Prince Sultan University

Deanship of Educational Services

Department of Mathematics
and General Sciences

COURSE DETAILS:

DIFFERENTIAL EQUATIONS	MATH 225	MAJOR EXAM I
Semester:	Fall 2018-2019 --Term 181	
Date:	Saturday October 13, 2018	
Time Allowed:	80 minutes	

STUDENT DETAILS:

Student Name:	
Student ID Number:	
Section:	93 95
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	**1,2**	**3,4**	**5,6**	
Marks	**14**	**11**	**15**	**40**

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Q.1 (7 points) Given that $y_1(x) = x^4$ is a solution of the differential equation $x^2y'' - 7xy' + 16y = 0$. Find a second solution for the equation.

Q.2 (7 points) Solve the following differential equation $y''' - 6y'' = 3 - \cos x$ by method of undetermined coefficients. Evaluate the constants of Y_p.

Q.3 (6 points) Solve the equation $y' - (1+2x)y^2 = 0, \quad y(0) = 5.$

Q.4 (5 points) Consider the equation $y'' + 9y = 0.$

a) Verify that the functions $y_1(t) = \cos(3t)$ and $y_2(t) = \sin(3t)$ are solutions of the equation.

b) Do these functions form a fundamental set of solutions for the equation. Explain your answer.

Q.5 (7 points) Solve the equation $(2y^2 + 3x)dx + (2xy)dy = 0.$

Q.6 (8) Solve the differential equation $xy' - (1+x)y = xy^2$ by appropriate substitution.