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Department of Petrochemical Engineering

Subject: Professional Elective (Numerical Method) **Subject Code: BTCHE405**
Class: Second Year **Semester: Fourth**

Question Bank

1. Solve x+2y+z=3; 2x+3y+3z=10; 3x-y+2z=13 by gauss elimination method.
2. Solve the following system by Gauss-seidel method:
   10x-5y-2z=3, 4x-10y+3z= -3, x+6y+10z= -3
3. Solve by LU decomposition method of following system:
   x+y+z=1,4x+3y-z=6 , 3x+5y+3z=4
4. 10x-2y-2z=6; -x+10y-2z=7; -x-y+10z=8 by Relaxation method**.**
5. Solve the following system by Gauss-Jacobi method:
   10x-5y-2z=3, 4x-10y+3z= -3, x+6y+10z= -3
6. Solve the following system by Gauss-Elimination method:
   2x+3y-z=5; 4x+4y-3z=3; 2x-3y+2z=2
7. Find the dominant eigen value of A= [1 2; 3 4] by Power method**.**

8. Find the dominant eigen value of A=[25 1 2; 1 3 0; 2 0 -4] by Power method**.**
9. Determine the coefficient of characteristics polynomial of the system

$$(-1-\lambda)x_1 = 0$$
$$x_1 + (-2-\lambda)x_2 + 3x_3 = 0$$
$$2x_2 + (-3-\lambda)x_3 = 0$$

   using Fadeeve- Laverrier Method

10. Find the dominant eigen value of A=[1 6 1; 1 2 0; 0 0 3] by Power method**.**

11. Find the dominant eigen value of A=[5 0 1; 0 -2 0;1 0 -5] by Power method**.**

12. Find the dominant eigen value of A=[-4 -5; 1 2] by Power method**.**

13. Solve $x^3+x^2-1=0$ by method of Fixed point/Iteration/Successive substations. .

14. Using Newton's method, find the root of $2x^3-3x-6=0$correct to 5 decimal places.

15. Using Newton's Rahson method, find the root between 0 and 1of $x^3=6x-4$ correct to 5 decimal places.

16. Using Newton's method, find the positive root of x=cosx.

17. Solve $e^x-3x=0$ by method of Fixed point/Iteration/Successive substations.

18. Using Newton's method, find the positive root of 3x-cosx-1=1.

19. By the method of Least Square method find the best fitting straight line to the data given below:

x: 5	10	15	20	25
y:15	19	23	26	30

20. By the method of Least Square method find the best fitting straight line and y at 4=2.5 to the data given below:

x: 0	1	2	3	4
y:1 1.8	3.3	4.5	6.3	

21. Find the value of y at x=21 from the following data by Newton's interpolation formula:

x:20	23	26	29	
y:0.3420	0.3907	0.4384	0.4848	

22. Using Newton's divided difference formula find the values of f(2) and f(8) from the following table:

x: 4	5	7	10	11	13	
f(x):	48	100	294	900	1210	2028

23. Using Lngrnges interpolation formula, Find y(10) from this data:

x:	5	6	9	11
y:	12	13	14	16

24. By the method of Least Square method find the best fitting straight line of y=a + bxy to the data given below:

x:	-4	1	2	3
y:	4	6	10	8

25. Apply Fourth Order Runge Kutta method to find y(0.2)given that $y'=x+y$, y(0)=1.
26. Apply Fourth Order Runge Kutta method to find y(0.2)given that $y'= -y$, y(0)=1.
27. Apply Fourth Order Runge Kutta method to find y(0.8)given that $y'=y-x^2$, y(0.6)=1.7379
28. Compute y(0.3) given $dy/dx+y+xy^2=0$, y(0)=1 by RK Method.
29. Given $y' = -y$ and y(0) = 1 , determine the values of y at x= (0.01)(0.01)(0.04) by Euler method.
30. $x^3 - 2x^2 - 3x - 4 = 0$ whose root lies between 3 and 4. Find the real root of equation by using Newton Raphson Method. Correct upto 4 decimal places.
31. Solve the following set of linear algebraic equations by using Gauss Elimination method correct upto 4 decimal places.

$$6x - y + z = 13$$
$$x + y + z = 9$$
$$10x + y - z = 19$$

32. Solve the following set of nonlinear algebraic equations by using Multivariable Newton Raphson method correct upto 4 decimal points. $xy = x^2 + 3$ and $y^2 = 2xy - 8$ using (x_0 , y_0) = (3.1, 3.9) for two iterations.

33. Using the Newton's divided difference interpolation find y (10) given that

y(5)=12, y(6)=13, y(9)= 14 , y(11) = 16

34. Use Runge Kutta method of 4'th order to solve $\frac{dy}{dx} = \frac{y^2-x^2}{y^2+x^2}$ with y(0) =1 at x=0.2 x=0.4

Solve to 4 decimal places.

35. Using Second Order Runge Kutta method find y(0.1), y(0.2) given $\frac{dy}{dx} = x^2 + y^2$ y(0)=1.

36. Find the real root of $x^3 = 1 - x^2$ equation by using Fixed point method.

Correct upto 2 decimal places.

37. Find the real root of $3x$ – cos$x$– 1= 0 by Newton Raphson Method.

Correct upto 4 decimal places.

38. Solve the following boundary value problems (1+ x^2) y'' + 4xy' + 2y= 2 y(0)= 0, y(1)= ½ by the Finite difference method. Use central difference approximation with h= 1/3.

39. Use Runge Kutta method of 4'th order to solve $\frac{dy}{dx} = \frac{y^2-x^2}{y^2+x^2}$ with y(0) =1 at x=0.2 x=0.4

Solve to 4 decimal places.

40. Using Second Order Runge Kutta method find y(0.1), y(0.2) given $\frac{dy}{dx} = x^2 + y^2$ y(0)=1.

41. Solve the following set of nonlinear algebraic equations by using Multivariable Newton Raphson method correct upto 4 decimal points.

$xy = x^2 + 3$ and $y^2 = 2xy - 8$ using $(x_0\ ,\ y_0\ ) = (3.1, 3.9)$ for two iterations.

42. Solve the system of linear algebraic equations by using Crout's method.

$$4x + 2y + z = 3$$
$$4x + 3y + 2z = 4$$
$$x + 5y - 2z = 6$$