

國立臺灣科技大學

九十學年度碩士班招生考試試題

系所組別：纖維及高分子工程系丙組

科目：工程數學

1. Solve the differential equation (20%)

$$\frac{dy}{dx} = \frac{e^x \sin y}{y - 2e^x \cos y} \quad y(0) = \frac{3\pi}{2}$$

2. There is a system model of $\dot{v}(t) + 5v(t) = f(t)$, (共20%)

- (a) Find the forced response of the system, if $f(t)$ is a impulse of strength A happen at $t = 3$ second. (10%)
- (b) Find the free response of the system, if the initial condition is $v(0) = 2$. (10%)

3. Transform the quadratic form to principal axes. (20%)

$$Q = 17x_1^2 - 30x_1x_2 + 17x_2^2$$

4. Solve the following differential equations: (共40%)

(a) $y'' - 3y' + 2y = e^x + e^{2x} + e^{-x}$ (13%)

(b) $x^2y'' + xy' - y = \frac{1}{x}$ (14%)

(c) $ty'' + (t-1)y' + y = 0 \quad y(0) = 0$ (13%)



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