中國文化大學 105 學年度碩士班考試入學招生考試試題

系所組：機械工程學系數位機電碩士班　　節次：第 2 節

科目：工程數學

1. The polar word coordinates (r, θ) and the Cartesian coordinates (x, y) are related by $x = r\cos\theta$, and $y = r\sin\theta$. The integral $\int_{-\infty}^{\infty} e^{-x^2} dx$ is equal to ? (20%)

2. $\mathcal{L}^{-1}\left\{\dfrac{1}{(s^2+4)^2}\right\} = ?$ (10%)

3. What are the eigenvalues of the matrix $A = \begin{bmatrix} 1 & 0 \\ 1 & 0 \end{bmatrix}$? (10%)

4. Solve the following higher order ODE? (30%)

(a) $y'' + 3y' + 2y = 0$

(b) $2y'' + 4y' + 7y = 0$

(c) $y'' - 4y' + 4y = 0$

5. Solve $(5x^2+1)y' - 20xy = 10x$. (10%)

6. If $\mathcal{L}\{t f(t)\} = \dfrac{1}{s(s^2-4)}$, find out $\mathcal{L}\{e^{-t} f(2t)\} = ?$ (20%)

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