

國立屏東科技大學 九十五 學年度 碩士班暨碩士在職專班招生考試
工程數學

1. The homogenous O.D.E. with constant coefficients is

$$y^{(4)} - 3y''' + 4y' = 0.$$

Find the general solution. (20%)

2. Solve the initial problem. (20%)

$$x^2 y'' + 2xy' - 6y = 30 \quad ; \quad y(1) = y'(1) = 0$$

3. For the matrix A

$$A = \begin{bmatrix} 4 & 0 & 1 \\ 2 & 3 & 2 \\ 1 & 0 & 4 \end{bmatrix}$$

(1) Find the eigenvalues and the corresponding eigenvectors of A. (10%)

(2) Find two nonsingular matrices P and Q such that PAQ is a diagonal matrix. (10%)

4. (1) Please prove the $L[f'(t)] = sF(s) - f(0)$ (10%)

(2) Find the $L[e^{-3t} \int_0^t \cosh 2x dx]$ (10%) (Note: $L[\]$ Laplace transform symbol)

5. For the partial differential equation

$$\frac{\partial u}{\partial t} = \frac{\partial^2 u}{\partial x^2} \quad ; \quad u_x(0, t) = u_x(\pi, t) = 0, \quad u(x, 0) = (1 - \cos 2x)/2.$$

Find the solution. (20%)