MAT 1011 - LAB FAT EXAMS (MATLAB)

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ROLL: 20BCT0332
DAY & DATE: Monday, 1st February, 2021

SUBJECT - MAT 1011 ELA (LAB)
TIME: 11:30 am - 1:00 pm
CLASS NO: VL2020210108470

SET - 2 (20BCT0332)

1) a) MATLAB CODE to find Laplace of $e^{-t} t \cos 5t$

A: i) Aim: To find the laplace transform of a user defined function (here in terms of t) using MATLAB.

ii) SYNTAX:

Commands	Description
1) x = input(' ');	Displays the text in prompt, waits for user to input value / function / variables followed by the enter 'key'. Stores afore-mentioned value / function / variables in x (here).
2) laplace(f);	Finds laplace transform of function. (here stored in variable 'f'). Default value for input is in terms of 't', & default return type value is in terms of 's'. This can be changed by using laplace(x, u, v); where u represents input variable terms and outputs a value in terms of v (as in example)
3) disp(F); disp('....');	Shows information about an immediate result, such as values, size types, variable names, variable data, text, etc.

iii) Program:

— P.T.O —

iii) <u>Program</u> :

```
clear all
clc
syms t
f = input ('Enter the function in terms of t:');
F = laplace(f);
disp ('Laplace Transform of f(t) = ');
disp (F);
```

iv) <u>Output</u> :

```
Enter the function in terms of t:
exp(-t) * t * cos(5*t)

Laplace transform of f(t) =
((2*s + 2)*(s+1))/((s+1)^2 + 25)^2 - 1/((s+1)^2+
```

(Output Screenshot in next page :)

1st Shifting Theory :

- If $L\{f(t)\} = F(s)$, then $L\{e^{at} f(t)\} = F(s-a)$
- If $L\{f(t)\} = F(s)$, then $L\{e^{-at} f(t)\} = F(s+a)$

Write a MATLAB Program to execute the first shifting theorem, verify with an example.

— P.T.O ⟶ Last Page —

1) b) MATLAB CODE to find the inverse laplace transform of $F(s) = \dfrac{1}{s^3(s-1)^2(s^2+4)}$

i) Aim: To find the Inverse Laplace Transform of a user defined function (here, in terms of s) using MATLAB.

ii) SYNTAX:

	Commands	Description
1)	F = input('....');	Displays the text in prompt, waits for user to input value / function / variables followed by the 'enter' key. Stores the aforementioned value / function / variables (here) in F.
2)	ilaplace (F);	Finds the inverse Laplace Transform of a function (here stored in variable 'F'). Default value for input is in terms of 's', & default return type value is in terms of 't'. This can be changed by using 'ilaplace (F, u, v)'; where u represent input variable, and v represents output variable.
3)	disp (f); disp ('....');	Shows information about an immediate result, such as values, size types, variable ~~name~~ names, variable data, text, etc

iii) Program:

— P.T.O —

iii) Program :

```
clear all
clc
syms s
F = input('Enter the function in terms of s: ');
f = ilaplace(F);
disp('Inverse laplace Transform of F(t) : ');
disp(f);
```

iv) Output :

```
Enter the function in terms of s:
1/((s^3)*((s-1)^2)*((s^2)+4)))

Inverse laplace transform of F(t) =
t/2 - (3*cos(2*t))/400 - sin(2*t)/100 - (17*exp(t))/25
    + (t*exp(t))/5 + t^2/8 + 11/16
```

(Output Screenshot in next page :)

2) MATLAB CODE to draw the surface $x = \cos(t)$, $y = \sin(t)$, $3 = \sin(3t)$ using the plot3( ) command.

i) <u>Aim</u>: To plot the surface defined by the three curves $x = \cos t$, $y = \sin t$, $3 = \sin 3t$ using the plot3() command in MATLAB.

ii) <u>SYNTAX</u>:

	Commands	Description
1)	t = linespace (start, end, step);	Creates a 2D/3D Vector with a defined length for succesive intervals. It takes in a start, end & step function.
2)	comet3 (x, y, 3);	Displays a comet graph of the curve through the points x(i), y(i) & 3(i)
3)	plot3(x, y, 3);	Displays a 3D plot of a set of data points (here defined as x, y and 3; corresponding to the 3 axes in a 3D graph).
4)	xlabel(), ylabel() and 3label();	Modifies the label appearance for the x, y and 3 axis respectively.
5)	title (' ');	Displays title card for obtained figure

iii) Program:

```
clear all
clc
t = linespace (0, 2*pi, 500);
x = cos (t);
y = sin (t);
3 = sin (3*t);
```

```
comet3(x,y,z);
plot3(x,y,z);
xlabel('x-axis');
ylabel('y-axis');
zlabel('z-axis');
title('3D - Curve');
```

iv) Output : Screenshot in the next page:

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3) Viva Question -> Verification of 1st Shifting Theorem

Aim: to verify 1st Shifting theorem using MATLAB

Screenshot : P.T.O

Syntax -> Same as Exp 1(a) & 1(b)
