

MATHEMATICS (GENERAL)**APPENDIX 'A'****(Outlines of Tests)**

Paper 'A':	Calculus (Differential and Integral Calculus)	100
Paper 'B':	Mathematical Methods: (Geometry, Infinite Series, Complex Number, Vectors, Linear Algebra and Differential Equations)	100

		200

APPENDIX 'B'**(Syllabi and Courses of Reading)**

(For Students of Natural and Integral Calculus)

Paper A: CALCULUS (Differential and Integral Calculus)**Paper B:** MATHEMATICAL METHODS: (Geometry, Infinite Series, Complex Number, Vectors, Linear Algebra and Differential Equations)**Paper A: (Calculus)**

Note:

Attempt six questions by selecting two questions from Section I, two from Section II, one from Section III and one from Section IV.

Section I**(i) (2/12) (Limit and Differentiation)**

Real Number System, Absolute values, Inequalities, Functions, Limits and continuity, Derivatives of algebraic and transcendental functions. Higher derivatives. Statements of (1) Leibniz theorem (2) Rolle's theorem, (3) Mean value theorems, (4) Taylor and Maclaurin series, Increasing and decreasing functions, Indeterminate forms.

(ii) (2/12) (Further Differentiation)

Differentials Related Rates, Extrema, Concavity, Singular Points, Asymptotes, Graphing or Cartesian Curvature and Radius of Curvature.

Section II**(i) (2/12) (Integration)**

Antiderivative and indefinite integral, Techniques of evaluation indefinite integral, Definite integral as area. Fundamental theorem of integral calculus properties of definite integral. Walli's sine and cosine formulas, Numerical integration, Improper integrals

(ii) (2/12) (length, Area and Volume)

Polar coordinates, Graphing curves in polar coordinates. Area between two curves, Length of plane. Volumes, Area of surface of revolution.

Section III**(i) (2/12) Infinite Series)**

Sequences, Infinite series and their convergence, Ratio Test, Cauchy's test, Comparison test, Integral tests, Absolute and conditional convergence, Taylor and Maclaurin series, Taylor's formula with remainder

Section IV**(i) (2/12) Calculus of Several variables)**

Definitions: Limit and continuity of a function of two variables, Derivatives, Incremental and differentials, Extrema of function two variable simple cases,

Paper B: (Mathematical Methods)

Note:

Attempt six questions by selecting two questions from Section I, two from Section II, one from Section III and one from Section IV.

Section I**(i) (2/12) (Plane Analytic Geometry)**

Translation and rotation of rectangular axes, General equation of the second degree, properties of parabola, ellipse and hyperbola. Tangent and normals, Parametric representations of curves.

(ii) (2/12) (Vector)

Rectangular coordinates in space, Vectors in space, The dot product, The cross product and triple products, Vector-valued functions, Limits, Derivatives, Scalar and vector fields, Gradients, Divergence and curl

Section II**(i) (2/12) (Analytic Geometry of three dimensions)**

Distance between two points, Direction angles, Direction numbers, Lines and planes, Skew lines, Cylindrical and spherical coordinates, Surfaces of sphere, cylinder, cone, paraboloid, hyperboloid.

(iii) (2/12) (Complex Numbers and Direction of Qibla)

Complex numbers, de Moivre's theorem and its applications, Circular, logarithmic and hyperbolic functions. Cosine, Sine and four-part formulas, latitude and longitude, Determination of direction of Qibla

Section III**(i) (2/12) (Linear Algebra)**

Algebra of matrices, Types of matrices, Operations within matrices, Determinants of a square matrix, Cofactors and minors. Laplace expansion of determinant, Properties of determinants, Elementary row and column operations of matrices equivalent and echelon matrices, Adjoint and inverse of a matrix, Rank of a matrix, Solutions of linear algebraic (homogeneous and non-homogeneous) systems of equation by the use of matrices, vector spaces, Linearly independent sets, Basis and dimension, subspaces, Spanning sets

Section IV**(i) (2/12) (Differential Equations)**

Formation of differential equations, families of curves, Orthogonal trajectories, initial and boundary value problems. Different methods of solving first order ODE. The Bernoulli, Riccati and Clairat equations. Second and higher order linear differential equations with constant coefficients and their methods of Solution, Cuchy-Euler Equation

Recommended Books:

1. C.W. Evans, Advanced Engineering Mathematics (Chapen and all, third edition, 1997)
2. C.W. Edwards and D.E. Panney, Calculus Analytic Geometry (Prentice Hall Inc. 1982, 1986, 1988)
3. E.W. Swokowski, Calculus with Analytic Geometry (PWS . Publisher. Boston, Masscuchoseted, 1983)
4. H. Anton, Calculus, (third edition) (John Wiley and Sons, New York).
5. G.B. Thomas, Jr. and R.L. Finney, Calculus and Analytic Geometry, (9th Edition) (Addison Wesely Publishing Company, 1997.)
6. L.D. Hoffman and G.L. Bradley, Calculus for Business, Economics, and the Social and Life Sciences
7. E. Kreyszing, Advanced Engineering mathematics (J, Wiley)
8. D.G. Zill. A First Course in Differential Equation with Applications (PWS. Publishers)
9. W.E. Boyee and R.E. DiPrima, Differential Equations and Boundary Value Problems, (J. Wiley, 5th edition 1992)