銘傳大學 97 學年度研究所碩士班招生考試

管理研究所碩士班（甲組）

普通物理學試題(第三節)

（第 1 頁共 1 頁）(限用答案本作答)　　☑可使用計算機 ☐不可使用計算機

可以使用計算機

1. A thin film (n=1.25) is deposited on a glass plate (n=1.40). What is the minimum (nonzero) thickness for the film that will (a) maximally transmit light with a wavelength of 550 nm and (b) maximally reflect light with a wavelength of 550 nm? (15%)
2. The gravitational force between two particles with masses m and M, initially at rest at great separation, pull then together. Show that at any instant the speed of either particle relative to the other is $\sqrt{2G(M+m)/d}$, where d is their separation at that instant. (15%)
3. A person on a railroad car blows a trumpet note at 440 Hz. The car is moving toward a wall at 20.0 m/s. Calculate (a) the frequency of the sound as received at the wall and (b) the frequency of the reflected sound arriving back at the trumpeter. (15%)
4. A car is rounding a flat curve of radius R=220 m at the curve's maximum design speed v=94.0 km/h. What is the magnitude of the net on the seat from a passenger with mass m=85.0 kg. (10%)
5. A Charge of 6.00 pC is spread uniformly throughout the volume of a sphere of radius r=4.00 cm. What is the magnitude and direction of the electric field at a radial distance of (a) 6.00 cm and (b) 3.00 cm? (15%)
6. A pendulum is hung from the higher of two large horizontal plates. The pendulum consists of a small nonconducting sphere of mass m and charge $+q$ and insulating thread of length l. What is the period of the pendulum if a uniform electric field E is set up between the plates by (a) charging the top plate negatively and the lower plate positively and (b) vice versa (i.e. top plate is charging positively and lower plate negatively)? (The field is directly away from one plate and toward the other plate) (15%)
7. A particle of mass M is dropped from a point that is at height h above the ground and horizontal distance s from an observation O. What is the magnitude of the angular momentum of the particle with respect to point O when the particle has fallen half the distance to the ground? (15%)

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