大葉大學 九十三 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
車輛工程研究所	甲	工程數學	3月28日	第 一 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） 08:30~10:00

1. Find the general solution of the differential equation (20%)

$$y'' + y = x + \sin x$$

2. Using the Laplace transform, solve the following problem (20%)

$$y'' + 3y' + 2y = u(t-2) - u(t-3) \qquad y(0) = 0, \quad y'(0) = 0$$

which $u(t-a)$ is unit step function, by definition $u(t-a) = 0$ for $t < a$,

$u(t-a) = 1$ for $t > a$

3. Please find eigenvalues and corresponding eigenvectors of the following matrix **A** (20%)

$$\mathbf{A} = \begin{bmatrix} 1 & 1 & -2 \\ -1 & 2 & 1 \\ 0 & 1 & -1 \end{bmatrix}$$

4. Please evaluate $\iint_S (7x\mathbf{i} - z\mathbf{k}) \cdot \mathbf{n}\, dA$, over the sphere S: $x^2 + y^2 + z^2 = 1$

(a) by divergence theorem of Gauss (10%)
(b) by directly integral (10%)

5. Solve the following partial differential equations (PDE) by separation of variables (20%)

$$\frac{\partial u}{\partial t} = \frac{\partial^2 u}{\partial x^2} \qquad 0 \le x \le 2, \quad t > 0$$

Boundary conditions: $u(0,t) = 1, \quad u(2,t) = 3$
Initial conditions: $u(x,0) = 0$