國立中山大學105學年度碩士暨碩士專班招生考試試題

科目名稱：工程數學【海下所碩士班】　　題號：454001

※本科目依簡章規定「不可以」使用計算機(問答申論題)　　

1. Prove that there is NO commutative law in multiplication of two matrices, by the following matrices, (15 %)

$$A=\begin{bmatrix}1 & 0 & 2\\ -1 & 2 & 3\\ 0 & 1 & -1\end{bmatrix},\qquad B=\begin{bmatrix}2 & 1 & -3\\ 0 & 4 & 1\\ -1 & 2 & 2\end{bmatrix}$$

Hint: $AB\neq BA$

2. Solve the initial value problem of the following equation, (10 %)

$$y''+8y'+16y=0,\ y(0)=1,\ y'(0)=2$$

3. With the following properties of Gamma function, find the values of (a) $\Gamma(3)$ and (b) $\Gamma(6)$, (10 %)

$$\Gamma(1)=1,\qquad \Gamma(\alpha+1)=\alpha\Gamma(\alpha)$$

4. Find the Fourier transform of the following function, (15 %)

$$f(t)=e^{-|t|},\quad -\infty<t<\infty$$

5. Find the curl of a vector function: (10%)

$$\mathbf{v}=yz\hat{\imath}+3zx\hat{\jmath}+z\hat{k},$$

6. Please find a unit vector n of the cone of revolution: (10%)

$z^2=4(x^2+y^2)$, at the point A: (1, 0, 2).

7. Solve $x^2y''+xy'+(x^2-9)y=0$, (10%)

8. Find the eigenfunction of the following equation: (20%)

$$y''+\beta y=0,\ y(0)=0,\ y'(L)=0$$

試題隨卷繳回