28. Mathematics A-Course

B.A./B.Sc. Mathematics A-Course-I Total Mark: 100

Appendix 'A'

(Outlines of Tests)

Calculus and Analytical Geometry : 100 Marks

Appendix 'B'

(Syllabi and Courses of Reading)

Calculus and Analytical Geometry 100 Marks

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

Section-I (4/12)

Preliminaries:

- Real numbers and the real line
- Functions and their graphs
- Shifting and scaling graphs
- Solution of equations involving absolute values
- Inequalities

Limit and Continuity:

- Limit of afunction, left hand and right hand limits. Theorems of limits
- Continuity, Continuous functions

Derivatives and its Applications:

- Differentiable functions
- Differentiation of polynomial, rational and transcendental functions
- Mean value theorems and applications
- Higher derivatives, Leibniz's theorem
- L'Hospitals Rule
- Intermediate value theorem, Rolle's theorem
- Taylor's and Maclaurin's theorem with their remainders

Section-II (4/12)

Integration and Definite Integrals:

- Techniques of evaluating indefinite integrals

- Integration by substitutions, Integration by parts. Integration by partial fractions
- Change of variable in indefinite integrals
- Definite integrals, Fundamental theorem of calculus
- Reduction formulas for algebraic and trigonometric integrands
- Improper integrals, Gamma functions
- Numerical integration

Plane Analytic Geometry:

- Conic section and quadratic equations
- Classifying conic section by eccentricity
- Translation and rotation of axis
- Properties of circle, parabola, ellipse, hyperbola
- Polar coordinates, conic sections inpolar coordinates
- Graphing in polar coordinates
- Tangents and normal, pedal equations, parametric representations of curves

Section-III (2/12)

Applications of Integration:

- Asymptotes.
- Relative extrema, points of inflection and concavity
- Singular, points, tangents at the origin
- Graphing of Cartesian and polar curves
- Area under the curve, area between two curves
- Arc length and intrinsic equations
- Curvature, radius and centre of curvature
- Involute and evolute, envelope

Section-IV (2/12)

Analytic Geometry of Three Dimensions:

- Rectangular coordinates system in a space
- Cylindrical and spherical coordinate system
- Direction ratios and direction cosines of a line
- Equation of straight lines and planes in three dimensions
- Shortest distance between skew lines
- Equation of sphere, cylinder, cone, ellipsoids, paraboloids, hyperboloids

- Quadric and ruled surfaces
- Spherical trigonometry, Direction of Qibla

Recommended Books:

1. Thomas, Calculus, 11th Edition. Addison Wesley Publishing Company, 2005.
2. H. Anton, I. Bevens, S. Davis, Calculus, 8th Edition, John Wiley & Sons, Inc. 2005.
3. Hughes-Hallett, Gleason, McCallum, et al, Calculus Single and Multivariable, 3rd Edition. John Wiley & Sons, Inc. 2002.
4. Frank A. Jr, Elliott Mendelson, Calculus, Schaum's outlines series, 4th Edition, 1999.
5. C.H. Edward and E.D Penney, Calculus and Analytics Geometry, Prentice Hall, Inc. 1988.
6. E. W. Swokowski, Calculus and Analytic Geometry, PWS Publishers, Boston, Massachosetts, 1983.