國立高雄師範大學 101 學年度學士班轉學生招生考試試題

系所別：電子工程學系三年級

科　目：工程數學（全一頁）

※注意：1.不必抄題，作答時請將試題題號及答案依照順序寫在答案卷上，於本試題上作答者，不予計分。

2.限用藍色或黑色之鋼筆、原子筆作答，以鉛筆或其他顏色作答者不予計分。

1. Find the eigenvalues and eigenvectors of $A = \begin{bmatrix} 1 & 0 & 0 \\ 2 & 4 & 0 \\ 6 & 4 & 2 \end{bmatrix}$ (10%)

2. Find the inverse transformation. (10%)

$$y_1 = x_1 - 2x_2$$
$$y_2 = 4x_1 - 3x_2$$

3. Please find the Laplace Transform of $f(t) = \frac{d}{dt}(e^{-at}\sinh \omega t)$ (10%)

4. Please find the inverse Laplace Transform $f(t)$ if $F(s) = \frac{(4s^2 + 7s + 1)}{s(s+1)^2}$ (10%)

5. Please give a general solution of the given nonhomogeneous ODE of

$y'' + 6y' + 73y = 80e^{x}\cos 4x$ (10%)

6. Find the two half-range expansions (the even and odd periodic extensions) of the function

$f(x) = x,\ if\ 0 < x < 1$. (20%)

7. Find the Fourier transform of the function :

(a) $f(x) = 1\ if\ |x| < 1,\ and\ f(x) = 0\ otherwise.$ (10%)

(b) $f(x-2)$. (10%)

8. Find the solution $u(x, y)$ of the partial differential equation:

$u_{xx} - u = 0,\ where\ u_{xx} = \frac{\partial^2 u}{\partial x^2}$. (10%)