Reg. No.

MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL (A constituent unit of MAHE, Manipal)

## **IV SEMESTER B.TECH END SEMESTER EXAMINATIONS, MAY 2019**

## SUBJECT: MATLAB FOR ENGINEERS [ELE 3287] (OPEN ELECTIVE -I)

**REVISED CREDIT SYSTEM** 

Time	e: 3	Hours Date: 07 May 2019	Max. Mark	s: 50
Instr	uctio	ns to Candidates:		
	*	Answer <b>ALL</b> the questions.		
	*	Missing data may be suitably assumed.		
	*	Use of MATLAB help is allowed. Use of Internet is NOT allowed.		
	*	Save your work regularly.		
	*	Read the instructions given below every question carefully.		
	*	Evaluation will be carried based on information available in the answer script	ONLY.	
1A.	Wr: 'wo 'e_c	te a MATLAB function 'lettercount' which takes a word as input and gives tw rdlength' & 'e_count'. 'word_length' will indicate number of letters in the ount' will indicate count of letter 'e' in the input word.	o outputs word and	
	<u>Not</u>	e: Do not use any inbuilt string operation functions		
	In t	he answer booklet: Lines of codes		(04)
1B.	Wr: call orig	te a MATLAB function 'img_modify' which takes an image as input. When the f ed, a figure window with three subplots – original image, grayscale & negative final image must be displayed with appropriate title.	function is e image of	
	<u>Not</u> 'im	<u>e:</u> x = imread('peppers.png'); can be used as input image. Use 'imshow', 'rgb2 complement' functions.	gray' and	
	In t	he answer booklet: Lines of codes		(04)
1C.	Wr fun of t	te a MATLAB function 'roll2dice' which has no input and output arguments. ction is called from the command window, numerical values (integer values fro wo cube shaped dice must be shown. Also, two dice should not show same value	When the om 1 to 6) es.	
	In t	he answer booklet: Lines of codes		(02)
2A.	Typ 'x1'	e 'load polydata.mat' in command window. Use the data in the variables 'x' an and 'y1') for curve fitting and answer the following:	d 'y' (NOT	
		a) Identify the outlier in the data and delete it. What is the index of the ou number)? How do you find them?	tlier (row	
		b) Fit a polynomial expression for the data (after deleting the outlier). Give the choice of degree	reason for	
	In t	he answer booklet: Answers for part a and b		(05)
2B.	Usi (-2	ng MATLAB, find the value of y at $x = 0$ given some set of values of (, 5), (1, 7), (3, 11), (7, 34). Use linear interpolation. The code should be within o	(x, y) as ne line.	
	In the answer booklet: Code			
2C.	Plo	(with legends) LHS and RHS of the expression: $\frac{3x^2-2}{x} = 5x + 7$ . Solve and put r	narkers at	
	the	solutions points		
	In t	he answer booklet: Lines of codes, rough graph of the expressions		(04)

In the answer booklet: Lines of codes, rough graph of the expressions

ELE 3287

- Develop an app using App Designer to calculate the BMI and BMI category of a person. 3A. Consider following points in the application

  - Height (in centimetres) and weight (in kg) must be collected from the user Formula for computing BMI is  $BMI = \frac{mass}{height^2}$  were 'mass' is in 'kg' and height is in • 'meter'
  - BMI categories are:

BMI	Category
< 18.5	Underweight
18.5 to 25	Normal weight
25 to 30	Over weight
> 30	Obese

(05) In the answer booklet: Diagram of GUI with necessary annotations, callback function

Using App Designer, develop a GUI which has two items – push button will label 'Show the 3B. image' and axis to display the image. When the GUI runs, no image should be displayed in the axis. When the user triggers the button, input dialogue box should pop-up to collect the password from the user. If the user entered password matches with pre-defined password text, the image must be displayed in the axis; otherwise error dialogue box should pop up with necessary message.

Hints: imread('peppers.png') can be used as the image; inputdlg; errordlg; strcmp In the answer booklet: Callback function, startup function, properties

Equation governing the fall of a paratrooper from a height of 'y' meters is: 4A.

$$m\frac{d^2y}{dt^2} = -mg + \frac{4}{15}\left(\frac{dy}{dt}\right)$$

m – mass of the paratrooper; g – accerleration of the gravity (9.81 m/s<sup>2</sup>)

If a trooper with mass 70 kg is falling from a height of 700m, what time will he reach the ground? Assume initial velocity of the trooper as zero.

In the answer booklet: Simulink block diagram, height v/s time graph, value of time when trooper reaches the ground, necessary annotations/comments

An inductor (L) is connected to DC voltage (V) through a resistor(R). The equation governing 4B. growth of current (i) in the inductor is,

$$V = Ri + L\frac{di}{dt}$$

Assume  $V = 10V, R = 50\Omega, L = 500mH$ 

- a) Draw the Simulink block diagram
- b) Draw the time vs. current waveform when simulated for 0.1 seconds. What is the current when t = 0.01s?
- In the answer booklet: Block diagram, waveform, answer for part b
- Given coordinates of two points A  $(x_1, y_1)$  and B  $(x_2, y_2)$ , compute the distance between the A **4C**. and B using Simulink.

$$distance = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$
  
In the answer booklet: Block diagram with one sample output

- Find the surface area bounded by the functions  $y_1(x) = 1 x^2$  and  $y_2(x) = x$ 5A. In the answer booklet: Procedure, value of the surface area
- An LED connected to a digital pin 6 of Arduino needs to turned ON. Write MATLAB code with 5B. necessary comments to trigger the LED

In the answer booklet: Lines of codes

**5C**. An LED is connected to GPIO pin 15 of Raspberry Pi. The Raspberry Pi is assigned with IP address '169.254.0.2'. Write a MATLAB program to continuously brighten and dim an LED with reasonable delay

In the answer booklet: Lines of codes

(03)

(02)

(04)

(05)

(05)

(03)

(03)