102 學年度四年制二、三年級轉學生招生考試

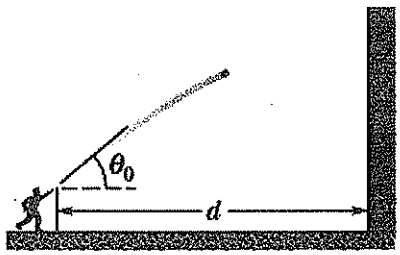
四技二年級 光電工程系

第二節 普通物理 試題

注意事項：

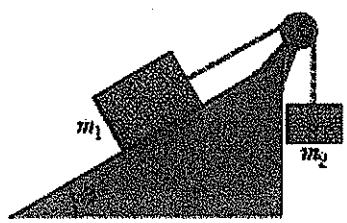
1.本試題共七題，配分共 100 分。
2. 請標明大題、子題編號作答，不必抄題。
3. 全部答案均須在答案卷之答案欄內作答，否則不予計分。

1. (15 %) In the figure 1, you throw a ball toward a wall at speed 36.0 m/s and at angle θ_0 = 30.0° above the horizontal. The wall is distance d = 25.0 m from the release point of the ball. **(a)**How far above the release point does the ball hit the wall? What are the **(b)** horizontal and**(c)** vertical components of its velocity as it hits the wall?



(Fig.1)

2. (15%) A block of mass m_1 = 4.20 kg on a frictionless plane inclined at angle θ = 30.0° is connected by a cord over a massless, frictionless pulley to a second block of mass m_2 = 3.60 kg hanging vertically (see the figure 2). (a) What is the acceleration of the hanging block (choose the positive direction up)? (b) What is the tension in the cord?



(Fig.2)

3. (10%) A single force acts on a 1.8 kg particle-like object in such a way that the position of the object as a function of time is given by $x = 2.5t - 4.0t^2 + 1.4t^3$, with x in meters and t in seconds. Find the work done on the object by the force from $t = 0$ to $t = 2.0$ s.

4. (15%) The boy in the figure 3 here is initially seated on the top of a hemispherical ice mound of radius $R = 15$ m. He begins to slide down the ice, with a negligible initial speed. Approximate the ice as being frictionless. At what height does the boy lose contact with the ice?

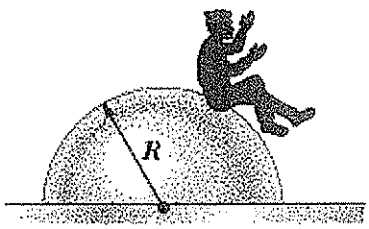
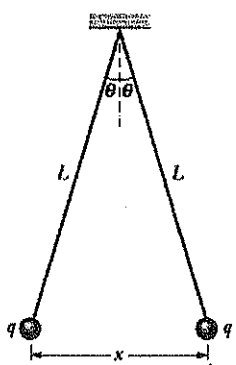


Fig.3

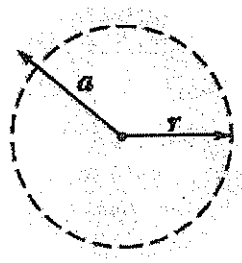
5. (15%) In the figure 4 two tiny conducting balls of identical mass m and identical charge q hang from nonconducting threads of length L. Assume that θ is so small that tan θ can be replaced by its approximate equal, sin θ. If $L = 220$ cm, $m = 3.8$ g, and $x = 6.2$ cm, what is the magnitude of q, in nanocoulombs?(Coulomb`s constant≈9×10^9 N·m^2/C^2)



(Fig.4)

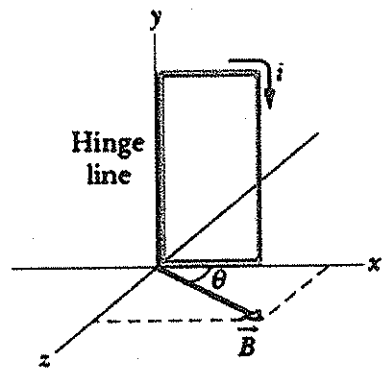
注意：背面尚有試題

6. (15%) Figure 5 show a cross section across a diameter of a long cylindrical conductor of radius a = 2.50 cm carrying uniform current 176 A. What is the magnitude of the current's magnetic field at radial distance (a) 0.50 cm, and (b) 4.00cm? (permeability constant=$4\pi \cdot 10^{-7}$ (T·m/A))



(Fig.5)

7. (15%) Figure 6 shows a rectangular 20-turn coil of wire, of dimensions 10 cm by 5.0 cm. It carries a current of 0.15 A and is hinged along one long side. It is mounted in the xy plane at angle θ = 60° to the direction of a uniform magnetic field of magnitude 0.24 T. In unit-vector notation, what is the torque acting on the coil about the hinge line?



(Fig.6)