)
2) apply the knowledge of Geometry to draw the curves in Cartesian , polar and parametric form (CL-I)
3) apply methods of integration to compute area and volumes of two dimensional and three dimensional objects respectively(CL-I)
4) identify periodic wave forms in series of sines and cosines of multiple angles and carry out practical analysis(CL-I)

Course Contents:
Ordinary Differential Equations and Applications

Introduction to first order differential equations, modelling and solution of exact and linear differential equation.

Group Activity: Applications of Differential Equations to Orthogonal Trajectories, Electrical Circuits, 1-Dimensional Heat Conduction Problemsetc.

Introduction to tracing of curves and 3-dimensional coordinate system:

Standard and important curves in Cartesian, Parametric and Polar coordinates. Examples based on 3- dimensional Cartesian, spherical polar and cylindrical coordinate system.

Tools for Integration, Multiple Integrals and their Applications

Problems on Reduction formulae, Beta, Gamma functions, Differentiation under integral sign, Error functions.Double and Triple integrations.

Group activity: Applications of double and triple integrals incalculating Area and Volume.

Fourier series

Introduction to Fourier series,Dirichlet's conditions, Harmonic Analysis.

Tutorial Exercises:

1. Linear and Exact DifferentialEquations.
2. Applications of DifferentialEquations.
3. Tracing of Curves (Cartesian and Parametric)
4. Tracing of Curves (Polar) and 3-dim coordinate system.
5. Reduction Formulae and Gamma functions.
6. Beta Functions.
7. DUIS & error function.
8. Double Integral.
9. Triple Integral.
10. Area and Volume.
11. Fourier series
12. Fourier Series of Odd and Even Functions and Harmonic Analysis

Three tutorials will be conducted using Mathematical Software.

<u>**Learning Resources:**</u>

Reference Books

1. Kreyszig Erwin, "Advanced Engineering Mathematics", 10^{th}edition, Wiley Eastern Limited2015.

2. Greenberg Michael D., "Advanced Engineering Mathematics", 2^{nd}edition, Pearson 2009.

3. Grewal B.S. "Higher Engineering Mathematics", 44th edition, Khanna Publishers 2017.

Supplementary Reading:

Weber H.J. and Arfken G.B. "Mathematical Methods For Physicists" ,6th edition, Academic Press 2011.

Web Resources:

Differential Equations:
    1. *http://nptel.ac.in/courses/111106100/1*
    2. *http://nptel.ac.in/courses/111106100/4*
Fourier Series:
http://mathworld.wolfram.com/FourierSeries.html

MOOCs (Coursera)

https://www.edx.org/course/differential-equations-linear-algebra-and-nxn-systems-of-differential-equations

MIT Opencourseware

Pedagogy:

1. Team teaching
2. Group activity
3. Audio- video techniques
4. Tutorials and class tests

Assessment Scheme:

Class Continuous Assessment (CCA): 100 marks

Assignment/ short term Question answers Tests	Tutorial	Mid Term Test	Group Activity	Case study	MCQ	Oral	Attendance	Total
20 Marks	50 Marks	15 Marks	10 Marks	Nil	Nil	Nil	5 Marks	100 Marks

Laboratory Continuous Assessment (LCA): **NA**

Regularity and punctuality	Understanding of objective	Understanding of procedure	Experimental skills	Ethics

Term End Examination : 50 marks

Syllabus:

Module No.	Contents	Workload in Hrs		
		Theory	*Tutorial*	*Assess*
1	**Ordinary Differential Equations and Applications**	8	2	--
2	**Introduction to Tracing of Curves and 3 dimensional coordinate system**	4	2	--
3	**Tools for Integration, Multiple Integrals and their Applications**	13	6	--
4	**Fourier Series and Harmonic Analysis**	5	2	---

Prepared By

Prof. Gajanan Birajdar
Subject Coordinator

Checked By

Prof. Ramaa Sandu
HOS, Mathematics and
Statistics

Approved By

Prof.Dr.Shubhalaxmi Joshi
Associate Dean, Faculty of
Science