PHYSICS

BOOKS - MTG PHYSICS (BENGALI ENGLISH)

QUESTION PAPER 2008

Physics

1. A beaker of radius 15 cm is filled with a liquid of surface tension 0.075 N/m. Force across an

imaginary diameter on the surface of the

liquid is

A. 0.075N

B. $1.5 \times 10^{-2} N$

C. .225 N

D. $2.25 \times 10^{-2} N$

Answer:

2. Two springs are joined & attached to a mass of 16 kg. The system is then suspended vertically from a rigid support. The spring constants of the two springs are — K_1 & K_2 respectively. The period of vertical oscillations of the system will be -

A. $\dfrac{1}{8\pi} \sqrt{K_1 + K_2}$

B. $8\pi \sqrt{\dfrac{K_1 + K_2}{K_1 K_2}}$

C. $\dfrac{\pi}{2} \sqrt{K_1 - K_2}$

D. $\dfrac{\pi}{2} \sqrt{\dfrac{K_1}{K_2}}$

Answer:

3. The equation of a progressive wave can be given by

$$Y = 15\sin(660\pi t - 0.02\pi x)\,cm.$$ The frequency of the wave is

    A. 330Hz

    B. 342 Hz

    C. 365 Hz

D. 660 Hz

Answer:

4. A hollow cylinder with both side open generales a frequency 'f' in air. When the cylinder vertically immersed into water by half its length the frequency will be

A. f

B. 2f

C. $\dfrac{f}{2}$

D. $\dfrac{f}{4}$

Answer:

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5. Two stretched strings has lengths 'l' and '2l' while tensions are 'T' and '4T' respectively. If they are made of same material the ratio of their frequency is

A. $2:1$

B. $1:2$

C. $1:1$

D. $1:4$

Answer:

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6. When sound is produced in an Aeroplane moving with a velocity of 200 m/sec horizontally its echo is heard after $10\sqrt{5}$

seconds. If velocity of sound in air is 300 m/sec the elevation of the aircraft is

A. 250 m

B. $250\sqrt{5}m$

C. 1250 m

D. 2500 m

Answer:

7. Two tuning forks of frequencies n_1 and n_2 produces n beats per second. If n_2 and n are known, n_1 may be given by

A. $\dfrac{n_2}{n} + n_2$

B. $n_2 n$

C. $n_2 \pm n$

D. $\dfrac{n_2}{n} - n_2$

Answer:

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8. A car moving with a velocity of 36 km/hr crosses a siren of frequency 500 Hz. The apparent frequency of the siren after passing it will be

A. 520 Hz

B. 485 Hz

C. 540 Hz

D. 460 Hz

Answer:

9. Six molecules have speeds 2 units, 5 units, 3 units, 6 units, 3 units and 5 units respectively. The rms speed is -
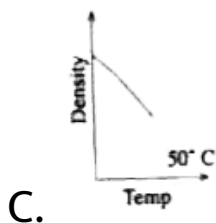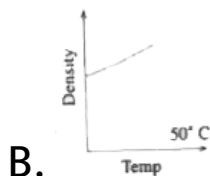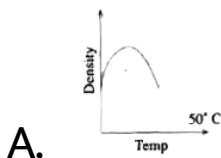
    A. 4.0 units
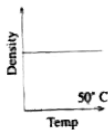
    B. 1.7 units

    C. 4.2 units

    D. 5.0 units

Answer:

10. Which one of the figures gives the temperature dependence of density of water correctly?

A.

B.

C.

D.

Temp 50° C

Density

Answer:

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11. A bullet emerges from a barrel of length 1.2 m with a speed of 640 m/s. Assuming constant acelaration, the approximate time that it spends in the barrel after the gun is fired is -

A. 4 ms

B. 40 ms

C. 400 μs

D. 1s

Answer:

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12. A body of mass 3 kg acted upon by a constant force is displaced by 's' meter, given by the relation $s = \dfrac{1}{3}t^2$, where t is in second. Work done by the force in 2 seconds is

A. $\dfrac{8}{3}J$

B. $\dfrac{19}{5}J$

C. $\dfrac{5}{19}J$

D. $\dfrac{3}{8}J$

Answer:

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13. The ionization potential of H atom is -13.6 eV. An electron in the ground state of a H-atom absorbs a photon of energy 12.75 eV.

How many different spectral lines can one expect when the electron makes a downward transition?

A. 1

B. 4

C. 2

D. 6

Answer:

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14. An experiment takes 10 minutes to raise temperature of water from $0°C$ to $100°C$ and another 55 minutes to convert it totally into steam by a stabilized heater. The latent heat of vaporization comes out to be -

A. 530 cal/gm

B. 540 cal/gm

C. 550 cal/gm

D. 560 cal/gm

Answer:

15. Which of the following substances has the

highest elasticity?

A. Steel

B. Copper

C. Rubber

D. Sponge

Answer:

16. A wire is stretched under a force. If the wire suddenly snaps the temperature of the wire

    A. remains the same

    B. decreases

    C. increases

    D. first decreases and then increases

Answer:

17. When the room temperature becomes equal to the dew-point, the relative humidity of the room is

A. 100 %

B. Zero %

C. 70 %

D. 85 %

Answer:

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18. At what temperature will the rms speed of air molecules be double that at NTP?

A. $519°C$

B. $619°C$

C. $719°C$

D. $819°C$

Answer:

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19. The refractive indices of glass and quartz with respect to air are $\dfrac{3}{2}$ and $\dfrac{12}{5}$ respectively. The r.i. of quartz w.r.t glass is

A. $\dfrac{8}{5}$

B. $\dfrac{5}{8}$

C. $\dfrac{5}{18}$

D. $\dfrac{18}{5}$

Answer:

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20. The radius of curvature of a concave mirror is 24cm and the image is magnified by 1.5 times. The object distance is

A. 20 cm

B. 8 cm

C. 16 cm

D. 24 cm

Answer:

21. A point source of light is kept at a depth of 'h' in water of r.i 4/3. The radius of the circle at the surface of water through which light emits is

A. $\dfrac{3}{\sqrt{7}}h$

B. $\dfrac{\sqrt{7}}{3}h$

C. $\dfrac{\sqrt{3}}{7}h$

D. $\dfrac{7}{\sqrt{3}}h$

Answer:

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22. Four point charges each '+q' is placed on the circumference of a circle of diameter 2d in such a way that they form a square. The potential at the centre is

A. 0

B. $\dfrac{4q}{d}$

C. $\dfrac{4q}{q}$

D. $\dfrac{q}{4d}$

Answer:

23. 64 identical spheres of charge q and capacitance C each are combined to form a large sphere. The charge and capacitance of the large sphere is

A. 64q, C

B. 16q, 4C

C. 64q, 4C

D. 16q, 64C

Answer:

24. Lenz's law of electromagnetic induction corresponds to

A. the law of conservation of charge

B. the law of conservation of energy

C. the law of conservation of momentum

D. the law of conservation of angular momentum

Answer:

25. A silicon and a germanium diode has identical physical dimensions. The band gap in silicon is larger than that in germanium. An identical reverse hlas is applied across the diodes.

A. The reverse current in germanium is larger than that in silicon.

B. The reverse current in silicon is larger than that in germanium.

C. The reverse curtenis are identical in the two diodes.

D. The relative magnitude of the reverse currents cannot be determined from the given data only.

Answer:

26. A thin wire of resistance 4Ω is bent to form

a circle. The resistance across any diameter is

    A. 4Ω

    B. 2Ω

    C. 1Ω

    D. 8Ω

Answer:

27. A battery of emf E and internal resistance 'r' is connected to an external resistance 'R', the condition for maximum power transfer is

   A. $r < R$

   B. $r > R$

   C. $r = \dfrac{1}{R}$

   D. $r = R$

Answer:

28. The binary number 10111 is equivalent to the decimal number

A. 19

B. 31

C. 23

D. 22

Answer:

29. The angle subtended by the vector $A = 4\hat{i} + 3\hat{j} + 12\hat{k}$ with the x-axis is

A. $\sin^{-1}\left(\dfrac{3}{13}\right)$

B. $\sin^{-1}\left(\dfrac{4}{13}\right)$

C. $\cos^{-1}\left(\dfrac{4}{13}\right)$

D. $\cos^{-1}\left(\dfrac{3}{13}\right)$

Answer:

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30. The velocity of a particle (v) at an instant 't'

is given by $v = at + bt^2$, the dimension of b is

A. L

B. LT^{-1}

C. LT^{-2}

D. LT^{-3}

Answer:

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31. The distance travelled by an object along a straight line in time 't' is given by $S = 3 - 4t + 5t^2$, the initial velocity of the object is

    A. 3 unit

    B. -3 unit

    C. 4 unit

    D. -4 unit

Answer:

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32. A pellet of mass 1 gm is moving with an angular velocity of 1 rad/s along a circle of radius 'l' meter, the centrifugal force is

    A. 0.1 dyne

    B. 1 dyne

    C. 10 dyne

    D. 100 dyne

Answer:

33. Two point objects of mass 1.5 gm and 2.5 gm respectively are at a distance 16 cm apart, the centre of gravity is at a distance 'x' from the object of mass 1.5 gm where 'x' is

A. 10 cm

B. 6 cm

C. 13 cm

D. 3 cm

Answer:

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34. If the earth shrinks such that ils mass does not change but radius decreases to one quarter of its original value then one complete day will take.

    A. 96 hrs

    B. 48 hrs

    C. 6 hrs

D. 1.5 hrs

Answer:

35. A Shell of mass 10 Kg is moving with a velocily of 10 Meter/Sec when it blasts and forms two parts of mass 9 kg and 1 kg respectively. If the 1st mass is stationary the velocity of the 2nd is

A. 1 m/s

B. 10 m/s

C. 100 m/s

D. 1000 m/s

Answer:

36. Force required to move a mass of 1 kg at rest on a horizonlal rough plane (coefficient of friction 0.1 and $g = 9.8m/s^2$) is

A. 0.98 N

B. 0.49 N

C. 9.8 N

D. 4.9 N

Answer:

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37. A rocket of mass 100 kg burns 0.1 Kg of fuel per second. If velocity of exhaust gas is 1 Km/Sec then it lifts with an acceleration of

A. $1000m/s^2$

B. $100m/s^2$

C. $10m/s^2$

D. $1m/s^2$

Answer:

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38. The weight of a body on the surface of the earth is 12.6 N. When it is elevated to a height half the radius of the earth its weight will be

A. 2.8 N

B. 5.6 N

C. 12.6 N

D. 25.2 N

Answer:

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