Internal Assessment Test 2 – January 2024

Sub:	**MATLAB Programming**					Sub Code:	**BEC358B**	Branch:	ECE
Date:	18/01/2024	Duration:	90 minutes	Max Marks:	50	Sem/Sec:	3rd (A,B,C,D)		OBE

	ANSWER ANY FIVE FULL QUESTIONS	MARKS	CO	RBT
1	Explain any four marker, color and line-style options used in two dimensional plots with examples	10	CO2	L1
2	Explain briefly about the file types in MATLAB with examples	10	CO2	L1
3	Write the MATLAB commands along with solutions of the command to carry out the following instructions: $$\begin{bmatrix} 4 & 2 & 2 \\ 4 & 5 & 6 \\ 1 & 2 & 9 \end{bmatrix}$$ (i) Use appropriate command and generate the above matrix and assign to variable A (ii) To create transpose of the first row of A and assign to x (iii) Compute B as product of row vector x' and column vector x (iv) Compute C as product of column vector x and row vector x' (v) Compute $A * A$ and square of A and comment on the results (vi) Extract the sub matrix from A using the range specifiers for row and column indices (2nd row to 3rd and 1st column to 3rd column)	10	CO2	L3
4	Write functions to do the following: (i)Create a 4×4 array A (ii)Print all elements of second row of array A (iii)Print all elements of last column of the array A (iv)Print diagonal elements of the array A (v)Access the second row-third number or element (viii)Delete all elements of third row of the array A	10	CO2	L3
5(i)	How to create multiple lines on a single graph with one command in overlay plots, such that each line is of different color?	5	CO2	L2
5(ii)	How to draw multiple figures/graphs on a single figure window? Explain with suitable examples	5	CO2	L1
6(i)	Write a script file to (i)Generate x- and y-co-ordinates of 100 equidistant point on a unit circle (ii)Plot x versus y and thus create the circle (iii)Set the scale of x-axis and the y-axis to be the same, so that the circle looks like a circle and not an ellipse (iv)Label the axes with text string (v)Title the graph with a text string Use parametric equation of the circle	5	CO2	L3
6(ii)	Write a function to compute the sum of a geometric series $1 + r + r^2 + r^3 + \cdots \cdots + r^n$ for a given r and n.	5	CO2	L3

1. Four marker, color and line-style options in Two-dimensional Plots

Table 5. 2 Line, Mark and Color Options

Line Type	Indicator	Point Type	Indicator	Color	Indicat
Solid	-	Point	.	blue	B
Dotted	:	Circle	o	green	G
dash-dot	-.	x-mark	x	red	R
Dashed	--	Plus	+	cyan	C
		Star	*	magenta	M
		square	s	yellow	Y
		diamond	d	black	K
		triangle down	v		
		triangle up	^		
		triangle left	<		
		triangle right	>		
		pentagram	p		
		hexagram	h		

2. File type in MATLAB

Two files in MATLAB (i) Script File (ii) Function File

Script file

A script file is an M-file with a set of valid MATLAB commands in it. A script file is executed by typing the name of the file (without the .m extension) on the command line. It is equivalent to typing all the commands stored in the script file, one by one, at the MATLAB prompt. Naturally, script files work on global variables, that is, variables currently present in the workspace. Results obtained from executing script files are left in the workspace.

A script file may contain any number of commands, including those that call built-in functions or functions written by you. Script files are useful when you have to repeat a set of commands several times.

```
% CIRCLE - A script file to draw a unit circle
% File written by Rudra Pratap. Last modified 5/28/98
% -------------------------
theta=linspace(0,2*pi,100);      % create vector theta
x=cos(theta);                    % generate x-coordinates
y=sin(theta);                    % generate y-coordinates
plot(x,y);                       % plot the circle
axis('equal');                   % set equal scale on axes
title('Circle of unit radius')   % put a title
```

Function File

A function file is also an M-file, like a script file, except that the variables in a function file are all local. Function files are like programs or subroutines in FORTRAN, procedures in Pascal, and functions in C. A function file begins with a function definition line, which has a well-defined list of inputs and outputs. Without this line, the file becomes a script file. The syntax of the function definition line is as follows:

Where the function_name must be the same as the file name (without the .m extension) in which the function is written. For example, if the name of the function is projectile it must be written and saved in a file with the name projectile.m. The function definition line may look slightly different, depending on whether there is no output, a single output, or multiple output.
 Examples:
Function Definition Line
 function [rho, H, F] = mot ion (x, y, t);
 function [theta] = angleTH (x, y) ;
function theta = THETA (x, y);

```
function [x,y] = circlefn(r);
% CIRCLEFN - Function to draw a circle of radius r.
% File written by Rudra Pratap on 9/17/94. Last modified 7/1/98
% Call syntax:   [x,y] = circlefn(r);  or just:  circlefn(r);
% Input:      r = specified radius
% Output: [x,y] = the x- and y-coordinates of data points
theta=linspace(0,2*pi,100);    % create vector theta
x = r*cos(theta);              % generate x-coordinates
y = r*sin(theta);              % generate y-coordinates
plot(x,y);                     % plot the circle
axis('equal');                 % set equal scale on axes
title(['Circle of radius r =',num2str(r)])
                               % put a title with the value of r
```

3.

(i)   Generation of the given matrix and assigned to A

```
>> A=[4 2 2;4 5 6;1 2 9]

A =

    4    2    2
    4    5    6
    1    2    9
```

(ii)   To create transpose of the first row of A and assign to x

```
>> x=A(1,:)'

x =

    4
    2
    2
```

(iii)   Compute B as product of row vector x' and column vector x

```
>> B=x'*x

B =

    24
```

(iv)   Compute C as product of column vector x and row vector x'

```
>> C=x*x'

C =

    16    8    8
     8    4    4
     8    4    4
```

(v)   Compute $A * A$ and square of A and comment on the results
$$A * A = A^2$$
$$\text{Square of } A = A.^2$$

```
>> A^2

ans =

     26    22    38
     42    45    92
     21    30    95

>> A.^2

ans =

     16     4     4
     16    25    36
      1     4    81
```

(vi)   Extract the submatrix from *A* using the range specifiers for row and column indices (2nd row to 3rd and 1st column to 3rd column)

```
>> submatrix = A(2:3,1:3)

submatrix =

      4     5     6
      1     2     9
```

4. Let the 4×4 array *A* be as mentioned below:

(i)

```
>> A = [1 2 3 4;5 6 7 8;9 10 11 12;13 14 15 16]

A =

      1     2     3     4
      5     6     7     8
      9    10    11    12
     13    14    15    16
```

(ii)Print all elements of second row of A

```
>> disp(A(2,:))
     5     6     7     8
```

(OR)

```
>> B=A(2,:)

B =

     5     6     7     8
```

(iii)Print all elements of last column of A

```
>> disp(A(:,end))
     4
     8
    12
    16
```

(OR)

```
>> C=A(:,4)

C =

     4
     8
    12
    16
```

(iv)Print diagonal elements of the array A

```
>> D=diag(A)

D =

     1
     6
    11
    16
```

(v) Access the second row-third number or element

```
>> E=A(2,3)

E =

     7
```

(vi)Delete all elements of third row of the array A

```
>> A(3,:)=[]

A =

     1     2     3     4
     5     6     7     8
    13    14    15    16
```

5. (i) To create multiple lines on a single graph with one command in overlay plots, such that each line is of different color

   ➢ To create multiple lines on a single graph with one command, such that plots are overlaid one another and each line is of different color
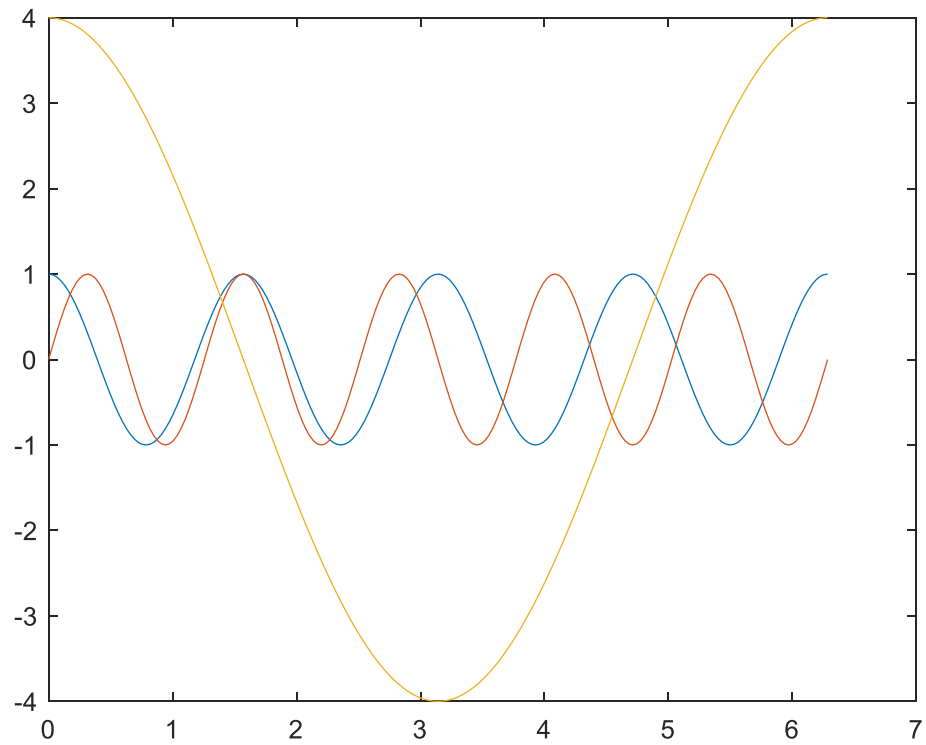
```
>> x=0:pi/100:2*pi;
>> y1=cos(4*x);
>>  y2=sin(5*x);
>> y3=cos(x)*4;
>> z=[y1;y2;y3];
>> plot(x,z);
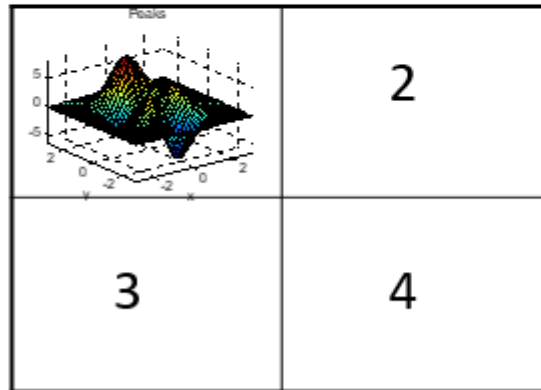```

(ii) To draw multiple figures/graphs on a single figure window

- The **subplot** command allows you to subdivide the graphing window into a grid of m rows and n columns
- **subplot(m,n,p)**

  rows

  columns

  location

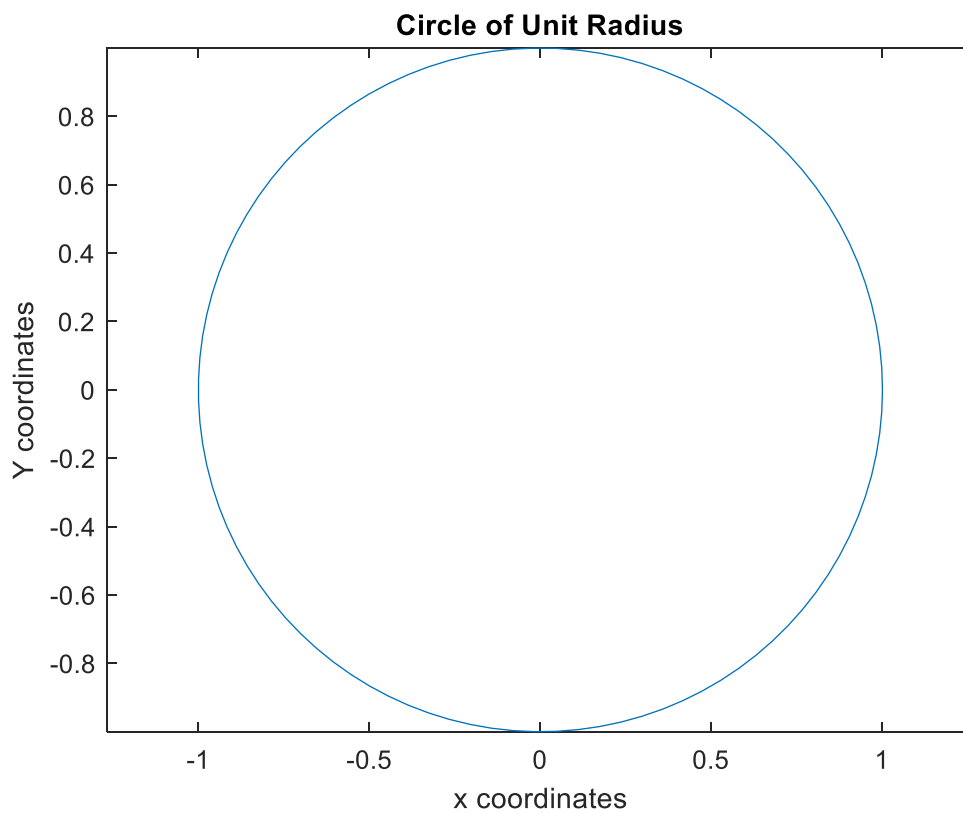# subplot(2,2,1)

2 columns

2 rows



6. (i)

```
r=input('Enter the radius of the circle: ')
theta=linspace(0,2*pi,100);        % create vector theta
x=r*cos(theta);                    % generate x-coordinates
y=r*sin(theta);                    % generate y-coordinates
plot(x,y);                         % plot the circle
axis('equal');                     % set equal scale on axes
title('Circle of given radius r')  % put a title
```


Circle of Unit Radius

6.(ii)

```matlab
function s=gseriessum(r,n);
  r=input('enter the value of r');
  n=input('enter the value upto which the series to be calculated');
  nvector =0:n;
  series=r.^nvector
  s=sum(series);
```

```
>> gseriessum
enter the value of r3
enter the value upto which the series to be calculated5

series =

     1     3     9    27    81   243


ans =

   364
```