

University : Menoufia	Date : 06/01/2020
Faculty : Electronic Engineering	Time : 3 Hours (10 AM - 1 PM)
Department : Phys. & Eng. Math.	No. of pages : 1
Academic level : First year	Semester : First
Course Name : Engineering Math. (3)	Full Mark : 100 Marks
Examiners: Prof. Dr. Saied EL-Serafi	Exam : Final Exam
Prof. Dr. Emil Shoukralla	



Answer all of the following questions for the 2 parts; 3 questions for each.

First Part : Ordinary Differential Equations (50 Marks)

Question No. 1. (20 Marks)

Find the general solutions (if exist) of the two first order differential equations

a) $\frac{dy}{dx} + \cos^2(x) = e^{2x} - \sin^2(x)$	b) $\frac{dy}{dx} = \frac{x+y+2}{x+y-2}$
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Question No. 2. (20 Marks)

Find the general solution (if exists) of the differential equations

i) $y'' + 9y = \sin(2x)$	ii) $x^2 y'' + 5xy' - 5y = x$
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Question No. 3. (10 Marks)

Solve the following system of the first order differential equations

$$-2x' + 2y' = e^t, 2x' - y' = e^{-t}; x = x(t), y = y(t)$$

Second Part: Laplace and Inverse Laplace Transforms (50 Marks)

Question No. 1. (20 Marks)

Find Laplace Transforms of the following four functions

i) $L(e^{2t} \cos(2t))$	ii) $L\left(\int_0^t 4xe^{4x} \cos(4x)\right)$
iii) $L\left(3t + \frac{\sin(t)}{2t}\right)$	iv) $L(u(t-1)(t-2)^2)$

Question No. 2. (20 Marks)

Find Inverse Laplace Transforms of the following two functions

(a) $F(s) = \frac{s^2}{(s-1)(s+2)(s+5)}$	(b) $F(s) = \frac{(s-1)e^{-\pi s}}{s^2 - 2s + 2}$
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Question No. 3. (10 Marks)

Solve the following initial value problem by using Laplace and inverse Laplace transforms

$$y'' + 5y' - 6y = u(t-2); y(0) = y'(0) = 0$$



God Luck

Prof. Dr. Saied EL-Serafi and Prof. Dr. Emil Shoukralla