PESIT Bangalore South Campus

15MAT41: ENGINEERING MATHEMATICS – IV

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Mrs. Sivasankari V

No. of hours Specified: 58

Class No.	Portions to be covered	% of portion covered	
		Chapterwise	Cumulative
	Module – 1 :Numerical Methods		
1-2	Numerical solution of ordinary differential equations of first order and first degree-Taylor's series method	20	20
3	Modified Euler's method		
4	Runge - Kutta method of fourth order.		
5-6	Milne's and Adams-Bashforth predictor and corrector methods		
	Module – 2: Numerical Methods and Special Functions		
7-9	Numerical solution of second order ordinary differential equations- Runge-Kutta method and Milne's method.	20	40
10	Special Functions: Series solution-Frobenious method.		
11-12	Series solution of Bessel's differential equation leading to Jn(x)- Bessel's function of first kind.		
13-14	Basic properties, recurrence relations and orthogonality		
15	Series solution of Legendre's differential equation leading to Pn(x)- Legendre polynomials.		
16	Rodrigue's formula, Problems		
	Module - 3 : Complex Variables		
17	Review of a function of a complex variable, limits, continuity, differentiability.	20	60
18-19	Analytic functions - Cauchy-Riemann equations in cartesian and polar forms.		
20	Properties and construction of analytic functions		
21-23	Complex line integrals ,Cauchy's theorem and Cauchy's integral formula-Problems		
24-25	Residue, poles-Problems		

26	Cauchy's Residue theorem (without proof) and problems.		
27	Conformal transformations		
28-31	Discussion of transformations: $w=z^2$, $w= e^z$, $w=z+(1/z)(z\neq0)$		
32	Bilinear transformations-problems.		
	Module - 4 : Probability Distributions		
33-35	Probability Distributions: Random variables (discrete and continuous), Probability mass/density functions.	20	80
36-37	Binomial distribution -Problems		
38-39	Poisson distribution -Problems		
40-44	Exponential and normal distributions –Problems		
45-46	Joint Probability distribution for two discrete random variables		
47	Expectation, Covariance, Correlation coefficient.		
	Unit –V : Sampling theory and Stochastic Process		
48	Sampling, Sampling distributions, standard error	20	100
49-51	Test of hypothesis for means and proportions, confidence limits for means		
52	Student's t-distribution -Problems		
53	Chi-square distribution as a test of goodness of fit.		
54-56	Stochastic processes, probability vector, stochastic matrices, fixed points, regular stochastic matrices		
57-58	Markov chains, higher transition probability-simple problems.		

Course Outcomes:

On completion of this course, students are able to:

1. Use appropriate single step and multi-step numerical methods to solve first and second order ordinary differential equations arising in flow data design problems.
2. Explain the idea of analyticity, potential fields residues and poles of complex potentials in field theory and electromagnetic theory.
3. Employ Bessel's functions and Legendre's polynomial s for tackling problems arising in continuum mechanics, hydrodynamics and heat conduction.
4. Describe random variables and probability distributions using rigorous statistical methods to analyze problems associated with optimization of digital circuits, information, coding theory and stability analysis of systems.
5. Apply the knowledge of joint probability distributions and Markov chains in attempting engineering problems for feasible random events.

Text books	Title & Author
1.	B.S. Grewal, "**Higher Engineering Mathematics**", Khanna publishers, 43rd edition, 2013.
2.	Erwin Kreyszig, " **Advanced Engineering Mathematics I**", Wiley &Sons, 10th Ed.,2015.

Reference books	Title & Author
1.	B.V. Ramana, "**Higher Engineering Mathematics**", Tata Mc Graw Hill, 2006
2.	N.P. Bali and Manish Goyal "**A text of Engineering Mathematics**", Laxmi publications, 7th Edition,2010
3.	H.K. Dass and Er. Rajnish Verma, "Higher Engineering Mathematics", S. Chand publishing, 1st edition, 2011.

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1. http://nptel.ac.in/courses.php?disciplineID=111
2.http://wwww.khanacademy.org/
3.http://www.class-central.com/subject/math