

# 國立高雄應用科技大學

## 九十八學年度碩士班招生考試

### 土木工程與防災科技研究所 (甲組、乙組)

准考證號碼  (考生必須填寫)

## 工程數學

試題有 5 題 共 1 頁，第 1 頁

- 注意：a. 本試題共 5 題，每題 20 分，共 100 分。  
b. 作答時不必抄題。  
c. 考生作答前請詳閱答案卷之考生注意事項。

1. An ellipse has the form  $\frac{1}{4}x^2 + y^2 = 1$  in the space. Please find (1) the vector

function (position vector), (2) the tangent vector at point  $(\sqrt{2}, \frac{1}{\sqrt{2}})$ , (3) the unit

normal vector at point  $(\sqrt{2}, \frac{1}{\sqrt{2}})$ , and (4) write down the length formula from point

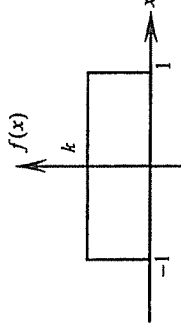
$(\sqrt{2}, \frac{1}{\sqrt{2}})$  to point  $(0, 1)$  of this ellipse. (20%)

2. Evaluate  $\iint_S \vec{F} \cdot d\vec{S}$  if  $\vec{F} = xy^2\vec{i} + y^3\vec{j} + 4x^2z\vec{k}$  and  $S$  is the closed surface consisting of  $x^2 + y^2 \leq 4$  and  $0 \leq z \leq 6$ . (20%)

3. Solve  $\begin{cases} y_1' = y_2 \\ y_2' = -2y_1 + 3y_2 + e^{3t} \end{cases}$  if  $y_1 = y_1(t)$  and  $y_2 = y_2(t)$  (20%)

4. Find the Fourier integral representation of the single pulse function as follows.

$$f(x) = \begin{cases} k, & |x| < 1 \\ 0, & |x| > 1 \end{cases}$$



5. Evaluate  $\int_0^{\infty} \frac{dx}{1+x^4}$ . (20%)