TRINITY COLLEGE FOR WOMEN NAMAKKAL

Department of MATHEMATICS

CLASSICAL ALGEBRA

21UMA01-ODD Semester

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E-CONTENT
CLASSICAL ALGEBRA
Application of Classical Algebra

1.Computer Programming:

Java,C++,Computer games.

2.Technology Algebra:

TV,Mobile and Computers could not have existed without algebra.Search algorithms are made by solving sophisticated algebraic problems.

3.Business and Finance Management:

Business owners use algebra calculate most of the software,evaluate owners ,Finance officers use algebra symbols to calculate exchange rates and interest rates.

4.Sports:

Shooting a Basketball includes using percentage and angles by finding the most consistent percentage of shots made while using a certain angle you can find out which player will score the most baskets.

5.Finding the Tax Liability:

On growing up as an adult people work to earn .They may require to find their tax liabity .The process involves doing calculation like finding the tax rebute cap and proprotioning the earnings to find how the income is to be divided into various investment options.

6.Astrological Calculation:

Astrologers predict various events on the basis of planetary various events on the basis of planetary movements they try to establish the relationship between the planets revolution speed its posistion after a period of chosen duration and so on.

UNIT –I
BINOMIAL SERIES

General term of Binomial Series:

$$(1-x)^{-p/q} = 1 + \frac{p}{1!}\left(\frac{x}{q}\right) + \frac{p(p+q)}{2!}\left(\frac{x}{q}\right)^2 + p(p+q)x(p+2q)\,/3!\,\left(\frac{x}{q}\right)^3 + \ldots\ldots. + \infty$$

$$(1+x)^{-p/q}.\,1 - \frac{p}{1!}\left(\frac{x}{q}\right) + p(p+q)/2!\,\left(\frac{x}{q}\right)^2 - p(p+q)(p+2q)/3!\,\left(\frac{x}{q}\right)^3 + \ldots\ldots\ldots\infty$$

Some Standard rules of the Exponential Series:

1. $e^x = 1 + \frac{x}{1!} + \frac{x^2}{2!} + \frac{x^3}{3!} + \cdots\infty$
2. $e^{-x} = 1 - \frac{x}{1!} + \frac{x^2}{2!} - \frac{x^3}{3!} + \cdots\infty$
3. $e^x + e^{-x}/2 = 1 + x^2/2! + x^4/4! + \ldots.\infty$
4. $e^x - e^{-x}/2 = x + x^3/3! + \frac{x^5}{5!} \ldots\infty$
5. $e = 1 + 1/! + 1/2! + 1/3! + \ldots\ldots\infty$
6. $e^{-1} = 1 - 1/1! + 1/2! - 1/3! + \ldots.\infty$
7. $e + e^{-1}/2 = 1 + 1/2! + 1/4! + \ldots..\infty$
8. $e - e^{-1}/2 = 1/1! + 1/3! + 1/5! + \ldots..\infty$

Some Results for Logarithms series:

1. $\log(1+x) = x - x^2/2 + x^3/3 - x^4/4 + \ldots\ldots\infty$

2. $\log(1-x) = -(x + x^2/2 + x^3/3 + \ldots\ldots\infty)$

$= -x - x^2/2 - x^3/3 - \ldots\ldots\infty$

3. $\log[1+x/1-x] = 2[x + x^3/3 + x^5 + \ldots\ldots\infty]$

4. $\log 2 = 1 - 1/2 + 1/3 - 1/4 + \ldots\ldots\infty$

UNIT-II
MATRICES

Characteristic Equation:

The Equation determinant |A-λI|=0 is called the Characteristic equation of the matrices A.

The roots of this equation are called the characterictic roots of the matrices A.Then Characteristic roots are also called Latent roots (or) Eigen roots.

Characteristic Vector:

Let A be an n×n matrices.let x be non zero column vector.

that is $x=\begin{bmatrix} x1 \\ x2 \\ xn \end{bmatrix}$ then any solution of equation Ax=λx other than x=0 corresponding to some particular values of λ is called a characteristic vector (or) Eigen vector (or) Latent vector.

Cayley Hamilton Theorem:

Every Square matrix A satisfies it is own characteristic equation

|A-λI|=0

Rank of Matrix:

The number of r is said to be rank of the matrix.

(i) A possesses atleast minor of order r which does not vanish.

(ii)Every minor ofA order (r+1) and higher order vanish.

The rank of matrix of A is denoted by ℓ(A).

Diagonolizable Matrix:

A matrix A is said to diagonolizable if it is similar to a diagonal matrix then there exists a non-singular matrix P such that p^{-1} Ap=D,where D is a diagonal matrix.

UNIT-III
THEORY OF EQUATIONS

An Equation of the form:

This equation is of the form.

x^n+$p1x^{n-1}$+p2x^{n-2}+…..+pn=0

This is known as the standard rational integral equation of the nth degree in x.

Fundamental theorem in the theory of equation:

1)Every polynomial equation f(x)=0 has atleast one root real (or) complex.

2)Every polynomial equation of nth degree has n roots and only n roots.

In this chapter we consider the following type of problems:

1)Arithmetic progression(AP)

2)Geometric progression(GP)

3)Harmonic progression(HP)

4)Imaginary and irrational roots.

UNIT-IV
RECIPROCAL EQUATION

Reciprocal equation:

For a reciprocal equation f(x)=0 if $\alpha 1, \alpha 2, \ldots\ldots \alpha n$ are the roots then $1/\alpha 1$,$1/\alpha 2$,… are also the roots of the equation f(x)=0.

$1/\alpha 1, 1/\alpha 2, \ldots\ldots 1/\alpha$n are the values as $\alpha 1, \alpha 2, \ldots. \alpha n$ is same order.

Transformation of equation:

If $\alpha 1, \alpha 2, \ldots. \alpha n$ are the roots of an equation f(x)=0,then forming the equation whose roots are $\emptyset\alpha 1, \emptyset\alpha 2, \ldots. \emptyset\alpha n$ is called transformation of an equation.

Removal of a term:

Let f(x)=$a_0 x^n$+$a_1 x^{n-1}$+…..a_n= 0.

we have to reemove the second term of this equation for this let us first diminish the root by h.

UNIT-V
DESCARTES RULE OF SIGNS

Positive real roots:

This rules states that an equation f(x)=0 cannot have more positive real roots than the number of change in the sign of the co-efficient of f(x).

Descartes rule of sign negative :

The number of negative rules of an equation f(x)=0 is not greater than the number of change of sign in the term of f(x).

Horner's Method:

This method is used to determine a real root of a numerical polynomial equation f(x)=0 correct to a given place of decimals suppose we are required to find a positive roots of the polynomial equation f(x)=0.

Newton's Method:

Newton Method of evaluating a real root correct to given decimal places:

Let f(x)=0 be a given polynomial equation let x=x_0 be a approximate value of a root of the equation f(X)=0 and x=x1 be a exact root nearer to x_0 then f(x1)=0.

Also,x_1-x_0 equal to h(x_1-x_0=h) is very small.

$$x_1 = h + x_0$$

f(x1)=0 then

f(h+x_0)=0.

THANK YOU

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