

大葉大學九十三年學年度 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
電信工程	甲.乙	工程數學	3月28日	第一節 08:30 ~ 10:00	共乙頁

註：備註欄若未註明可攜帶計算機或其他輔助工具作答時，考生一律不准攜帶。
答題應詳列計算步驟，否則一概不予計分

(1) Solve the following first order differential equations (where $y' = \frac{dy}{dx}$) (15%)

(a). $xy' + 2y = 9x$ (b). $2y' + (1 + 2x^2 + 4xy) = 0$

(2) Solve the following Second order differential equations (where $y' = \frac{dy}{dx}$, $y'' = \frac{d^2y}{dx^2}$) (15%)

(a). $x^2y'' - 4xy' + 6y = \frac{42}{x^4}$ (b). $y'' - y' - 2y = 10 \sin x$

$$y\left(\frac{\pi}{2}\right) = -3, \quad y'\left(\frac{\pi}{2}\right) = -1$$

(3) Given a matrix $A = \begin{pmatrix} 1 & 2 & 4 \\ -2 & -4 & 2 \\ 2 & 4 & 3 \end{pmatrix}$, find its eigenvalues and corresponding eigenvectors (15%)

(4) Given a periodic function $f(x) = \begin{cases} 1, & -\frac{\pi}{2} \leq x \leq \frac{\pi}{2} \\ -1, & \frac{\pi}{2} \leq x \leq \frac{3\pi}{2} \end{cases}$ $f(x+2\pi) = f(x)$, find its Fourier series, also prove that $1 + \frac{1}{9} + \frac{1}{25} + \dots = \frac{\pi^2}{8}$ (20%)

(5) Find the integral $\int_0^{\pi} \frac{d\theta}{5/4 - \sin \theta}$ (15%)

(6) Find the integral $\int_C \mathbf{F}(\mathbf{x}) \cdot d\mathbf{x}$, where $\mathbf{F}(\mathbf{x}, y) = xy\mathbf{i} + ye^x\mathbf{j}$ and C is the rectangle joining the point (0,0), (2,0), (2,1) and (0,1) it C is traversed in the counterclockwise direction (20%)