

國立台灣科技大學九十五學年度碩士班招生試題

系所組別：電機工程系碩士班甲組、乙二組

科目：工程數學

總分100分

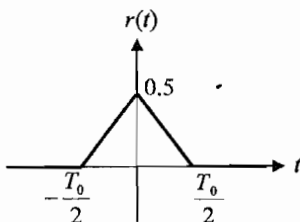
- (1) Solve the following differential equation:

$$y'' - 2y' + y = e^x + x \quad y(0)=1, \quad y'(0)=0 \quad (15\%)$$

- (2) Solve the initial-value problem:

$$\mathbf{x}' = \begin{bmatrix} 2 & 1 & 0 \\ 2 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix} \mathbf{x}, \quad \mathbf{x}(0) = \begin{bmatrix} 1 \\ 0 \\ 2 \end{bmatrix} \quad (15\%)$$

- (3) (a) Find the Fourier Transform for the following function: (10%)



- (b) Let
- $F(s) = \frac{1}{s^2(s^2 + \omega^2)}$
- , find the inverse Laplace transform
- $f(t)$
- .

(10%)

4. Evaluate the complex integral
- $\oint_C \tan z dz$
- for the contour C in the

circle $|z| = 3$. (15%)

5. Evaluate
- $\int_C (x-1)yz dx + \cos(yz) dy + x(z-1) dz$
- , where C is

straight-line segment from (1,1,1) to (-2,1,3). (15%)

6. Let V describe the region bounded by the hemisphere

 $x^2 + y^2 + (z-2)^2 = 9$, $2 \leq z \leq 5$, and the plane $z = 2$. Please verify thedivergence theorem if $\vec{F} = x\vec{i} + y\vec{j} + (z-2)\vec{k}$. (20%)