國立屏東教育大學 101 學年度研究所碩士班入學考試

微積分(A) 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. Find the unit vector perpendicular to the surface, $x^2 + 2y^2 + z^2 = 4$, at the point (1, 1, 1). (10%)

2. $xydx + x^2dy = 0$. Find general solution of y(x) (10%)

3. (a) $\dfrac{d\sin(ax)}{dx} = ?$ (5%)

   (b) $\dfrac{d2^{5x}}{dx} = ?$ (5%)

4. $\displaystyle\int_0^\infty e^{-2t}\sin(3t)dt = ?$ (10%)

5. $r = \sqrt{x^2 + y^2 + z^2}$, find expression for $\nabla(\dfrac{1}{r})$. (10%)

6. Find $\displaystyle\int_0^{2\pi}\sin^2 x\,dx$. (10%)

7. Find $\displaystyle\int x^2 \ln x\,dx$. (10%)

8. Solve $2xy\dfrac{dy}{dx} = 4x^2 + 3y^2$. (10%)

9. Find a particular solution of $y'' + 4y = 3x^3$. (10%)

10. A body with mass $m = \frac{1}{2}$ kilogram (kg) is attached to the end of a spring that is stretched 2 meters (m) by a force of 100 newtons (N). It is set in motion with initial position $x_0 = 1$ (m) and initial velocity $v_0 = -5$ (m/s). Find the position function of the body as well as the amplitude, frequency, period of oscillation, and time lag of its motion. (10%)