Reg. No.



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IV SEMESTER B.TECH END SEMESTER EXAMINATIONS,

APRIL - MAY 2017

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

REVISED CREDIT SYSTEM

Time:	3 H	ours	Date:	02, May 2017	Max. Ma	rks: 50		
Instru	ctio	ns to Candidates:						
	*	Answer ALL the questions.						
	*	Missing data may be suitably	assumed.					
	*	Use of MATLAB help is allow	ed. Use of	Internet is NOT allowed				
	*	Save your work regularly.						
	*	Read the note given below ev	ery quest	ion carefully.				
	*	Evaluation will be carried bas	sed on info	ormation available in the	e answer script ONLY .			
1A.	Wri arg any	ite a MATLAB function with uments. When the function is one of the following words –	name 'my called fro Blue, Bro	color' which does not h om command window, i wn, Orange, Pink, Black	ave any input and output t should randomly display			
	In t	he answer booklet: Lines of	codes			(03)		
1B.	Write a MATLAB function with name 'no2array' to realize the following:							
	Ex	ample 1:		Example 2:				
	In	nut: 569		Input: 742				
	01	1tput: [5 6 9]		Output: $[7 4 2]$				
	Input is a 3-digit number and output is an array of order 1 × 3							
	I 4	ha an ann a ba abhat. I in an a				(0.4)		
	In t	ine answer bookiet: Lines of	codes			(04)		
1C.	Wri stri	ite a MATLAB function with ng	name 'vo	welcount' to count nun	nber of vowels in a given			
	In t	he answer booklet: Lines of	codes			(03)		
2A.	Sol	ve following problems using N	/uPAD					
	P1. Plot (both leaves of) the lemniscate: $r^2 = \cos(2\theta)$							
	P2. Evaluate the expression: $ln(u + 1\sqrt{u^2 - 3})$. at $u = 2$							
	P3. Evaluate: $\sum_{n=1}^{\infty} \frac{2}{2}$							
	1.5. Evaluate. $\Delta n=1 \frac{1}{(n+1)(n+2)}$							
		P4. Verify the expression: \int_0^1	$\frac{x^4(1-x)^4}{1+x^2}dx$	$x = \frac{22}{7} - \pi$				
	In	the answer booklet: Com	nands us	ed in MuPAD for ever	y problem with relevant			

solutions

2B. Using MuPAD, find the solution of the following equation:

$$2x^4 - 11x^3 - 20x^2 + 113x + 60 = 0$$

In the answer booklet: Commands used in MuPAD with obtained solutions

2C. Fit a polynomial equation for the given set of data of temperature and pressure considering pressure as dependent variable. Which degree fit is more suitable for temperature range 0°C to 400°C?

Using interp1 function, carry out linear, pchip and spline interpolation for T = 250 °C and compare it with the fitted result (find difference between fitted value and interpolated value)

Temperature (°C)	300	259	233	167	88	19
Pressure (bar)	2.07	1.8	1.65	1.17	0.59	0.13

In the answer booklet: Justification for choice of fit for the first part of question; calculation and results for second part of the question (04)

3A. Create a graphical user interface consisting of digital output (lamp if App Designer, static text with value 1 and 0 if GUIDE is used)

The user interface should have following provisions:

- User can give pulse duration of digital output in seconds (ranging from 0.5 to 2 seconds)
- Two buttons, one dedicated to start the pulsing of digital output governed by pulse duration specified by user, and one to stop the process

In the answer booklet: Callback function of the two buttons

- **3B.** Refer Fig. 3B for the appearance of the user interface. Following should be sequence of working of the GUI
 - Step 1. Using objects 1, 2 and 3, user defines the array size and clicks 'Set Array Size' button. Objects 4, 5, 6 appear after the button click and object 1, 2 and 3 are disabled.
 - Step 2. Depending upon user specified array size, user will enter the array element in object 6 one by one and clicks 'Save as array' button every time. Object 4 should dynamically guide the user by giving information of which element he is entering. Once all array elements are entered, bar graph of the entered array must be plotted in axes (object 8) and objects 5, 6 and 7 must get disabled



In the answer booklet: Callback function of the buttons

(06)

(04)

(02)

ELE 3287

4A. The ordinary differential equation of a series RC circuit connected to DC supply 'V' is:

$$V = Ri + V_C$$
 where, $V_C = \frac{1}{C} \int i. dt$

Model this equation in Simulink. Assuming V = 5, R = 100, C = 10×10^{-3} , obtain the response of V_C vs. time for 10 seconds

In the answer booklet: Simulink block diagram with rough sketch of output graph obtained **(03)**

4B. Using Simscape tool box components, simulate a series RC circuit with $R = 100\Omega$, C = 10mF connected to DC supply voltage V = 5V.



If the capacitor was initially charged to a voltage of 2V, what is the voltage across the capacitor at time t = 2 seconds?

In the answer booklet: Simulink block diagram with value of voltage at time t = 2 seconds (04)

4C. Using 'if condition' blocks, create pulses governed by a sinusoidal signal. During the positive cycle of the sine wave, the pulse should have high (1) value, and zero during negative cycle of the sine wave.

In the answer booklet: Simulink block diagram only

5A. Develop a user interface which consist of a static text and a button. On click of the button, the color of the static text should randomly change

In the answer booklet: Callback function of the button

5B. An LED is connected to digital pin 9 of Arduino Uno. A distance measuring analog sensor that generates 0 to 5V is connected to analog pin A0 of Arduino Uno. Write a MATLAB program to vary the flickering frequency of the LED depending on the position of any object from the sensor.

In the answer booklet: Lines of codes

5C. A room has two doors, one dedicated for entry and other for exit. A PIR sensor is placed at both the doors to monitor the movement of the people.

Write a MATLAB code to dynamically count the number of occupants in the room. Assume that PIR sensors are connected to digital pin 8 and 9 of Arduino Uno which are dedicated for entry and exit doors respectively

In the answer booklet: Lines of codes

(03)

(03)

(03)

(04)

Page 3 of 3