國立嘉義大學九十一學年度轉學生招生考試試題

科目：普通物理　　(請將答案寫在答案卷上)

一、選擇題：60 分(每題 3 分)

1. Two projectiles are in flight at the same time. The acceleration of one relative to the other:
   A) is always 9.8 m/s^2　B) can be as large as 9.8 m/s^2　C) can be horizontal
   D) is zero　E) none of these
2. At time t = 0 a car has a velocity of 16 m/s. It slows down with an acceleration given by -3t, in m/s^2 for t in seconds. At the end of 4.0s the displacement is (m):
   A) 32　B) 16　C) -40　D) 64　E) none of these
3. A physics textbook is suspended on a spring scale in an elevator. Of the following, the scale shows the highest reading when the elevator:
   A) moves downward, increasing speed　B) moves downward, decreasing speed
   C) moves upward, decreasing speed　D) moves upward at constant speed
   E) remains stationary
4. One end of a 1.0-m string is fixed, the other end is attached to a 2.0-kg stone. The stone swings in a vertical circle, passing the top point at 4.0 m/s. The tension force of the string (newtons) at this point is about:
   A) 0　B) 12　C) 20　D) 32　E) 52
5. A 6.0-kg block is released from rest 80 m above the ground. When it has fallen 60 m its kinetic energy is approximately:
   A) 4800 J　B) 3500 J　C) 1200 J　D) 120 J　E) 60 J
6. If two different masses have the same kinetic energy, their momenta are:
   A) proportional to their masses　B) proportional to the squares of their masses
   C) proportional to the square roots of their masses
   D) inversely proportional to their masses
   E) inversely proportional to the square roots of their masses
7. A cart of mass m, traveling on a horizontal air track with speed v, collides with a stationary cart of mass 2m. The carts stick together. The impulse exerted by one cart on the other has magnitude:
   A) 0　B) 1mv/3　C) 2mv/3　D) 2mv　E) 3mv
8. A 2.0-kg block travels around a 0.50-m radius circle with an angular velocity of 12 rad/s. Its angular momentum about the center of the circle is:
   A) 3.0 kg • m^2/s　B) 6.0 kg • m^2/s　C) 12 kg/m^2 • s
   D) 36 kg • m^2/s^2　E) 72 kg/m^2 • s^2
9. A flywheel of diameter 1.2 m has a constant angular acceleration of 5.0 rad/s^2. The tangential acceleration of a point on its rim is:
   A) 3.0 rad/s^2　B) 6.0 m/s^2　C) 7.2 m/s^2　D) 18 m/s^2　E) 41.7 m/s^2
10. Three separate strings are made of the same material. String 1 has length L and tension T, string 2 has length 2L and tension 2T, and string 3 has length 3L and tension 3T. A pulse is started at one end of each string. If the pulses start at the same time, the time cost in which they reach the other end is:
    A) 1:2:3　B) 3:2:1　C) $\sqrt{1}:\sqrt{2}:\sqrt{3}$　D) $\sqrt{3}:\sqrt{2}:\sqrt{1}$　E) none of these
11. Solid A, with mass m_A, is at its melting point T_A. It is placed in thermal contact with solid B, with mass m_B, heat capacity C_B and initially at temperature T_B ($T_B > T_A$). The combination is thermally isolated. A has latent heat of fusion L and when it has melted has heat capacity C_A. If A completely melts the final temperature of both A and B is:
    A) $(m_AC_AT_A+m_BC_BT_B-m_AL)/(m_AC_A+m_BC_B)$　B) $(m_AC_AT_A+m_BC_BT_B+m_AL)/(m_AC_A+m_BC_B)$
    C) $(m_AC_AT_A+m_BC_BT_B-m_AL)/(m_A+m_B) \bullet (C_A+C_B)$
    D) $(m_AC_AT_A+m_BC_BT_B+m_AL)/(m_A+m_B) \bullet (C_A+C_B)$　E) none of these
12. The pressure of an ideal gas is doubled in an isothermal process. The root-mean-square speed of the molecules:
    A) does not change　B) increases by a factor of $\sqrt{2}$
    C) decreases by a factor of $1/\sqrt{2}$　D) increases by a factor of 2
    E) decreases by a factor of 1/2
13. Two concentric spheres with radii R and 2R surround an positive isolated point charge. The ratio of the number of field lines through the small sphere to the larger one is:
    A) 1　B) 2　C) 4　D) 1/2　E) 1/4
14. When the dipole moment of a dipole in a uniform electric field rotates to become more nearly aligned with the field:
    A) the field does no work
    B) the field does negative work, potential energy increases
    C) the field does negative work, potential energy decreases
    D) the field does positive work, potential energy increases
    E) the field does positive work, potential energy decreases
15. By using only two resistors, R_1 and R_2 a student is able to obtain results of 3Ω, 4Ω, 12Ω, and 16Ω. The values of R_1 and R_2 are:
    A) 3, 4　B) 2, 12　C) 3, 16　D) 4, 12　E) 4, 16

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16. A 10cm long microscope slide is separated from a glass plate at one end by a sheet of paper. It shows 12 fringes/cm illuminated by a monochromatic light λ=600nm. Estimate the thickness of this paper.

A) 7.2nm B) 720μm C) 360μm D) 72μm E) 36μm

17. A vertical bar magnet is dropped through the center of a horizontal loop of wire, with its north-pole leading. At the instant when the midpoint of the magnet is in the plane of the loop, the induced current at point P, viewed from above, is:

A) maximum and clockwise B) maximum and counterclockwise

C) not maximum but clockwise D) not maximum but counterclockwise

E) essentially zero

18. The resonant angular frequency of RLC series circuit is (where R=5Ω,C=40μF,L=25mH):

A)1.00×10^{-6} B) 6.28×10^{-3} C) 1.00×10^{-3} D) 3.14 E) 1000

19. The theoretical upper limit for the frequency of electromagnetic waves is:

A) just slightly greater than that of red light

B) just slightly less than that of blue light

C) the greatest x-ray frequency

D) none of the above,there is no upper limit

E) none of the above but there is an upper limit

20. The speed of an electron with kinetic energy 100eV is about the order of (m/s)

A) 33 B) 2.5K C) 250K D) 36×10^{12} E)none of these

二、演算題：40 分(每題 20 分)