

淡江大學九十三年學年度碩士班招生考試試題

系別：機械與機電工程學系

科目：工程數學

准帶項目請打「○」否則打「×」
簡單型計算機 「×」

本試題共 壹 頁

1. Solve $y' = \frac{x-y+6}{3x-3y+4}$. (15%)

2. Solve $x^4 y^{(4)} + 4x^3 y^{(3)} + x^2 y'' + xy' - y = 0$ for $x > 0$. (15%)

3. Use the Laplace transform to solve the initial value problem
 $y'' - 8y' + 16y = 3$; $y(0) = 0$, $y'(0) = 0$. (15%)

4. Let $\vec{F}(x, y, z) = yx^2 \hat{i} - xy^2 \hat{j} + z^2 \hat{k}$, the surface Σ consisting of the hemisphere $x^2 + y^2 + z^2 = 4$ for $z \geq 0$. Compute both sides of the Stokes's theorem. (20%)

5. Solve the boundary-value problem

$$\frac{\partial^2 u}{\partial r^2} + \frac{1}{r} \frac{\partial u}{\partial r} + \frac{1}{r^2} \frac{\partial^2 u}{\partial \theta^2} = 0 \quad (0 \leq r < 5, -\pi \leq \theta \leq \pi),$$

$$u(5, \theta) = 4 + \theta \quad (-\pi \leq \theta \leq \pi). \quad (20\%)$$

6. Evaluate $\int_{-\infty}^{\infty} \frac{3x+2}{x(x-4)(x^2+9)} dx$. (15%)

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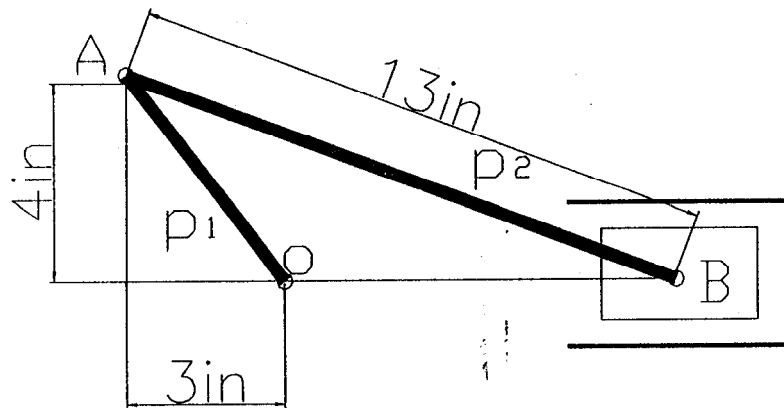
系別：機械與機電工程學系

科目：動力學

准帶項目請打「○」否則打「x」
簡單型計算機 ○

本試題共 2 頁

- (3) The crank arm P_1 shown in the figures turns about a horizontal z axis, through its pinned point end O , with an angular velocity of 10rad/sec clockwise at the given instant. Find the velocity of the piston pin B . (25%)



- (4) A mechanical system with a rotating wheel of mass m_w (with uniform mass distribution). Springs and dampers are connected to the wheel using a flexible cable without slip on the wheel. Please write all the modeling equations for translational and rotational motion. (25%)

