Mathematics General
B.A./B.Sc.: Elective

Outlines of Tests

<table>
<thead>
<tr>
<th>Paper</th>
<th>Title of Course</th>
<th>Marks</th>
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</thead>
<tbody>
<tr>
<td>A</td>
<td>Calculus (Differential and Integral Calculus)</td>
<td>100</td>
</tr>
<tr>
<td>B</td>
<td>Mathematical Methods:(Geometry, Infinite Series, Complex Number, Vector, Linear Algebra and Differential Equations).</td>
<td>100</td>
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<td><strong>Total</strong></td>
<td><strong>200</strong></td>
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Syllabi and Courses of Reading

**PAPER A: CALCULUS (DIFFERENTIAL AND INTEGRAL CALCULUS)**

Note: Attempt six questions, 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 & Continuity, Derivatives of Algebraic & transcendental functions and Higher derivatives. Statements of: (1) Leibinz theorem, (2) Rolle’s theorem, (3) Mean value theorem, (4) Taylor and Maclaurin’s series. Increasing & decreasing functions and Indeterminate forms.

**SECTION I (ii) (2/12) (Further Differentiation)**
Differentials and Related Rates, Extrema, Concavity, Singular points and Asymptotes. Curvature and Radius of Curvature.

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

**SECTION II (ii) (2/12) (Length Areas and Volume)**
Polar Coordinates, Graphing curves in polar coordinates. Area between two curves, curve Lengths. Volume and area of surface revolution.

**SECTION III (2/12) (Infinite Series)**

**SECTION IV (2/12) (Calculus of Several Variables)**
Definition: Limit and continuity of a function of two variables, Derivates. Increments and differentials. Extrema of functions two variables (Simple cases)

**PAPER B: MATHEMATICAL METHODS**

Note:- Attempt six questions, selecting two question 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 normal, Parametric representations of curves.

**SECTION I (ii) (2/12) (Vectors)**

SECTION II (i) (2/12) (Analytical Geometry in Three Dimensions)
Distance between two points, Direction angles. Direction ratio’s, Direction Cosines. Lines and Planes Skew Lines Cylindrical and Spherical Coordinates Surfaces of Sphere, Cylinder, Cone, Paraboloid, hyperboloid.

(ii) (2/12) (Complex Numbers and Direction of Qiblah)
Complex Numbers, de Moivre’s theorem and its application. Circular, Logarithmic and hyperbolic functions. Cosine, sine and four part formula, Latitude and Longitude Determination of direction of Qiblah.

SECTION III (2/12) (Linear Algebra)

SECTION IV (2/12) (Differential Equations)

Recommended Books:
7. I. Kreyszing , Advanced Engineering Mathematics, (J. Wiley)