

DEPARTMENT OF APPLIED MATHEMATICS  
FACULTY OF ENGG.& TECH.,  
M.J.P.R.U., BAREILLY.



**Syllabus of Maths. Papers in  
B.Tech.:2020-21.**

## **B.Tech.First Semester(For all branches)**

### **Paper: Engineering Mathematics-I**

#### **Paper Code: MA-101T**

##### **UNIT 1:Differential Calculus:**

Limit, continuity and differentiability of functions of single variable. Successive Differentiation, Leibnitz's Theorem, expansion of functions by Maclaurin's and Taylor's theorems.

Functions of several variables: Partial derivatives, Euler's Theorem, change of variables, total differential coefficients, maxima and minima, Lagrange's method of multipliers.

##### **UNIT 2: Integral Calculus:**

Fundamental and mean value theorems of integral calculus. Reduction formulae, Walli's formula, Beta and Gamma functions, Double and Triple integrals, change of orders of integrations. Area enclosed by plane curves, surfaces and volumes of revolutions.

##### **UNIT 3: Vectors and Matrices:**

Differentiation and integration of vectors. Gradient, Divergence and Curl. Vector identities, Green's, Gauss's and Stoke's theorems with applications.

Types and algebra of matrices, rank, solution of simultaneous linear equations, Eigen values and Eigen vectors, diagonalisation of matrices, Cayley-Hamilton Theorem.

##### **References:**

1. E. Kreyszig: Advance Engineering mathematics, John Wiley & Sons, 2005.
2. B. V. Ramana: Higher Engineering Mathematics, Tata McGraw Hill Co. Ltd., 2008.
3. R. K. Jain & S. R. K. Iyenger: Advance Engineering, Mathematics, Narosa Publishing House 2002.
4. J. C. Sharma: Vector Algebra, Students & Friends Co. Ltd. Agra.
5. J. K. Goel & K. P. Gupta: Matrix Algebra, Students & Friends Co. Ltd. Agra.
6. H. K. Das: Advance Engineering Mathematics.

**B.Tech.Second Semester (For all branches)****Paper:Engineering Mathematics-II****Paper Code: MA-102T****UNIT1: Numerical Techniques:**

Numerical solution of algebraic and transcendental equations by Bisection method, Secant method, Regula-Falsi and Newton-Raphson methods. Numerical integration by Gauss quadrature formula, Trapezoidal rule, Simpson's rule and Weddle's rule. Numerical solution of ordinary differential equations by Euler's method, Milne's method and Runge-Kutta method.

**UNIT 2:Probability andStatistics:**

Definitions of probability and simple theorems, conditional probability, Baye's Theorem, random variables, discrete and continuous distributions, Binomial, Poisson and normal distributions, correlation and linear regression.

**UNIT 3: Complex Analysis:**

Analytic functions, C-R equations in Cartesian and polar forms, Harmonic functions, Milne-Thomson method, complex integration, Cauchy's theorem, Cauchy's integral formula, Liouville's and Morera's Theorems, Taylor's and Laurent's theorems. Residues: Cauchy's residue theorem, evaluation of real integrals of the type  $\int_0^{2\pi} f(\cos\theta, \sin\theta)d\theta$  and  $\int f(x)dx$  under the limits  $-\infty$  to  $+\infty$ .

## References:

1. E.Balagurusamy: Numerical Methods, Tata McGraw Hill, 2008.
2. Devi Prasad: An introduction to Numerical analysis, Narosa Publishing House, 2006.
3. J.B.Conway: Functions of one complex variable, Springer Verlag, International Students Edition Narosa Publishing House, 1980.
4. A.M.Goon, M.K.Gupta & B.Das Gupta: Basic Statistics, The world Press PVT. Ltd, Calcutta, 1991.
5. L.V.Alhfors: Complex analysis, Tata McGraw Hill, 1979.

**B.Tech.Third Semester (For all branches)****Paper:Engineering Mathematics-III****Paper Code: MA-201T****UNIT 1. Ordinary Differential Equations:**

First order equations (linear and non-linear). Linear equations of second and higher orders with constant and variable coefficients. Solution of second order equations by removing first derivative, changing of dependent and independent variables and method of variation of parameters.

**UNIT 2: Special Functions & Partial Diff. Equations:**

Power Series solutions of second order equations by Frobenius method. Legendre polynomials and Bessel's functions of first kind and their properties. Method of separation of variables for heat, wave and Laplace equations: Their solutions and related applications.

**UNIT 3: Integral Transforms:**

Laplace transform, existence theorem, Laplace transform of derivatives and integrals, Laplace transform of special functions. Inverse Laplace transform, convolution theorem. Applications of Laplace transform and its inverse to solve ordinary and partial differential equations.

**References:**

1. J.N .Sharma: Differential Equations, Krishna PrakashanMedia(P) Ltd., Meerut.
2. B.V.Raman: Higher Engineering Mathematics, Tata McGraw Hill Co. Ltd., 2008.
3. R.K.Jain & S.R.K.Iyenger: Advance Engineering Mathematics, Narosa Publishing House, 2002.
4. A.R. Vashishta: Integral Transforms KrishnaPrakashanMedia(P) Ltd., Meerut.
5. G.F.Simmons: Differential Equations, Tata McGraw Hill Co. Ltd., 1981.

**B.Tech .IV Semester(For Chemical branch only)****Paper: Engineering Statistics****Paper Code: MA-202T**

**Unit 1:-**Measures of dispersions, Skewness and Kurtosis, Moments of frequency distributions, Principle of least squares, Fitting of curves of straight line, parabola,  $y=ab^x$  and  $y=ax^b$ .

Correlation and Regression: correlation coefficient, coefficient of regression and equation of line of regression,

**Unit 2:-**Discrete and continuous random variables, mathematical expectations, moment generating functions, characteristic functions, effect of change of origin and scale on cumulants, Cauchy-Schwarz inequality, Distributions: Beta, Gamma, Cauchy, Weibull, Pearson distribution.

**Unit 3 :-** Exponential distribution, Rectangular distribution, Exact sampling distribution:  $\chi^2$  probability curve, Non-central  $\chi^2$ - distribution,  $\chi^2$ -test, t-test, F-test, Z-tests, one way and two way analysis of variance.

**References:**

1. J. Medhi :Statistical methods, New age international(P)Ltd.
2. A.J Medhi Festschrift : Prob. & models and Statistics, New age International(P) Ltd.
3. Hogg (Reprint ISBN-8178086301) : Introduction of Mathematical Statistics, Pearsons Education.
4. J.K. Ghosh, Mathematical statistics, John Wiley & Sons, New York.
5. J.K. Goyal & J.N. Sharma, Mathematical statistics.
6. M. Ray & H.S. Shanna, Mathematical Statistics, Ram Prasad & Sons.

## **B.Tech. VII Semester(For all branches except Mechanical)**

### **Paper: Operations Research (Open Elective)**

#### **Paper Code: MA-491T**

**Introduction:** Definition of O.R. and its scope, Modelling in O.R., General Methods for solving O.R. models. The Monte-Carlo technique, main characteristics of O.R., main phases of O.R. Linear programming problems. Graphical method to solve L.P.P. Two phase method, Big-M method, problems of tie.

**Assignment Model:** Mathematical formulation of Assignment model, Reduction theorem, Problems of maximization & minimization, Hungarian process, Travelling salesman problems.

**Transportation Model:** Mathematical formulation of transportation problem, Definition of BFS, IBFS, Optimal solution. Algorithms of N-W rule, Least cost entry method and Vogel's approximation method, Related problems. .

**Sequencing:** Introduction, principal assumption, processing of jobs through two, three and m-machines.

**Game theory :** Characteristics of games, dominance process, Arithmetic method for solving zero-sum-two person Games, Graphical and simplex methods for solving the games.

**Replacement :** Failure mechanism of items, replacement of items that deteriorate. Replacement of items that fail completely.

**Inventory:** Elementary Inventory Models, Inventory model's with price breaks.

#### **References :**

1. F. S. Hiller and G. J. Liberman, Introduction to Operations Research (Sixth Edition), McGraw Hill International Edition, Industrial Engineering Series, 1995 (This book comes with a CD containing tutorial software)
2. G. Hadley, Non-linear and Dynamic Programming, Addison-Wesley, Reading Mass.
3. Mokhtar, S. Bazaraa, John, J. Jarvis and Hanif, D. Sherali, Linear Programming and Network Flows, John Wiley and Sons, New York, 1990.

4. H. A. Taha, Operations Research: An Introduction. Macmillan Publishing Co. Inc., New York.