9-May-19 1T00525 - T.E.(CHEMICAL)(Sem V) (Choice Based) / 31701 - Computer Programming & Numerical Methods
68091

(3 Hours) [Total Marks: 80]

N. B. (i) Question number **one is compulsory.**
(ii) Answer any **three** questions from the rest.
(iii) Assume suitable data wherever necessary.

Q.1.a) Explain False position method using graphical representation. (05)

b) Find LU decomposition of $A = \begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{bmatrix}$ (05)

c) How to use Loops in Python? Explain with examples (05)

d) Using Bender-Schmidt method to solve $\frac{\partial^2 u}{\partial x^2} - 2\frac{\partial u}{\partial t} = 0$ given u(0, t)= 0, u(4,t)=0, u(x,0) = x (4-x). Assume h=1.Find the values of u upto t=5 (05)

Q.2.a) Solve the equation $x^3 + x^2 - 1 = 0$ for the positive root by iteration method (Method of successive approximations) (10)

b) Find the positive root of $x = cosx$ using Newton's Method correct to six decimal places. (10)

Q.3. a) Solve the following equations by Gauss-Elimination Method (08)

$$x + 2y + z = 3$$
$$2x + 3y + 3z = 10$$
$$3x - y + 2z = 13$$

b) Solve the following equations by Gauss-Jacobi Method (12)

$$10x - 5y - 2z = 3$$
$$4x - 10y + 3z = -3$$
$$x + 6y + 10z = -3$$

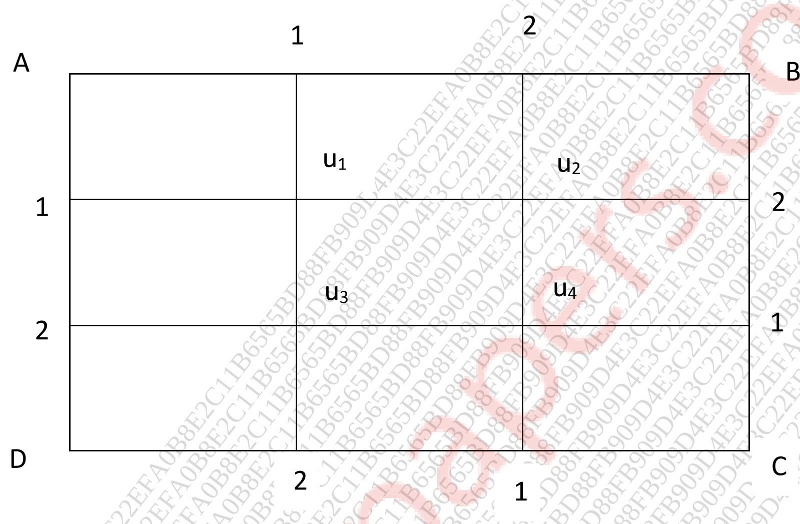
Q.4.a) The change in velocity of a moving particle is given by the following equation (15)

$$\frac{dv}{dt} = 0.025v^2 - 5t$$

Where v is in m/s and t is in seconds. If at t=0, v=5m/s, then find the velocity at t=1.5s taking step size as 0.25. Use Euler's Method.

b) Solve by Crank Nicholson method the equation $u_{xx} = u_t$ subject to the condition $u(x,0) = 0\,, u(0,t) = 0 \; and \; u(1,t) = t$ taking h=0.25 for one-time steps. (05)

Q.5.a) Solve $u_{xx} + u_{yy} = 0$ for the following square mesh with boundary conditions as shown below. (12)



b) Solve $y_{x+2} - 5y_{x+1} + 6y_x = x^2 + x + 1$ (08)

Q.6a) Using Adam-Bashforth predictor-corrector method find y (0.4) (10)

$\frac{dy}{dx} = \frac{1}{2}xy$, y (0) =1, y(0.1)=1.01, y(0.2)=1.022, y(0.3)=1.023

b) Compare Newton Raphson and Secant method of finding roots of nonlinear equations (10)
