Reg. No.									

MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

(A constituent unit of MAHE, Manipal)

IV SEMESTER B.TECH (ELECTRICAL & ELECTRONICS ENGINEERING)

MAKEUP EXAMINATIONS, JULY 2023

MATLAB for Engineers [ELE 4303]

REVISED CREDIT SYSTEM

Time: 3 Hours **Date: 11 JULY 2023** **Max. Marks: 50**

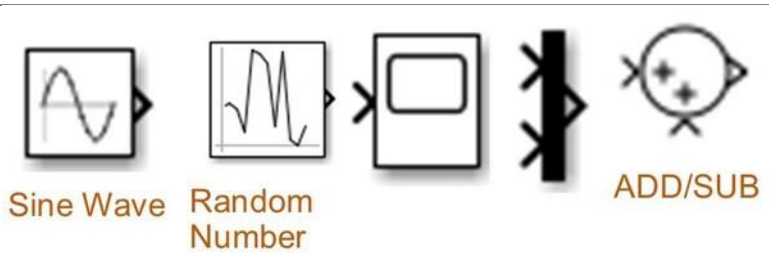
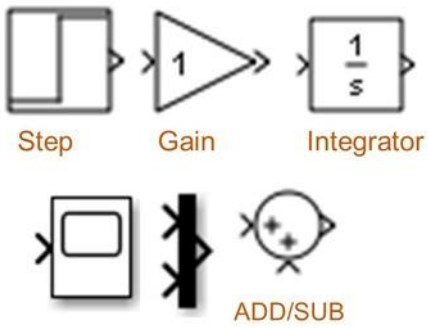
Instructions to Candidates:

- Answer **ALL** the questions.
- Missing data may be suitably assumed.
- Write MATLAB code wherever required.

Q.NO	Questions	Marks	CO	BTL
1A.	When MATLAB application is started on the **desktop**, the desktop appears in its default layout. What are the **different panels** available in **MATLAB Desktop environment**? Mention their uses.	(03)	01	02
1B.	The circumference (perimeter) of an ellipse can be approximated by calculating an intermediate parameter h: $h = \frac{(a-b)^2}{(a+b)^2}$ The approximate circumference of an ellipse can be found from a, b, and h as: $C \simeq \pi(a+b)(1+\frac{3h}{10+\sqrt{4-3h}})$ Create a script file that defines a and b, calculates h, and then calculates the final circumference. Assume that a=5 and b=10.	(03)	01	03
1C.	In MATLAB, **eye(n)** returns an n-by-n **identity matrix** with ones on the main diagonal and zeros elsewhere. Given a matrix **A = eye(4)**, give the output of the following MATLAB operations on matrix A. a) A (2, :) b) A (1:2, 2 : end) c) A (1:2,3:4) d) A(11)	(04)	CO2	04
2A.	Write a MATLAB program to evaluate a function f(x,y) for any two user-specified values x and y. The function f(x,y) is defined as follows:	(03)	CO1	03

	$f(x,y) = \begin{cases} x+y & for\ x \geq 0\ and\ y \geq 0 \\ x+y^2 & for\ x \geq 0\ and\ y < 0 \\ x^2+y & for\ x < 0\ and\ y \geq 0 \\ x^2+y^2 & for\ x < 0\ and\ y < 0 \end{cases}$			
2B.	What is the difference between an array, matrix, scalar and a vector in MATLAB? Give examples using MATLAB statements.	***(03)***	***CO2***	***04***
2C.	Write a MATLAB code to do the following: Create a **identity matrix A** of size 5 x 5. Write the contents of the **matrix A** into a file named "**ONE.txt**". Read the file "**ONE.txt**" and write the ODD columns from the file into "**TWO.txt**". Delete "**ONE.txt**" from the current directory. Some MATLAB functions for reference: • **A = readmatrix(FILENAME)** creates a homogeneous array by reading from a file. • **writematrix(A, FILENAME)** writes the homogenous array A to the file FILENAME as column-oriented data. delete file_name **deletes the named file from disk.**	***(04)***	***CO2***	***04***
3A.	Write a MATLAB code to check if a given **word or a whole number** is a palindrome or not. Use **WHILE loop** in your code. Find the **time complexity of the code**. Palindrome is a word, phrase, or sequence that reads the same backwards as forwards, e.g. madam, 10101 etc.	***(03)***	***CO3***	***03***
3B.	Let y=sin(x), where 'x' is a row vector of 100 evenly spaced points between 0 and 10pi. Write a MATLAB code to PLOT half wave rectified 'y' (i.e. show only positive cycles of the wave form). Illustrate the use of **FOR** loop in the code.	***(03)***	***CO3***	***03***
3C.	Write a MATLAB code to construct a pie chart to visually display the favourite fruits of the students in a class based on the given data: Mango - 45; Orange - 30; Plum - 15; Pineapple - 30; Apple – 30. Use labels in the chart. MATLAB function for reference: **pie(X)** draws a pie chart using the data in X. Each slice of the pie chart represents an element in X. **pie(X, labels)** specifies options for labelling the pie slices. In this case, X must be numeric. **bar(y)** creates a bar graph with one bar for each element in y.	***(04)***	***CO3***	***03***

4A.	Write a MATLAB code to evaluate the polynomial p(x) = 5x+10 for 30 evenly spaced points between -2 and 2. MATLAB function for reference: y = **polyval**(p,x) evaluates the polynomial p at each point in x. The argument p is a vector of length n+1 whose elements are the coefficients (in descending powers) of an nth-degree polynomial.	***(03)***	***CO4***	***04***
4B.	Solve the following puzzle using MATLAB symbolic computation code. **"John bought some pens and pencils at a bookstore. If 5 pens and 3 pencils cost Rs 8.40 while 5 pencils and 3 pens cost Rs 6.00 instead, find the cost of a pen and pencil."** Show necessary equations for solving the puzzle.	***(03)***	***CO4***	***03***
4C.	The following data relates to indirect labour expenses and the level of output. **Months** | Jan | Feb | Mar | Apr | May | June **Units of output** | 200 | 300 | 400 | 640 | 540 | 580 **Indirect labour expenses (Rs)** | 2500 | 2800 | 3100 | 3820 | 3220 | 3640 Write a MATLAB code to estimate the expenses at a level of output of 350 and 500 units. Use 1-D data interpolation in MATLAB. Description of the MATLAB function for 1-D data interpolation (table lookup) is as follows: vq = **interp1**(x,v,xq) returns interpolated values of a 1-D function at specific query points using linear interpolation. Vector x contains the sample points, and v contains the corresponding values, v(x). Vector xq contains the coordinates of the query points.	***(04)***	***CO4***	***03***
5A.	Create a SIMULINK model to add noise to a SINE wave and display the output on a scope. Use Simulink's built in random number generator to simulate the noise. Make use of the following SIMULINK blocks to create the model.	***(03)***	***CO5***	***03***

				
5B.	Create a SIMULINK model to obtain the step response of the equation: dy/dt = 5f(t) - 7y; Make use of the following SIMULINK blocks to create the model. 	***(03)***	***CO5***	***04***
5C.	List any two features and any two applications of SIMULINK in your field of engineering.	***(04)***	***CO5***	***02***