Name:

Enrolment No:

MANIPAL UNIVERSITY
JAIPUR

Odd Semester Mid Term Examination, Dec 2024
FoE, School of Automobile, Mechanical, and Mechatronics Engineering
Department of Mechanical Engineering
B.Tech

Course Code: MEE1006 **Course: MATLAB For Engineers** **Semester: I**

Time: 1 hrs 30 min **Max. Marks: 30**

Instructions: All questions are compulsory.
Missing data, if any, may be assumed suitably.
Calculators are not allowed.

SECTION A

Q. No.		Marks	CO
Q. 1	What is the abbreviation of MATLAB? How can we multiply a row matrix 'A' with another row matrix 'B' of the same order? Write the MATLAB code.	2	CO1
Q. 2	What is the difference between *clc* and *clear* command in MATLAB?	2	CO1
Q. 3	How do you create a row vector of 10 evenly spaced values between 0 and 1 in MATLAB?	2	CO1

SECTION B

Q. 4 Write a MATLAB code to create the given matrix P and to perform the following operations: 4 CO1

$$P = \begin{bmatrix} 3 & 6 & 9 & 12 \\ 4 & 8 & 12 & 16 \\ 5 & 10 & 15 & 20 \\ 6 & 12 & 18 & 24 \end{bmatrix}$$

(i) Extract the top-left 2x2 submatrix of P

(ii) Replace the element $P(4,4)$ with 25

(iii)Delete the second row and third column from P

(iv)Extract the first and last columns of P and save them as matrix Q

Q. 5 Write a MATLAB code to solve the following set of simultaneous linear algebraic equations using symbolic computation. 4 CO1

$x_1 + 2x_2 + 3x_3 + 5x_4 = 21$----------(1)

$-2x_1 + 5x_2 + 7x_3 - 9x_4 = 17$----------(2)

$5x_1 + 7x_2 + 2x_3 - 5x_4 = 23$----------(3)

$-x_1 - 3x_2 - 7x_3 + 7x_4 = 26$----------(4)

Also write the code to substitute value of x_1 in Eq. (2) and verify.

Q. 6 Write a MATLAB code to define an anonymous function $q(x) = e^{-x^2} \cdot cos(2\pi x) + log(1 + x^2)$ and evaluate $q(x)$ for $x = 1$. Also write a code to plot $q(x)$ for x in the range of [-2, 2] and highlight the point at $x = 1$ on the graph with a red color marker '*'. 4 CO2

Q. 7 Write a MATLAB code to plot the function y (in same figure window) having 50, 100, and 150 elements for the following: 4 CO1

$$y(x) = \begin{cases} x^2; for\ 0 \le x < 2 \\ 2x + 1;\ for\ 2 \le x < 4 \\ e^x; for\ 4 \le x < 6 \end{cases}$$

SECTION-C

Q. 8 Create a MATLAB function named *quadraticSolver* that solves a quadratic equation of the form $ax^2 + bx + c = 0$. The function should: 8 CO3

1. Accept three inputs: a, b, and c
2. Use a nested function to calculate the discriminant ($D = b^2 - 4ac$)
3. Return the roots of the equation (real or complex)

Test the function with the values of $a = 1, b = -3, and\ c = 2$.