PHYSICS

BOOKS - TS EAMCET PREVIOUS YEAR PAPERS

TS EAMCET 2018 (4 MAY SHIFT 1)

Physics

1. Assertion (A) When we bounce a ball on the ground, it comes to rest after a few bounces, losing all its energy. This is an example of violation of conservation of energy.

Reason (R) Energy can change from one form to another but the total energy is always conserved.

Which of the following is true?

A. Both (A) and (R) are true and (R) is the correct explanation of (A)

B. Both (A) and (R) are true, but (R) is not the correct explanation of (A)

C. (A) is true, but (R) is false

D. (A) is false, but (R) is true

Answer: D

Watch Video Solution

2. A gas satisfies the relation $pV^{5/3} = k$, where p is pressure, V is volume and k is constant. The dimension of constant k are

A. $\left[ML^4T^{-2}\right]$

B. $\left[ML^2T^{-2}\right]$

C. $\left[ML^6T^{-2}\right]$

D. $\left[MLT^{-2}\right]$

Answer: A

Watch Video Solution

3. A car moves in positive y-direction with velocity v proportional to distance travelled y as $v(y) \propto y^{\beta}$, where β is a positive constant. The car covers a distance L with average velocity $< v >$ proportional to L as $< v > \propto L^{1/3}$, The constant β is given as

A. $\frac{1}{4}$

B. $\frac{1}{3}$

C. $\frac{2}{3}$

D. $\frac{1}{2}$

Answer: B

Watch Video Solution

4. Consider a particle moving along the positive direction of X-axis. The velocity of the particle is given by $v = \alpha\sqrt{x}$ (α is a positive constant). At time t = 0, if the particle is located at x = 0, the time dependence of the velocity and the acceleration of the particle are respectively

A. $\frac{\alpha^2}{2}t$ and $\frac{\alpha^2}{2}$

B. $\alpha^2 t$ and α^2

C. $\frac{\alpha}{2}t$ and $\frac{\alpha}{2}$

D. $\frac{\alpha^2}{4}t$ and $\frac{\alpha^2}{4}$

Answer: A

Watch Video Solution

5. The magnitude of velocity and acceleration and velocity of a particle moving in a plane, whose position vector $r = 3t^2\hat{i} + 2t\hat{j} + \hat{k}$ at t = 2s are respectively

Note In the question paper sequence is given, (acceleration and velocity) which is not matching with any of option given.

A. $\sqrt{148}, 6$

B. $\sqrt{144}, 6$

C. $\sqrt{13}, 3$

D. $\sqrt{14}, 3$

Answer: A

Watch Video Solution

6. Two objects are located at height 10 m above the ground. At some point of time, the objects are thrown with initial velocity $2\sqrt{2}$ m/s at an angle 45° and 135° with the positive X-axis, respectively. Assuming $g = 10\frac{m}{s^2}$, the velocity vectors will be perpendicular to each other at time is equal to

A. 0.2 s

B. 0.4 s

C. 0.6 s

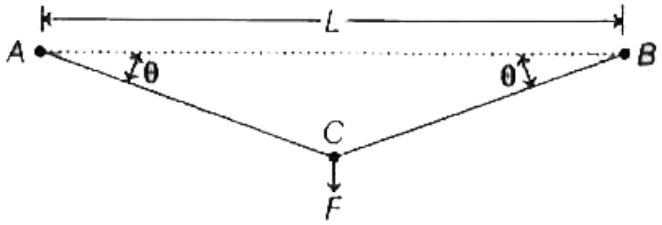
D. 0.8 s

Answer: B

Watch Video Solution

7. String AB of unstretched length, L is stretched by applying a force F at the mid-point C such that the segments AC and BC make an angle θ with AB as shown in the figure. The string may be considered as an elastic element with a force to elongation ratio K. The force F is

given by



A. $KL(1-\tan\theta)\sin\theta$

B. $2KL(1-\cos\theta)\tan\theta$

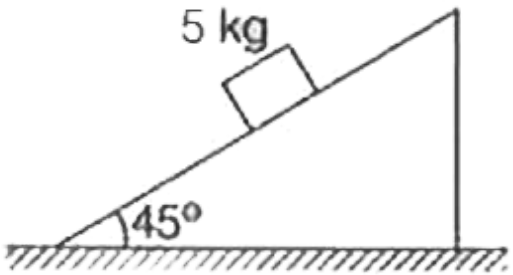
C. $KL(1-\cos\theta)\tan\theta$

D. $2KL(1-\sin\theta)\tan\theta$

Answer: C

Watch Video Solution

8. A block of mass 5 kg is kept against an accelerating wedge with a wedge angle of 45° to the horizontal. The coefficient of friction between the block and the wedge is $\mu = 0.4$. What is the minimum absolute value of the acceleration of the wedge to keep the block steady? [Assume, $g = 10\frac{m}{s^2}$]



A. $\frac{60}{7} m/s^2$

B. $\frac{30}{7} m/s^2$

C. $\frac{30}{\sqrt{7}} m/s^2$

D. $\frac{60}{\sqrt{7}} m/s^2$

Answer: B

Watch Video Solution

9. An object moves along the circle with normal acceleration proportional to t^{α}, where t is the time and α is a positive constant. The power developed by all the forces acting on the object will have time dependence proportional to

A. $t^{\alpha - 1}$

B. $t^{\alpha / 2}$

C. $t^{\frac{1+\alpha}{2}}$

D. $t^{2\alpha}$

Answer: A

Watch Video Solution

10. A ball of mass 1 kg moving along x-direction collides elastically with a stationary ball of mass m. The first ball (mass = 1 kg) recoils at right angle to its original direction of motion. If the second ball starts moving at an angle 30° with the X-axis, then the value of m must be

A. 0.5 kg

B. 1.5 kg

C. 2.5 kg

D. 2 kg

Answer: D

Watch Video Solution

11. A machine gun can fire 200 bullets/min. If 35 g bullets are fired at a speed of 750 m/s, then the average force exerted by the gun on the bullets is

A. 87.5 N

B. 26.2N

C. 78.9 N

D. 110.3 N

Answer: A

Watch Video Solution

12. A solid sphere of radius R makes a perfect rolling down on a plane which is inclined to the horizontal axis at an angle θ. If the radius of gyration is k, then its acceleration is

A. $\frac{g\sin\theta}{\left(1+\frac{k^2}{R^2}\right)}$

B. $\frac{g\sin\theta}{(R^2+k^2)}$

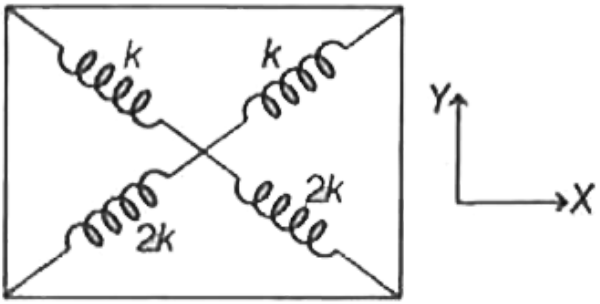
C. $\frac{g\sin\theta}{2(R^2+k^2)}$

D. $\frac{g\sin\theta}{2\left(1+\frac{k^2}{R^2}\right)}$

Answer: A

Watch Video Solution

13. A particle of mass m is attached to four springs with spring constant k, k, 2k and 2k. as shown in the figure. Four springs are attached to the four corners of a square and a particle is placed at the center. If the particle is pushed slightly towards any sides of the square and released, the period of oscillation will be



A. $2\pi\sqrt{\frac{m}{3k}}$

B. $2\pi\sqrt{\frac{m}{3\sqrt{2}k}}$

C. $2\pi\sqrt{\frac{m}{6k}}$

D. $2\pi\sqrt{\frac{m}{2k}}$

Answer: B

Watch Video Solution

14. The ratio of the height above the surface of earth to the depth below, the surface of earth, for gravitational accelerations to be the same (assuming small heights) is

A. 0.25

B. 0.5

C. 1.0

D. 1.25

Answer: B

Watch Video Solution

15. A steel rod has radius 50 mm and length 2 m. It is stretched along its length with a force of 400 KN. This causes an elongation of 0.5 mm. Find the (approximate) Young's modulus of steel from this information.

A. $2 \times 10^{10} Nm^2$

B. $10^{11} Nm^2$

C. $2 \times 10^{11} Nm^2$

D. $10^{12} Nm^2$

Answer: C

Watch Video Solution

16. Consider a vessel filled with a liquid upto height H. The bottom of the vessel lies in the XY-plane passing through the origin. The density of the liquid varies with Z-axis as $\rho(z) = \rho_0\left[2 - \left(\frac{z}{H}\right)^2\right]$. If p_1 and p_2 are the pressures at the bottom surface and top surface of the liquid, the magnitude of $(p_1 - p_2)$ is

A. $\rho_0 gH$

B. $\frac{8}{5}\rho_0 gH$

C. $\frac{3}{2}\rho_0 gH$

D. $\frac{5}{3}\rho_0 gH$

Answer: D

Watch Video Solution

17. A one mole of ideal gas goes through a process in which pressure p varies with volume V as $p = 3 - g\left(\frac{V}{V_0}\right)^2$, where, V_0 is a constant. The maximum attainable temperature by the ideal gas during this process is

(all quantities are is SI units and Ris gas constant)

A. $\frac{2V_0}{3R}$

B. $\frac{2V_0}{R}$

C. $\frac{3V_0}{2R}$

D. None of these

Answer: D

Watch Video Solution

Watch Video Solution

18. The internal energy of the air, in a room of volume V, at temperature T and with outside pressure p increasing linearly with time, varies as

A. increases linearly

B. increases exponentially

C. decreases linearly

D. remains constant

Answer: A

Watch Video Solution

19. The efficiency of Carnot engine is y, when it η hot and cold reservoirs are maintained at temperature T_1 and T_2, respectively. To increase the efficiency to 1.5η, the increase in temperature (ΔT) of the hot reservoir by keeping the cold one constant at T_2 is

A. $\dfrac{T_1 T_2}{(1-\eta)(1-1.5\eta)}$

B. $\dfrac{0.5 T_2 \eta}{(1-1.5\eta)(1-\eta)}$

C. $\dfrac{T_1}{(1-\eta)} - \dfrac{T_2}{(1-1.5\eta)}$

D. $\dfrac{(1-\eta)(1-1.5\eta)}{T_1 T_2}$

Answer: B

Watch Video Solution

20. An air bubble rises from the bottom of a water tank of height 5 m. If the initial volume of the bubble is $3 \ \text{mm}^3$, then what will be its volume as it reaches the surface? Assume that its temperature does not change.

$[g = 9.8m/s^2, 1 \ \text{atm} \ = 10^5" Pa, densityofwater=1gm//]$

A. $1.5 \ \text{mm}^3$

B. $4.5 \ \text{mm}^3$

C. $9 \ \text{mm}^3$

D. $9 \ \text{mm}^3$

Answer: B

Watch Video Solution

21. Two harmonic travelling waves are described by the equations $y_1 = a\sin(kx - \omega t)$ and $y_2 = a\sin(-kx + \omega t + \phi)$. The amplitude of the superimposed wave is

A. $2a\dfrac{\cos(\phi)}{2}$

B. $2a\sin\phi$

C. $2a\cos\phi$

D. $2a\dfrac{\sin(\phi)}{2}$

Answer: D

Watch Video Solution

22. Where should an object be placed on the axis of a convex lens of focal length 8 cm, so as to achieve magnification of -4? (Distances are measured from optic centre of the lens)

A. -6 cm

B. -10 cm

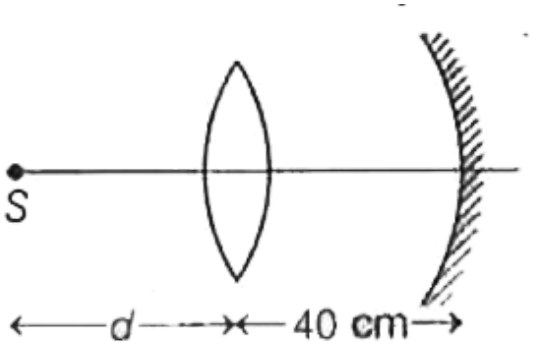
C. -12 cm

D. -9 cm

Answer: B

Watch Video Solution

23. A converging mirror is placed on the right hand side of a converging lens as shown in the figure. The focal length of the mirror and the lens are 20 cm and 15 cm, respectively. The separation between the lens and the mirror is 40 cm and their principal axis coincide. A point source is placed on the principal axis at a distance d to the left of the lens. If the final beam comes out parallel to the principal axis, then the value of d is



A. 4 cm

B. 8 cm

C. 12 cm

D. 16 cm

Answer: C

Watch Video Solution

24. Interference fringes are obtained in a Young's double slit experiment using beam of light consisting two wavelengths 500 nm and 600 nm. Bright fringes due to both wavelengths coincide at 2.5 mm from the central maximum. If the separation between the slits is 3 mm, then the distance between the screen and plane of the slits is

A. 1.2 m

B. 2.8 m

C. 2.5 m

D. 3.2 m

Answer: C

Watch Video Solution

25. A point charge of 50 uC is placed in the XY-plane at a location with radius vector $r_0 = 2\hat{i} + 3\hat{j}$ m. The electric field strength and its magnitude at a point with radius vector $r = 8\hat{i} - 5\hat{j}$ m is

$\left(\varepsilon_0 = 8.85 \times 10^{-12} C^2 / N - m^2\right)$

A. 4.5 kV/m

B. 45 kV/m

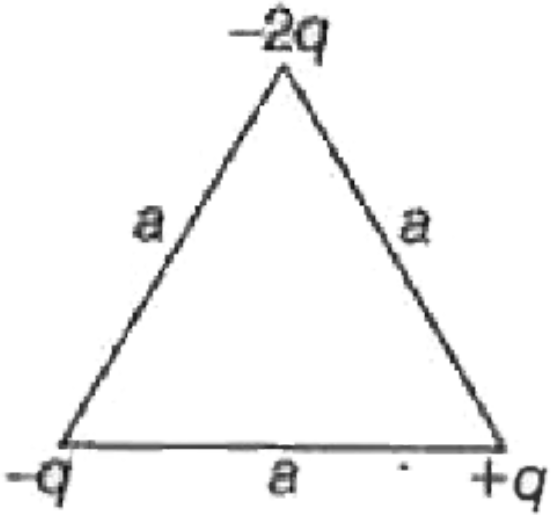
C. 0.45 kV/m

D. 450 kV/m

Answer: A

Watch Video Solution

26. The work done to assemble the three charges in a configuration as shown in the figure below is



A. $\frac{-3q^2}{4\pi\varepsilon_0 a}$

B. $\frac{-2q^2}{4\pi\varepsilon_0 a}$

C. $\frac{-q^2}{4\pi\varepsilon_0 a}$

D. 0

Answer: C

Watch Video Solution

27. Consider the following two circuits

[A] 20 bulbs are connected in series to a power supply line.

[B] 20 bulbs identical to [A] are connected in a parallel circuit to an identical power supply line.

Identify which of the following is not true?

A. If one bulb in [A] blows out, all others will stop glowing

B. Bulbs in [A] glow brighter, since the current flowing in [A] is higher

C. If one bulb in [B] blows, other bulbs will still glow

D. Bulbs in [B] have the highest voltage across each bulb

Answer: B

Watch Video Solution

28. A tapered bar of length L and end diameters D_1 and D_2 is made of a material of electrical resistivity ρ. The electrical resistance of the bar is

A. $\frac{4\rho L}{\pi(D_1 + D_2)^2}$

B. $\frac{4\rho L}{\pi(D_1 - D_2)^2}$

C. $\frac{\rho\pi\sqrt{D_1 + D_2}}{4L^2}$

D. $\frac{4\rho L}{\pi D_1 D_2}$

Answer: D

Watch Video Solution

29. Two circular loops L_1 and L_2 of wire carrying equal and opposite currents are placed parallel to each other with a common axis. The radius of loop L_1 is R_1 and that of L_2 is R_2. The distance between the centres of the loops is $\sqrt{3}R_1$. The magnetic field at the centre of L_2 shall be zero, if

A. $R_2 = 4R_1$

B. $R_2 = 2R_1$

C. $R_2 = \sqrt{2}R_1$

D. $R_2 = 8R_1$

Answer: D

Watch Video Solution

30. A non-conducting thin disc of radius R rotates about its axis with an angular velocity ω. The surface charge density on the disc varies with the distance r from the centre as $\sigma(r) = \sigma_0\left[1 + \left(\frac{r}{R}\right)^{\beta}\right]$, where σ_0 and β are constants. If the magnetic induction at the center is $B = \left(\frac{9}{10}\right)\mu_0\sigma_0\omega R$, the value of β is

A. $\frac{1}{4}$

B. 4

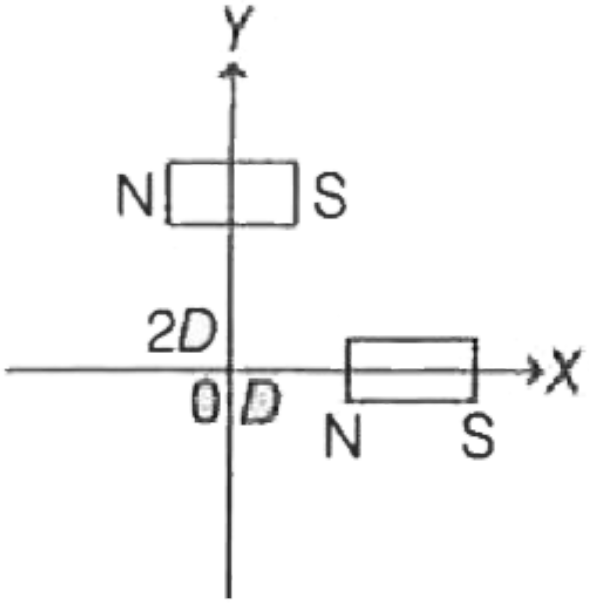
C. $\frac{1}{2}$

D. 2

Answer: A

Watch Video Solution

31. A bar magnet of magnetic moment Mis placed at a distance D with its axis along positive X-axis. Likewise, second bar manget of magnetic moment M is placed at a distance 2D on positive Y-axis and perpendicular to it as shown in the figure. The magnitude of magnetic field at the origin is $|B| = \alpha\left[\frac{\eta_0}{4\pi}\frac{M}{D^3}\right]$. The value of a must be (assume $D > > l$, where l is the length of magnets)



A. 2

B. $\frac{15}{8}$

C. $\frac{17}{8}$

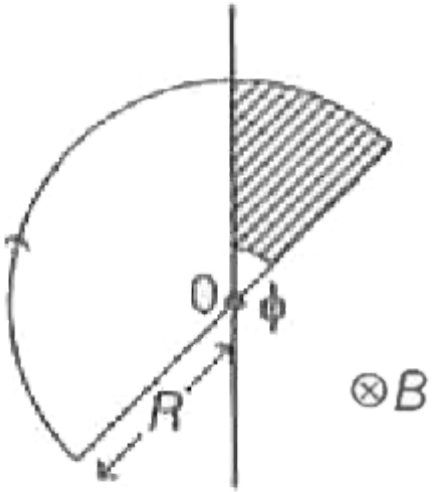
D. $\frac{9}{8}$

Answer: B

Watch Video Solution

32. A wire loop enclosing a semi-circle of radius Ris located on the boundary of a uniform magnetic field of induction B. At timc t = 0, the loop is set into rotation with angular velocity angular ω about its axis 0, coinciding with a line vector B on the boundary as shown in the figure. The emf

induced in the loop is



A. $\frac{BR^2}{2}\omega$

B. $BR\omega$

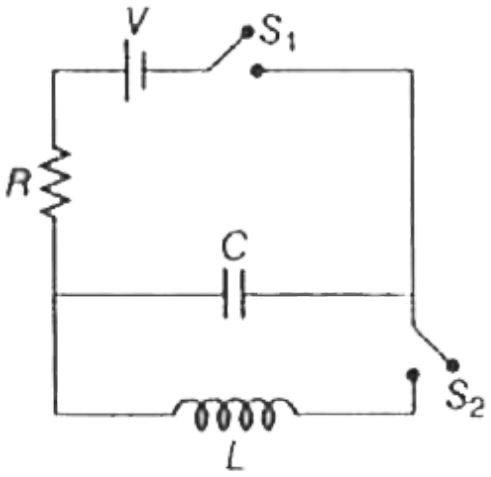
C. $BR^2\omega$

D. $\frac{BR^2}{2\omega}$

Answer: A

Watch Video Solution

33. In the circuit given below, the capacitor C is charged by closing the switch S_1 and opening the switch S_2. After charging, the switch S_1 is opened and S_2, is closed, then the maximum current in the circuit



A. $V\sqrt{\frac{L}{C}}$

B. $V\sqrt{\frac{C}{L}}$

C. $\frac{V}{2\pi}\sqrt{\frac{L}{C}}$

D. $2\pi V\sqrt{\frac{L}{C}}$

Answer: B

Watch Video Solution

34. A 100 W electric bulb produces electromagnetic radiation with electric field amplitude of $\frac{2V}{m}$ at a distance of 10 m.

Assuming it as a point source, estimate the efficiency of the bulb.

A. 0.049

B. 2.5%

C. 0.066

D. 0.197

Answer: C

Watch Video Solution

35. At an incident radiation frequency of v_1, which is greater than the threshold frequency, the stopping potential for a certain metal is V_1. At frequency $2v_1$, the stopping potential is $3V_1$. If the stopping potential at frequency $4v_1$ is nV_1 then n is

A. 2

B. 3

C. 6

D. 7

Answer: D

Watch Video Solution

36. The de-Broglie wavelength of an electron of kinetic energy 9 eV is (take, $h = 4 \times 10^{-15} eV - s, c = 3 \times 10^{10} cm/s$ and the mass m_e of electron as $m_e c^2 = 0.5$ MeV

A. 4×10^{-8} cm

B. 3×10^{-8} cm

C. 4×10^{-7} cm

D. 3×10^{-7} cm

Answer: A

Watch Video Solution

37. An active nucleus decays to $\left(\frac{1}{3}\right)$ rd in 20 h.

The fraction of original activity remaining after 80 h is

A. $\frac{1}{16}$

B. $\frac{1}{81}$

C. $\frac{1}{36}$

D. $\frac{1}{54}$

Answer: B

Watch Video Solution

38. Consider an amplifier circuit, where in a transistor is used in common emitter mode. The change in collector current and base current respectively are 4 mA and 20 UA when a signal of 40 mV is added to the base-emitter voltage. If the load resistance is 10 k 2, then power gain in the circuit is

A. 1×10^4

B. 2×10^7

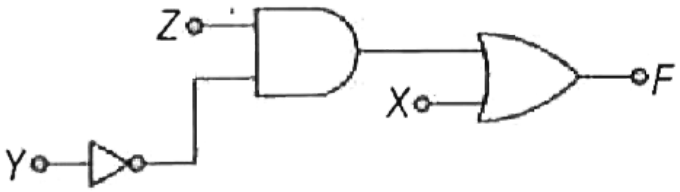
C. 8×10^5

D. 1×10^6

Answer: B

Watch Video Solution

39. The output F of the logic circuit given below is



A. $X + \overrightarrow{Y} . Z$

B. $(Y + Z) . X$

C. $\left(\overrightarrow{Y} + Z\right) + X$

D. $X + \overrightarrow{Y} + Z$

Answer: A

Watch Video Solution

40. A carrier wave of peak voltage 20 V is used to transmit a message signal. For getting a modulation index of 60%, the peak voltage of the modulating signal is

A. 6 V

B. 8V

C. 12 V

D. 33.3 V

Answer: C

 Watch Video Solution