招生學年度	106	招生類別	碩士班
系所班別	電機工程學系碩士班、材料科學與工程學系碩士班、光電工程學系碩士班		
科目名稱	工程數學		
注意事項	本考科可使用掌上型計算機		

(10%) 1. Which equation is nonlinear?

(A) $y'''-y''-2y'+2y=3e^{-x}$ (B) $y''+4y=10\sin x$ (C) $y''+xy'=6x$ (D) $y'''+4y'-3y=\sin x$ (E) None

(10%) 2. (a) Is the equation $3x^2ydx+(2x^3-2)dy=0$ exact? (b) Please find the solution of this equation!

(10%) 3. Solve the differential equation: $y^{(3)}-4y''-y'+4y=0$

(10%) 4. 試以 Laplace transform 求 O.D.E $y''-4y'+3y=10e^{-2t}$, $y(0)=2$, $y'(0)=2$

(10%) 5.若 $F\{f(x)\}$的*Fourier transform*爲 $F(\omega)$則$F\{f(x-a)\}$爲何?

(A) $e^{ia\omega}F(\omega)$ (B) $F(\omega-a)$ (C) 1

(14%) 6. Matrix **A**= $\begin{bmatrix}1+i & -1+2i\\ 3+2i & 2+i\end{bmatrix}$ Matrix **B**= $\begin{bmatrix}1 & -2\\ 4 & 2i\end{bmatrix}$

Find (a) -2**A**+3**B** (b) **BA**

(12%) 7. Find the (a) eigenvalues and (b) eigenvectors of the matrix $\begin{bmatrix}1 & 2 & 1\\ 6 & -1 & 0\\ -1 & -2 & -1\end{bmatrix}$

(12%) 8. Let matrix **A**= $\begin{bmatrix}8 & 0 & 1\\ 3 & -2 & 1\\ 1 & 4 & 0\end{bmatrix}$ Find the inverse matrix $\mathbf{A}^{-1}$.

(12%) 9. A tetrahedron is determined by three edge vectors $\vec{a},\vec{b},\vec{c}$

where $\vec{a}=\vec{i}+2\vec{k}$ $\vec{b}=4\vec{i}+6\vec{j}+2\vec{k}$ $\vec{c}=3\vec{i}+3\vec{j}-6\vec{k}$

Find the volume **V** of the tetrahedron.