

元智大學 107 學年度 轉學考 招生試題卷

系(所)別：電機工程學系學士班

組別：電機工程學系甲組3年級

科目：工程數學

用紙第 1 頁共 1 頁

●不可使用電子計算機

1. (10%) Solve $\frac{dy}{dx} = -\frac{x}{y}$, $y(4) = -3$
2. (15%) Solve $4y'' + 4y' + 17y = 0$, $y(0) = -1$, $y'(0) = 2$
(hint: use auxiliary equation)
3. (15%) Find the particular solution of the equation
 $y'' - 6y' + 9y = 6x^2 + 2 - 12e^{3x}$
4. (15%) Solve $y'' - 3y' + 2y = e^{-4t}$, $y(0) = 1$, $y'(0) = 5$.
(hint: use Laplace transformation)
5. (10%) Find $\mathcal{L}\left\{\int_0^t e^{\tau} \sin(t-\tau) d\tau\right\}$.
($\mathcal{L}$ means the Laplace transform)
6. (20%) If $\mathbf{F} = (x^2y^3 - z^4)\mathbf{i} + 4x^5y^2z\mathbf{j} - y^4z^6\mathbf{k}$, find (a) $\text{curl } \mathbf{F}$ and (b) $\text{div } \mathbf{F}$
and (c) $\text{div}(\text{curl } \mathbf{F})$.
7. (15%) Expand $f(x) = \begin{cases} 0, & -\pi < x < 0 \\ \pi - x, & 0 \leq x < \pi \end{cases}$ in a Fourier series.