

## **Mathematics : Semester-2**

### **Course : CC MAT-122**

**UNIT-1.** De'Morve's theorem and its applications, (a) Roots of a complex number

(b) Application of Expansion of  $\sin^n \theta, \cos^n \theta$ ,  $n \in \mathbb{N}$  in terms of sine and cosine of multiples of  $\theta$ .

(C) Expansion of  $\sin n\theta$ ,  $\cos n\theta$  and  $\tan n\theta$  in terms of sine, cosine and tangent resply.

**UNIT -2.** (a) Exponential, Circular and hyperbolic function, Logarithmic and inverse functions.

(b) Sequence and series: Definition of sequence, series. Definition of convergence of sequence and series, partial sum, comparison test, ratio test, root test and its examples.

**UNIT -3.** (a) Linear differential equation  $dy/dx + Py = Q$ , P and Q are functions of x, Bernoulli's differential equation. (b) Differential equation of first order and higher degree solvable for s, solvable for y, solvable for  $P = dy/dx$ . (c) Solution of Clairaut's and Lagrange's differential equation. (d) Linear differential equation with constant coefficients.

**UNIT -4.** Matrices: Introduction of matrices, different types of matrices, operations on matrices, theorems on matrices, Symmetric and skew -symmetric matrices, Hermitian and skew-Hermitian matrices, linear dependence and independence of row and column matrices. Row rank, Column rank and rank of matrix, Row reduced Echelon form of a matrix and matrix inversion using it.

#### **Reference Books:**

(1) Complex Variables and Appiication, by Ruel V. Churchill & James Ward Brown, McGraw-Hill Publishing Company, New Delhi.

(2) Complex Analysis, by J.V.DESHPANDE, Tata McGRAW-Hill Publishing Co. Ltd. New Delhi.

(3) Theory of Matrices, by B.S.Vatssa, 2<sup>nd</sup> Edition, Wiley Easterns Ltd.

(4) Matrix Operations, by Schaum's Series McGRAW-HILL Book Co.

### **Course : PC MAT-122**

#### **List of Practicals:**

**Unit:1**(1) Application of De'Morve's theorem.

(2) Application of roots of complex number.

(3) Application of  $\sin^n \theta$  and  $\cos^n \theta$  in terms of series of sine and cosine respectively.

(4) Application of  $\sin n\theta$  and  $\cos n\theta$  in terms of series of sine and cosine.

(5) Application of  $\tan n\theta$  in terms of series of tangent.

**Unit:2**(1) Application of Exponential, Circular and hyperbolic function

(2) Application of inverse hyperbolic function and logarithm function of a complex number.

(3) Application of comparison test for a given sequence.

(4) Application of root test for a given sequence.

(5) Application of ratio test for a given sequence.

**Unit:3**(1) Application of linear differential equation  $dy/dx + Py = Q$ , where P and Q are function of x.

(2) Application of Bernoulli's differential equation.

(3) Application of differential equation in first order and higher degree solvable for x, y and p, where  $p = dy/dx$ .

(4) Application of Clairaut's differential equation

(5) Application of linear differential equation with constant coefficients.

**Unit:4**(1)Solution of simultaneous linear equations using matrices.

(2)Application of the inverse matrix by row reduction method.

(3)Application of the rank of a matrix.

(4)Application of the rank of a matrix by transforming into echelon form.

(5) Application of Hermitian and skew-Hermitian matrices.

(6) Matrix operation through Excel.(Addition, Multiplication, Inverse, Determinant, etc.....)

### **Course :PC MAT-122**

Instructions: Strictly follow the instructions given by examiner(s)

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| 1. Attempt any two out of three from unit-I   | (10 Marks) |
| 2. Attempt any two out of three from unit-II  | (10 Marks) |
| 3. Attempt any two out of three from unit-III | (10 Marks) |
| 4. Attempt any two out of three from unit-VI  | (10 Marks) |
| 5. (a) Viva                                   | ( 5 Marks) |
| (b) Journal                                   | ( 5 Marks) |
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