Prince Sultan University

Deanship of Educational Services
Department of Mathematics
and
General Sciences

COURSE DETAILS:

DIFFERENTIAL EQUATIONS	MATH 225	MAJOR EXAM III
Semester:	Spring Semester --Term 172	
Date:	Saturday, April 21, 2018	
Time Allowed:	80 minutes	

STUDENT DETAILS:

Student Name:	
Student ID Number:	
Section:	640, 159
Instructor's Name:	J. Alzabut

INSTRUCTIONS:

- You may use a scientific calculator that does not have programming or graphing capabilities. NO borrowing calculators.
- NO talking or looking around during the examination.
- NO mobile phones. If your mobile is seen or heard, your exam will be taken immediately.
- Show all your work and be organized.
- You may use the back of the pages for extra space, but be sure to indicate that on the page with the problem.

GRADING:

	Page 1	Page 2	Page 3	Total
Questions	**Q.1,2.3 (15 pts)**	**Q.4 (15 pts)**	**Q.5 (15 pts)**	**45**
Marks				

Q.1 (5 points) Find the Laplace of $f(t) = t^2 - e^{-9t} + 5 - 7\cos 5t$.

Q.2 (5 points) Use the definition of Laplace transform to show that $L\{e^{-3t}\} = \frac{1}{s+3}$.

Q.3 (5 points) Show that the functions $f_1(x) = x^3$ and $f_2(x) = x^2 + 1$ are orthogonal on $[-1,1]$.

Q.4 (15 points) Find a series solution for the equation $3xy'' + y' - y = 0$ around $x_0 = 0$.

Q.5 (15) points Consider the function $f(t) = \pi^2 - x^2$.

a) Determine whether the function is even, odd or neither.

b) Expand f in Fourier series where $-\pi \leq x \leq \pi$.