Nirma University

Institute of Technology

Semester End Examination, December - 2020
B.Tech., Semester – V(Open Elective)
2ECOE76: MATLAB for Engineers

Roll /
Exam No.

Supervisor's initial
With date

Time: 1.5 Hours

Max. Marks: 40

Instructions: 1. Attempt all questions.
                2. Figure to right indicate full marks.
                3. Draw neat sketches wherever necessary.
                4. Assume suitable data wherever necessary.

Q.1 (A) Write a MATLAB code which generates the following function.   (05)

$$y(t) = 3t^2 - 2t + 6 \;\; for\; t < -5$$
$$= 4t^2 - 3t + 5 \;\; for - 5 \leq t \leq 5 \; at\; step\; size\; 1$$
$$= 4t + 17 \;\; for\; t > 5$$

OR

(A) Write a MATLAB code which generates the following function.   (05)

$$y(2j) = \frac{x(j) + x(j-1)}{2} \; and \; y(2j-1) = \frac{x(j) - x(j-1)}{2}$$

Where the given array x=[2,7,10,5,4,8,7,6,3,14].

(B) Write a MATLAB program that accepts a string from a user with the   (05)
input function, chops that string into a series of tokens, sorts the
tokens into ascending order, and prints them out.

(C) Write a MATLAB program that returns the following plots: (10)
1. y1=$sin(x)$ versus x
2. y2=$cos(x)$ versus x
3. y3=[$sin(x)$+$cos(x)$] versus x
4. y4=[$sin(x)$−$cos(x)$] versus x
over the range $0 \leq x \leq 2\pi$ using the following specs:
1. Twenty points to create each plot
2. Label the x- and y-axis
3. Choose color, markers, and line style for each curve
4. Create the continuous plots in the same figure window with a grid
5. Limit the plotting range over $1.5 \leq y \leq -2$
6. Remove the axis
7. Identify each curve by a text string
8. Also, plot each curve in an individual subwindow

Q.2 (A) Create a 3-D plot in MATLAB from a 2-D, 11×11 matrix (in the xy (05)
plane) having ones along the main diagonals, zeros everywhere else,
with the center element having a magnitude of 2. It is desired that the
zx planes indicate the magnitudes of the elements position on the xy
plane all having triangular shapes.

(A) Create the MATLAB script file that performs the operations indicated   (05)
as follows:

$$A = \begin{bmatrix} [3e^{(j\pi/3)}] & 6\cos\left(\dfrac{\pi}{6}\right)+i6\sin\left(\dfrac{\pi}{6}\right) \\ 3+4i & 4.23e^{(-i\pi/18)}+9 \end{bmatrix} \qquad B = \begin{bmatrix} 5-9j & 5e^{(j(\pi/3+\pi/5)} \\ (2-3j)^{3.3} & \log(6-8j) \end{bmatrix}$$

1. C = determinant of A
2. D = conjugate of A
3. E = square of A
4. $F = A.\verb|^|B$
5. G = Transpose of A

(B) If there is a group of n people in a room, then write a MATLAB program   (05)
that calculates the probability that two or more of n people will have
the same birthday, where n is a calling argument.
(*Hint*: To do this, the function should create an array of size n and
generate n birthdays in the range 1 to 365 randomly. It should then
check to see if any of the n birthdays are identical. The function
should perform this experiment at least 5000 times and calculate the
fraction of those times in which two or more people had the same
birthday.)

(C) Write a MATLAB function that will accept a structure array of student   (05)
and calculate the final average of each one, assuming that all exams
have equal weighting. Add a new field to each array to contain the
final average for that student, and return the updated structure to
the calling program. Also, calculate and return the final class average.

(D) Write a MATLAB function that will accept a cell array of strings and   (05)
sort them into ascending order according to *alphabetical order*. (This
implies that you must treat 'A' and 'a' as the same letter.)