明志科技大學 101 學年度研究所碩士班一般考試暨在職專班招生命題用紙

所別：　　電子工程研究所　　組別：　　　***　　　科目：　　　工程數學　　

注意：■不准□一般□工程用計算器，考試時間總計：100 分鐘。試題共 1 頁，第 1 頁

1. Solve the differential equation. (15%)

$$y' + y = 2e^{2x}$$

2. Solve the differential equation. (15%)

$$y'' + 4y = x^2$$

3. Find the Laplace transform of the function. (20%)

$$f(t) = \begin{cases} 2 & \text{for } 0 \leq t < 1 \\ 3t & \text{for } 1 \leq t < 2 \\ 0 & \text{for } 2 \leq t \end{cases}$$

4. (i) Find the eigenvalues and corresponding eigenvectors of the following matrix. (15%)

$$A = \begin{bmatrix} -0.2 & 3 \\ 0 & 0.5 \end{bmatrix}$$

(ii) Find an orthogonal matrix that diagonalizes the above matrix and compute the indicated power of matrix. (15%)

$$A^{\infty}$$

5. Consider the level surface $\varphi(x, y, z) = z - \sqrt{x^2 + y^2} = 0$. Find the tangent plane to this surface at $(1, 1, 2)$. (20%)