Chapter – 01
Functions – Limits - Continuity - Derivatives and differentiation of standard functions.

Chapter – 02
Standard rules of differentiation.

Chapter – 03
i) Application of differentiation to plane curves – Tangents – and ii) Application of differentiation to normal asymptotes.

Chapter – 04
Curvature - Singular points and envelopes.

Chapter – 05
i) Successive differentiantion and leibnitz’s theorem - ii) Rolle’s theorem - iii) Intermediate value theorem - iv) Cauchy’s mean value theorem.

Chapter – 06
Taylor’s theorem with remainder applications of taylor’s theorem to expansions and approximations.

Chapter – 07
i) Maxima and minima and standard problems intermediate forms and L Hospital’s rule - ii) Functions of two variables.

Chapter – 08
i) Continuity and partial differentiation - ii) Euler’s theorem on homogeneous functions.

Chapter – 09
i) Integration of irrational, Trigonometric functions - ii) Bernailli’s formula for integration by parts, Reduction formula - iii) Length of ARC, Surface area

Chapter – 10
i) Properties of definite integral - ii) Valuation of double and triple integrals

Chapter - 11
Changing the order of integration.

Chapter – 12
Simple applications to area volume and centroid.
Chapter -01
Power series – Binomial - Exponential theorem and its applications.

Chapter -02
Logarithmic Theorems and their Applications to summation of infinite series.

Chapter -03
Theory of Numbers - Prime number - Composite number.

Chapter -04
Decomposition of a composite number as a product of primes uniquely.

Chapter -05
Divisions of a Positive Integer n - Euler’s function for (n) - formula for (n).

Chapter -06
Gighest Power of a Prime p Contained in N – Congruences – Forma’s and wilson’s theorems - Simple problems.

Chapter -07
theory of equation - polynomial equations - irrational roots - complex roots - reciprocal equations

Chapter -08
Approximation of roots of a polynomial equation by newton’s and horner’s methods.

Chapter -09
Symmetric - Skew symmetric – Hermitian - Skew hermitian – Orthogonal - Unitary Matrices.

Chapter -10
Rank of a Matrix - Consistency of equations - Eigen values and eigen vectors - Cayley - Hamilton theorem.

Chapter -11
Verification and computation of inverse digitization of matrices.

Chapter -12
Characteristic roots and vectors of a square matrix.

references:
1. Algebra - t.k.manickavachagam pillai and others - s.viswanathan publishers.
2. Matrices - a.r.vashista - krishnaprakashan mandhir mmerut. n.sharma s.n.gole kethar natr publisher meerut.
Chapter – 02
Polynomials and equations – Sequences and series – Permutations and combinations – Binomial theorem – Two dimensional coordinate system – Area of triangle – Angle between two lines – Distance of a point from a line – Circle.

Chapter – 03
Three dimensional coordinate system – Equation of a straight line in 3-D- Algebra of vectors and their applications – Dot and cross product

Chapter – 04

Chapter -05
Differentiation of inverse algebraic and inverse trigonometric functions – Differentiation of Implicit functions and logarithmic differentiation – Physical aspects of derivatives.

Chapter – 06

Chapter – 07

Chapter – 08
Integration of trigonometric functions – Preliminaries – Formation of differential equations – Methods of solving differential equations of first order and first degree.

Chapter – 09
Basic definitions on statistics – Frequency distribution – Measures of central tendency and Dispersion (mean, mode, median, standard deviation, mean deviation) - Preliminaries – Sample space.

Chapter – 10
Rules of probability – Conditional probability – Bays theorem – Combination of events – Binomial distribution – Poisson distribution.

Chapter - 11
Sample Selection – Random sampling procedure – M measure of variation and accuracy – Standard error – Types of sample design (Random sampling, cluster sampling).

Chapter – 12
Statistical Hypothesis – Level of significance – Degrees of freedom – Chi-square test T-test – Analysis of variance - Correlation – Correlation coefficient – Linear regression – Curve fitting.
Differential Equations and Laplace Transforms

Subject Descriptions:
This course presents the method of solving ordinary differential Equations of First Order and Second Order, Partial Differential equations. Also it deals with Laplace Transforms, its inverse and Application of Laplace Transform in solving First and Second Order Differential Equations with constant coefficients - Problems in Physical and Social sciences.

Chapter - 01
Ordinary Differential Equations: Equations of First Order and of Degree Higher than one – Solvable for $p, x, y$ – Clairaut’s Equation – Simultaneous Differential Equations with constant coefficients of the form - i) $f1(D)x + g1(D)y = ( ) 1 \frac{dt}{d - D}$ - ii) $f2(D)x + g2(D)y = ( ) 2 \frac{dt}{d - D}$ - where $f1, g1, f2$ and $g2$ are rational functions - with constant coefficients 1 - and 2 - explicit - Functions of $t$.

Chapter - 02
Finding the solution of Second and Higher Order with constant coefficients with Right Hand Side is of the form $Veax$ where $V$ is a function of $x$ – Euler’s Homogeneous Linear - Differential Equations – Method of variation of parameters. - Anx.18 D - B.Sc Maths (SDE) 2007-08 Page 6 of 26

Chapter - 03

Chapter - 04
Laplace Transforms: Definition – Laplace Transforms of standard functions – Linearity property – Firsting Shifting Theorem – Transform of $tf(t)$
$t$
$tf$
$f_1(t), f_11(t)$.

Chapter - 05
Inverse Laplace Transforms – Applications to solutions of First Order and Second Order Differential Equations with constant coefficients.

Treatment as in

References:

2) N.P. Bali, Differential Equations, Laxmi Publication Ltd, New Delhi, 2004

3) Dr. J. K. Goyal and K.P. Gupta, Laplace and Fourier Transforms, Pragali Prakashan
Chapter –01
Probability Space - Total Probability - Multiplication Law on Probability - Conditional Probability - Independent Events – Baye’s Theorem

Chapter –02
Random Variables Discrete and Continuous - Distribution Function Expected Value - Moments - Moment Generating Function

Chapter –03
Probability generating function

Chapter –04
Characteristics Function – Statements of Uniqueness Theorem - Inversion Theorem on Characteristic Function – Cumutants – Chebychev’s Inequality

Chapter –05
Concept of bivariate Distribution Correlation and Regression Linear Prediction - Rank Correlation Coefficient - Concepts of Partial - Multiple Correlation Coefficients

Chapter –06
Standard Distributions – Binomial – Poisson - Normal Uniform Distributions

Chapter –07
Sampling Distribution T - X2 - F Distributions

Chapter –08
Geometric - Gamma and Exponential Distributions - Recurrence relation between Moments Inter relations between the Distributions

Chapter –09
Point - Estimation Concepts of Consistency - Unbiased Efficiency and Sufficiency - Row-Gramer Inequality - Maximum likelihood and Minimum - Chi-square Methods and their Properties

Chapter –10
Interval Estimation Confidence Interval based on Normal - T and Chi square

Chapter –11
Test of Hypothesis - Large Sample Tests - Small Sample Tests based on T - Chi square - F distributions with respect to Mean

Chapter –12
Chapter – 01
Vector Analysis – Introduction – Gradient - Divergence curl - Directional derivative - Unit normal to a surface tangent and normal planes to a surface.

Chapter – 02
Line - Surface and volume integrals and their evaluation theorems of gauss - Stokes and green (without proof) – Simple problems based on them.

Chapter – 03
Analytical Solid Geometry – Planes and lines – Reduction to symmetric form for a line given by pair of planes – Condition for two lines to be coplanar and equation of the plane containing them.

Chapter – 04
Length and equation of the shortest distance between two skew lines – Image of a point and of a line with respect to a plane – Bisector plane.

Chapter – 05
Sphere – Equation of sphere in centre radius form diameentric from - General form - Section of a sphere by a plane - Tangent plane - Radical plane – Coaxal sphere of spheres, orthogonal spheres

Chapter – 06
Analytical solid geometry – Cone and cylinder – Equation of a cone with vertex as a origin – Equation of a quadric cone given the vertex and the guiding curve

Chapter – 07
Condition for a general equation of second degree to represent a cone, Equation of right circular cone given the vertex, Axis and semi-vertical angle equation of the enveloping cone of a sphere with centre at origin

Chapter – 08
General equation of a cylinder and a right circular cylinder
Chapter 01

Chapter 02
Entoriom and Hamiltonion Graphs – Algorithm for Entoriom circuits – Bipartite Graphs -Trees.

Chapter 03
Matrix representation of a graph - Vector spaces - Associated with a Graph – Cycle spaces and act set spaces.

Chapter 04
Planar graphs - Enter’s theorem on planar graphs – Characterization of planar graphs (no Proofs) of the difficult part of the characterization.

Chapter 05
Directed graphs –Connectivity – Enteoriom Digraph -Tournaments.

Books for References

Treatment as in “A First Course in Graph Theory “by A. Chandran (Macmillan )
Chapters 1 to 7.

1. Narasingh Deo.” Graph Theory “ (Prentice Hall of India ).

Chapter 01

Chapter 02

Chapter 03

Chapter 04

Chapter 05
Newton’s forward and backward formulae equidistant terms with one or more missing values Central differences and central differences table – Gauss forward and backward formulae - Stirlings formula.

Chapter 06
Interpolation (for unequal intervals) - Divided differences – Properties - Relations between divided differences and forward differences.

Chapter 07
Newton’s divided differences formula – Lagrange’s formula and inverse interpolation.

Chapter 08
Numerical differentiations - Newton’s forward and backward formulae to computer the derivatives- Derivative using starlings formulae – To find maxima and minima of the function given the tabular values.

Chapter 09

Chapter 10
Difference Equation - Order and degree of a difference equation –solving homogeneous and non – homogeneous liner difference equations.

Chapter 11

Chapter 12
Solution of ordinary differential equations by finite difference method (for second order O.D.E).

Literature Treatment
Chapters: 9, 10, 11, Appendix and Appendix E).
References:


Chapter 01

Chapter 02

Chapter 03
Relations and functions - Composition of relations - Composition of functions – Inverse functions - One-to- one – Onto - One-to-one& onto - Onto functions - Hashing functions - Permutation function - Growth of functions.

Chapter 04
Algebra structures - Semi groups - Free semi groups – Monoids – Groups – Cosets – Sets - Normal subgroups – Homomorphism - (2-3.5, 2-3.7, 2-4.2, 2-4.3, 2-4.6, 3-2, 3-5, 3-5.3, 3-5.4).

Chapter 05
Formal languages and Automata - Regular expressions - Types of grammar – Regular grammar and finite state automata - Context free and sensitive grammars - (3-3.1, 3-3.2, 4-6.2).

Chapter 06
Lattices and Boolean algebra - Partial ordering – Poset – Lattices - Boolean algebra - Boolean Functions – Theorems - Minimization of Boolean functions - (4-1.1, 4-2, 4-3, 4-4.2).

Chapter 07
Graph Theories - Directed and undirected graphs – Paths - Reach ability – Connectedness - Metric representation - Eular paths.

Chapter 08
Hamiltonean paths – Trees - Binary trees simple theorems and applications. (5-1,1, 5-1.2, 5-1.3, 5-1.4).

Text Books:


Anx.18 D - B.Sc Maths (SDE) 2007-08 Pages 18 of 26
Chapter 01
Forces acting at a point: Resultant and Component - Lami’s theorem – Resultant of any number of forces (Analytical and graphical methods).

Chapter 02
Parallel forces and moments – Couples - Definition - Equivalence of two couples – Resultant of a couple and a force.

Chapter 03
Three forces acting on a rigid body - Coplanar forces – Condition of equilibrium of a system of coplanar forces – Friction - Equilibrium of a particle on a rough inclined plane under - Any force.

Chapter 04
Centre of gravity by integration – Principle of virtual work for a system of coplanar forces acting on a body - Kinematics – velocity – motion down a smooth inclined plane.

Chapter 05

Chapter 06
Projectiles - Definition – Two fundamental particles – Finding the velocity of the projectile in magnitude and direction ate the end of line’t’ – Motion under the action of central forces.

Chapter 07

Chapter 08
Application Oriented Subject - Astronomy - General description of the Solar System. Comets and meteorites – Spherical trigonometry - Celestial sphere – Celestial co-ordinates - Diurnal motion – Variation in length of the day.

Chapter 09

Chapter 10

Chapter 11
Annual Parallax – Aberration - Precession – Notation.

Chapter 12

Reference Treatment
“ASTRONOMY” by S. Kumaravelu and Susheela Kumaravelu
Question paper setters to confine to the above text book only.

Reference
Mechanics
M.K. Venkataraman, Statics, Agasthiar Publications, Trichy, 1999


7. ASTRONOMY” by S. Kumaravelu and Susheela Kumaravelu.
Chapter 01
Expansion of $\cos n\phi$, $\sin n\phi$, $\cos n\phi$, $\sin n\phi$ – Hyperbolic functions – Separation of real and imaginary parts of $\sin(\alpha + \beta)$ - $\cos(\alpha + \beta)$ - $\tan(\alpha + \beta)$ - $\sinh(\alpha + \beta)$ - $\cosh(\alpha + \beta)$ - $\tan(\alpha + \beta)$ - $\tanh(\alpha + \beta)$.

Chapter 02
Logarithm of a complex number – Summation of trigonometric series.

Chapter 03

Chapter 04
Integration for vectors- Line - Surface and volume integrals – Theorems of Gauss – Green - Stokes (Statements only) – Verifications.

Chapter 05
Fourier series – Definition – Finding Fourier coefficients for a given periodic function with period $2\pi$ - Odd and even functions – Half range series – Change of interval.

Chapter 06

Chapter 07
Analytical geometry of three dimensions - Straight lines – Co planarity of straight lines – Shortest distance and equation of shortest distance of between two lines – Simple problems.

Chapter 08
Sphere – Standard equation – Results based on the properties of a sphere - Tangent plane to a sphere – equation of a circle.

Chapter 09
Cone and cylinder – Cone whose vertex is at the origin – Enveloping cone of a sphere right circular cone.

Chapter 10

Chapter 11
Standard equation of a central conicoid – Enveloping cone.

Chapter 12
Tangent plane – Conditions for tangency – Director Sphere and director plane.

Reference Treatment as in:


2) Analytical Geometry of 2 D by T.K. M.Pillai and others.

3) Analytical Geometry by P. Duraipandian and others.
1. Trigonometry by S. Narayanan.

2. Vector Calculus by P. Duraipandian.

3. Fourier series by S. Narayanan.