Semester-I

ALGEBRA AND TRIGONOMETRY

Subject Code: BA-MAJ-MATH-01

Major Theory

Max. Marks: 70 | Credits: 04

End-Semester Exam: 50 | Total teaching hrs.: 50

Internal Evaluation: 20 | Pass Marks: 40%

Course Objective: The main goal of this course is to deliver basics of binomial theorem, properties of binomial coefficients. The course introduces the concept of De Moivre's theorem and its applications, eigen values and eigen vectors of a matrix. To understand nature of solution of a linear system of equations.

Course Outcomes: The students will be able to:

CO1: To understand D' Moivre's theorem, applications of D' Moivre's theorem.
CO2: To know about exponential, logarithmic, direct and inverse circular and hyperbolic functions of a complex variable.
CO3: To understand summation of series including Gregory series.
CO4: To know Hermitian and Skew- Hermitian matrices, linear dependence of row and column vectors.
CO5: Determine the sum of infinite binomial series, the rank of a matrix, eigen values, eigen vectors and solve linear system of equations using matrices.

Instructions for the paper setter:

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 ten short answer type questions covering the entire syllabus uniformly. Each question in sections A and B will be of 10 marks and section C will be of 30 marks.

Instructions for the candidates

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

SECTION-A

Principle of mathematical induction, recall of binomial theorem for positive index, properties of binomial coefficients, summation of infinite binomial series, solution of trigonometric equations, D'Moivre's theorem, applications of D' Moivre's theorem including primitive nth root of unity, expansions of $\sin n\theta$, $\cos n\theta$, $\sin^n\theta$, $\cos^n\theta$ ($n \varepsilon N$). summation of series including Gregory series, the exponential, logarithmic, direct and inverse circular and hyperbolic functions of a complex variable.

SECTION-B

Recall of determinant of a matrix, properties of determinants . Hermitian and skew- Hermitian matrices, linear dependence of row and column vectors, row rank, column rank and rank of a matrix and their equivalence, eigen- values, eigen- vectors and characteristic equation of a matrix, theorems on consistency of a system of linear equations (both homogeneous and non-homogeneous),Cayley- Hamiltonion 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. Shanti Narayan and P. K. Mittal :A text book of matrices, S. Chand and Co., New Delhi, Revised Edition,2007.

PRACTICAL (ALGEBRA AND TRIGONOMETRY)

Subject Code BA-MAJ-MATH-01-P

(Major Practical)

Credit: 01

Max. Marks: 30

Total teaching hrs: 28

End Semester Practical Exam: 20

Pass Marks: 40%

Internal Evaluation: 10

Course outcomes:

CO1: The objective of the course is to make the student familiar with different computer software such as MATLAB Python etc.

CO2: The students will be able to compute various operations on matrices by using different software such as MATLAB/Python etc.

General Guidelines for End- Semester Practical Examination:

1. **The student will be allotted one programme out of the programmes mentioned in syllabus and asked to perform.**
2. **The distribution of marks is as follows:**
   - (i) **One full programme to be performed by student (10 marks)**
   - (ii) **Viva-voce (04 marks)**
   - (iii) **Record (practical file) (03 marks)**

Practical/ Lab work to be performed in Computer Lab.

List of the practical to be using Python/MATLAB etc.

1. Introduction to the software and commands related to the topic.
2. Computation of addition and subtraction of matrices.
3. Computation of multiplication of matrices.
4. Computation of Rank of matrix.
5. Computation of trace and transpose of matrix.
6. Computation of Inverse of a matrix.
7. Eigen values and eigen vectors, application to diagonalization of matrices.
8. Solving the system of homogeneous and non- homogeneous linear algebraic equations.