Ordinary Differential Equations and Transforms (MAL201)

Course no: MAL201	Open course (YES/NO) :	HM Course (Y/N)	DC (Y/N)	DE (Y/N)
	NO	N	N	N
Type of course	Regular			
Course Title	**Ordinary Differential Equations and Transforms**			
Course Coordinator	Dr. Prashant Kumar			
Course objectives:	This course provides an introduction to topics involving ordinary differential equations. Emphasis is placed on the development of abstract concepts and applications for first-order and linear higher-order differential equations, systems of differential equations, series solutions, special functions, Laplace and Fourier transforms.			
POs				

Semester: 3rd		Autumn: Yes		Spring:		
		Lecture	**Tutorial**	**Practical**	**Credits**	**Total Teaching Load**
Contact Hours		3	1	0	4	48
Prerequisite course code as per proposed course numbers		Nil	Nil			
Prerequisite credits		Nil	Nil			
Equivalent course codes as per proposed course and old course		Nil	Nil			
Overlap course codes as per proposed course numbers		Nil	Nil			

Text Books:			
1.	Title	An Introduction to Ordinary Differential Equations,	
	Author	E.A. Codington,	
	Publisher	Dover Publications,	
	Edition	1989.	
2.	Title	Advanced Engineering Mathematics	
	Author	E. Kreyszig,	
	Publisher	John Wiley and Sons	
	Edition	8th Edition, 2008.	
Reference Book:			
1.	Title	Advanced Engineering Mathematics,	
	Author	R. K. Jain and S. R. K. Iyengar	
	Publisher	Narosa Pub. House	
	Edition	2008.	

Content	**Unit I: Ordinary Differential Equations:** Formation of differential equations; Separable equations; Equations reducible to separable form; Exact solutions, Exact equations, Integrating factors, Linear first order equations; Bernoulli's equation; Orthogonal trajectories. Homogeneous linear equations of arbitrary order with constant coefficients; Non-homogeneous linear equations with constant coefficients; Euler and Cauchy's equations; Method of variation of parameters; System of linear differential equations. (14 hours) **Unit II: Special Functions:** Classification of singularities of an ordinary differential equation, series solution, Method of Frobenius, Indicial equation; Examples of Bessel and Legendre functions; Bessel of first kind-recurrence formulae-generating functions-orthogonality of Bessel functions; Legendre polynomial-Rodrigue's formula- generating function-recurrence formula-orthogonality of Legendre polynomials. (14 hours) **Unit III: Laplace Transform:** Laplace transform– Inverse Laplace transform– properties of Laplace transforms, Convolution theorem–Solution ODE by Laplace transform. Laplace transform of periodic function, Dirac-Delta function, Unit Step function. (6 hours) **Unit IV: Fourier Series and Transform:** Fourier Series-Expansion of a function in Fourier series for a given range – Half range sine and cosine expansions. Fourier transformation and inverse transforms – sine, cosine transformations and inverse transforms–simple illustrations. (14 hours)
Curse Assessment	Continuous Evaluation 25% Mid Semester 25% End Semester 50%