

**Subject Code: 02MA0201**
**Subject Name: ENGINEERING MATHEMATICS-III**
**B.Tech. II Year – (Sem-3) (ALL BRANCHES EXCEPT IT/CE)**

**Objective:** The subject aims to make the learner able to apply the knowledge of differential equations and transforms to solve core Engineering and real world problems.

**Credits Earned: 5 Credits**

**Course Outcomes:** After completion of this course, student will be able to

- Expand various functions in terms of basic trigonometric functions.
- Analyze differential equations.
- Solve differential equations by using tool like Laplace transform and Fourier series.
- solve ODEs and PDEs The course is designed in such a way
- Apply the knowledge of differential equations and its solutions to evaluate engineering problems

### Teaching and Examination Scheme

Teaching Scheme (Hours)			Credits	Theory Marks			Tutorial/ Practical Marks		Total Marks
Theory	Tutorial	Practical		ESE (E)	IA	CSE	Viva (V)	Term work (TW)	
4	2	-	5	50	30	20	25	25	150

### Contents:

Unit	Topics	Contact Hours
1	<b>Fourier series :</b> Periodic functions, Trigonometric series, Euler formulae, Fourier series of periodic function of period $2\pi$ , Even and odd functions, Half range series, Fourier series of arbitrary period.	14
2	<b>Laplace Transforms :</b> Laplace transforms as an improper integral and its existence. Laplace transforms of elementary functions, inverse Laplace transforms, Linearity property, First and second shifting theorems, Laplace transforms of derivatives and integrals, Convolution theorem and its application to obtain inverse Laplace transform, Laplace transform of periodic functions, Unit step function, Unit impulse function (Dirac delta function).	16

3	<b>Linear Differential Equations</b> : Model of real world problems of higher order LDE, Complementary function and particular integral and LDE of higher order with constant coefficients, Methods for finding particular integrals viz. Inverse Operators and Variation of Parameters, LDE of higher order with variable coefficients viz Cauchy's, Legendre's and Bessel's homogeneous linear differential equations and their solutions in terms of infinite series, System of two first order linear differential equations.	10
4	<b>Partial Differential Equations</b> : Initial and Boundary valued conditions, Methods of solutions of first order PDE , Lagrange's equation , Special types of Nonlinear PDE of the first order	10
5	<b>Applications of differential equations:</b> Application of ODE: Mechanical vibration system, Electrical circuit system, Deflection of beams, Application of PDE: Heat, wave, Laplace equations and their solution by method of separation of variables and Fourier series.	10
	<b>Total Hours</b>	<b>60</b>

**Recommended Textbooks:**

1. Erwin Kreyszig: Advanced Engineering Mathematics, 8<sup>th</sup> Ed., Jhon Wiley & Sons, India ,1999.

**Reference Books:**

1. M. D. Weir *et al*: Thomas' Calculus, 11<sup>th</sup> Ed., Pearson Eduaction, 2008.
2. Stewart James: Calculus Early Transcendental, 5<sup>th</sup> Ed., Thomson India, 2007
3. Wylie & Barrett: Advanced Engineering Mathematics, Mc graw Hill pub.
4. Greenberg M D: Advanced Engineering Mathematics, 2nd ed., Pearson.

**Suggested Theory distribution:**

The suggested theory distribution as per Bloom's taxonomy is as per follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process

Distribution of Theory for course delivery and evaluation					
Remember	Understand	Apply	Analyze	Evaluate	Create
20%	20%	30%	15%	10%	5%

**Instructional Method:**

- a. The course delivery method will depend upon the requirement of content and need of students. The teacher in addition to conventional teaching method by black board, may also use any of tools such as demonstration, role play, Quiz, brainstorming, MOOCs etc.
- b. The internal evaluation will be done on the basis of continuous evaluation of students in the laboratory and class-room.
- c. Practical examination will be conducted at the end of semester for evaluation of performance of students in laboratory.
- d. Students will use supplementary resources such as online videos, NPTEL videos, e-courses, Virtual Laboratory

**Supplementary Resources:**

Web site: <http://mathworld.wolfram.com/>

<http://en.wikipedia.org/wiki/Math>