

系所組別：地球科學系甲、乙組

考試科目：應用數學

考試日期：0224，節次：4

※ 考生請注意：本試題不可使用計算機

(I) Evaluate the following integrals.

1.  $\int_0^1 e^x \sin x \, dx$  (10%)

2.  $\int_0^\pi \tan^3 \theta \, d\theta$  (10%)

3.  $\int_0^\pi \frac{\sin \omega t}{\omega} \, dt$  (10%)

4.  $\int_0^\infty e^{-\omega t} e^{-\alpha t} \, dt$  (10%)

5.  $\int_0^\infty e^{-\omega t} t^{n+1} \, dt$  (10%)

(II) Find the general solution of following ODE.

1.  $y'' + y' = \sec x$  (10%)

2.  $y' = 2xy$  (10%)

3.  $y'' - 6y' + 7y = 0$  (10%)

(III) Find the general solution of one dimensional wave equation. (20%)

$$\frac{\partial^2 v}{\partial t^2} = c^2 \frac{\partial^2 v}{\partial x^2}, \text{ where } c^2 \text{ is constant.}$$