MATH 1005	MATHEMATICS-II	L	T	P	C
Version 1.0		3	1	0	4
Pre-requisites/Exposure	Mathematics upto B.Tech 1st semester				
Co-requisites	--				

Course Objectives

1. To enable the students to solve linear ordinary differential equations.
2. To equip the students with essential tools for probability and statistics.
3. To make students understand numerical techniques to solve different types of equations and integrals.
4. To help the students to gain the knowledge of posets and lattices.

Course Outcomes

On completion of this course, the students will be able to

CO1. Find the solution of exact differential equations, complementary function and particular integral of linear differential equations; probability mass and density functions; a root of transcendental equations and relation between finite difference operators; define posets, lattice and its related properties.

CO2. Explain the techniques for solving linear differential equations; the concept of moments and probability distributions; numerical techniques for solving system of linear, transcendental and ordinary differential equations; the basic concepts of lattices.

CO3. Solve the linear differential equations; problems using probability distributions; problems to obtain approximate solution using numerical methods and identify the special lattices among posets.

Catalog Description

This serves as a basic course for describing and analyzing engineering processes and systems. It also enables precise representation and communication of knowledge of mathematical techniques. It fulfills the need of the concepts and aids in visualizing the underlying geometric interpretation. In first unit posets and lattices will be taught which play an important role in many discipline of computer science. In second unit students will learn numerical techniques which have become an important tool for an engineer for solving complex problems. In third unit student will learn about linear differential equation which arise in the study of rates of change and of quantities or things that change. They play a significant role in science, applied mathematics, physics, engineering, biology, economics etc. The last unit will cover statistical techniques which are very important for data analysis. The techniques taught in this course will help students being mathematically efficient in dealing real life problems.

Course Content

Unit I: Differential Equations   11 lecture hours
Exact differential equations, Linear differential equations with constant coefficients, Cauchy-Euler differential equation, Legendre linear differential equation, Solution of second order differential equations when a part of complementary function is known, Solution of second order differential

equations by reduction to normal form, Solution of second order differential equations by changing the independent variable, Solution of second order differential equation by variation of parameters.

Unit II: Probability & Statistics   8 lecture hours
Discrete and continuous random variables, Moments, Skewness and Kurtosis, Probability mass and probability density functions, Moment generating functions and their properties, Binomial distribution, Poisson distribution, Normal distribution.

Unit III: Numerical Methods   17 lecture hours
Bisection method, Regula Falsi method, Fixed point iteration and Newton-Raphson method, Gauss-Jacobi and Gauss-Seidel methods, Finite difference operators and their relationships, difference tables, Newton forward and backward interpolation formula, Newton divided difference method, Numerical differentiation, Newton-Cotes integral formula, Trapezoidal rule, Simpson's1/3 and Simpson's 3/8 Rules, Picard's method, Taylor Series method, Euler's method and Modified Euler's method, Runge-Kutta fourth order method.

Unit IV: Posets and Lattices   6 lecture hours
Partial order relations, Hasse diagram, Posets, lattices, maximal and minimal element, Well ordered set, properties of lattices, Some special lattices-bounded lattice and complemented lattices, distributive lattice, modular lattice and complete lattice.

Text Books
1. B. Kolman, R. C. Busby and S. C. Ross, Discrete Mathematical Structures, PHI Learning. ISBN: 9788131724972.
2. R. K. Jain and S. R. K. Iyengar, Advanced Engineering Mathematics, Narosa Publications. ISBN: 9788173197307.
3. E. Kreyszig, Advanced Engineering Mathematics, Wiley Publications. ISBN: 9788126554232.
4. B. V. Ramana, Higher Engineering Mathematics, Tata McGraw Hill. ISBN: 9780070634190

Reference Books
1. L. Seymour and L. Marc, Discrete Mathematics, Tata Mcgraw Hill Professional. ISBN: 9781259062537.
2. S. S. Sastry, Introductory Methods of Numerical Analysis, PHI Learning. ISBN: 9788120345928.
3. Z. Ahsan, Differential Equations and their Applications, Prentice Hall of India. ISBN: 9788120325234.
4. M. Greenberg, Advanced Engineering Mathematics, Pearson. ISBN: 9788177585469.

Modes of Evaluation: Class tests/Assignment/Tutorial Assessment/Written Examination Examination Scheme:

Components	Tutorial/Faculty Assessment	Class Tests	MSE	ESE
Weightage (%)	15	15	20	50

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

	Mapping between COs and POs	
	Course Outcomes (COs)	**Mapped Programme Outcomes**
CO1	Find the solution of exact differential equations, complementary function and particular integral of linear differential equations; probability mass and density functions; a root of transcendental equations and relation between finite difference operators; define posets, lattice and its related properties.	**PO1, PO2, PO5**
CO2	Explain the techniques for solving linear differential equations; the concept of moments and probability distributions; numerical techniques for solving system of linear, transcendental and ordinary differential equations; the basic concepts of lattices.	**PO1, PO2, PO5**
CO3	Solve the linear differential equations; problems using probability distributions; problems to obtain approximate solution using numerical methods and identify the special lattices among posets.	**PO1, PO2, PO5**

Course Code	Course Title	Engineering Knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual or team work	Communication	Project management and finance	Life-long Learning
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
MATH 1005	MATHEMATICS-II	3	1			1							

1=weakly mapped
2= moderately mapped
3=strongly mapped