

淡江大學八十八學年度日間部轉學生招生考試試題

29

系別：物理系三年級

科目：理論力學

本試題共壹頁

1. A particle of mass m has velocity $v = a/x$, where x is its displacement. Find the force $F(x)$ responsible. 25%
2. For a system of particles, prove that its total angular momentum about an origin is the sum of the angular momentum of the center of mass about that origin and the angular momentum of the system about the position of the center of mass. 25%
3. Calculate the inertia tensor of a homogeneous cube of density ρ , mass M , and side of length b . Let one corner be at the origin, and let three adjacent edges lie along the coordinate axes. 25%
4. Two identical harmonic oscillators (with masses M and natural frequencies ω_0) are coupled such that by adding to the system a mass m common to both oscillators the equations of motion become

$$\begin{aligned}\ddot{x}_1 + (m/M)\ddot{x}_2 + \omega_0^2 x_1 &= 0 & 25\% \\ \ddot{x}_2 + (m/M)\ddot{x}_1 + \omega_0^2 x_2 &= 0\end{aligned}$$

Solve this pair of coupled equations, and obtain the frequencies of the normal modes of the system.