TS EAMCET Physics Previous Questions with Key – Test 2

81)Match the entries in column A with those in column B.

Column-A	Column-B
a)unified interaction reducing the number of fundamental forces form forces formfour to three	i) strong interaction
b)force between two molecules separated by a distance near about the sum of the molecular radii	Gravitational force
c)nuclear binding force	iii) Electroweak interaction
d) bodies of astronomical proportions	iv) Electromagnetic interaction

1)a-iii, b-iv, c-I, d-ii 2)a-iii, b-I, c-ii, d-iv

3)a-iii, b-I, c-iv, d-ii 4)a-ii, d-I, c-iii, d-iv

82)Assertion(A): Electromagnetic force is enormously strong as compared to gravitational force. Yet, gravity dominates in the large-scale phenomena(e.g. formation of galaxies).

Reason(R):Existence of positive and negative charges make matter mostly electrically neutral.

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 and (R) is not the correct explanation of (A)

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

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

83)An object moves in a straight line with deceleration whose magnitude varies with velocity as $3v^{2/3}$. If at an initial point, the velocity is 8m/sec, then the distance travelled by the object before it stops is

1)2m

2)4m

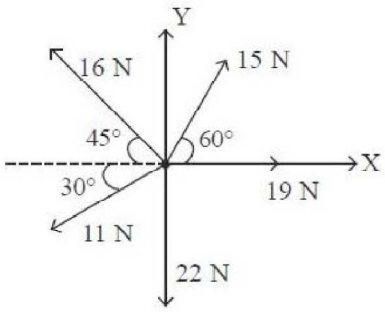
3)6m

4)8m

84)A particle starts form origin at time t = 0 and moves in positive X-direction. Its velocity $\vec{v}$ varies with time $\vec{v}=10t\hat{i}\,cm/sec$. The distance covered by the particle in 8 sec. will be

1)320cm 2)80cm 3)120cm 4)640cm

85)Consider an object kept at the center, in the XY plance, on which five coplanar forces act as shown in the figure. The resultant force on the object is



1)6.5N, 330° 2)6.5N, 300° 3)6.5N, 30° 4)5.7N, 330°

86)Consider an object making uniform motion around a circle of radius 5m with tangential velocity $2m^{s-1}$. The time it takes to complete 2 revolutions and the magnitude of acceleration respectively are

1)0.2π s & 0.8 ms^{-2}

2)0.5π s & 1.0 ms^{-2}

3)10π s & 0.8 ms^{-2}

4)5π & 5 m^{-2}

87)A small block starts sliding down an inclined plane forming an angle 45° with horizontal. The coefficient of friction μ, varies with distance s as $\mu = cs^2$ where 'c' is a constant of appropriate dimensions. Then, distance covered by the block before it stop is

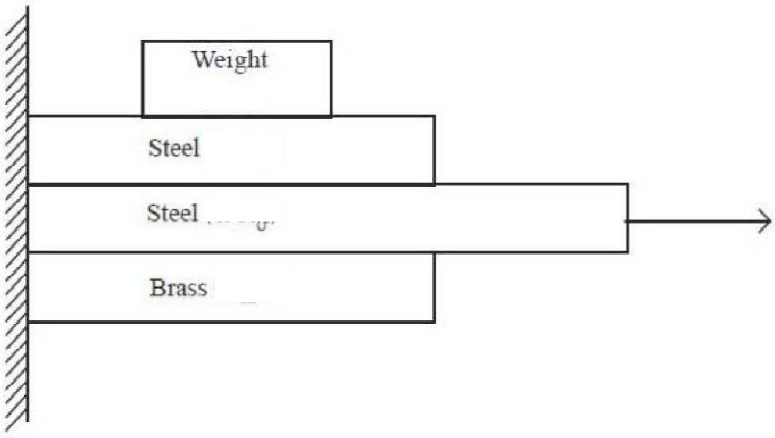
1)$\sqrt{\frac{3}{c}}$

2)$\sqrt{3c}$

3)$\sqrt{c}$

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

88)A movable steel plate is placed between fixed steel and brass plates and the stack of plates is subjected to weight of 100N as shown in the figure. The coefficient of kinetic friction for steel on steel is 0.57 and for steel on brass is 0.44. Assuming that the entire weight comes onto the stack and that the weight of the plates is negligible in comparison to the applied weight, the force required to move the middle plate in N is



1)13

2)101

3)440

4)570

89)A car of mass 1200 kg (together with the driver) is moving with a constant acceleration of $2m/s^2$. How much power does the engine generate at the instance when the speed reaches 20m/s? (Assume that the coefficient of friction between the car and the road is 0.5).

1)48000 W

2)12000 W

3)168000

4)288000 W

90)A ball moving with a velocity v, collides head on with a stationary second ball of same mass. After the collision the velocity of the first ball is reduced to 0.15 v. the kinetic energy of the system is decreased nearly by

1)20% 2)25% 3)30% 4)40%

91)A uniform disk of mass 100 kg and radius 2m is rotating at 1 rad/s about a perpendicular axis passing through its center. A boy of mass 60 kg, standing at the center of the dist suddently jumps to a point which is 1m from the center of the dist. The final angular velocity of the boy (in rad/s) is

1)0.77

2)0.5

3)1

4)2

92) A force $\vec{F}_1 = A\hat{j}$ is applied to a point whose radius vector $\vec{r}_1 = a\hat{i}$ while a force $\vec{F}_2 = B\hat{i}$ is applied to the point whose radius vector $\vec{r}_2 = b\hat{j}$. Both the radius vectors are determined relative to the origin of the coordinate axes 'O'. The moment of the force relative to 'O' is

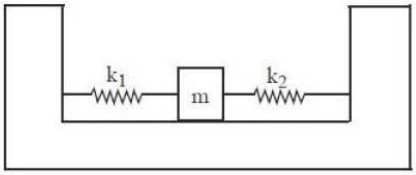
1)$(aA-bB)\hat{k}$

2)$(aA-bB)\hat{j}$

3)$(ab-AB)\hat{k}$

4)$(aB-bA)\hat{j}$

93)Two springs of spring constant k_1 and k_2 are connected by a mass 'm' as shown in the figure. Under negligible friction, if the mass is displaced by small amount 'x' form its equilibrium position and released, the period of oscillation is



1) $2\pi\sqrt{\frac{m(k_1+k_2)}{k_1k_2}}$

2) $2\pi\sqrt{\frac{m}{k_1+k_2}}$

3) $2\pi\sqrt{\frac{mk_2k_2}{(k_1+k_2)}}$

4) $2\pi\sqrt{\frac{m(k_1-k_2)}{k_2k_2}}$

94)The density of a solid sphere of radius R is $\rho(r)=20\frac{r^2}{R^2}$, where r is the distance from its center. If the gravitational field due to this sphere at a distance 4 R from its center is E and G is the gravitational constant, the ratio $\frac{E}{GR}$ is

1) $\frac{\pi}{5}$

2) 3π

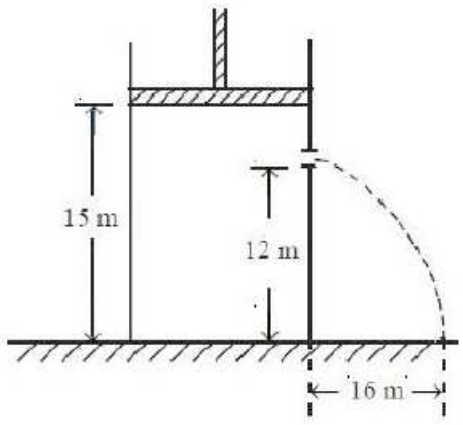
3) $\frac{3\pi}{2}$

4) π

95)In a tensile test on metal bar of diameter 0.015 m and length 0.2 m, the relation between the load and elongation within the proportional limit is found to be $F = 97.2\times10^6\ (\Delta L)$, where F is the load in N and ΔL is the elongation in m. The Young's modulus of the material in GPa is

1)75.5 2)85.6 3)98.7 4)110

96)A tank of height 15 m and cross-section area $10m^2$ is filled with water. There is a small hole of cross-section area 'a' which is much smaller than the container. Located at a height of 12 m from the base of the container. How much force should be applied with a piston at the top level, so what the wate coming out of the hole hits the ground at a distance of 16m. (take density of water = 1000 kg/m^3)



1)233 kN

2)200 kN

3)320 kN

4)400 kN

97)An ideal gas has molar heat capacity Cv at constant volume. The gas undergoes a process wherein the temperature changes as $T = T_0 (1 + \alpha V^2)$, where T and V are temperature and volume respectively, T_0 and α are positive constants. The molar heat capacity C of the gas is given as $C = Cv + Rf(V)$, where f(V) is a function of volume. The expression for f(V) is

1) $\frac{\alpha V^2}{1+\alpha V^2}$ 2) $\frac{1+\alpha V^2}{2\alpha V^2}$ 3) $\alpha V^2(1+\alpha V^2)$ 4) $\frac{1}{2\alpha V^2(1+\alpha V^2)}$

98)A container is filled with liquid that cools from 100 °C to 70 °C in 5 min. when kept at room temperature of 30 °C. The time that it must have taken to cool down to 80 °C from its initial temperature approximately is

1)1.7 min

2)2.6 mi

3)8.2 min

4)4.1 min

99)An ideal gas in a cylinder is compressed adiabatically to one-third of its original volume. A work of 45 J is done on the gas by the process. The change in internal energy of the gas and the heat flowed into the gas, respectively are

1)45J and zero

2)-45J and zero

3)45 J and heat flows out of the gas

4)-45 J and heat flows into the gas

100)In a cubic container of inner side length 10 cm, nitrogen gas of 100 kPa pressure is maintained at 300 K. If the pressure inside the gas is increased to 300 kPa by adding oxygen gas, the ratio of number of $N_2$to O_2 molecules in the container is

1)0.5

2)3.0

3)1.5

4)0.33

101)A source of sound whose frequency is 1000 Hz is moving with a speed 33 m/s. The waves reflected by a fixed obstacle are registered by a receiver that moves together with the source. (the speed of the sound waves is 330 m/s). The frequency registered by receiver is

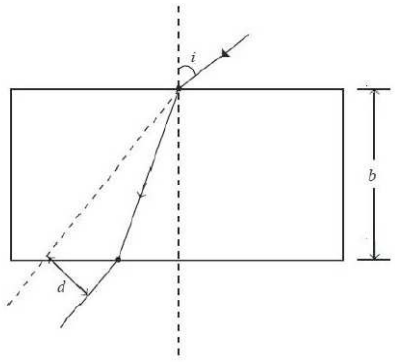
1)0.9kHz

2)1.1kHz

3)1.2kHz

4)2.2kHz

102)Figure shows a ray of light entering and passing through a dense glass slab and emerging from the other side. If the angle i = 60°, slab thickness b=0.04 m and the refractive index of glass = $\sqrt{3}$, the parallel shift 'd' between the emerging and entering rays in mm is



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

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

3) $\frac{40}{\sqrt{3}}$

4)$15\sqrt{3}$

103)Let S_1 be the amount of Rayleigh scattered light of wavelength λ_1 and S_2 that of light of wavelength λ_2 from a particle of size 'a'. Which of the following statements is true

1) $\frac{s_1}{s_2}=\left(\frac{\lambda_2}{\lambda_1}\right)^4$ if $\lambda_1,\lambda_2 >> a$

2) $\frac{s_1}{s_2}=\left(\frac{\lambda_1}{\lambda_2}\right)^4$ if $\lambda_1,\lambda_2 >> a$

3) $\frac{s_1}{s_2}=\left(\frac{\lambda_2}{\lambda_1}\right)^4$ if $\lambda_1,\lambda_2 << a$

4) $\frac{s_1}{s_2}=\left(\frac{\lambda_1}{\lambda_2}\right)^4$ if $\lambda_1,\lambda_2 << a$

104)In a Young's double slit experiment, a monochromatic light of wavelength 600 nm is used. If the two slits are covered by transparent sheets of thickness 0.132 mm and 0.1 mm of refractive index 1.5, the number of fringes that will shift due to introduction of the sheets are

1)20 2)40 3)60 4)80

105)The volume charge density in a spherical ball of radius R varies with distance r form the centre as $\rho(r)=\rho_0\left[1-\left(\frac{r}{R}\right)^3\right]$ Where ρ_0 is a constant. The radius at which the field would be maximum is

1) $\frac{R}{2^{1/3}}$ 2)R 3) $\frac{R}{2}$ 4) $\frac{R^{1/3}}{2}$

106)The potential $\phi(x, y)$ of an electrostatic field $\vec{E} = a(y\hat{i} + x\hat{j})$ is [a is a constant and $\hat{i}$ and $\hat{j}$ are unit vectors along X and Y axes]

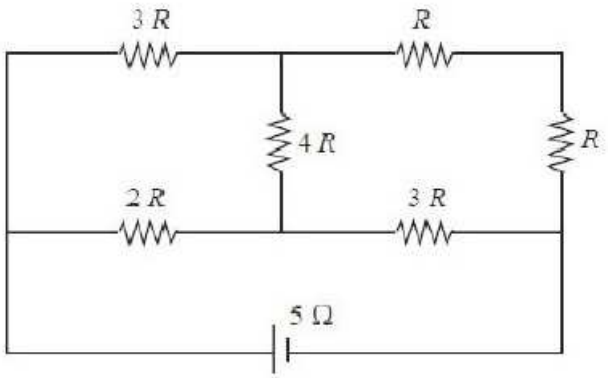
1)-2axy+ c (c is a constant)

2)axy + c (c is a constant)

3)a^2xy + c (c is a constant)

4)$a(xy)^2$ + c (c is a constant)

107)A resistance network is connected to a battery as shown in the figure below. If the internal resistance of the battery is 5Ω, the value of R (in Ω) for maximum power delivered to the network is



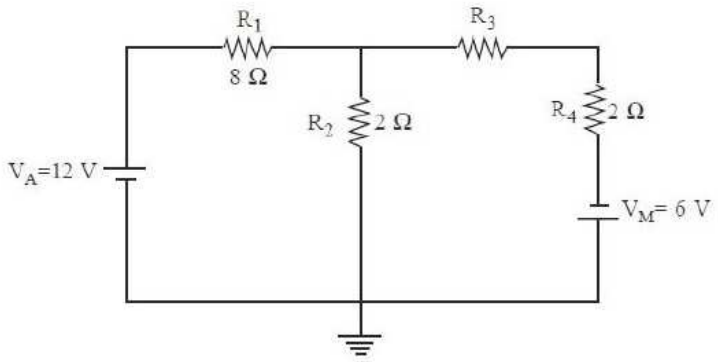
1)2

2)4

3)5

4)6

108)Find the voltage V_2 across R_2 for the given circuit



1)0.56 V

2)1.61 V

3)0.63 V

4) None

109)A moving coil galvanometer has rectangular wire coil of enclosed area 0.001 m^2 and 500 turns. The coil operates in a radial magnetic field of 0.2 T and carries a current of $6\pi \times 10^{-8}$ A. if the torsional spring constant is 6×10^{-7} N.m/rad, the angular deflection of the coil in radians is

1) $\frac{\pi}{100}$

2) $\frac{\pi}{200}$

3) $\frac{\pi}{300}$

4) $\frac{\pi}{400}$

110)A charge q enters a region having electric filed $\vec{E}$ and magnetic field $\vec{B}$ with velocity $\vec{v}$. If it continues to move with the same velocity then which of the following statements is not true

1) $\vec{E}.\vec{B}=0$

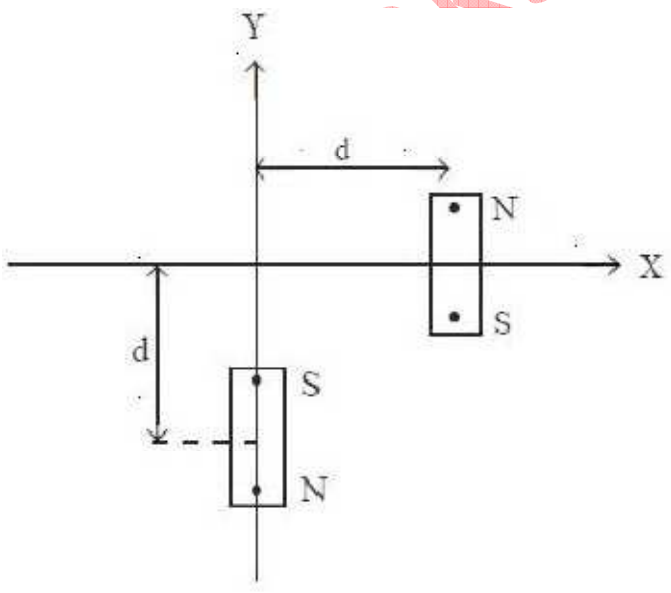
2) $\vec{E}.\vec{v}=0$

3) If $\vec{v}.\vec{B}=0$ then $\vec{v}=\frac{\vec{E}\times\vec{B}}{\vec{B}.\vec{B}}$

4) $\vec{v}\times\vec{E}=\vec{B}$

111)Two identical bar magnets of magnetic moment M each, are place along X and Y axis respectively at a distance d from the origin (as shown in the figure). The origin lies on perpendicular bisector of magnet place on X-axis of magnet place on Y –axis. If the magnetic field at the origin is $B=\alpha\left[\frac{\mu_0 M}{4\pi d^3}\right]$, the value of constant α will be:

(d >>l, where l is the length of the bar magnets and direction of N to S in magnets is opposite with respect to each other)



1)2

2)2

3)3

4)$\sqrt{5}$

112)A conducting rod of length L lies in X-Y plane and makes an angle 30° with the X-axis. One end of the ord lies at origin initially. A magnetic field also exists in the region pointing along Positive Z-direction. The magnitude of the magnetic field varies with y as $B_0\left(\frac{y}{L}\right)^3$ where B_0 constants. At some instant the rod starts moving with a velocity V_0 along X-axis. The emf induced in the rod is

1) $\frac{B_0 v_0 L}{64}$

2) $\frac{B_0 v_0 L}{16}$

3)$B_0 v_0 L$

4)$64 B_0 v_0 L$

113)An oscillating circuit consisting of a capacitor with capacitance C = 10 μF, a coil with inductance L = 6.0 μH and active resistance R = 10Ω. The mean power that should be fed to the circuit to maintain undamped harmonic oscillations with an external driving power with 50 Hz and a V_m of 280 V is

1)3.8 W 2)48W 3)3Mw 4)48 mW

114)If the magnetic field of a plane electromagnetic wave is given by 5×10^{-6} sin $(0.6 \times 10^{2} x + 0.5 \times 10^{10} t)$, then the speed of the wave is

1)0.83×10^{7} m/s

2)0.83×10^{8} m/s

3)5.24×10^{8} m/s

4)5.24×10^{9} m/s

115)An isolated lead ball is charged upon continuous irradiation by EM radiation of wavelength (λ) = 221 nm. The maximum potential attained by the lead ball. If its work function is 4.14 eV, is (take $h = 6.63 \times 10^{-34}$ J.s,$c = 3 \times 10^{8}$ m/s, $e = 1.6 \times 10^{-19}$C)

1)1.49V

2)2.67V

3)3.14V

4)0.51V

116)An energy of 13.6 eV is equal to

1)0.518×10^{-25} Kcal

2)6.04×10^{-25}kWh

3)2.17×10^{-10} J

4)2.17×10^{-15}kN.m

117)The frequency of light emitted when the electron makes transition from the level of principal quantum number n = 2 to the level with n = 1 is (take the ionization energy of hydrogen to be 13.6eV and h $\tilde{}$ 4 $\times 10^{-15}$ eV-sec)

1)2.55×10^{15} Hz

2)1.7×10^{15} Hz

3)3.4×10^{15} Hz

4)5.1×10^{15} Hz

118)In a junction transistor, the collector current changes by 6.8 mA if the emitter current is changed by 7 mA. For such transistor the current amplification factor is

1)30

2)34

3)40

4)45

119)In a p-n junction diode, an electric field of magnitude 2×10^5 V/m exists in the depletion region. A particle with charge -3|e| can diffuse form n-side to p-side, if it has minimum kinetic energy 0.6 eV. The width of the depletion region of the p-n junction is

1)300 nm

2)600

3)1000 nm

4)1200 nm

120)A person tries to broadcast with the same antenna both the signals at 10^7 Hz and 10^6 Hz. If the receiver at some distance has to receive an equal strength for both the frequencies, the broadcaster has to approximately increase the signal strength at 10^6 Hz to 10^7 Hz by

1) $\frac{1}{10}$ times

2)10 times

3)100 times

4) $\frac{1}{100}$ times

TS EAMCET 2018 Engineering Stream Final Key Date: 04-05-2018 AN (Shift 2)	
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82	1
83	2
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86	3
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120	3