

# 國立屏東教育大學 100 學年度研究所碩士班入學考試

## 微積分(含微分方程) 試題

(應用物理系光電暨材料碩士班)

※請注意：答案須寫在答案卷上，否則不予計分。

### 計算題 (共 100 分)

1.  $\sin(xy) + x + y^2 = 0$ , find  $\frac{dy}{dx}$  (10%)

2.  $\lim_{x \rightarrow 0} \frac{\tan 3x}{7x}$ . (10%)

3.  $f(x) = x^2 \tan(x)e^{2x}$ , find  $\frac{df(x)}{dx}$ . (10%)

4.  $x^2 y''(x) - 2xy'(x) + 2y(x) = 0$  find  $y(x)$ . (10%)

5.  $\int_0^{\infty} x e^{-2x} dx$ . (10%)

6. Find the general solution of  $\frac{d^2 y}{dx^2} + 3\frac{dy}{dx} + 2y = 6e^x$ . (10%)

7. Solve the couple system: (15%)

$$2\frac{dx}{dt} + \frac{dy}{dt} - 4x - y = e^t$$

$$\frac{dx}{dt} + 3x + y = 0$$

$$x(0) = y(0) = 0$$

8.  $6 + \int_a^x \frac{f(t)}{t^2} dt = 2\sqrt{x}$ , (for all  $x > 0$ ). Find  $f(x)$  and  $a$ . (10%)

9. Compute the line integral of  $\vec{v} = 6\hat{x} + yz^2\hat{y} + (3y+z)\hat{z}$  along the triangular path shown in the following figure. (15%)

