VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS), HYDERABAD
Accredited by NAAC with A++ Grade
B.E. IV-Semester Main & Backlog Examinations, JuLY-2022
Mathematical Programming for Engineers (OE-II)

Time: **3 hours**

Max. Marks: **60**

*Note: Answer all questions from **Part-A** and any **FIVE** from **Part-B***

Part-A (10 × 2 = 20 Marks)

Q. No.	Stem of the question	M	L	CO	PO
1.	Write down MATLAB script for the solution of algebraic equation $2s^2 + 10s + 12 = 0$	2	3	3	1
2.	Consider a matrix $x = \begin{bmatrix} 0.1 & 0.2 & 0.5 \\ 0.6 & 2 & 0.3 \end{bmatrix}$. Write down the code to form $x_1 = [0.1 \quad 0.2 \quad 0.5]$ and $x_2 = \begin{bmatrix} 0.1 & 0.2 \\ 0.6 & 2 \end{bmatrix}$ from the given matrix x.	2	2	3	2
3.	Create a function file and write down the code to plot the contour of $z = x^2 + y^2$	2	4	3	1
4.	Draw the plot of the below MATLAB code. $x = -\pi:\frac{\pi}{20}:\pi; \;\; plot(x, \sin(x), 'r-', x, \cos(x), 'b:')$	2	2	2	5
5.	Write down a MATLAB code to find the largest two eigen values of the matrix $A = \begin{bmatrix} 1 & 0 & 0 & 1 & -1 \\ 0 & 2 & 3 & 5 & 0 \\ -1 & 0 & 0 & 0 & 1 \\ 6 & 8 & 1 & 2 & -2 \\ 1 & 1 & 1 & 1 & 1 \end{bmatrix}$	2	3	1	1,2
6.	Write down the syntax for element-by-element multiplication and division of two matrix.	2	3	1	2
7.	When "fsolver" is used? Write down its syntax.	2	1	3	2
8.	What do you mean by curve fitting? How MSE (mean-square error) is used?	2	1	2	1
9.	Write down the MATLAB syntax of ODE23 and ODE45.	2	1	4	1
10.	What is GUI? What are the ways one can build MATLAB GUI.	2	2	5	5

Part-B (5 × 8 = 40 Marks)

11. a)	illustrate the syntax of following i) if else ii) for loop iii) while loop iv) switch case statement.	5	1	3	1
b)	Write down the MATLAB code to calculate 6! (six factorial) by using for loop.	3	3	3	2
12. a)	Compare script file and function file? What is the important difference between these two? What are the precautions needed while saving script file and function file? What is debugging? What are the common errors that may face while executing the program?	5	1	3	2

			M	L	CO	PO
	b)	Construct the MATLAB code to plot the quadratic equation $x^2 + 7x - 3$ from x equals -3 to +3 in steps of 0.3. Also give the x-axis and y-axis label and make the grid on.	3	2	2	5
13.	a)	Discuss trapezoidal rule and Simpson's 1/3 rule for numerical integration	5	4	4	2
	b)	Write down the MATLAB code to solve $\int_0^1 \sin x^2 dx$.	3	2	4	2
14.	a)	What is polynomial regression and how the regression analysis is carried out?	5	1	4	2
	b)	Write down the MATLAB code to compute polynomial regression of the following system Time $t = [0\ 1\ 2\ 3\ 4\ 5]^T$, output (temperature) $y = [0\ 20\ 60\ 68\ 77\ 110]^T$	3	2	3	2
15.	a)	Illustrate the basic steps involved in Runge-kutta method for solving ordinary differential equation.	3	1	4	1
	b)	Write down the MATLAB code to solve $\frac{dy}{dt} = 3e^{-t} + 0.4y$ with given condition $y(0) = 5,\ t = [0,\ 3]$	5	2	3	2
16.	a)	For a given matrix, write down MATLAB syntax to know the following information (i) dimension of the matrix, (ii) number of rows and columns present in the matrix, (iii) transpose. Also write down the syntax for null matrix and unit matrix.	4	2	1	2
	b)	Write down the code to plot two different functions in one plot $f_1 = x^2 - 3x + 2$ and $f_2 = 2x^2 + x - 3$. Also write the code to plot the two functions in one plot with separate y-axis.	4	2	2	5
17.		Answer any *two* of the following:				
	a)	Solve the linear equation $3x_1 + 2x_2 - x_3 = 10,\ -x_1 + 3x_2 + 2x_3 = 5,\ x_1 - x_2 - x_3 = -1$. Also, write down the MATLAB code that can be used to solve these equations.	4	3	3	3
	b)	Explain with MATLAB code how to find the roots of the polynomial $P(s) = s^3 - 2s^2 - 3s + 10$. How to verify the accuracy of these roots by MATLAB code. Also write down the code to construct polynomial from the roots.	4	2	3	3
	c)	Write down the MATLAB code by using ode45 solver to solve $\frac{dy}{dt} = \sin t + \sin y$, subject to $y(0) = 0$, t varies from 0 to 10π.	4	3	3	2,5

M : Marks;   L: Bloom's Taxonomy Level;   CO; Course Outcome;   PO: Programme Outcome

i)	Blooms Taxonomy Level – 1	30%
ii)	Blooms Taxonomy Level – 2	40%
iii)	Blooms Taxonomy Level – 3 & 4	30%

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