

系所別	組別	科目	考試日期	節次	時間
營建工程與管理研究所	甲	工程數學	93年5月2日	第2節	

- 一、 Solve the following differential equation (15%)

$$x^2y'' - 3xy' - 5y = 6x^5$$

- 二、 Solve the following initial value problem. Show the details of your work. (20%)

$$y' = 2(y-1)\tanh 2x, y(0) = 4$$

- 三、 If eigenvalues of the matrix $\begin{bmatrix} 2 & 2 & 1 \\ 1 & 3 & 1 \\ 1 & 2 & 2 \end{bmatrix}$ is $(5, 1, 1)$, please determine the related eigenvectors. (10%)

四、 $\mathcal{L}^{-1}\left[\frac{2s^2 + 12s - 46}{(s-1)^2(s-5)^2}\right] = ?$ (15%)

- 五、 (Motion) A small body moves on a straight line so that the product of its velocity and acceleration is constant, say, 1 meter²/sec³. If at $t = 0$ the body's distance from the origin is 2 meters and its velocity is 2 meters/sec, what are the distance and velocity at $t = 6$ sec? (20%)

- 六、 Solve the differential equation. (10%)

$$\frac{d^6y}{dx^6} + 8\frac{d^4y}{dx^4} + 16\frac{d^2y}{dx^2} = 0$$

- 七、 If the scalar is $\Phi = 3x^2 - yz$, please find the values of $\nabla\Phi$ at $(1, -1, 1)$. (10%)

$$\left(\nabla = \frac{d}{dx}i + \frac{d}{dy}j + \frac{d}{dz}k\right)$$