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Syllabus 2023-24
Panjab University

BA/BSc
(MATHS)

FIRST SEMESTER

SCO 80-81, Sec.15D, Chandigarh
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MATHEMATICS**SEMESTER – I****Paper-I: PLANE GEOMETRY**

Max. Marks	: 30
Time	: 3 Hours

- Note:**
1. The syllabus has been split into two Units: Unit-I and Unit-II. Four questions will be set from each Unit.
 2. A student will be asked to attempt five questions selecting at least two questions from each Unit. Each question will carry 6 marks.
 3. The teaching time shall be five periods (45 minutes each) per paper per week including tutorial.
 4. If internal assessment is to be conducted in the form of written examinations, then there will be only one written examination in a Semester

Unit-I

Transformation of axes in two dimensions: Shifting of origin, rotation of axes, invariants.

Pair of Straight Lines :

Joint equation of pair of straight lines and angle between them, Condition of parallelism and perpendicularity, Joint equation of the angle bisectors, Joint equation of lines joining origin to the intersection of a line and a curve.

Circle :

General equation of circle, Circle through intersection of two lines, tangents, normals, chord of contact, pole and polar, pair of tangents from a point, equation of chord in terms of mid-point, angle of intersection and orthogonality, power of a point w.r.t. circle, radical axis, co-axial family of circles, limiting points.

Unit-II**Conic :**

General equation of a conic, tangents, normals, chord of contact, pole and polar, pair of tangents from a point, equation of chord in terms of mid-point, diameter. Conjugate diameters of ellipse and hyperbola, special properties of parabola, ellipse and hyperbola, conjugate hyperbola, asymptotes of hyperbola, rectangular hyperbola. Identification of conic in general second degree equations.

References :

1. S. L. Loney : *The Elements of Coordinate Geometry*, Macmillan and Company, London, 2nd Edition 2007.
2. P.K. Jain and Khalil Ahmad : *A Text Book of Analytical Geometry of Two Dimensions*, Wiley Eastern Ltd., 1999.
3. Erwin Kreyszig : *Advanced Engineering Mathematics*, John Wiley & Sons, 1999.
4. Gorakh Prasad and H.C. Gupta : *Text Book on Coordinate Geometry*, Pothishala Pvt. Ltd., Allahabad, 1955.

Paper-II : CALCULUS - I

Max. Marks : 30
Time : 3 Hours

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 4. If internal assessment is to be conducted in the form of written examinations, then there will be only one written examination in a Semester

Unit-I**Properties of real numbers :**

Order property of real numbers, bounds, l.u.b. and g.l.b. order completeness property of real numbers, archimedian property of real numbers.

Limits:

$\mathcal{E} - \delta$ definition of the limit of a function, basic properties of limits, infinite limits, indeterminate forms.

Continuity:

Continuous functions, types of discontinuities, continuity of composite functions, continuity of $|f(x)|$, sign of a function in a neighborhood of a point of continuity, intermediate value theorem, maximum and minimum value theorem.

Unit-II**Mean value theorems:**

Rolle's Theorem, Lagrange's mean value theorem, Cauchy's mean value theorem, their geometric interpretation and applications, Taylor's theorem, Maclaurin's theorem with various form of remainders and their applications.

Hyperbolic, inverse hyperbolic functions of a real variable and their derivatives, successive differentiations, Leibnitz's theorem.

References :

1. J. D. Murray & M . R. Spiegel : *Theory and Problems of Advanced Calculus*, Schaum's Outline Series, Schaum Publishing Co., New York.
2. P.K. Jain and S. K. Kaushik : *An Introduction to Real Analysis*, S. Chand & Co., New Delhi, 2000.
3. Gorakh Prasad : *Differential Calculus*, Pothishala Private Ltd., Allahabad.
4. G.B. Thomas & R.L. Finney : *Calculus and Analytic Geometry (Ninth Edition)*, Pearson Publication.
5. Shanti Narayan and P.K. Mittal : *Differential Calculus*, Edition 2006, S. Chand & Co., New Delhi.

Paper III: TRIGONOMETRY AND MATRICES

Max. Marks : 30
Time : 3 Hours

- Note:**
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Unit-I

D'Moivre's theorem, application of D'Moivre's theorem including primitive n^{th} root of unity. Expansions of $\sin n\theta$, $\cos n\theta$, $\sin^n \theta$, $\cos^n \theta$ ($n \in \mathbb{N}$). The exponential, logarithmic, direct and inverse circular and hyperbolic functions of a complex variable. Summation of series including Gregory Series.

Unit-II

Hermitian and skew-hermitian matrices, linear dependence of row and column vectors, row rank, column rank and rank of a matrix and their equivalence. Theorems on consistency of a system of linear equations (both homogeneous and non-homogeneous). Eigen-values, eigen-vectors and characteristic equation of a matrix, Cayley-Hamilton theorem and its use in finding inverse of a matrix. Diagonalization.

References:

1. K.B. Datta : *Matrix and Linear Algebra*, Prentice Hall of India Pvt. Ltd., New Delhi, 2000.
2. S. R. Knight and H.S. Hall : *Higher Algebra*, H.M. Publications, 1994.
3. R.S. Verma and K.S. Shukla : *Text Book on Trigonometry*, Pothishala Pvt. Ltd., Allahabad.
4. Shanti Narayan and P.K. Mittal : *A Text Book of Matrices*, S. Chand & Co., New Delhi, Revised Edition, 2007.

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Semester I to VI



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