Subject Code: 01MA1301
Subject Name: Applied Differential Equation
B. Tech. Year - II (Semester - 3)

Objective of the Course :

The subject aims to make the learner able to apply the knowledge of differential equations and numerical methods to solve core Engineering and real-world problems.

Credit Earned : 04

Course Outcome :

After completion of this course, student will be able to

1. Apply Laplace transform and Fourier series to solve differential equations.
2. Classify and apply the standard methods to solve ordinary differential equations.
3. Expand various functions in terms of sine and cosine functions.
4. Apply partial differential equations in engineering problems.

Teaching and Examination Scheme :

Teaching Scheme			Credits	Examination Marks					
				Theory Marks			Practical Marks		Total Marks
THEOTY	TUTORIAL	PRACTICAL	C	ESE(E)	IA	CSE	Viva (V)	Term Work (TW)	
3	2	0	5	50	30	20	25	25	150

Content:

Sr. No.	Content	Total Hrs.
1	**Fourier Series, Fourier integral and Some Special Functions** Periodic function, Trigonometric series, Fourier series for functions of any period, Even and odd functions, Half-range Expansion, Fourier integrals. Definitions of: Gamma function, Beta function, Error function, and complementary Error function, Heaviside's function, pulse unit height, and duration function, Sinusoidal Pulse function, Rectangle function, Gate function, Dirac's Delta function, Signum function, Sawtooth wave function, Triangular wave function, Halfwave rectified sinusoidal function, Full rectified sine wave, square wave function.	10
2	**Laplace Transforms** Laplace transforms definition, Laplace transforms of some elementary functions,	10

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	Inverse transforms, Linearity and shifting properties, Laplace transforms of derivatives and integrals, Differentiation and integrations of Transforms, Convolution theorem and its application to obtain inverse Laplace transform, Laplace transform of periodic functions, Unit step function, Unit impulse function (Dirac delta function), second shifting property, Applications of Laplace transforms to solve ODE and system of ODE	
3	**Higher-Order ODE with Applications** Solution of homogeneous linear differential equations with constant coefficients, Nonhomogeneous linear differential equations, Variation of Parameters, Euler-Cauchy's differential equations with variable coefficients, Application of ODE: Mechanical vibration system, Newtons Colling law.	**12**
4	**Partial Differential Equations** Formation of PDE, Classification of 2nd order PDE, Solution of Partial Differential Equations, Lagrange's linear partial differential equation, Special types of Nonlinear PDE of the first order, method of separation of variables, Homogeneous and Non-homogeneous PDE, Application of PDE: Heat, wave, Laplace equations and their	**10**
5	**Application of ODE and Laplace by MATLAB** Laplace transforms of some function, Inverse Laplace transform of some function, Solution of the Differential equation, Solution of Differential equation with IVP and BVP	**To be covered in Tutorial hours**

Distribution of Theory Marks

R Level	**U** Level	**A** Level	**N** Level	**E`** Level	**C** Level
20	**30**	**25**	**15**	**10**	**--**

Legends: R: Remember**; U:** Understand**; A:** Apply**; N:** Analyze**; E:** Evaluate**; C**: Create

List of Tutorials :

1.Theory and Example on Fourier series.

2.Theory and Example on Laplace Transforms.

3.Theory and Example on Higher Order ODE.

4.Theory and Example on partial differential equation.

Reference books :

1. Engineering mathematics Vol. 2, by Baburam, 2nd Edition, Pearson, (2012).

2. W.E. Boyce and R. Diprima, Elementry Differential Equation (8th Edition), John

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Wiley (2005).

3. Wylie & Barrett: Advanced Engineering Mathematics, Mc graw Hill pub.

4. Greenberg M D: Advanced Engineering Mathematics, 2nd ed., Pearson.

List of Open Base Software / learning website :

1. http://mathworld.wolfram.com/

2. http://en.wikipedia.org/wiki/Mat

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