

GUJARAT UNIVERSITY

Syllabus for F.Y.B.Sc.(Effective from June 2003)

Mathematics Paper-I

Calculus and applications

- Unit I : Successive Derivatives, Standard results for n th derivatives, Leibnitz' rule.
- Unit II : Convergence and divergence of infinite series, Comparison test, Ratio test, Root test, Convergence of power series.
- Unit III : Mean value theorems, Rolle's theorem, Lagranges' and Cauchy's mean value theorems, Taylor's theorem. Expansion in power series of $\sin x, \cos x, \log(1+x), e^x$ and $(1+x)^m$.(in appropriate domain) Indeterminate forms, L Hospital's rule.
- Unit IV : Integration, Reduction formula, $\int_0^{\pi/2} \sin^m x \cos^n x dx$, ($m, n \in N \cup \{0\}$) Application of definite integrals to (1) Summation of series (2) Rectification (3) Surface and Volume of revolution.
- Unit V : Differential equations, Family of curves leading to differential equation and conversely its solution leading to a family of curves. Constants of integration. Boundary/initial conditions. Exact differential equations in two variables, First order linear and higher degree equations, and their applications.
- Unit VI : Linear differential equations with constant coefficients. Their applications. Equations reducible to this type. Second order linear differential equations, Homogenous differential equations.
- Unit VII : Velocities and acceleration along radial and transverse directions, and along tangential and normal directions. Simple Harmonic motion.

Reference Books

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| (1) Differential Calculus | : Shantinakaran |
| (2) Integral Calculus | : Shantinakaran |
| (3) Introductory Course in Differential equations | : Murray |
| (4) Differential Equations | : G. F. Simmons (T.M.H.) |
| (5) Elementary Differential Equations | : Kells |
| (6) Calculus | : T. M. Apostol |
| (7) Pure Mathematics | : G. H. Hardy |
| (8) Mechanics | : Synge and Griffith |
| | (Art. 4.1, 5.1, 5.2, 6.1, 6.2, 6.3) |
| (9) વિકલ સમીકરણ | : જે. બી. સાંડિલ અને શેઠ |

Syllabus for F.Y.B.Sc. in force from year June, 2003

Mathematics Paper-II

Matrix Algebra and Geometry (With theory of equations)

- Unit I : Symmetric and skew-symmetric matrices. Hermitian and skew-hermitian matrices. Elementary operations on matrices. Inverse of a matrix. Linear dependence and independence of row and column matrices. Row rank, column rank and rank of a matrix. Equivalence of row rank and column rank of a matrix.
- Unit II : Eigenvalues, eigenvectors and the characteristic equation of a matrix. Cayley-Hamilton theorem and its use in finding inverse of a matrix. Application of matrices to a system of linear equations. Theorems on system of consistency of linear equations.

- Unit-III : Relations between roots and the coefficients of a polynomial equation in one variable. Transformation of equations, Descarte's rule of signs. Solution of cubic equations,(Cardan method) Biquadratic equation.
- Unit IV : Polar co-ordinates. Polar co-ordinate and Cartesian co-ordinate system and mutual relation. Equations of a line, a circle and conics in polar co-ordinates. Spherical and cylindrical co-ordinates in R^3 . Their relation with Cartesian system.
- Unit V : Sphere, Intersection of a line and a sphere. Equation of tangent plane and normal. Plane section of a sphere. Intersection of two spheres. Angle between two spheres. Orthogonal spheres.
- Unit VI : Cone and cylinder; Definition of a cone. Its vertex and guiding curve. Its equation with given vertex and guiding curve. Homogenous equation and cone with vertex origin. Right circular cone. Its equation with given vertex, axis and semi vertical angle. Definition of a cylinder. Its equation with generators intersecting a given curve and parallel to a line. Right circular cylinder. Its equation with given axis and radius.
- Unit-VII : Conicoids: Central and non-central conicoids, Ellipsoid, Hyperboloid of two sheets and one sheet. Elliptic paraboloid and hyperbolic paraboloid. Intersection of a line and a conicoid. Equation of tangent plane and normal.

Reference Books

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| (1) Matrix and linear algebra | : K. B. Dutta Prentice Hall |
| (2) Higher Algebra | : H. S. Hall and S. R. Knight H. M. |
| (3) Co-ordinate Geometry of three dimensions | : Shantinarayan |
| (4) Elements of co-ordinate Geometry | : S. L. Loney |
| (5) Elementary Treatise on co-ordinate Geometry | : R. J. T. Bell |
| (6) Theory of matrices | : Vatsa Wiley-Eastern |
| (7) Higher Algebra | : Barnard S. & Child J.M. |

(Each unit carries 15 marks in each paper and four periods per week for each paper)

The following are suggestions for S.Y.B.Sc. and T.Y.B.Sc. syllabus. Your suggestions about the content and reference books are welcome. You may write to Prof. Ladhawala, Head of mathematics department, Gujarat University, Ahmedabad on or before 30/06/2003.

S.Y.B.Sc.

- Paper III : As per present syllabus except for Riemann integration to be replaced by unit IV of present F.Y. B.Sc. syllabus.(curve tracing and allied topics) Introduction to partial differential equation in place of improper integral and beta, gamma functions.
- Paper IV : Linear algebra including F.Y.B.Sc. topics. (including Determinants of matrices)
- Paper VA : Numerical Analysis as it is and Ch. VII of Mollah's book. No theory of equations.
- Paper VB : As it is.

Optional paper of numerical analysis using language C.

T.Y.B.Sc.

- Paper VI : As it is. Abstract algebra by I. H. Sheth.(English book)
- Paper VII & VIII : Analysis with following changes. Riemann integration in detail instead of Riemann -S integration. Improper integrals. Beta,gamma functions. Metric spaces. Cauchy's integral test for convergence of series. Delete Functions of several variables.
- Paper IX : Graph theory and Boolean algebra. (Discrete mathematics)
- Paper X : (any one) :
- (1) Number theory and combinatorial analysis.
 - (2) Probability and Optimisation.
 - (3) Mechanics
 - (4) Computer as suggested by U.G.C.-Principles of computer science.