

中國文化大學 104 學年度碩士班考試入學招生考試試題

系所組：機械工程學系數位機電碩士班

節次：第 2 節

科目：工程數學

1. Please to find the general solution of two equations(30%)

(1) $y'=(y+x)(y+x-5)-2$

(2) $xy'=y^2+y-7$

2. A, B are Matrices, $A_{m \times n}$, $B_{k \times y}$, UNDER WHAT condition AXB is ok? (5%)3. Using Laplace transfer $y(t) \rightarrow y(s)$: $y'' - 3y' + 2y = t$, $y(0) = 4$, $y'(0) = 5$, find $Y(s) = ?$ (20%)

4. 計算 (5%)

$$\begin{vmatrix} 2 & 1 & 4 \\ 3 & 6 & 7 \\ 1 & 5 & 8 \end{vmatrix} =$$

5. 利用高斯消去法:(10%)

$$\begin{cases} 3y + 2z = 10 \\ 3x + 2y - z = 9 \\ x - 2y - 3z = 11 \end{cases}$$

6. 三階矩陣 $A = \begin{bmatrix} 2 & 2 & 1 \\ 1 & 3 & 1 \\ 1 & 2 & 2 \end{bmatrix}$, 求 A 的特徵值、特徵向量, 並請求 A 的對角矩

陣?(10%)

7. 若 $\mathbf{a} = \langle a_1, a_2, a_3 \rangle$, $\mathbf{b} = \langle b_1, b_2, b_3 \rangle$ 為二個三維向量, 請問 (20%)

(1) $\mathbf{a} \pm \mathbf{b} = ?$

(2) $|\mathbf{a}| = ?$

(3) $\mathbf{a} \cdot \mathbf{b} = ?$

(4) $\mathbf{a} \cdot \mathbf{b} = 0$ 之條件為?

(5) $\mathbf{a} \cdot \mathbf{a} = ?$

(6) $\mathbf{a} \times \mathbf{b} = ?$

(7) $\mathbf{c} = \mathbf{a} \times \mathbf{b}$ 之物理意義為?

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