# 臺灣綜合大學系統

# 108 學年度 學士班
# 轉學生聯合招生考試

# 試　題

類組：D37

科目名稱：工程數學

科目代碼：D3792

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1. Solve the initial-value problem $y'' - 4y' + 4y = (12x^2 - 6x)e^{2x}$, $y(0) = 1$, $y'(0) = 0$ by variation of parameters. (25%)

2. Use the Laplace transform to solve the initial-value problem:

$$\begin{cases} \dfrac{d^2x}{dt^2} + \dfrac{dx}{dt} + \dfrac{dy}{dt} = 0 \\[2mm] \dfrac{d^2y}{dt^2} + \dfrac{dy}{dt} - 4\dfrac{dx}{dt} = 0 \end{cases} \quad \text{subject to} \quad \begin{cases} x(0) = 1, \ x'(0) = 0 \\ y(0) = -1, \ y'(0) = 5 \end{cases}. \qquad (25\%)$$

3. Find the matrix $\mathbf{X}$ to satisfy the equation $\mathbf{X}^2 - 5\mathbf{X} + 6\mathbf{I} = \begin{pmatrix} -4 & -5 \\ 8 & 10 \end{pmatrix}$. (25%)

4. Verify Stokes' theorem $\oint_C \mathbf{F} \cdot d\mathbf{r} = \iint_S (\text{curl}\,\mathbf{F}) \cdot \mathbf{n}\,dS$ for the vector field $\mathbf{F} = 5y\,\mathbf{i} - 5x\,\mathbf{j} + 3\,\mathbf{k}$, and for $S$ being the portion of the plane $z = 1$ within the cylinder $x^2 + y^2 = 4$. Assume $S$ is oriented upward. (25%)