

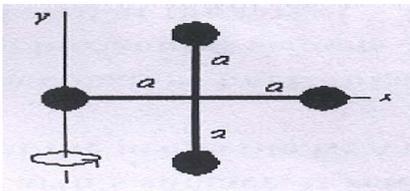
銘傳大學九十二學年度轉學生招生考試

七月二十五日 第三節

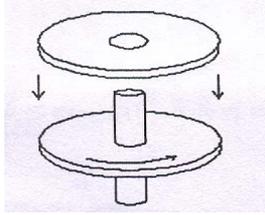
物理學 試題

單選題 40%(每題 2 分) 可使用計算機

1. A 32-N force, parallel to the incline, is required to push a certain crate at constant velocity up a frictionless incline that is  $30^\circ$  above the horizontal. The mass of the crate is:  
A) 3.3kg B) 3.8kg C) 5.7kg D) 6.5kg E) 160kg
2. Which of the following is NOT a correct unit for work?  
A) erg B) ft · lb C) watt D) newton · meter E) joule
3. A 2-kg particle on the end of an ideal spring is pulled out 0.5m and released from rest. The spring constant is 200N/m. When the particle passes the point where the spring force is zero its speed is  
A) 0 B) 0.05 m/s C) 5 m/s D) 10 m/s E) 100 m/s
4. A kilowatt hour is a unit of:  
A) power B) energy/time C) work D) power/time E) force/distance
5. A nonconservative force:  
A) violates Newton's second law B) violates Newton's third law C) cannot do any work D) must be perpendicular to the velocity of the particle on which it acts E) none of the above
6. A force of 10 N holds an ideal spring with a 20-N/m spring constant in compression. The potential energy stored in the spring is:  
A) 0.5J B) 2.5J C) 5J D) 10J E) 200J
7. A 1.0 kg-ball moving at 2.0 m/s perpendicular to a wall rebounds from the wall at 1.5m/s. The change in the momentum of the ball is :  
A) zero B)  $0.5\text{N} \cdot \text{s}$  away from wall C)  $0.5\text{N} \cdot \text{s}$  toward wall D)  $3.5\text{N} \cdot \text{s}$  away from wall E)  $3.5\text{N} \cdot \text{s}$  toward wall.
8. The physical quantity "impulse" has the same dimensions as that of:  
A) force B) power C) energy D) momentum E) work
9. Four identical particles, each with mass  $m$ , are arranged in the  $x,y$  plane as shown. They are connected by light sticks to form a rigid body. If  $m=2.0\text{ kg}$  and  $a = 1.0\text{m}$ , the rotational inertia of this array about the  $y$ -axis is:  
A)  $4.0\text{kg} \cdot \text{m}^2$  B)  $12\text{ kg} \cdot \text{m}^2$  C)  $9.6\text{ kg} \cdot \text{m}^2$  D)  $4.8\text{kg} \cdot \text{m}^2$  E) none of these



10. A wheel, mounted on a vertical shaft of negligible rotational inertia, is rotating at 500 rpm. Another identical (but not rotating) wheel is suddenly dropped onto the same shaft as shown. The resultant combination of two wheels and shaft will rotate at: A) 250rpm B) 354rpm C) 500rpm D) 707rpm E) 1000rpm

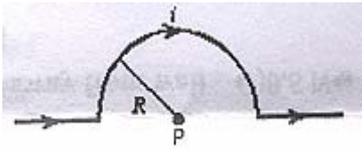


11. Possible units of angular momentum are : A)  $\text{kg} \cdot \text{m} / \text{s}$  B)  $\text{kg} \cdot \text{m}^2 / \text{s}^2$  C)  $\text{kg} \cdot \text{m} / \text{s}^2$  D)  $\text{kg} \cdot \text{m}^2 / \text{s}$  E) none of these
12. A Carnot engine that operates between the temperatures  $T_H = 850 \text{ K}$  and  $T_L = 300 \text{ K}$ . The engine performs 1200J of work each cycle, which takes 0.25 s. What is the efficiency of this engine? A) 50% B) 65% C) 70% D) 55% E) 45%
13. Electric field lines: A) are trajectories of a test charge B) are vectors in the direction of the electric field C) form closed loops D) cross each other in the region between two point charges E) are none of the above.
14. Two identical charges  $q$  are placed on the  $x$  axis, one at the origin and the other at  $x = 5 \text{ cm}$ . A third charge  $-q$  is placed on the  $x$  axis so the potential energy of the three-charge system is the same as the potential energy at infinite separation. Its  $x$  coordinate is : A) 13cm B) 2.5cm C) 7.5cm D) 10cm E) 15cm
15. Charge  $Q$  is distributed uniformly throughout an insulating sphere of radius  $R$ . the magnitude of the electric field at a point  $R/2$  from the center is: A)  $Q / 4\pi\epsilon_0 R^2$  B)

$$Q / 4\pi\epsilon_0 R^2$$

16. The unit of capacitance are equivalent to: A) J/C B) V/C C)  $\text{J}^2 / \text{C}$  D) C/J E)  $\text{C}^2 / \text{J}$
17. Capacitors  $C_1$  and  $C_2$  are connected in series. The equivalent capacitance is given by: A)  $C_1 C_2 / (C_1 + C_2)$  B)  $(C_1 + C_2) / C_1 C_2$  C)  $1 / (C_1 + C_2)$  D)  $C_1 / C_2$  E)  $C_1 + C_2$
18. A certain wire has resistance  $R$ . Another wire, of the same material, has half the length and half the diameter of the first wire. The resistance of the second wire is: A)  $R/4$  B)  $R/2$  C)  $R$  D)  $2R$  E)  $4R$
19. Units of a magnetic field might be: A)  $\text{C} \cdot \text{m} / \text{s}$  B)  $\text{C} \cdot \text{s} / \text{m}$  C)  $\text{C} \cdot \text{kg}$  D)  $\text{kg} / \text{C} \cdot \text{m}$  E)  $\text{N} / \text{C} \cdot \text{m}$
20. The magnitude of the magnetic field at point P, at the center of the semicircle shown, is given by: A)  $\mu_0 / R^2$  B)  $\mu_0 / 2\pi R$  C)  $\mu_0 i / 4\pi R$  D)  $\mu_0 i / 2R$  E)

$$\mu_0 i / 4R$$



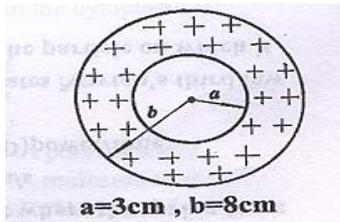
計算題 60%

(一),如右圖所示一不導電之球殼，其電荷密度為  $\rho = Ar$  ( $3\text{cm} < r < 8\text{cm}$ )，其中  $r$  為球心到量測點之距離， $A$  為常數，試求下列範圍內的電場：(若

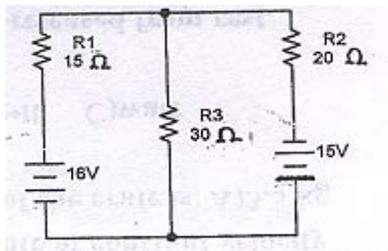
$$A = 4\mu\text{C}/\text{m}^4, \epsilon_0 = 8.85 \times 10^{-12} \text{C}^2/\text{N} \cdot \text{m}^2 \quad a = 3\text{cm}, b = 8\text{cm})$$

(a)  $r = 2\text{cm}$

(b)  $r = 5\text{cm}$  (c)  $r = 10\text{cm}$  15%



(二),如右圖所示，求出(a)流經各電阻之電流? (b)  $R_3$  之端電壓? 15%



(三),一汽車的引擎傳送 20 馬力，當時的車速是 40km/hr。求(a)阻力是多少牛頓?

(b)若阻力與速度成正比，則車速為 20km/hr 及 80km/hr 時的功率各若干? (1 馬力 = 746J/s) 10%

(四),列出並簡單說明其物理意義 (a)白努力方程式 (Bernoulli's Equation)? (b)高斯定律(Gauss's Law)? (c)法拉第定義(Faraday's law)? (d)楞次定律 (Lenz's law)?

20%

試題完