Physics Galaxy Telegram Test Series

DPYQ JEE Main FULL Test - 1 for JEE Main & NEET Aspirants

Topic : **Full Syllabus** Time: 75 Min Marking: +4 –1

Section - A : MCQs with Single Option Correct

1. A, B, C and D are four different physical quantities having different dimensions. None of them is dimensionless. But we know that the equation $AD = C \ln (BD)$ holds true. Then which of the combination is not a meaningful quantity ?

[DPYQ From 2016]

(A) $\frac{C}{BD} - C$ (B) $A^2 - B^2C^2$

(C) $\frac{A}{B} - C$ (D) $\frac{(A-C)}{D}$

2. A person climbs up a stalled escalator in 30 s. If standing on the same but escalator running with constant velocity he takes 20 s. How much time is taken by the person to walk up the moving escalator ?

[DPYQ From 2014]

(A) 37 s (B) 27 s

(C) 24 s (D) 12 s

3. Two forces P and Q of magnitude $2F$ and $4F$, respectively, are at an angle θ with each other. If the force Q is doubled, then their resultant also gets doubled. Then, the angle is :

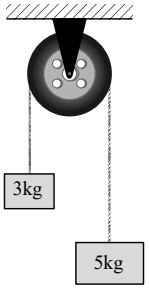
[DPYQ From 2019]

(A) $\cos^{-1}\left(\frac{2}{8}\right)$ (B) 60°

(C) $\cos^{-1}\left(-\frac{3}{8}\right)$ (D) 120°

4. Two blocks of masses 3 kg are connected by a metal wire going over a smooth pulley. The breaking stress of the metal is $\frac{75}{2\pi} \times 10^2\ \text{Nm}^{-2}$. What is the minimum radius of the wire ? (take $g = 10\ \text{ms}^{-2}$) :

[DPYQ From 2021]



(A) 1000 cm (B) 0.1 cm

(C) 100 cm (D) 10 cm

5. A bullet of mass 50 g has an initial speed of 1 ms^{-1}, just before it starts penetrating a mud wall of thickness 19 cm. If the wall offers a mean resistance of 2.5×10^{-2} N, the speed of the bullet after emerging from the other side of the wall is close to:

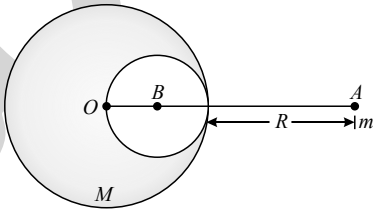
[DPYQ From 2019]

(A) 0.4 ms^{-1} (B) 0.1 ms^{-1}

(3) 0.9 ms^{-1} (D) 0.7 ms^{-1}

6. A solid sphere of radius R gravitationally attracts a particle placed at 2R from its centre with a force F_1. Now a spherical cavity of radius $\left(\frac{R}{2}\right)$ is made in the sphere (as shown in figure) and the force becomes F_2. The value of $F_1 : F_2$ is :

[DPYQ From 2021]



(A) 25 : 36 (B) 50 : 41

(C) 41 : 50 (D) 9 : 7

7. A steel wire having a radius of 2.0 mm, carrying a load of 4 kg, is hanging from a ceiling. Given that $g = 3.1\ \pi\ \text{ms}^{-2}$, what will be the tensile stress that would be developed in the wire ?

[DPYQ From 2019]

(A) $4.8 \times 10^6\ \text{Nm}^{-2}$ (B) $5.2 \times 10^6\ \text{Nm}^{-2}$

(C) $6.2 \times 10^6\ \text{Nm}^{-2}$ (D) $3.1 \times 10^6\ \text{Nm}^{-2}$

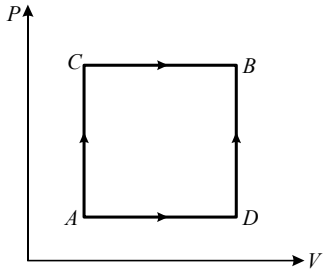
8. A hollow spherical shell at outer radius R floats just submerged under the water surface. The inner radius of the shell is r. If the specific gravity of the shell material is $\frac{27}{19}$ w.r.t. water, the value of r is :

[DPYQ From 2020]

(A) $\frac{4}{9}R$ (B) $\frac{8}{9}R$

(C) $\frac{1}{3}R$ (D) $\frac{2}{3}R$

9. A gas can be taken from A to B via two different processes ACB and ADB. When path ACB is used 80 J of heat flows into the system and 40 J of work is done by the system. If path ADB is used work done by the system is 10 J. The heat Flow into the system in path ADB is : **[DPYQ From 2019]**



(A) 80 J (B) 50 J
(C) 100 J (D) 40 J

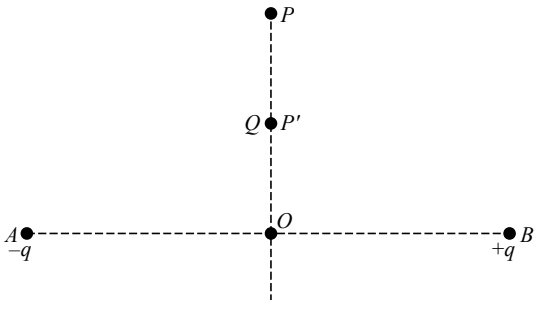
10. An ideal gas has molecules with 3 degrees of freedom. The ratio of specific heats at constant pressure (C_p) and at constant volume (C_v) is : **[DPYQ From 2017]**

(A) 6 (B) $\frac{7}{2}$
(C) $\frac{5}{3}$ (D) $\frac{7}{5}$

11. The pressure wave, $P = 0.01 \sin [1000t - 3x]$ Nm^{-2}, corresponds to the sound produced by a vibrating blade on a day when atmospheric temperature is 0°C. On some other day, when temperature is T, the speed of sound produced by the same blade and at the same frequency is found to be 336 ms^{-1}. Approximate value of T is : **[DPYQ From 2019]**

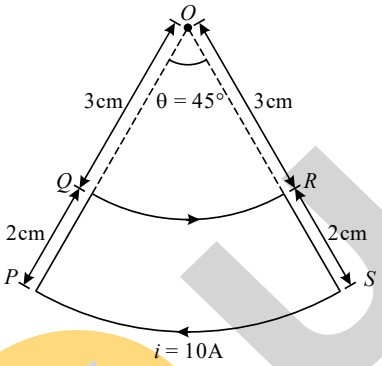
(A) 15°C (B) 12°C
(C) 4°C (D) 11°C

12. Charges $-q$ and $+q$ located at A and B, respectively, constitute an electric dipole. Distance $AB = 2a$, O is the mid point of the dipole and OP is perpendicular to AB. A charge Q is placed at P where $OP = y$ and $y >> 2a$. The charge Q experiences and electrostatic force F. If Q is now moved along the equatorial line to P' such that $OP' = \left(\frac{y}{2}\right)$, the force on Q will be close to. $\left(\frac{y}{2} >> 2a\right)$: **[DPYQ From 2019]**



(A) $\frac{F}{3}$ (B) $3F$
(C) $8F$ (D) $27F$

13. A current loop, having two circular arcs joined by two radial lines is shown in the figure. It carries a current of 15 A. The magnetic field at point O will be close to : **[DPYQ From 2019]**

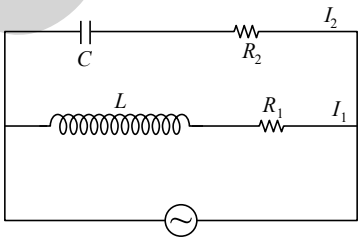


(A) 1.0×10^{-5} T (B) 1.5×10^{-5} T
(C) 1.0×10^{-7} T (D) 1.0×10^{-7} T

14. A small bar magnet placed with its axis at 30° with an external field of 0.06 T experiences a torque of 0.030 Nm. The minimum work required to rotate it from its stable to unstable equilibrium position is : **[DPYQ From 2020]**

(A) 9.2×10^{-3} J (B) 12×10^{-2} J
(C) 11.7×10^{-3} J (D) 7.2×10^{-2} J

15.



In the above circuit, $C = \frac{\sqrt{3}}{2}\mu F$, $R_2 = 20\ \Omega$, $L = \frac{\sqrt{3}}{10}$ H and $R_1 = 10\sqrt{3}\ \Omega$. Current in L-R_1 path is I_1 and in C-R_2 path it is I_2. The voltage of A.C source is given by $V = 200\sqrt{2}\sin(100t)$ volts. The phase difference between I_1 and I_2 is : **[DPYQ From 2019]**

(A) 30° (B) 0°
(C) 90° (D) 135°

16. The electric field component of a monochromatic radiation is given by

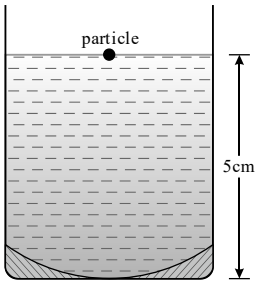
$$\vec{E} = 2E_0\hat{i}\cos kz \cos \omega t$$

Its magnetic field $\vec{B}$ is then given by : **[DPYQ From 2017]**

(A) $\frac{2E_0}{c}\hat{j}\ \sin kz \cos \omega t$ (B) $\frac{2E_0}{c}\hat{j}\ \cos kz \sin \omega t$

(C) $\frac{2E_0}{c}\hat{j}\ \sin kz \sin \omega t$ (D) $\frac{2E_0}{c}\hat{j}\ \cos kz \cos \omega t$

17. A concave mirror has focal length of 20 cm. It is at the bottom of a glass that has water filled up to 5 cm (see figure). If a small particle is floating on the surface of water, its image as seen, from directly above the glass, is at a distance d from the surface of water. The value of d is close to : (Refractive index of water = 1.33) : **[DPYQ From 2019]**



(A) 8.8 cm (B) 11.7 cm
(C) 6.7 cm (D) 13.4 cm

18. The energy required to remove the electron from a singly ionized Helium atom is 2 times the energy required to remove an electron from Helium atom. The total energy required to ionize the Helium atom completely is : **[DPYQ From 2018]**

(A) 20 eV (B) 79 eV
(C) 109 eV (D) 81.6 eV

19. Mobility of electrons in a semiconductor is defined as the ratio of their drift velocity to the applied electric field. If, for an n-type semiconductor, the density of electrons is 10^{18} m^{-3} and their mobility is 1.6 $m^2/(V.s)$ then the resistivity of the semiconductor (since it is an n-type semiconductor contribution of holes is ignored) is close to : **[DPYQ From 2019]**

(A) 2 Ωm (B) 0.4 Ωm
(C) 4 Ωm (D) 0.2 Ωm

20. The density of a material in the shape of a cube is determined by measuring three sides of the cube and its mass. If the relative errors in measuring the mass and length are respectively 1.5% and 2%, the maximum error in determining the density is : **[DPYQ From 2018]**

(A) 7.5% (B) 3.5%
(C) 4.5% (D) 6%

Section- B: INTEGER Answer Type Questions

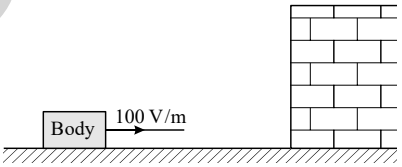
1. A radioactive sample has an average life of 30 ms and is decaying. A capacitor of capacitance 200 μF is first charged and later connected with resistor 'R'. If the ratio of charge on capacitor to the activity of radioactive sample is fixed with respect to time then the value of 'R' should be _____Ω. **[DPYQ From 2021]**

2. A uniform chain of length 3 meter and mass 5 kg overhangs a smooth table with 2 meter laying on the table. If k is the kinetic energy of the chain in joule as it completely slips off the table, then the value of k is _____ . **[DPYQ From 2021]**

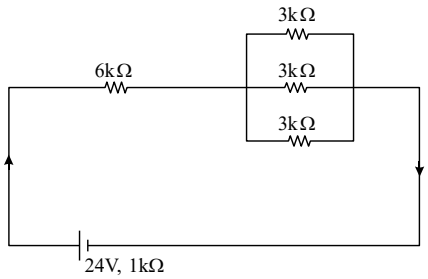
3. A non-isotropic solid metal cube has coefficients of linear expansion as :
5×10^{-5}/°C along the x-axis and 10×10^{-6}/°C along the y and the z-axis. If the coefficient of volume expansion of the solid is $C \times 10^{-16}$/°C then the value of C is _____. **[DPYQ From 2020]**

4. A particle executes SHM with amplitude A and time period T. The displacement of the particle when its speed is one-fourth of maximum speed is $\frac{\sqrt{x}A}{4}$. The value of x is _____. **[DPYQ From 2021]**

5. A body having specific charge 10 μC/g is resting on a frictionless plane at a distance 80 cm from the wall (as shown in the figure). It starts moving towards the wall when a uniform electric field of 100 V/m is applied horizontally towards the wall. If the collision of the body with the wall is perfectly elastic, the time period of the motion will be _____s. **[DPYQ From 2021]**



6. In the figure given, the electric current flowing through the 5 kΩ resistor is 'x' mA.



The value of x to the nearest integer is _____. **[DPYQ From 2021]**

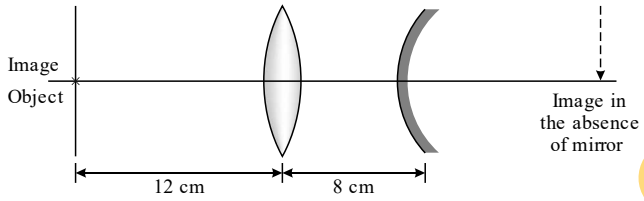
7. Two concentric circular coils, C_1 and C_2, are placed in the XY plane. C_1 has 500 turns, and a radius of 1 cm. C_2 has 200 turns and radius of 20 cm. C_2 carries a time dependent current

$I(t) = (5t^2 - 4t + 3)$. A where t is in s. The emf induced in C_1 (in mV), at the instant $t = 1$s is $\frac{6}{x}$. The value of x is :

[DPYQ From 2020]

8. An object Is placed at a distance of 12 cm from a convex lens. A convex mirror of focal length 15 cm is placed on other side of lens at 8 cm as shown in the figure. Image of object coincides with the object. When the convex mirror is removed, a real and inverted image is formed at a position. The distance of the image from the object will be _____ (cm).

[DPYQ From 2021]



9. In a Young's double slit experiment 15 fringes are observed on a small portion of the screen when light of wavelength 200 nm is used. Ten fringes are observed on the same section of the screen when another light source of wavelength λ is used. Then the value of λ is (in nm) _____. **[DPYQ From 2020]**

10. A beam of electromagnetic radiation of intensity 6.4×10^{-5} W/cm^2 is comprised of wavelength, $\lambda = 310$ nm. It falls normally on a metal (work function $\varphi = 2\ eV$) of surface area of 1 cm^2. If one in 10^4 photons ejects an electron, total number of electrons ejected in 1 s is 10^x. ($hc = 1240\ eVnm$, $1\ eV = 1.6 \times 10^{-19}$ J), then x is_____. **[DPYQ From 2020]**

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ANSWER KEY

Section - A : MCQs with Single Option Correct

1. (D)	**2.** (D)	**3.** (C)	**4.** (D)
5. (C)	**6.** (D)	**7.** (D)	**8.** (D)
9. (B)	**10.** (C)	**11.** (C)	**12.** (C)
13. (B)	**14.** (B)	**15.** (D)	**16.** (C)
17. (A)	**18.** (D)	**19.** (C)	**20.** (A)

Section- B: INTEGER Answer Type Questions

1. (150)	**2.** (70)	**3.** (65)	**4.** (15)
5. (0.8)	**6.** (3)	**7.** (10)	**8.** (50)
9. (300)	**10.** (10)		