PHYSICS

BOOKS - MTG PHYSICS (BENGALI ENGLISH)

QUESTION PAPER 2009

Multiple Choice Questions Physics

1. $\vec{A}$ and $\vec{B}$ are two vectors given by $\vec{A} = 2\hat{i} + 3\hat{j}$ and $\vec{B} = \hat{i} + \hat{j}$. The

magnitude of the component of $\vec{A}$ along $\vec{B}$ is

A. $\dfrac{5}{\sqrt{2}}$

B. $\dfrac{3}{\sqrt{2}}$

C. $\dfrac{7}{\sqrt{2}}$

D. $\dfrac{1}{\sqrt{2}}$

Answer:

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2. Given $\vec{C} = \vec{A} \times \vec{B}$ and $\vec{D} = \vec{B} \times \vec{A}$.

What is the angle between $\vec{C}$ and $\vec{D}$?

A. $30°$

B. $60°$

C. $90°$

D. $180°$

Answer:

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3. The acceleration 'a' (in ms^{-2}) of a body, starting from rest varies with time t (in s) following the equation $a = 3t + 4$ The velocity of the body at time t= 2s will be

A. $10ms^{-1}$

B. $18ms^{-1}$

C. $14ms^{-1}$

D. $26ms^{-1}$

Answer:

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4. Figure below shows the distance -time graph of the motion of a car. It follows from the graph that the car is-

$$x = 1.2t^2$$

A. at rest

B. in uniform motion

C. in non-uniform acceleration

D. uniformly accelerated

Answer:

5. Two particles have masses m & 4m and their kinetic energies are in the ratio $2:1$. What is the ratio of their linear momenta?

A. $\dfrac{1}{\sqrt{2}}$

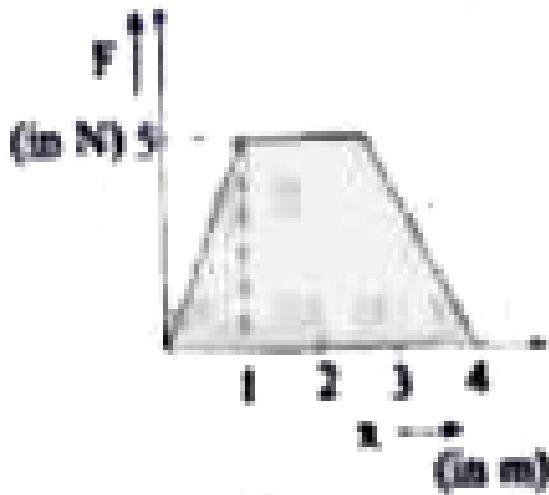B. $\dfrac{1}{2}$

C. $\dfrac{1}{4}$

D. $\dfrac{1}{16}$

Answer:

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6. The force F acting on a particle moving in a straight line is shown below. What is the work done by the force on the particle in the 1st

meter of the trajectory ?

A. 5J

B. 10J

C. 15J

D. 2.5J

Answer:

7. If the kinetic energy of a body changes by 20% then its momentum would change by-

A. 0.2

B. 0.24

C. 0.4

D. 0.44

Answer:

8. A bullet is fired with a velocity u making an angle of $60°$ with the horizontal plane. The horizontal component of the velocity of the bullet when it reaches the maximum height is

A. u

B. 0

C. $\dfrac{\sqrt{3}u}{2}$

D. $\dfrac{u}{2}$

Answer:

9. A particle is projected at $60°$ to the horizontal with a kinetic energy K. The kinetic energy at the highest point is

A. K

B. zero

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

D. $\dfrac{K}{2}$

Answer:

10. The Poisson's ratio of a material is 0.5. If a force is applied to a wire of this material, there is a decreases in the cross-sectional area by 4%. The percentage increase in the length is

A. 0.01

B. 0.02

C. 2.5%

D. 0.04

Answer:

11. Two spheres of equal masses but radii r_1 and r_2 are allowed to fall in a liquid of infinite column. The ratio of their terminal velocities is:

A. 1

B. $r_1 : r_2$

C. $r_2 : r_1$

D. $\sqrt{r_1} : \sqrt{r_2}$

Answer:

12. Two massless springs of force constant K_1 and K_2 are joined end to end. The resultant force constant K of the system is

A. $K = \dfrac{K_1 + K_2}{K_1 K_2}$

B. $K = \dfrac{K_1 - K_2}{K_1 K_2}$

C. $K = \dfrac{K_1 K_2}{K_1 + K_2}$

D. $K = \dfrac{K_1 K_2}{K_1 - K_2}$

Answer:

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13. A spring of force constant k is cut into two equal halves. The force constant of each half is

A. $\dfrac{k}{\sqrt{2}}$

B. k

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

D. 2k

Answer:

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14. Two rods of equal length and diameter have thermal conductivities 3 and 4 units respectively. If they are joined in series, the

thermal conductivity of the combination would be:

A. 3.43

B. 3.5

C. 3.4

D. 3.34

Answer:

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15. 10g of water at $30°C$ and 5g of ice at $-20°$ C are mixed together in a calorimeter. What is the final temperature of the mixture? Given specific heat of ice= 0.5 cal $g^{-1}(^0C)^{-1}$ and latent heat of fusion of ice =80 cal g^{-1}

    A. $0°C$

    B. $-5°C$

    C. $5°C$

    D. $10°C$

Answer:

16. It is difficult to cook rice in an open vessel by boiling it at high altitudes because of

    A. low boiling point and high pressure

    B. high boiling point and low pressure

    C. low boiling point and low pressure

    D. high boiling point and high pressure

Answer:

▶

17. The height of a waterfall is 50m. If $g = 9.8ms^{-2}$ the difference between the temperature at the top and the bottom of the waterfall is

    A. $1.17°C$

    B. $2.17°C$

    C. $0.117°C$

    D. $1.43°C$

Answer:

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18. The distance between an object and a divergent lens is m times the focal length of the lens. The linear magnification produced by the lens is

A. m

B. $\dfrac{1}{m}$

C. $m + 1$

D. $\dfrac{1}{m+1}$

Answer:

19. A 2.0cm tall object is placed 15cm in front of a concave mirror of focal length 10cm. What is the size and nature of the image?

A. 4cm, real

B. 4cm, virtual

C. 1.0cm, real

D. None

Answer:

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20. A beam of monochromatic blue light of wavelength 4200Å in air travels in water of refractive index 4/3. Its wavelength in water will be:

A. 4200Å

B. 5800Å

C. 4150Å

D. 3150Å

Answer:

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21. Two identical light waves, propagating in the same direction, have a phase difference δ.

After they superpose the intensity of the resulting wave will be proportional to

A. $\cos \delta$

B. $\cos(\delta/2)$

C. $\cos^2(\delta/2)$

D. $\cos^2 \delta$

Answer:

22. The equation of state for n moles of an ideal gas is PV= nRT, where R is a constant. The SI unit for R is

A. JK^{-1} per molecule

B. $JK^{-1}mol^{-1}$

C. $JKg^{-1}K^{-1}$

D. $JK^{-1}g^{-1}$

Answer:

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23. At a certain place, the horizontal component of earth's magnetic field is $\sqrt{3}$ times the vertical component. The angle of dip at that place is

A. $30°$

B. $60°$

C. $45°$

D. $90°$

Answer:

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24. The number of electrons in 2coulomb of charge is

    A. 5×10^{29}

    B. 12.5×10^{18}

    C. 1.6×10^{19}

    D. 9×10^{11}

Answer:

25. The current flowing through a wire depends on time as $I = 3t^2 + 2t + 5$. The charge flowing through the cross-section of the wire in time from t= 0 to t= 2 sec is.

A. 22C

B. 20C

C. 18C

D. 5C

Answer:

26. If the charge on a capacitor is increased by

2 coulomb, the energy stored in it increases by

21%. The original charge on the capacitor is

A. 10C

B. 20C

C. 30C

D. 40C

Answer:

27. Work done to carry a charge q once along the circular path of radius r with charge q' at its centre, will be

A. $\dfrac{qQ}{4\pi \in_0 r}$

B. $\dfrac{qQ}{4\pi \in_0} \dfrac{1}{\pi r}$

C. $\dfrac{qQ}{4\pi \in_0} \left(\dfrac{1}{2\pi r} \right)$

D. 0

Answer:

28. Four capacitors of equal capacitance have an equivalent capacitance C_1 when connected in series and an equivalent capacitance C_2 when connected in parallel. The ratio $\dfrac{C_1}{C_2}$ is

A. $1/4$

B. $1/16$

C. $1/8$

D. $1/12$

Answer:

29. Magnetic field intensity H at the centre of a circular loop of radius r carrying current I e.m.u is

    A. r/1 oersted

    B. $2\pi I/r$ oersted

    C. $1/2\pi r$ oersted

    D. $2\pi r/I$ oersted

Answer:

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30. Which of the following materials is the best conductor of electricity?

A. Platinum

B. Gold

C. Silicon

D. Copper

Answer:

31. One Kg of copper is drawn into a wire of 1mm diameter and a wire of 2mm diameter. The resistance of the two wires will be in the ratio

   A. $2:1$

   B. $1:2$

   C. $16:1$

D. $4:1$

Answer:

32. An electrical cable having a resistance of 0.2Ω delivers 10kw at 200V D.C to a factory. What is the efficiency of transmission?

A. 0.65

B. 0.75

C. 0.85

D. 0.95

Answer:

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33. A wire of resistance 5Ω is drawn out so that its new length is 3 times its original length. What is the resistance of the new wire?

A. 45Ω

B. 15Ω

C. $^5/_3\,\Omega$

D. 5Ω

Answer:

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34. Two identical cells each of emf E and internal resistance r are connected in parallel with an external resistance R. To get maximum power developed across R, the value of R is

A. $R = r/2$

B. R= r

C. $R = r/3$

D. R= 2r

Answer:

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35. To write the decimal number 37 in binary,
how many binary digits are required?
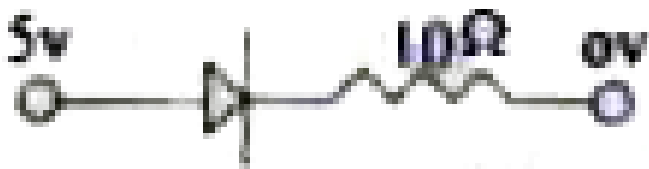
A. 5

B. 6

C. 7

D. 4

Answer:

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36. A junction diode has a resistance of 25Ω when forward biased and 2500Ω when reverse biased. The current in the diode, for the

arrangement shown will be:

A. $\dfrac{1}{15}A$

B. $\dfrac{1}{7}A$

C. $\dfrac{1}{25}A$

D. $\dfrac{1}{480}A$

Answer:

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37. If the electron in a hydrogen atom jumps from an orbit with level $n_1 = 2$ to an orbit with level $n_2 = 1$ the emitted radiation has a wavelength given by

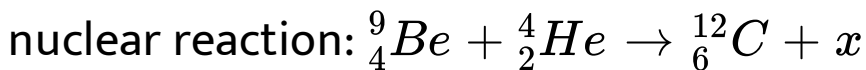A. $\lambda = 5/3R$

B. $\lambda = 4/3R$

C. $\lambda = R/4$

D. $\lambda = 3R/4$

Answer:

38. What is the particle x in the following nuclear reaction: $^{9}_{4}Be + ^{4}_{2}He \rightarrow ^{12}_{6}C + x$

A. electron

B. proton

C. Photon

D. Neutron

Answer:

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39. An alternating current of rms value 10A is passed through a 12Ω resistor. The maximum potential difference across the resistor is:

A. 20V

B. 90V

C. 169.68V

D. none

Answer:

40. Which of the following relation represent Biot-Savart's law?

A. $d\vec{B} = \dfrac{\mu_0}{4\pi} I \dfrac{\vec{d\,l} \times \vec{r}}{r}$

B. $d\vec{B} = \dfrac{\mu_0}{4\pi} I \dfrac{\vec{d\,l} \times \vec{r}}{r^3}$

C. $d\vec{B} = \dfrac{\mu_0}{4\pi} I \dfrac{\vec{d\,l} \times \hat{r}}{r^3}$

D. $d\vec{B} = \dfrac{\mu_0}{4\pi} I \dfrac{\vec{d\,l} \times \vec{r}}{r^4}$

Answer:

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