Kadi Sarva Vishwavidyalaya

Faculty of Engineering & Technology

Second Year Bachelor of Engineering (ME,EE,CV,EC) – Semester III

(With effect from: Academic Year 2018-19)

Subject Code: CC302A-N	Subject Title: Differential Equations and Transforms
Pre-requisite	Branch: Mechanical, Electrical, Civil and Electronics & Communications Engg.

Teaching scheme				Total Credit	Evaluation Scheme					Total
L	T	P	Total		Theory		Mid Sem Exam	CIA	Pract.	
Hours	Hours	Hours	Hours		Hours	Marks	Marks	Marks	Marks	Marks
03	01	00	04	04	03	70	30	50	00	150

Course Objective:

The objective of this course is

- To present the foundations of many basic Mathematical tools and concepts related to Engineering.
- To provide a coherent development to the students for the courses of various branches of Engineering like Control Theory , Circuits and Networks, Digital Logic design , Fluid Mechanics, Machine Design etc
- To enhance the student's ability to think logically and mathematically.
- To give an experience in the implementation of Mathematical concepts which are applied in various fields of Engineering.

Outline Of the Course:

Sr. No	Title of the Unit	Minimum Hours
1	First Order Ordinary Differential Equations	9
2	Higher Order Ordinary Differential Equations	10
3	Partial Differential Equations and Applications	10
4	Laplace transforms	9
5	Fourier Series	5
6	Fourier transform	5
	Total	48

Total hours (Theory): 48
Total hours (Tutorial): 16
Total hours: 64

Detailed Syllabus

Sr. No	Topic	Lecture Hours	Weight age(%)
1	**First Order Ordinary Differential Equations:** basic concepts- formation and solution, Separable , Exact differential equations, Reduction of Non exact differential equation using , Integrating factor, Linear differential equations, Bernoulli equations, Homogeneous equation –reduction to separable form.	9	20%
2	**Higher Order Ordinary Differential Equations:** Basic- General solution and particular integral, Auxiliary equation, complementary function. Higher order linear differential equations with constant coefficient, method of variation of parameters, Cauchy-Euler equation.	10	20%
3	**Partial Differential Equations and Applications:** Basic Concepts-Formation PDEs, Order , Linearity & Homogeneity of PDE, Solution of Partial Differential equations $f(x,y,z,p,q) = 0$, Nonlinear PDEs first order, Some standard forms of nonlinear PDE, higher order Linear PDEs with constant coefficients, Classification of second order linear PDEs. Method of Separation of variables. **Applications**- One Dimensional Wave equation, One Dimensional Heat equation, Two Dimensional Laplace equation.	10	20 %
4	**Laplace transforms:** - Laplace Transform, Properties of Laplace Transform, Laplace transform of periodic functions. Finding inverse Laplace transform by different methods, convolution theorem. Evaluation of integrals by Laplace transform, solving ODEs by Laplace Transform method.	9	20%
5	**Fourier Series:** Periodic function, Trigonometric series, Fourier series, Functions of any period, Even and odd functions, Half-range Expansion.	5	10%
6	**Fourier transform:** Definition and properties of Fourier sine, cosine and, Convolution theorem. Inversion theorems. Fourier transform of derivatives.	5	10%
	Total	48	100%

Instructional Method and Pedagogy:

- In Tutorial, class will be divide into two subclasses & faculties will solve or assign the problem of the subject in each subclass.

- Attendance is compulsory in lectures and Tutorial which carries 05 Marks.

- At regular intervals assignments is given. In all, a student should submit all assignments of 30 marks each.

- Classroom participation and involvement in solving the problems in Tutorial rooms carries 05 Marks.

- One internal exam of 30 marks is conducted as a part of internal theory evaluation.

Learning Outcome: At the end of the course

- The students will be able to think logically and mathematically in any field of engineering.

The students will gain an experience in the implementation of Mathematical concepts which are applied in various field of Engineering.

Text/Reference Books:

1. "Advanced Engineering Mathematics (8th Edition)", E. Kreyszig, Wiley-India (2007).
2. "Higer Engineering Mathematics", B V Ramana, Tata McGraw-Hill.
3. "Transforms and Partial Differential Equations", Manish Goyal and N.P. Bali University Science Press, Second Edition, 2010.
4. "Elementary Differential Equations (8th Edition)", W. E. Boyce and R. DiPrima, John Wiley.
5. "Differential Equations", S. L. Ross, 3rd Ed., Wiley India, 1984.
6. "Engineering Mathematics Vol 2", Baburam, Pearson Publication.
7. "Ordinary and Partial Differential Equations", M.D Raisinghania, S Chand & Co.
8. "Introduction to Partial Differential Equations", Gerald B Folland, 2nd edition, Prentice – Hall of India (2001.)
9. "Higher Engineering Mathematics", B.S. Grewal, Khanna Publishers, 36th Edition, 2010.

List of Tutorials:

Sr. No.	Tutorial Content
1	Problem solving on "**First Order Ordinary Differential Equations".**
2	Problem solving on "**Higher Order Ordinary Differential Equations"**
3	Assignment on "**Partial Differential Equations and Applications".**
4	Assignment on "**Laplace transforms".**
5	Problem solving on "**Fourier Series"**
6	Assignment on **"Fourier transform".**