D.Y. Patil College of Engineering &Technology

Kasaba Bawada, Kolhapur 416006

(An Autonomous Institute)

Academic Year: 2023-24 **Sem:** I **Class:** F.Y.B. Tech.

Course: Linear Algebra and Calculus **Course Code:** 231FYL101

Tutorial-V

Numerical Solutions of Linear Equations: Gauss Elimination method, Gauss–Jordan method.

Course Outcomes (COs): After successful completion of this tutorial, the students will be able to:	
101.3	Solve linear equations by numerical methods.

Q.1 Solve the following equations by Gauss Elimination method

a) $5x + 5y + 2z = 12$
$2x + 4y + 5z = 2$
$39x + 43y + 45z = 74$

b) $x + 2y + 3z - t = 10$
$2x + 3y - 3z - t = 1$
$3x + 2y - 4z + 3t = 2$
$2x - y + 2z + 3t = 7$

c) $x + 4y - z = -5$
$x + y - 6z = -12$
$3x - y - z = 4$

d) $x + y - z = 2$
$2x + 3y + 5z = -3$
$3x + 2y - 3z = 6$

e) $2x - 3y + 4z = 7$
$5x - 2y + 2z = 7$
$6x - 3y + 10z = 23$

Q.2 Obtain the solution of following equations by using Gauss- Jordan method

a) $2x + y + z = 10$
$3x + 2y + 3z = 18$
$x + 4y + 9z = 16$

b) $x + 3y + 3z = 16$
$x + 4y + 3z = 18$
$x + 3y + 4z = 19$

c) $x + y + z = 9$
$2x + y - z = 0$
$2x + 5y + 7z = 52$

d) $2x - 3y + z = -1$
$x + 4y + 5z = 25$
$3\,x - 4y + z = 2$

e) $5x - y = 9$
$-x + 5y - z = 4$
$-y + 5z = -6$

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Tutorial-VI

Numerical Solutions of Linear Equations: Gauss–Seidel method, Jacobi's Iterative method.

Course Outcomes (COs): After successful completion of this tutorial, the students will be able to:	
101.3	Solve linear equations by numerical methods.

Q.1	Solve the following system of equations by Gauss Seidel method (Carry out 3 iterations only) a) $6x + y + z = 10.5$ $4x + 8y + 3z = 15.5$ $5x + 4y - 10z = 6.5$ b) $5x - 2y + 3z = 18$ $x + 7y - 3z = -22$ $2x - y + 6z = 22$ c) $5x + y - z = 10$ $2x + 4y + z = 14$ $x + y + 8z = 20$ d) $8x + 2y + 3z = 30$ $x - 9y + 2z = 1$ $2x + 3y + 6z = 31$ e) $x + y + z = 1$ $4x + 3y - z = 6$ $3x + 5y + 3z = 4$
Q.2	Obtain the solution of following system of equations by using Jacobi's Iterative method up to three iterations. a) $5x - y + z = 10$ $2x + 4y = 12$ $x + y + 5z = -1$ b) $10x + y + 2z = 13$ $3x + 10y + z = 14$ $2x + 3y + 10z = 15$ c) $2x + 3y - 4z = 1$ $5x + 9y + 3z = 17$ $-8x + 2y + z = -9$ d) $15x + y - z = 14$ $x + 20y + z = 23$ $2x - 3y + 18z = 37$ e) $x + 20y + z = 22$ $-x - y + 20z = 18$ $20x + y + z = 20$

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Tutorial-VII

Differential Calculus-I: Taylor's theorem and Standard expansion by Maclaurin's theorem

Course Outcomes (COs): After successful completion of this tutorial, the students will be able to:	
101.4	Apply Taylor theorem to find the expansion of functions and identify the indeterminate forms

Q.1	Using Taylor's theorem, express $(x+2)^4 - 3(x+2)^3 + (x+2)^2 + 5$ in powers of x.
Q.2	Using Taylor's theorem, express $(x+2)^4 + 5(x+2)^3 + 6(x+2)^2 + 7(x+2) + 8$ in powers of x.
Q.3	Using Taylor's theorem, express $x^5 - 5x^4 + 6x^3 - 7x^2 + 8x - 9$ in powers of $(x-1)$.
Q.4	Using Taylor's theorem, find the value of $\sqrt{1.02}$ up to 4 places of decimals
Q.5	Using Taylor's theorem, express $17 + 6(x+2) + (x+2)^3 + (x+2)^4 - (x+2)^5$ in ascending powers of x.
Q.6	Using Maclaurin's theorem, Prove that $\log(1+tanx) = x - \frac{x^2}{2} + 2\frac{x^3}{3} + \text{---}$
Q.7	Prove that by Maclaurin's theorem $e^{xcosx} = 1 + x + \frac{x^2}{2} + \text{---}$
Q.8	Prove that by Maclaurin's theorem $\log(1+e^x) = log2 + \frac{x}{2} + \frac{x^2}{8} + \text{---}$
Q.9	Using Maclaurin's theorem, Prove that $e^x secx = 1 + x + \frac{2x^2}{2!} + \text{---}$
Q.10	Using Maclaurin's theorem, Prove that $tan^{-1}x = x - \frac{x^3}{3} + \frac{x^5}{5} - \text{---}$