MATHEMATICAL METHODS IN ENGINEERING

I Semester: CAD / CAM								
Course Code	**Category**	**Hours / Week**			**Credits**	**Maximum Marks**		
BCCB02	**Core**	**L**	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
		3	-	-	3	30	70	100
Contact Classes: 45	**Tutorial Classes: 15**	**Practical Classes: Nil**				**Total Classes: 60**		

COURSE OBJECTIVES:
The course should enable the students to:

I. Develop a basic understanding of a range of mathematics tools with emphasis on engineering applications.
II. Solve problems with techniques from advanced linear algebra, ordinary differential equations and multivariable differentiation.
III. Develop skills to think quantitatively and analyze problems critically.

COURSE OUTCOMES (COs):

CO 1: Describe the basic concepts of probability, discrete, continuous random variables and determine probability distribution, sampling distribution of statistics like t, F and chi-square.
CO 2: Understand the foundation for hypothesis testing to predict the significance difference in the sample means and the use of ANOVA technique.
CO 3: Determine Ordinary linear differential equations solvable by nonlinear ODE's.
CO 4: Explore First and second order partial differential equations.
CO 5: Analyze the solution methods for wave equation, D'Alembert solution, and potential equation, properties of harmonic functions, maximum principle, and solution by variable separation method.

COURSE LEARNING OUTCOMES (CLOs):

1. Describe the basic concepts of probability, discrete and continuous random variables
2. Determine the probability distribution to find mean and variance.
3. Discuss the concept of sampling distribution of statistics like t, F and chi-square.
4. Understand the foundation for hypothesis testing.
5. Apply testing of hypothesis to predict the significance difference in the sample means.
6. Understand the assumptions involved in the use of ANOVA technique.
7. Solve differential equation using single step method.
8. Solve differential equation using multi step methods.
9. Understand the concept of non- linear ordinary differential equations.
10. Understand partial differential equation for solving linear equations.
11. Solving the heat equation in subject to boundary conditions.
12. Solving the wave equation in subject to boundary conditions.
13. Understand the conditions for a complex variable to be analytic and entire function.
14. Understand the concept of harmonic functions.
15. Analyze the concept of partial differential equations by variable separation method.

UNIT-I	INTRODUCTION TO PROBABILITY	Classes: 09

Theory Probability Theory and Sampling Distributions. Basic probability theory along with examples. Standard discrete and continuous distributions like Binomial, Poisson, Normal, Exponential etc. Central Limit Theorem and its significance. Some sampling distributions like chi-square , t, F.

UNIT -II	TESTING OF STATISTICAL HYPOTHESIS	Classes: 09

Testing a statistical hypothesis, tests on single sample and two samples concerning means and variances. ANOVA: One – way, Two – way with/without interactions.

UNIT-III	ORDINARY DIFFERENTIAL EQUATIONS	Classes: 09

Ordinary linear differential equations solvable by direct solution methods; solvable nonlinear ODE's.

UNIT-IV	PARTIAL DIFFERENTIAL EQUATIONS AND CONCEPTS IN SOLUTION TO BOUNDARY VALUE PROBLEMS	Classes: 09

First and second order partial differential equations; canonical forms

UNIT-V	MAJOR EQUATION TYPES ENCOUNTERED IN ENGINEERING AND PHYSICAL SCIENCES	Classes: 09

Solution methods for wave equation, D'Alembert solution, potential equation, properties of harmonic functions, maximum principle, solution by variable separation method.

Text Books:

1. J. B. Doshi, "Differential Equations for Scientists and Engineers", Narosa, New Delhi.
2. B. S. Grewal, "Higher Engineering Mathematics", Khanna Publishers, 43rd Edition, Delhi.

Reference Books:

1. S. P. Gupta, "Statistical Methods", S. Chand & Sons, 37th revised edition.
2. Erwin Kreyszig," Advanced Engineering Mathematics (9th Edition)", Wiley India.

Web References:

1. http://www.efunda.com/math/math_home/math.cfm
2. http://www.ocw.mit.edu/resourcs/#Mathematics
3. http://www.sosmath.com
4. http://www.mathworld.wolfram.com

E-Text Books:

1. http://www.keralatechnologicaluniversity.blogspot.in/2015/06/erwin-kreyszig-advanced-engineering-mathematics-ktu-ebook-download.html
2. http://www.faadooengineers.com/threads/13449-Engineering-Maths-II-eBooks