ENGINEERING MATHEMATICS-IV

[As per Choice Based Credit System (CBCS) scheme]

(Effective from the academic year 2017 -2018)

SEMESTER – IV

Subject Code	17MAT41	IA Marks	40
Number of Lecture Hours/Week	04	Exam Marks	60
Total Number of Lecture Hours	50	Exam Hours	03

CREDITS – 04

Module 1	**Teaching Hours**
Numerical Methods: Numerical solution of ordinary differential equations of first order and first degree, Taylor's series method, modified Euler's method. Runge - Kutta method of fourth order, Milne's and Adams-Bashforth predictor and corrector methods (No derivations of formulae-single step computation only).	**10 Hours**
Module 2	
Numerical Methods: Numerical solution of second order ordinary differential equations, Runge-Kutta method and Milne's method. (No derivations of formulae-single step computation only). **Special Functions:** Series solution of Bessel's differential equation leading to $J_n(x)$-Bessel's function of first kind. Basic properties and orthogonality. Series solution of Legendre's differential equation leading to $P_n(x)$-Legendre polynomials. Rodrigue's formula, problems	**10 Hours**
Module 3	
Complex Variables: Review of a function of a complex variable, limits, continuity, differentiability. Analytic functions-Cauchy-Riemann equations in cartesian and polar forms. Properties and construction of analytic functions. Complex line integrals-Cauchy's theorem and Cauchy's integral formula, Residue, poles, Cauchy's Residue theorem (without proof) and problems. **Transformations:** Conformal transformations-Discussion of transformations: $w = z^2$, $w = e^z$, $w = z + (1/z)$ $(z \neq 0)$, Bilinear transformations-problems.	**10 Hours**
Module 4	
Probability Distributions: Random variables (discrete and continuous), probability functions. Poisson distributions, geometric distribution, uniform distribution, exponential and normal distributions, Problems. **Joint probability distribution:** Joint Probability distribution for two variables, expectation, covariance, correlation coefficient.	**10 Hours**
Module 5	
Sampling Theory: Sampling, Sampling distributions, standard error, test of hypothesis for means and proportions, confidence limits for means, student's t-distribution, Chi-square distribution as a test of goodness of fit. **Stochastic process:** Stochastic process, probability vector, stochastic matrices, fixed points, regular stochastic matrices, Markov chains, higher transition probability.	**10 Hours**

Course Outcomes: After studying this course, students will be able to:

- Solve first and second order ordinary differential equation arising in flow problems using single step and multistep numerical methods.
- Illustrate problems of potential theory, quantum mechanics and heat conduction by employing notions and properties of Bessel's functions and Legendre's polynomials.
- Explain the concepts of analytic functions, residues, poles of complex potentials and describe

conformal and Bilinear transformation arising in field theory and signal processing. • Develop probability distribution of discrete, continuous random variables and joint probability distribution occurring in digital signal processing, information theory and design engineering. • Demonstrate testing of hypothesis of sampling distributions and illustrate examples of Markov chains related to discrete parameter stochastic process.
Question paper pattern:
The question paper will have ten questions. There will be 2 questions from each module. Each question will have questions covering all the topics under a module. The students will have to answer 5 full questions, selecting one full question from each module.
Text Books:
1. B.V.Ramana "Higher Engineering Mathematics" Tata McGraw-Hill, 2006. 2. B. S. Grewal," Higher Engineering Mathematics", Khanna publishers, 42nd edition, 2013.
Reference Books:
1. N P Bali and Manish Goyal, "A text book of Engineering mathematics" , Laxmi publications, latest edition. 2. Kreyszig, "Advanced Engineering Mathematics " - 9th edition, Wiley, 2013. 3. H. K Dass and Er. RajnishVerma, "Higher Engineering Mathematics", S. Chand, 1st ed, 2011.

H.O.D.
Dept. Of Information Science & Engineering
Alva's Institute of Engg. & Technology
Mijar, MOODBIDRI - 574 225