

B.A (Sem -I)

BA105 : ALGEBRA AND TRIGONOMETRY (MAJOR)

Pass percentage: 35%
Time allowed : 3hours.

External Evaluation: 70
Internal Evaluation: 30

Course objective : The objective of the course is to help the students acquire skills to do calculations like finding roots of a polynomial using different methods, solving simultaneous linear equation system and solving problems related to trigonometry with ease.

Course learning outcomes: On completion of course, the student will be able to

CO-I: Understand DeMoivre's theorem and apply it to solve numerical problems.

CO-II: Understand exponential, logarithmic ,hyperbolic functions of a complex variable.

CO-III: Understand how to find Eigen-values ,Eigen-vectors of a matrix and characteristic equation of a matrix and Diagonalization of matrices.

CO-IV : Understand rank of the matrix and use it to recognize consistent and inconsistent system of linear equations using row echelon form of the matrices.

INSTRUCTIONS FOR THE PAPER-SETTER/EXAMINER

The question paper will consist of three sections A, B and C. Sections A and B will have four questions each from the respective sections of the syllabus and Section C will consist of one compulsory question having eleven short answer type questions covering the entire syllabus uniformly. Each question in Sections A and B will be of 12 marks and Section C will be of 22 marks.

INSTRUCTIONS FOR THE CANDIDATES

Candidates are required to attempt five questions in all selecting two questions from each of the Sections A and B and compulsory question of Section C.

SECTION:A

D'Moivre's theorem and its application including primitive nth root of unity, Expansions of $\sin n\theta$, $\cos n\theta$, $\sin^n\theta$, $\cos^n\theta$ ($n \in \mathbb{N}$). The exponential, logarithmic, circular and hyperbolic functions. Relation between the roots and coefficients of a general polynomial in

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One variable, Transformation of equation, solutions of cubic equations using Cardan's method, solutions of bi-quadratic equation using Descartes's method.

SECTION: B

Hermitian and skew-Hermitian matrices, Elementary operations on matrices, linear independence and dependence of row and column vectors, row rank, column rank and rank of a matrix and their equivalence, Normal form of a matrix, 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.

Books Recommended:

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.
5. C. Prasad, Textbook on Algebra and theory of equations, Pothishala Pvt. Ltd., Allahabad.

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BA124: Mathematics Based Practicals

Course Objectives:

- Introduce students to mathematics-based software
- Enable plotting of graphs for various functions using software
- Plot straight lines and represent conics as sections of a cone
- Develop understanding of basic mathematical concepts
- Learn applicability of software in solving mathematical problems

Assessment:

Theory: 100marks

External:70(50 theory+20 Viva), Internal:30

Time allowed: 1.5 hours

Course Outline:

Section A: Functions

- Domain and range of standard functions
- Trigonometric functions

Section B: Straight Lines and Conic Sections

- Straight lines
- Conic sections
- Equation of a circle

Practicals:

- Plot graphs of functions such as: $\sqrt{ax+b}$, e^{ax+b} , $\sin(ax+b)$
- Plot the general equation of a straight line
- Show conics as sections of a cone
- Draw circles when: Center and radius are given, or Center and a point on the circle is given

References:

- NCERT Mathematics Textbooks – Class XI & XII

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B.A (Sem -II)

BA205 : CALCULUS (MAJOR)

Pass percentage: 35%
Time allowed : 3hours.

External Evaluation: 70
Internal Evaluation: 30

Course objective: The objective of the course is to help the students acquire skills to understand concepts of limits and continuity of a function geometrically and geometrical interpretation of various mean value theorems with their applications.

Course learning outcomes: On completion of course , the student will be able to

CO-I: understand Concavity, Convexity and points of Inflexion of a curve.

CO-II: learn basic properties of limits, infinite limits, indeterminate forms.

CO-III: understand Continuous functions, types of discontinuities, Continuity of composite functions ,Uniform continuity

CO-IV: Understand Rolle's Theorem, Lagrange's mean value theorem, Cauchy's mean value theorem, their geometric interpretation and applications.

CO-V: Understand Taylor's theorem and Maclaurian theorem with various forms of remainder and their applications

INSTRUCTIONS FOR THE PAPER-SETTER /EXAMINER

The question paper will consist of three sections A, B and C. Sections A and B will have four questions each from the respective sections of the syllabus and Section C will consist of one compulsory question having eleven short answer type questions covering the entire syllabus uniformly. Each question in Sections A and B will be of 12 marks and Section C will be of 22 marks.

INSTRUCTIONS FOR THE CANDIDATES

Candidates are required to attempt five questions in all selecting two questions from each of the Sections A and B and compulsory question of Section C.

SECTION:A

Limits: ϵ - δ 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, sign of a function in a neighborhood of a point of continuity, intermediate value theorem, maximum and minimum value theorem

Concavity and convexity, points of inflexion, asymptotes

SECTION : B

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 differentiation, Leibnitz's theorem and its applications

Books Recommended:

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

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