

First Year 2nd Semester Curriculum Structure for B.Tech. Course

Mathematics - II (BSC104)	
Department: Program: Course Code: Title of Course: Year of Study: Semester:	Basic Science and Humanities B. Tech. BSC104 Mathematics - II First Year Second
Contact Hours: Credits: Type of course: Total Lecture Hours:	L-T-P: 3-1-0 4 Theory
Pre-requisites Courses:	● High School Mathematics ● BSC-103
Course Outcome (CO):	CO1: Recognize the methods for evaluating multiple integrals and apply to different physical problems. CO2: Appraise different techniques to solve first and second order ordinary differential equations with its formulation to address the modeling of systems and problems of engineering sciences. CO3: Use the tools of power series to analyze engineering problems and apply the concept of convergence of infinite series in many approximation techniques in engineering disciplines. CO4: Explain the concept of probability with their properties and applications in physical and engineering environment.

Detailed Syllabus

- **Module 1: Multivariate Calculus (Integration) (10 L)**

Multiple Integration: Change of Order of IntegDouble Integrals (Cartesian), ration in Double Integrals, Change of Variables (Cartesian to Polar), Applications: areas and volumes, Centre of Mass and Gravity (constant and variable densities); Triple Integrals (Cartesian), Orthogonal Curvilinear Coordinates, Simple applications involving cubes, sphere and rectangular parallelepiped; Scalar Line Integrals, Vector Line Integrals, Scalar Surface Integrals, Vector Surface Integrals, Theorems of Green, Gauss and Stokes.

- **Module 2: ODE (14 L)**

Exact, Linear and Bernoulli's equations, Euler's equations, Equations not of first degree: Equations solvable for p, Equations solvable for y, Equations solvable for x and Clairaut's type.

Second Order Linear Differential Equations with variable coefficients, Method of Variation of Parameters, Cauchy-Euler Equation; Power series Solutions; Legendre Polynomials, Bessel Functions of the First kind and their properties with some applications in the field of engineering.

- **Module 3: Sequences and Series (10 L)**

Convergence of Sequence and Series, Tests for Convergence; Power Series, Taylor's Series, Series for Exponential, Trigonometric and Logarithm Functions; Fourier Series: Half Range Sine and Cosine Series, Parseval's Theorem.

- **Module 4: Basic Probability (8 L)**

Basic Terminology, Classical & Axiomatic Definition of Probability, Some elementary deductions- $0 \leq P(A) \leq 1$, $P(\bar{A}) = 1 - P(A)$ etc., Addition Rule for two events (proof) & three events (statement only) - Related problems, Concept of Conditional Probability, Multiplication Rule of Probability, Bayes' Theorem (statement only) - related problems, Independent Events – properties and related problems.

- o **Book list:**

1. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.
 2. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
 3. W. E. Boyce and R. C. DiPrima, Elementary Differential Equations and Boundary Value Problems, 9th Edition., Wiley India, 2009.
 4. S. L. Ross, Differential Equations, 3rd Edition., Wiley India, 1984.
 5. E. A. Coddington, An Introduction to Ordinary Differential Equations, Prentice Hall India, 1995.
 6. E. L. Ince, Ordinary Differential Equations, Dover Publications, 1958.
 7. N.P. Bali and Manish Goyal, A Text Book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.
 8. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.
 9. P. G. Hoel, S. C. Port and C. J. Stone, Introduction to Probability Theory, Universal Book Stall, 2003(Reprint).
 10. S. Ross, A First Course in Probability, 6th Ed., Pearson Education India, 2002.
 11. W. Feller, An Introduction to Probability Theory and its Applications, Vol. 1, 3rd Ed., Wiley, 1968.
 12. B.Basu Mallik & Krishanu Deyasi, Engineering Mathematics-1B, Cengage Learning, First Edition, 2020.
 13. (xiii) B.Basu Mallik & Krishanu Deyasi, Engineering Mathematics-2B, Cengage Learning, First Edition, 2020.
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