

大葉大學 95 學年度 研究所碩士班 招生考試試題紙

系所別	組別	考試科目 (中文名稱)	考試日期	節次	備註
電機系/電信系	甲、乙	工程數學	4月23日	第1節	共2頁

註：考生可否攜帶計算機或其他資料作答，請在備註欄註明（如未註明，一律不准攜帶）

08:30 ~ 12:00

注意：電機系甲、乙組只須作答 1 至 4 題。電信系甲組只須作答 1, 2, 5, 6, 7 題。電信系乙組只須作答 5 至 11 題。

1. Solve the following differential equations: (40%)

(a)  $y' = -\frac{y}{x}, y(1) = 1$

(b)  $y' + y \tan x = \sin 2x, y(0) = 1$

(c)  $y'' - y = 0, y(0) = 4, y'(0) = -2$

(d)  $y'' + 2y' + y = e^{-x}, y(0) = -1, y'(0) = 1$

2. Find the following Laplace transform of the functions: (20%)

(a)  $f(t) = \cosh at$

(b)  $f(t) = \sin^2 t$

3. Find the complex Fourier series of  $f(x) = e^x$  if  $-\pi < x < \pi$  and  $f(x+2\pi) = f(x)$  (20%)

4. Find the Fourier integral representation of the function:  $f(x) = \begin{cases} 1 & \text{if } |x| < 1, \\ 0 & \text{if } |x| > 1, \end{cases}$  (20%)

5. Find the inverse of a matrix  $A = \begin{bmatrix} -1 & 1 & 2 \\ 3 & -1 & 1 \\ -1 & 3 & 4 \end{bmatrix}$ . (10%)

6. Evaluation of the determinants  $\begin{vmatrix} 3 & 2 & 0 & 0 \\ 6 & 8 & 0 & 0 \\ 0 & 0 & 4 & 7 \\ 0 & 0 & 2 & 5 \end{vmatrix}$ . (10%)

7. Find the eigenvalues and eigenvectors of the matrix  $A = \begin{bmatrix} -2 & 2 & -3 \\ 2 & 1 & -6 \\ -1 & -2 & 0 \end{bmatrix}$  (20%)

8. How many different samples of 4 objects can be draw from a lot of 50 objects? (10%)

9. Find the mean and variance of the random variable  $X$ , where density function  $f(x) = 2x$  for  $0 \leq x \leq 1$  (10%)

10. Let  $X$  have the density function  $f(x) = 0.75(1-x^2)$  if  $-1 \leq x \leq 1$  and zero otherwise. Find the distribution function. Find the probabilities  $P(-\frac{1}{2} \leq X \leq \frac{1}{2})$ . (20%)

11. Compute the probability of obtaining at least two "Six" in rolling a fair die 4 times (20%)