

國立高雄科技大學 113 學年度碩士班招生考試 試題紙

系所別：電子工程系碩士班（建工校區）

組別：電信與系統組

考科代碼：3011

考科：微分方程

注意事項：

1、筆試可使用電子計算器之科目，由本校提供，考生不得使用自備計算器，違者該科不予計分。

2、請於答案卷上規定之範圍作答，違者該題不予計分。

1. Given  $y = x^3 (1+x)^9 e^{6x}$ , find  $\frac{dy}{dx}$  (10%)

2. If  $y = \sqrt{1+x^2} \sin^2 x$ , find  $\frac{dy}{dx}$  (10%)

3. Given that  $y = x^2 (1-x)^8$ , find  $\frac{dy}{dx}$  (10%)

4. Solve the following differential equations

$$(2x + 3y - 2)dx + (3x - 4y + 1)dy = 0 \quad (10\%)$$

5. Use Integrating Factor to solve the following differential equations

$$ydx + (2x + 4)dy = 0 \quad (10\%)$$

6. This differential equation is Bernoulli's equation. Solve the following differential equation

$$y' - \frac{1}{x}y = xy^3 \quad (10\%)$$

7. The tangent slope of a curve is  $3x^2 + 2x$ , and it passes through (1,4). Find the equation of the curve. (10%)

8. Solve the following second-order differential equations

$$y'' - 6y' + 9y = 0 \quad (10\%)$$

9. Solve the following second-order linear nonhomogeneous differential equations

$$y'' - 3y' + 2y = e^{3x} \quad (10\%)$$

10. Use second-order Euler-Cauchy equation to solve the following second-order linear nonhomogeneous differential equations

$$x^2 y'' - 2xy' + 2y = x^3 \quad (x > 0) \quad (10\%)$$