

國立屏東科技大學 102 學年度 碩士班暨碩士在職專班 招生考試  
機械工程系碩士班 工程數學(常微分方程+線性代數)試題

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第 1 至第 6 題;試求解起始值問題之解  $y$  :  
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1.  $\frac{dy}{dx} = ye^{-3x}$  ;  $y(0) = 1$ . (10%)

2.  $\frac{dy}{dx} = \frac{y^2 + 1}{y(x^2 - 1)}$  ;  $y(0) = 1$ . (10%)

3.  $\frac{dy}{dx} = \frac{-2}{x}y + e^{2x}$  ;  $y(1) = 0$ . (10%)

4.  $\frac{d^2y}{dx^2} + 5\frac{dy}{dx} + 6y = x^2$  ;  $y(0) = 0$ ,  $\frac{dy(0)}{dx} = 0$ . (10%)  
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5.  $\frac{d^2y}{dx^2} - 2\frac{dy}{dx} + y = e^x$  ;  $y(0) = 0$  ,  $\frac{dy(0)}{dx} = 1$ . (10%)  
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6.  $\frac{d^2y}{dx^2} + 4y = \frac{1}{\cos 2x}$  ;  $y(0) = 0$  ,  $\frac{dy(0)}{dx} = 0$ . (10%)

矩陣  $A = \begin{bmatrix} 1 & 1 & 1 & 1 \\ 0 & 1 & 1 & 1 \\ 0 & 0 & 1 & 1 \\ 1 & 0 & 0 & 1 \end{bmatrix}$ ,  $B = \begin{bmatrix} 1 & 0 & 0 & 0 \\ 5 & 2 & 0 & 0 \\ 0 & 6 & 3 & 1 \\ 0 & 0 & 7 & 4 \end{bmatrix}$ ,  $C = \begin{bmatrix} 1 \\ 1 \\ 1 \\ 1 \end{bmatrix}$ ,  $D = \begin{bmatrix} 1 & 2 \\ 3 & 0 \end{bmatrix}$ ,  $X = \begin{bmatrix} x_1 \\ x_2 \\ x_3 \\ x_4 \end{bmatrix}$ .

7. 試求行列式  $\det(B)$  之值. (10%)

8. 試求矩陣  $A$  的反矩陣  $A^{-1}$ . (10%)

9.  $AX = C$ , 試求未知矩陣  $X$  之值. (10%)  
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10. 試求矩陣  $D$  的特徵值(characteristic values)與對應的特徵向量  
(characteristic vectors). (10%)  
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