TS EAMCET Physics Previous Questions with Key – Test 1

81) 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?

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

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

3) (A) is true, but (R) is false

4) (A) is false, but (R) is true

82) A gas satisfies the relation $PV^{5/3} = K$ where P is pressure, V is volume and K is constant. The dimensions of constant K are

1) ML^4T^{-2}

2) ML^2T^{-2}

3) ML^6T^{-2}

4) MLT^{-2}

83) 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 $\langle v \rangle \propto L^{1/3}$. The constant β is given as

1) $\frac{1}{4}$

2) $\frac{1}{3}$

3) $\frac{2}{3}$

4) $\frac{1}{2}$

84) Consider a particle moving along the positive direction of X-axis. The velocity of the particle is given by v=α√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.

1) $\frac{\alpha^2}{2}t$ t and $\frac{\alpha^2}{2}$ 2) α^2 t and α^2 3) $\frac{\alpha}{2}t$ and $\frac{\alpha}{2}$ 4) $\frac{\alpha^2}{4}t$ and $\frac{\alpha^2}{4}$

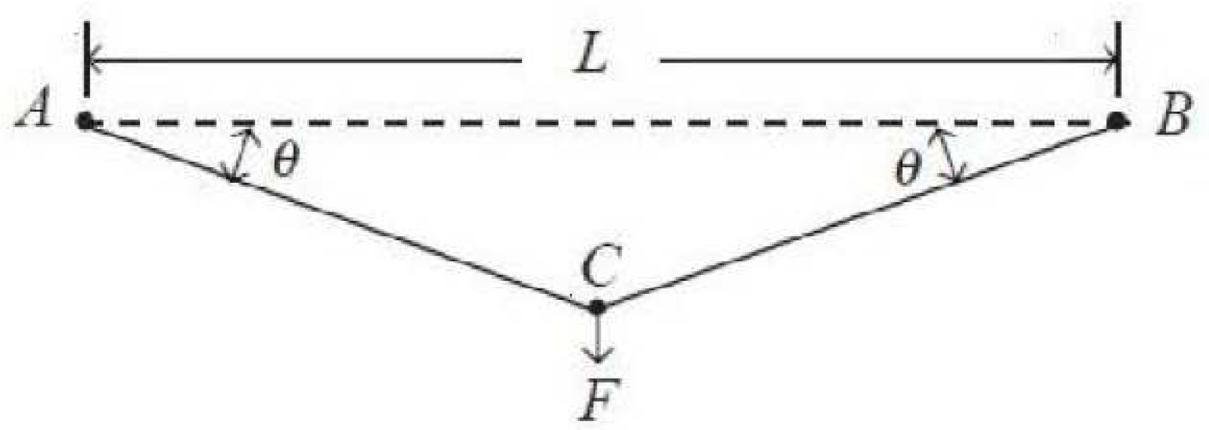
85) The magnitude of acceleration and velocity of a particle moving in a plane, whose position vector $\bar{r} = 3t^2\hat{i} + 2t\hat{j} + \hat{k}$ at t=2 sec. are, respectively

1) √148, 6 2) √144, 6 3) √13, 3 4) None

86) Two objects are located at height 10m abobe the ground. At some point of time, the objects are thrown with velocity 2√2 m/s at an angle 45° and 135° with the positive X-axis respectively. Assuming g=10 m/s^2, the velocity vectors will be perpendicular to each other at time equal to

1) 0.2 s 2) 0.4 s 3) 0.6 s 4) 0.8 s

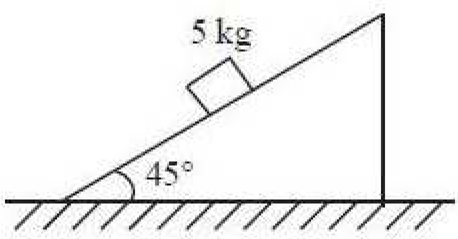
87) String AB unstretched length L is stretched by applying a force F at the mid-point C such that the segments AC and BC make an angle 'θ' with AB as shown in the figure. The string may be considered as an elastic element with a force to elongation ratio K. the force F is given by



1) KL(1-tanθ) sinθ 2) 2KL(1-cosθ) tanθ

3) KL(1-cosθ) tanθ 4) 2KL(1-sinθ) tanθ

88) A block of mass 5 Kg is kept against an acceleration wedge with a wedge angle of 45° to the horizontal. The co-efficient of friction between the block and the wedge is $\mu = 0.4$. What is the minium absolute value of the acceleration of the wedge to keep the block steady. Assume $g = 10 m/s^2$



1) $\frac{60}{7} m/s^2$

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

3) $\frac{30}{\sqrt{7}} m/s^2$

4) $\frac{60}{\sqrt{7}} m/s^2$

89) 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

1) $t^{\alpha-1}$

2) $t^{\alpha/2}$

3) $t^{\frac{1+\alpha}{2}}$

4) $t^{2\alpha}$

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

1) 0.5kg 2) 1.5kg 3) 2.5kg 4) 2kg

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

1) 87.5N

2) 26.2N

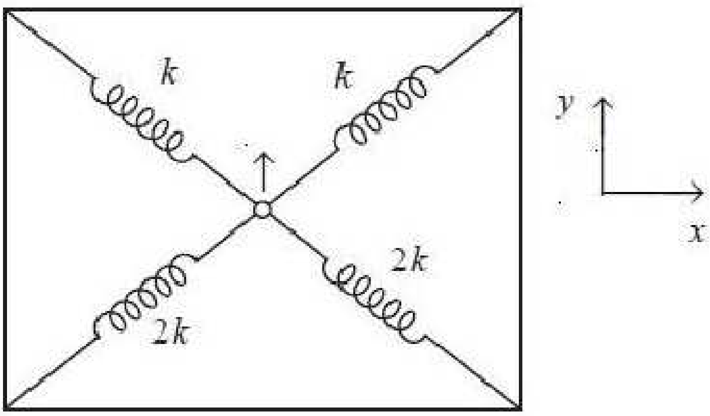
3) 78.9N

4) 110.3N

92) A solid sphere of radius R males a perfect rolling down on a plane which is inclines to the horizontal axis at an angle θ. If the radius of gyration is 'k', then its acceleration is

1) $\frac{g\sin\theta}{\left(1+\frac{k^2}{R^2}\right)}$ 2) $\frac{g\sin\theta}{\left(R^2+K^2\right)}$ 3) $\frac{g\sin\theta}{2\left(R^2+K^2\right)}$ 4) $\frac{g\sin\theta}{2\left(1+\frac{k^2}{R^2}\right)}$

93) 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, any side of the square and released, the period of oscillation will be



1) $2\pi\sqrt{\frac{m}{3k}}$ 2) $2\pi\sqrt{\frac{m}{3\sqrt{2}k}}$ 3) $2\pi\sqrt{\frac{m}{6k}}$ 4) $2\pi\sqrt{\frac{m}{2k}}$

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

1) 0.25 2) 0.5 3) 1.0 4) 1.25

95) A steel rod has radius 50 mm and length 2 m. It is stretches 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.

1) $2 \times 10^{10} Nm^2$

2) $10^{11} Nm^2$

3) $2 \times 10^{11} Nm^2$

4) $10^{12} Nm^2$

96) Consider a vessel filled with a liquid upto height H. The bottom of the vessel lies in the X-Y 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:

1) $\rho_0 gH$

2) $\frac{8}{5}\rho_0 gH$

3) $\frac{3}{2}\rho_0 gH$

4) $\frac{5}{3}\rho_0 gH$

97) 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 in SI units and R is gas constant)

1) $\frac{2V_0}{3R}$ 2) $\frac{2V_0}{R}$ 3) $\frac{3V_0}{2R}$ 4) None

98) 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

1) increases linearly

2) increases exponentially

3) decreases linearly

4) remains constant

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

1) $\frac{T_1 T_2}{(1-\eta)(1-1.5\eta)}$

2) $\frac{0.5 T_2 \eta}{(1-1.5\eta)(1-\eta)}$

3) $\frac{T_1}{1-\eta} - \frac{T_2}{1-1.5\eta}$

4) $\frac{(1-\eta)(1-1.5\eta)}{T_1 T_2}$

100) An air bubble rises from the bottom of a water tank of height 5m. If the initial volume of the bubble is $3mm^3$. What will be its volume as it reaches the surface. Assume that its temperature does not change.

[$g=9.8m/s^2$, $1atm=10^5Pa$, density of water=1gm/cc]

1) $1.5mm^3$

2) $4.5mm^3$

3) $9mm^3$

4) $6mm^3$

101) 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 superposed wave is

1) $2a\cos\frac{\phi}{2}$ 2) $2a\sin\phi$ 3) $2a\cos\phi$ 4) $2a\sin\frac{\phi}{2}$

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

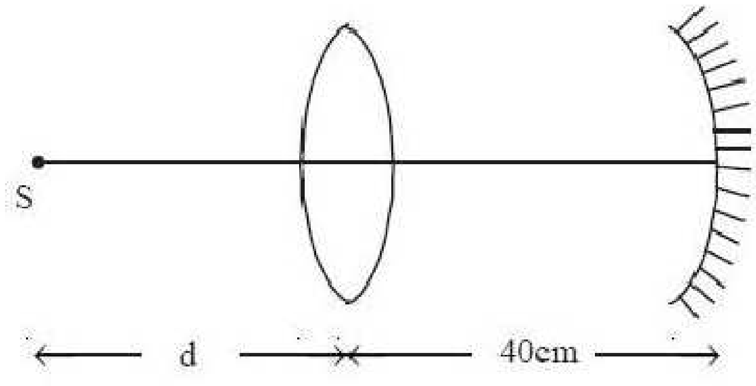
1) -6cm

2) -10cm

3) -12cm

4) -9cm

103) A converging mirror is placed on the right hand side af a converging lens as shown in the figure. The focus length of the mirror and the lens are 20cm and 15cm respectively. The separation between the lens and the mirror is 40cm and their principal axes 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:



1) 4cm

2) 8cm

3) 12cm

4) 16cm

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

1) 1.2m   2) 2.8m   3) 2.5m   4) 3.2m

105) A point charge of μC is placed in the XY plane at a location with radius vector $\overline{r}_0=2\hat{i}+3\hat{j}$ m. The electric field strength and its magnitude at a point with radius vector $\overline{r}=8\hat{i}-5\hat{j}$ m is ($\in_0=8.85\times10^{-12}C^2/N\text{-}m^2$)

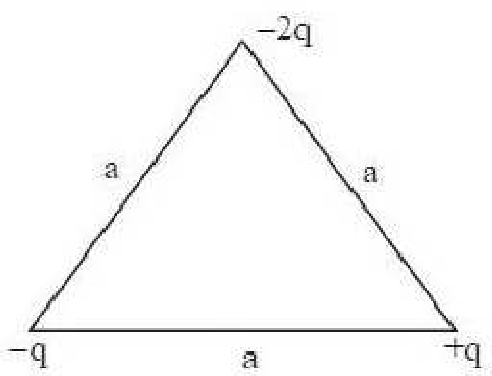
1) 4.5 kV/m

2) 45 kV/m

3) 0.45 kV/m

4) 450 kV/m

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



1) $\frac{-3q^2}{4\pi\varepsilon_0 a}$

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

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

4) 0

107) 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

1) If one bulb in (A) blows out all others will stop glowing

2) Bulbs in (A) glow brighter current flowing in (A) is higher

3) If one bulb in (B) blows, other bulbs will still glow

4) Bulbs in (B) have the highest voltage across each bulb

108) 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

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

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

3) $\frac{\rho\pi\sqrt{D_1D_2}}{4L^2}$

4) $\frac{4\rho L}{\pi D_1D_2}$

109) 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 $\sqrt{3}R_1$. This magnetic field at the centre of L_2 shall be zero if

1) $R_2=4R_1$ 2) $R_2=2R_1$ 3) $R_2=\sqrt{2}R_1$ 4) $R_2=8R_1$

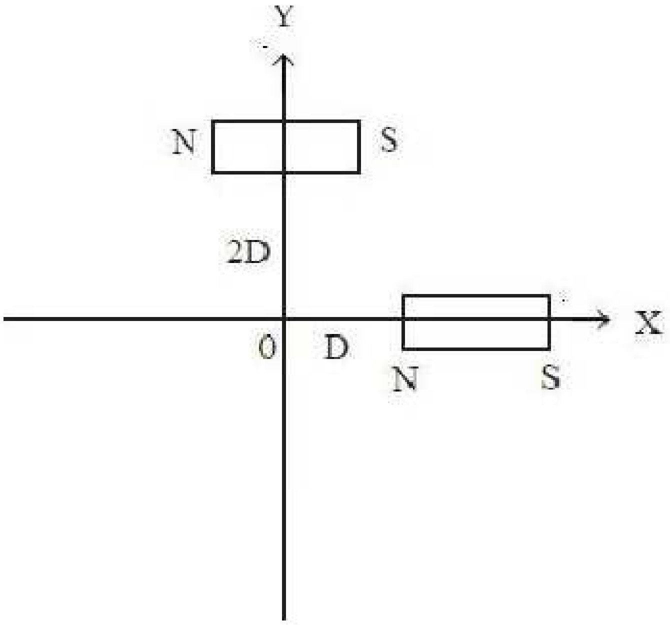
110) A non-conducting thin disc of radius R rotates about its axis with an angular velocity ω. The surface charge density on the disc varies with the distance r from the center as

$\sigma(r)=\sigma_0\left[1+\left(\frac{r}{R}\right)^{\beta}\right]$, 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

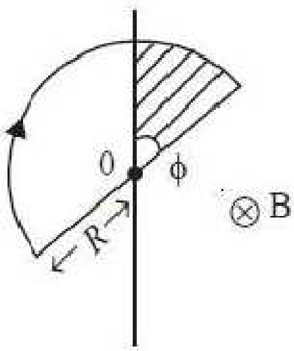
1) $\frac{1}{4}$ 2) 4 3) $\frac{1}{2}$ 4) 2

111) A bar magnetic moment M is placed at a distance D with its axis along positive X-axis. Likewise, second bar magnet 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 $\left|\vec{B}\right| = \alpha\left[\frac{\mu_0}{4\pi}\frac{M}{D^3}\right]$. The value of α must be (Assume D>>l where l is the length of magnets)



1) 2 2) $\frac{15}{8}$ 3) $\frac{17}{8}$ 4) $\frac{9}{8}$

112) A wire loop enclosing a semi-circle of radius 'R' is located on the boundary of a uniform magnetic field of induction $\vec{B}$. At time t=0, the loop is set into rotation with velocity 'ω' about its axis '0', coinciding with a line of vector $\vec{B}$ on the boundary as shown in the figure. The emf induced in the loop is



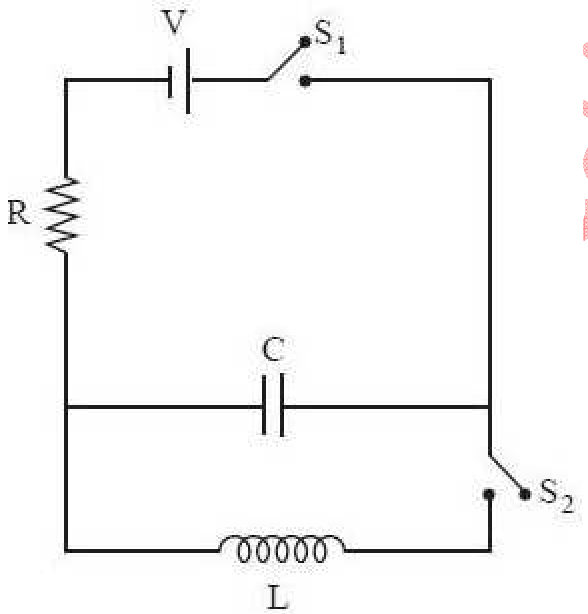
1) $\frac{BR^2}{2}\omega$

2) $BR\omega$

3) $BR^2\omega$

4) $\frac{BR^2}{2\omega}$

113) 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



1) $V\sqrt{\frac{L}{C}}$

2) $V\sqrt{\frac{C}{L}}$

3) $\frac{V}{2\pi}\sqrt{\frac{L}{C}}$

4) $2\pi V\sqrt{\frac{L}{C}}$

114) A 100 W electric bulb produces electromagnetic radiation with electric field amplitude of $\frac{2V}{m}$ at a distance of 10m. Assuming it as a point source, estimate the efficiency of the bulb.

1) 4.9%
2) 2.5%
3) 6.6%
4) 19.7%

115) At an incident radiation frequency of ν_1, which is greater than the threshold frequency, the stopping potential for a certain metal is V_1. At frequency $2\nu_1$ the stopping potential is $3V_1$. If the stopping potential at frequency $4\nu_1$ is nV_1, then n is

1) 2
2) 3
3) 6
4) 7

116) The de Broglie wavelength of an electron of kinetic energy 9eV is (take $h=4\times10^{-15}$eV.sec, $c=3\times10^{10}$cm/sec and the mass m_e of electron as $m_ec^2=0.5$MeV)

1) 4×10^{-8}cm
2) 3×10^{-8}cm
3) 4×10^{-7}cm
4) 3×10^{-7}cm

117) An active nucleus decays to one-third $\left(\frac{1}{3}\right)$ in 20 Hrs. The fraction of original activity remaining after 80 Hrs is

1) $\frac{1}{16}$ 2) $\frac{1}{81}$ 3) $\frac{1}{36}$ 4) $\frac{1}{54}$

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

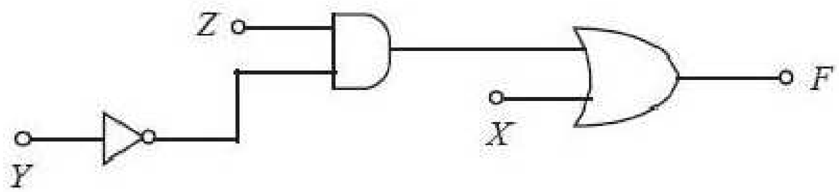
1) 1×10^4

2) 2×10^5

3) 8×10^5

4) 1×10^6

119) The output 'F' of the logic circuit given below is



1) $X+\overline{Y}.Z$

2) (Y+Z) .X

3) $(\overline{Y}+Z)+X$

4) $X+\overline{Y}+Z$

120) 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

1) 6V

2) 8V

3) 12V

4) 33.3V

TS EAMCET 2018 Engineering Stream Final Key Date: 04-05-2018 FN (Shift 1)	
81	4
82	1
83	2
84	1
85	4
86	2
87	3
88	2
89	1
90	4
91	1
92	1
93	2
94	2
95	3
96	4
97	4
98	1
99	2
100	2
101	4
102	2
103	3
104	3
105	1
106	3
107	2
108	4
109	4
110	1
111	2
112	1
113	2
114	3
115	4
116	1
117	2
118	2
119	1
120	3