



MANIPAL UNIVERSITY JAIPUR  
DEPARTMENT OF MECHANICAL ENGINEERING  
Department of Mathematics  
Course Hand-out

Engineering Mathematics IV | MA 1410 | 3 Credits

Session: January-18-May-18 | Faculty: Dr. Virendra Singh Chouhan | Course: B. Tech (Mech)

**COURSE OUTCOMES:** At the end of the course, students will be able to

[1410.1] Analysis the problems of engineering by using Numerical analysis.

[1410.2]. Solve for the zero of a non-linear algebraic function using bisection and regula- falsi methods, as well as Newton-Raphson and secant iteration methods which help them to improve the analytical skills and make them employable.

[1410.3]. Solve the ordinary and partial differential equations by using numerical methods.

[1410.4] Draw normal distribution curve and will be able to compare the results.

[1410.5] To understand and calculate figures of more than three dimensions.

**A. SYLLABUS**

**Tensor:** Introduction to tensors, Cartesian tensors, Rank of tensor, First, second and higher order tensors, Algebraic operation on tensors, contraction of tensors, Contravariant and covariant vectors and tensors, Theorem based on tensors. **Solution of Non-Linear Equations:** Bisection, Newton-Raphson, Regula Falsi, Secant Methods. **System of Simultaneous Linear Equations:** Gauss elimination method, Gauss-Jacobi, Gauss-Seidel. **Solution of Initial Value Problems:** Taylor's series method, Euler method, modified Euler method, Runge-Kutta 4<sup>th</sup> order method. **Finite Difference Methods:** Solution of Laplace and Poisson equations by standard five-point formula, Solution of heat equations by Crank-Nicolson method, Solution of Wave Equations. **Statistics:** Correlation, Regression, Random variables, Probability distributions – Binomial, Poisson, Normal.

**B. TEXT BOOKS:**

1. S. Grewal, "Higher Engineering Mathematics", Khanna Publishers, Delhi, 2006.
2. Srimanta Pal, Subhddh C. Bhunia, "Engineering Mathematics", Oxford University Press, 2015.
3. H. K. Das, "Advanced Engineering Mathematics" S. Chand, 2015.
4. Erwin Kreyszig, "Advanced Engineering Mathematics", Wiley India Eastern, 2006.
5. B. V. Ramana, Higher Engineering Mathematics, Tata McGraw Hill Education Private Limited, New Delhi 2007.

