

國立臺灣科技大學

九十三年學年度碩士班考試試題

系所組別：機械工程系甲組、機械工程系乙組、機械工程系丙組、機械工程系丁組、機械工程系戊組
 科目：工程數學

總分 100 分

1. Solve the differential equation (20%)

$$y'' + 2y' - 3y = 8e^x$$

2. Find the solution of the integral equation (20%)

$$y(t) = 2t^2 + \int_0^t y(t-\tau)e^{-\tau} d\tau$$

3. Find the inverse matrix of the following matrix (20%)

$$A = \begin{pmatrix} -2 & 4 & 1 \\ 6 & 3 & -3 \\ 2 & 9 & -5 \end{pmatrix}$$

4. Solve the problem (20%)

$$\frac{\partial u}{\partial t} = 4 \frac{\partial^2 u}{\partial x^2} + 1 \quad \text{for } 0 < x < \pi, t > 0$$

$$u(0, t) = u(\pi, t) = 0 \quad \text{for } t \geq 0, \quad u(x, 0) = 0 \quad \text{for } 0 < x < \pi$$

5. Evaluate the integral (20%)

$$\int_{-\infty}^{\infty} \frac{\cos x}{\pi^2 - 4x^2} dx$$

