國立雲林科技大學
98學年度博士班招生考試試題

所別：工程科技研究所、電子工程系
科目：工程數學 (2)

1. (10%) Solve $(y^2 - y)dx + xdy = 0$ with $y(1) = 2$

2. (15%)Find the integrating factor and solve :

$$2\sin y dx + \cos y dy = 0, y(0) = \frac{\pi}{2}$$

3. (10%) Solve the general solution $y'' + 5y' + 6y = e^{-2x}$

4. (15%) Find the eigenvalues and eigenvector of the matrix

$$A = \begin{bmatrix} 3 & 0 & 0 \\ 0 & 4 & \sqrt{3} \\ 0 & \sqrt{3} & 6 \end{bmatrix}$$

5. (15%)Evaluate the integral

$$\oiint_s [(y+z)dydz + (z+x)dzdx + (x+z)dxdy], \text{ where } s: x^2 + y^2 + z^2 = 1.$$

6. (15%) If $f(x) = 1 - \frac{x}{2}$, $0 \le x \le 2$, (a) find the Fourier coefficients (with full- range expansions). (b) Find the Fourier cosine series (with half-range expansions).

7. (10%)Find the integral : $\int_0^\infty \frac{\cos x\omega}{1+\omega^2} d\omega$.

8. (10%) Let $\vec{F}$ be a continuous vector field with continuous first and second partial derivatives. Prove that $\nabla \cdot (\nabla \times \vec{F}) = 0$.