DEPARTMENT OF CHEMICAL ENGINEERING

MATLAB FOR SCIENTISTS AND ENGINEERS CHO4260

SESSION 2022-2023

ASSIGNMENT-2

Date of Announcement 16/11/2022 **Date of Submission- 26/11/2022**

1: Write the different steps to solve following simultaneous linear equation in command window:

5x = 3y - 2z + 10

8y + 4z = 3x + 20

2x + 4y - 9z = 9 **[CO-2]**

2: Consider the following system of non linear equations

$$F_1(x_1, x_2) = 2x_1^2 - 5x_2^3 - 3 = 0$$

$$F_2(x_1, x_2) = 3x_1^3 + 2x_2^2 - 26 = 0$$

You may take initial guess as $\boldsymbol{x}^{(1)}$ $[1 \;\; 1]^T$

Elaborate its solution strategy with the help of MATLAB clearly mentioning the commands used. **[CO-2]**

3:Write program in MATLAB to use the following control structure

for, if , while, switch case. **[CO-2]**

4: The Antonie equation for vapour pressure of pure compound is written as:

$\ln p_{sat} = a - \frac{b}{T+c}$ where a, b and c are constants for that compound, for acetone T (K) and p_{sat} in bar is given in the following table

T(K)	259.2	273.4	290.1	320.5	350.9	390.3	446.4	470.6	508.1
P_{sat} (bar)	0.04267	0.09497	021525	0.74449	2.01571	5.655	17.682	26.628	47

Using the command **'fit'** and **'nlinfit'** calculate a, b and c for acetone.

[CO-2]

5:The above Antonie equation may be rewritten as:

$$\ln p_{sat} = \left(a - \frac{b}{c}\right) + \left(\frac{a}{c}\right)T - \frac{1}{c}T\ ln\ p_{sat}$$

Use **'regress'** and **' \'** determine the values a, b and c for acetone. Compare this value with the value obtained from question 4. **[CO-2]**

6: Calculate sin (1.25) and sin (2.75) with the help of **'interp1'** and **'polyfit'**, commands of MATLAB. Data of the attached table may be used.

x	0.0	0.5	1.0	1.5	2.0	2.5
sin(x)	0.00000	0.479426	0.841471	0.997495	0.909297	0.598472

[CO-2]

7: With the suitable example explain **'interp2'** and **'diff'**. **[CO-2]**

8: With the help of **'integral' ',quqad' 'dblquad', 'integral2'** and **'integral3'** calculate the following:

$\int_0^{\infty} e^{-x^2}\left(ln(x)\right)^2 dx$, $\int_0^2 \frac{1}{x^3-2x-c} dx$ where c =4

$\iint y * \sin(x) + x * \cos(y)\, dxdy$ over pi <= x <= 2*pi, 0 <= y <= pi

$\iint \frac{1}{\sqrt{x+y}*(1+x+y)^2} dxdy$ over the triangle 0 <= x <= 1, 0 <= y <= 1-x.

$\iiint (y * \sin(x) + z * \cos(x))dxdydz$ over the region 0 <= x <= pi, 0 <= y <= 1, -1 <= z <= 1

$\iiint (x * \cos(y) + x^2 * \cos(z))dxdydz$ over the region xmin <= x <= xmax, ymin<= y <= ymax, zmin <= z <=zmax

xmin = -1

xmax = 1

ymin $= -\sqrt{(1-x^2)}$

ymax $= \sqrt{(1-x^2)}$

zmin $= -\sqrt{(1-x^2-y^2)}$

zmax $= \sqrt{(1-x^2-y^2)}$

[CO-2]