國立嘉義大學 95 學年度
【日間學制】轉學生招生考試試題

科目：普通物理學　　　　　　　　　　　　　　　　　　〈請將答案寫在答案卷上〉

第一部分：選擇題（每小題 4 分，共 40 分）

1. A 50g ball strikes the wall with a speed 52m/s and rebounds after 7ms with 64% of initial kinetic energy. Find the impulse on the wall. (A) 20.8 (B)42.64 (C)46.8 (D)5200　N・s

2. The electric field at the position $(1,-1,2)_R$ with given electric potential $V(x, y, z) = \dfrac{\sqrt{x^3}\, y}{z}$ (A)Ex=-1/2 (B) Ey=-1/2 (C) Ez=-1/2 (D)None of them is correct

3. The total energy U stored in a parallel-plate capacitor C=60 μ f and voltage difference V=10V with a dielectric inserted in the capacitor with k=2.5 equals (A)1.2 μ J (B)3 μ J (C)1.2m J (D)3m J

4. The focal length of a convex mirror at the corner is about 3m. The distance of image from you standing 1m front the mirror is (A)4/3 (B)5/3 (C)6/3 (D)7/3 m

5. The maximum compression of the spring (k=1600NT/m) struck by a 4kg massive block with kinetic energy 18 Joules is (A)15 (B)2.25 (C)1.125 (D)0.25 cm

6. The work done by the gravitation $\vec{F}(r) = -G\dfrac{mM}{r^2}\hat{r}$ from r_1 to r_2 ($r_1 < r_2$) is

   (A) $G\dfrac{mM}{r_2} - G\dfrac{mM}{r_1}$ (B) $G\dfrac{mM}{r_1} - G\dfrac{mM}{r_2}$ (C) $G\dfrac{mM}{r_2^2} - G\dfrac{mM}{r_1^2}$ (D) $G\dfrac{mM}{r_1^2} - G\dfrac{mM}{r_2^2}$

7. A particle was accelerated by a varying force with acceleration a(t)=2t-4 from rest. When will this particle move back to the origin after it moved　(A)1/3 (B)2/3 (C)2 (D)4 s

8. Estimate the escape speed of O_2 on the surface of a comet (mass=7.3E19kg, radius=8E4m, gravitational constant G=6.7E-11 NTm^2/kg^2)　(A)350 (B)2380 (C)6990 (D)11200　m/s

9. A thermometer reads 32.5 at frozen point which read –2 for iced and 102 boiling points while calibrated. The correct temperature in Celsius scale is　(A)34.5 (B)31.3 (C)30.5 (D)29.3 ℃

10. Identify the rotational inertial about the center of a thin spherical shell with mass M and radius R.　Icm=　(A)1/2 (B)2/3 (C)3/5 (D)2/5　MR^2

第二部分：計算題（每小題 5 分，共 60 分；請注意有效數字以三位為原則）

1. A stick with length L oscillates as a physical pendulum with uniform linear density of mass λ, pivoted about point O in the figure.
   (a) Find out its rotational inertial I_x about O (b) Derive an expression for the period of the pendulum in terms of λ、g、L and x, the distance from the point of support to the center of mass of the pendulum (c) At what position of x it got a minimum period of rotation?
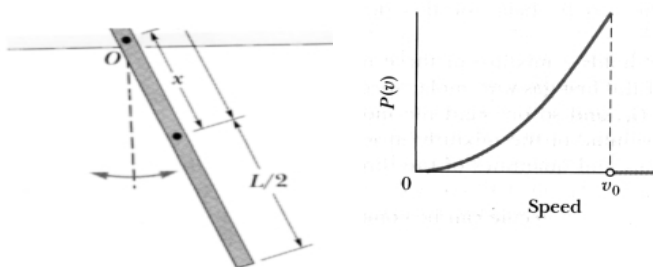
2. A 60.0 cm guitar string with linear mass density λ=1.20g/m vibrates at its fundamental frequency of 440.0 Hz. There is a beat frequency of 4.00 Hz in one end opened pipe which resonates in its fundamental mode. The beat frequency decreases while the string is tightened. (a) Find out the wave speed in the string (b) Find out the tension of guitar string (c) Find out the length of the pipe (sound speed in air v=340.0 m/s).

3. Consider an LRC series circuit with a D.C. voltage input Vs. (a) Determine the value R to match the critical damping with L=10.0mH, C=4.00μF. (b) Find out the impedance Z with R=60.0Ω and sinusoidal driving voltage power input ω_d=2500rad/s (c) Determine that the circuit be more inductive, more capacitive or in resonance?

4. There are two kinds of fringes spacing in double slit experiment diffraction patterns with slit-separation **d**=0.450mm slit width **s**=60.0μm wavelength **λ**=500.0nm and distance from screen **D**=1.20m. (a) Find the total width of central peak diffraction bright envelope. (b) How many bright interference fringes in central peak diffraction bright envelope? (c) Find the spacing of diffraction bright spots by gratings with 100 lines/mm.