

B.Sc. ACTUARIAL AND FINANCIAL MATHEMATICS

Course Title : Vector Calculus
Course Code : MTH201C
Credit hrs. : 4

Semester-III

Course Objective: The aim of this course is to introduce basic fundamentals of vector calculus. It also introduces students to manipulate vectors to perform geometrical calculations in three dimensions.

Unit I: Three dimensional coordinate system, vectors, dot product, cross product, equations of lines and planes, cylinders and quadric surfaces, cylindrical and spherical coordinates

Unit II: Vector functions and space curves, derivatives and integrals of vector functions, arc length and curvature, motion in space- velocity and acceleration.

Unit III: Double integrals over rectangles, iterated integrals, double integrals over general regions, change of order of integration; double integrals in polar coordinates, applications, surface area, triple integrals, triple integrals in cylindrical and spherical coordinates, change of variables.

Unit IV: Vector fields, line integrals, fundamental theorem for line integrals, Green's theorem, curl and divergence, parametric surfaces and their areas, surface integrals, Stoke's theorem, Divergence theorem

Textbooks: Calculus – Early Transcendentals by James Stewart (2006 Edition)

Supplementary texts:

- A First Course in Calculus - by Serge Lang,
- Calculus – by Howard Anton,
- Textbook of Calculus - by Larson and Edwards,
- Schaum's Outline of Vector Analysis,
- Calculus I & II by Tom Apostol

B.Sc. ACTUARIAL AND FINANCIAL MATHEMATICS

Course Title : Linear Algebra
Course Code : MTH202C
Credit hrs. : 4

Semester-III

Course Objective: Introduces students use of computational techniques and algebraic skills essential for the study of systems of linear equations, matrix algebra, vector spaces, eigenvalues and eigenvectors, vectors and basic vector operations and solving computational problems of linear algebra.

Unit I: Introduction to systems of linear equations, Gauss-Jordan elimination, matrices and matrix operations, matrix arithmetic, transpose and adjoint of a matrix, inverses, diagonal, triangular and symmetric matrices, determinants, cofactor expansion, row reduction.

Unit II: Euclidean n-space, linear transformations on n-spaces, vector spaces, subspaces, linear independence, basis and dimension, row space, column space, null space, rank and nullity. Inner products, orthogonality, orthonormal bases, Gram-Schmidt process, change of basis

Unit III: Complex numbers, arithmetic of complex numbers, polar form, brief introduction to complex functions, complex vector spaces.

Unit IV: Eigenvalues and eigenvectors, diagonalization, orthogonal diagonalization, general linear transformations, kernel and range, inverses, similarity and isomorphism

Textbooks:

- Elementary Linear Algebra by Howard Anton and Chris Rorres
- Linear Functions and Matrix Theory by Bill Jacob
- A Textbook on Matrices by Hari Krishen
- Linear Algebra – Schaum’s Outline Series
- Linear Algebra and its Applications by David C. Lay, Springer
- Linear Algebra and its Applications by Gilbert Strang Thomson Learning

B.Sc. ACTUARIAL AND FINANCIAL MATHEMATICS

Course Title : **Probability Theory**
Course Code : **STA201C**
Credit hrs. : **5**

Semester-III

Course Objective: The main objective of this course is to provide students with the foundations of probabilistic and statistical analysis mostly used in varied applications in engineering and science like disease modeling, climate prediction and computer networks etc.

Unit I: Sample spaces and events; axioms of probability; counting principle; permutations and combinations; conditional probability; independent events; Bayes' Theorem; discrete and continuous random variables; distribution and density functions; expected value, variance, standard deviation. Expectation of a function of a.r.v.

Unit II: Bernoulli, Binomial, multinomial, negative binomial, geometric, hypergeometric distributions and Poisson distributions; uniform, exponential, normal, log normal, Gamma, Beta, Chi Square, t and F distributions, expected values and variances of these distributions, expectation of a function of a random variable; MGF, Probability generating function and characteristic function of these distributions

Unit III: Two-dimensional random variables, Joint distributions (continuous and discrete case); covariance and correlation, conditional distributions; independent random variables, conditional expectation, covariance and variance of sums of random variables; joint probability distribution of functions of random variables.

Unit IV: Markov and Chebyshev's inequalities, normal approximation to binomial; strong and weak law of large numbers; central limit theorem with proof (using Levy's Continuity Theorem). Moment generating functions, probability generating functions and characteristics functions; Cumulant generating functions, derivation for various distributions; sums of independent random variables.

Text Book:

- John E. Freund's Mathematical Statistics by Miler and Miler
- A first Course in Probability by Sheldon Ross
- An Introduction to Probability Models by Sheldon Ross
- An Introduction to Probability Theory and Mathematical Statistics by V.K. Rohtagi and Saleh
- Elementary Probability Theory by K.L. Chung
- Fundamentals of Mathematical Statistics by S.C. Gupta
- Linear Statistical Inference and its Applications by C.R. Rao
- Modern Probability Theory by B.R. Bhat

B.Sc. ACTUARIAL AND FINANCIAL MATHEMATICS

Course Title : **Fundamentals of Accounting**

Semester-III

Course Code : **SBS201C**

Credit hrs. : **5**

Course Objective: Introduces the students the accounts and financial statements of companies and financial institutions.

Unit 1: Accounting - Meaning, Nature, Functions & Usefulness. Generally Accepted Accounting Principles (GAP). Recording of Transaction Journals, Ledger posting and Trial Balance, Preparation of Financial Statement.

Unit 2: Accounting for depreciation. Company Accounts Final Statements Valuation of Good will and shares, Hire Purchase System.

Unit 3: Amalgamation, absorption and external reconstruction. Alternation of Share Capital & Internal Reconstruction. Liquidation Accounts of Holding Companies - Consolidated Balance Sheet.

Unit 4: Bank accounts Insurance Company Accounts. Double Account System. Accounts of Non- Profit Organization.

Suggested readings:

1. Antony R.N. & Recce J.S. "Accounting -Test & Cases", Richard Irwan. Inc. Home Wood Illionois.
2. Aulandam & Raman "Advanced Accounting" Himalyan Pub. House Mumbai.
3. Gupta R.L. & Radhaswamy. M. "Advanced Accounting" Sultan Chand & Sons.New Delhi.
4. Maheswari. S.N "Financial Accounting" Vikas Publishing House. New Delhi.
5. Mukherjee & Hanif"Modern Accounting" Tata McGraw Hill