

MEMORY BASED QUESTIONS JEE–MAIN EXAMINATION – JANUARY 2026

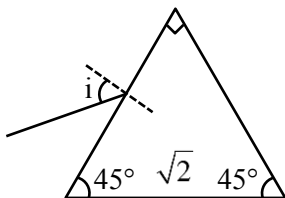
(HELD ON WEDNESDAY 21st JANUARY 2026)

TIME : 3:00 PM TO 6:00 PM

PHYSICS

TEST PAPER WITH SOLUTION

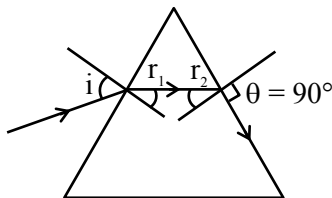
1. Refractive index of prism is $\sqrt{2}$. What should be angle of incidence for a light ray such that the emerging ray grazes out the surface :



- (1) 60° (2) 30°
 (3) 90° (4) 45°

Ans. (3)

Sol.



$$\sqrt{2} \sin r_2 = 1 \sin 90^\circ$$

$$r_2 = 45^\circ$$

$$r_1 + r_2 = A$$

$$r_1 = 45^\circ$$

$$1 \sin i = \sqrt{2} \sin 45^\circ$$

$$i = 90^\circ$$

2. For YDSE experiment, for angular fringe width :

Statement-1 :- If distance between slits and screen increases then width increases.

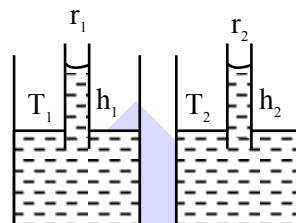
Statement-2 :- Angular fringe width depends on frequency of source.

- (1) **Statement 1** is true & **Statement 2** is false
 (2) **Statement 1** is false & **Statement 2** is true
 (3) Both are true
 (4) Both are false

Ans. (2)

Sol. Angular fring width is given by λ/d .

3. Two capillaries are dipped in two different liquids having meniscus radius R_1, R_2 ($R_1 > R_2$) and surface Tension T_1 & T_2 . If density of liquids are same :



- (1) $h_1 = h_2$ then $T_1 = T_2$
 (2) $h_1 > h_2$ then $T_1 = T_2$
 (3) $h_1 > h_2$ then $T_1 < T_2$
 (4) $h_1 < h_2$ then $T_1 = T_2$

Ans. (4)

Sol. $h = \frac{2T}{R\rho g}$

$$h \propto \frac{1}{R}$$

Given $R_1 > R_2$

then $h_1 < h_2$

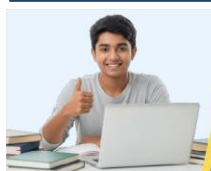
4. A particle is performing S.H.M. with frequency f_0 . If frequency of oscillations of its kinetic energy is 176 Hz, find out f_0

Ans. (88 Hz)

Sol. as we know $f_{KE} = 2f_0$

$$f_0 = \frac{f_{KE}}{2} = \frac{176}{2}$$

$$= 88 \text{ Hz}$$

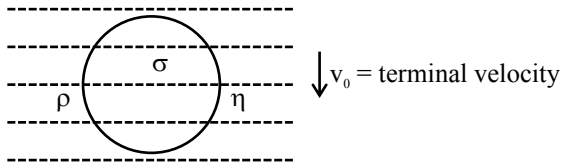


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10. Figure shows a ball falling in a viscous medium with coefficient of viscosity η . If error in measurement of radius is Δr & that is measurement of terminal velocity is Δv_0 . Density of ball & liquid is exactly known, then fractional error in measurement of η (coefficient of viscosity)



(1) $\frac{\Delta\eta}{\eta} = \frac{2\Delta r}{r} + \frac{\Delta v_0}{v_0}$ (2) $\frac{\Delta\eta}{\eta} = \frac{2\Delta r}{r} - \frac{\Delta v_0}{v_0}$
 (3) $\frac{\Delta\eta}{\eta} = 2\left(\frac{\Delta r}{r} + \frac{\Delta v_0}{v_0}\right)$ (4) $\frac{\Delta\eta}{\eta} = 2\left(\frac{\Delta r}{r} - \frac{\Delta v_0}{v_0}\right)$

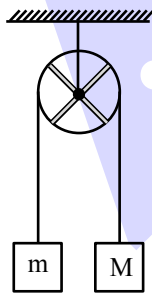
Ans. (1)

Sol. $v_0 = \frac{2}{9}(\rho_s - \rho_l) \frac{r^2 g}{\eta}$ (Here v_0 is terminal velocity)

$\Rightarrow \eta = \frac{2}{9}(\rho_s - \rho_l) \frac{r^2 g}{v_0}$

$\therefore \frac{\Delta\eta}{\eta} = \frac{2\Delta r}{r} + \frac{\Delta v_0}{v_0}$

11. A ring and two rods each of mass M are able to rotate freely about its centre as shown. Find acceleration of each block? There is no slipping between string and pulley.



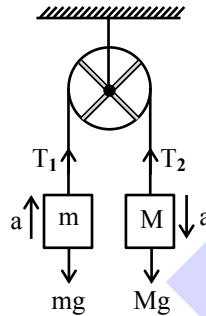
(1) $\frac{(M-m)g}{5M+m}$
 (2) $\frac{2(M-m)g}{8M+m}$

(3) $\frac{3(M-m)g}{8M+3m}$

(4) $\frac{2(M-m)g}{5M+2m}$

Ans. (3)

Sol.



$Mg - T_2 = Ma$... (1)

$T_1 - mg = ma$... (2)

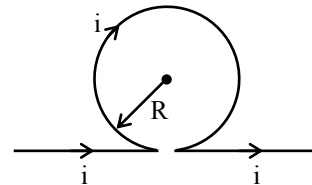
$(T_2 - T_1)r = I \frac{a}{r}$... (3)

(1) + (2) + (3)

$(M-m)g = \left(M + m + \frac{I}{r^2}\right)a$

Here $I = Mr^2 + \frac{M \times (2r)^2}{12} \times 2$

12. Current i is flowing in the long wire as shown in figure. Find magnetic field at centre of circle.



(1) $B = \frac{\mu_0 i}{R} + \frac{\mu_0 i}{2\pi R}$

(2) $B = \frac{\mu_0 i}{2R} + \frac{\mu_0 i}{\pi R}$

(3) $B = \frac{\mu_0 i}{2R} + \frac{\mu_0 i}{2\pi R}$

(4) $B = \frac{\mu_0 i}{R} + \frac{\mu_0 i}{\pi R}$

Ans. (3)

Sol. $B = \frac{\mu_0 i}{2R} + \frac{\mu_0 i}{2\pi R}$

13. If position of a particle is given $x = t^2 + t + 1$. Mass of particle is 2 kg. Find work done by force from $t = 2$ sec to $t = 3$ sec.

(1) 24 Joule

(2) 21 Joule

(3) 28 Joule

(4) 20 Joule

Ans. (1)



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Sol. $v = \frac{dx}{dt} = 2t + 1$

$a = 2 ; F = ma$

$F = 2 \times 2 = 4N$

$x_{(t=2\text{sec})} = 2^2 + 2 + 1 = 7$

$x_{(t=3\text{sec})} = 3^2 + 3 + 1 = 13$

Displacement = $\Delta x = 13 - 7 = 6$

Work done by force = $F \times x$

= $4 \times 6 = 24 J$

14. Terminal velocity of a spherical ball of radius 6mm in a liquid is given as 20 cm/sec. Find terminal velocity (in cm/s) of a ball of 3mm radius in same liquid.

- (1) 5 (2) 10
(3) 7 (4) 9

Ans. (1)

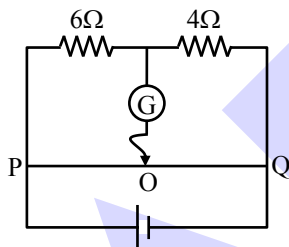
Sol. We know :

Terminal velocity $\propto (\text{radius})^2$

$$\frac{(v_T)_1}{(v_T)_2} = \left(\frac{6}{3}\right)^2$$

$$(v_T)_2 = \frac{(v_T)_1}{4} = 5 \text{ cm/sec}$$

15. The total length of potential wire PQ is 50 cm in the arrangement shown in the figure. Find out balance length PO (in cm).



- (1) 25 (2) 20
(3) 30 (4) 35

Ans. (3)

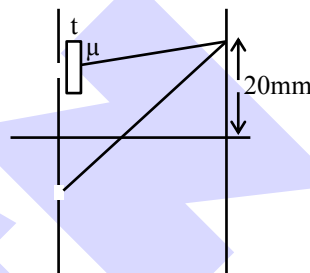
Sol. $\frac{6}{4} = \frac{x}{50-x}$

$$\frac{3}{2} = \frac{x}{50-x}$$

$$150 - 3x = 2x$$

$$x = \frac{150}{5} = 30 \text{ cm}$$

16. In YDSE experiment, central maxima shift by 20 mm if a slab of thickness 20 μm and refractive index μ is placed in front of one of the slits. If distance between slits is 4×10^{-4} m and screen is placed 1m away from slits. Then refractive index is α/10. Find α.



Ans. 14

Sol. $\frac{Y}{D} \cdot t = t(\mu - 1)$

$$\mu = \left(\frac{Yd}{Dt} + 1\right)$$

$$= \left(\frac{20 \times 10^{-3} \times 4 \times 10^{-4}}{1 \times 20 \times 10^{-6}}\right) + 1$$

$$= \frac{4}{10} + 1$$

$$\Rightarrow \mu = \frac{14}{10}$$

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17. A medium having conductivity 10 siemen/meter. Electromagnetic waves of frequency 100 MHz are passed through this medium. Find ratio of maximum displacement current & conduction current. (Given : $\epsilon_r = 2$)

- (1) 400 (2) 600
(3) 900 (4) 1000

Ans. (3)

Sol. $i_c = A \cdot \sigma E = A \sigma E_0 \sin(\omega t - kx)$

$$i_d = A \epsilon_r \epsilon_0 \frac{\partial E}{\partial t}$$

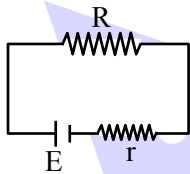
$$= A \epsilon_r \epsilon_0 E_0 \omega \cos(\omega t - kx)$$

$$\frac{i_{c \max}}{i_{d \max}} = \frac{\sigma}{\epsilon_r \epsilon_0 \omega}$$

$$= \frac{10}{2 \times 8.85 \times 10^{-12} \times 100 \times 10^6}$$

= 900

18. In a circuit, there is a battery with internal resistance r and emf E , which is connected to external load resistance R as shown. Find value of R so that maximum power dissipates across R :



- (1) $R = r$ (2) $R = \frac{r}{2}$
(3) $R = \sqrt{2} r$ (4) $R = 2r$

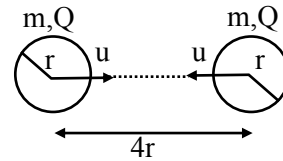
Ans. (1)

Sol. For maximum power drawn across load Resistance

$$R_{\text{Load}} = R_{\text{internal}}$$

$$\boxed{R = r}$$

19. Two spheres of same mass m radius r and charge at separation $4r$ are moving with same speed u towards each other as shown in figure:



Find the u_{\min} so that they collide

- (1) $\sqrt{\frac{KQ^2 - Gm^2}{4mr}}$ (2) $\sqrt{\frac{KQ^2 - Gm^2}{2mr}}$
(3) $\sqrt{\frac{KQ^2 - Gm^2}{8mr}}$ (4) $\sqrt{\frac{2KQ^2 - Gm^2}{8mr}}$

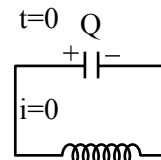
Ans. (1)

Sol. Using energy conservation

$$(2) \left(\frac{1}{2} mu^2 \right) - \frac{Gm^2}{4r} + \frac{KQ^2}{4r} = -\frac{Gm^2}{2r} + \frac{KQ^2}{2r}$$

$$u = \sqrt{\frac{1}{4mr} (KQ^2 - Gm^2)}$$

20. In an L-C circuit at $t = 0$ capacitor is fully charged and zero current in circuit. At $t = t_0$, 25% energy of capacitor goes into inductor then value of t_0 is :



- (1) $\frac{\pi}{3} \sqrt{LC}$ (2) $\frac{\pi}{6} \sqrt{LC}$
(3) $\frac{3}{2} \pi \sqrt{LC}$ (4) $\frac{\pi}{2} \sqrt{LC}$

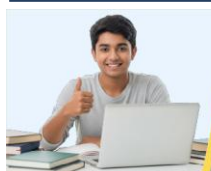
Ans. (2)

Sol. $U_{c_f} = 75\% U_{c_i}$

$$Q_F^2 = \frac{3}{4} Q_I^2$$

$$Q_i \cos \omega t = \frac{\sqrt{3}}{2} Q_i \Rightarrow t = \frac{T}{12}$$

$$t = \frac{\pi}{6} \sqrt{LC}$$

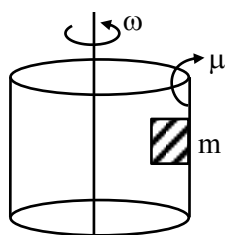


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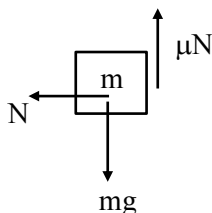
21. Find ω such that block does not slip on the surface of cylinder :



- (1) $\sqrt{\frac{g}{\mu r}}$ (2) $\frac{g}{\mu r}$
 (3) $\sqrt{\frac{gr}{\mu}}$ (4) $r\sqrt{\frac{g}{\mu}}$

Ans. (1)

Sol.



$$N = m\omega^2 r \text{ and } mg = \mu N$$

$$\mu \times m\omega^2 r = mg$$

$$\omega = \sqrt{\frac{g}{\mu r}}$$

22. For a diatomic gas undergoing an isobaric process, work done is 100 Joules then calculate heat supplied during the process :

- (1) 350 (2) 400
 (3) 450 (4) 700

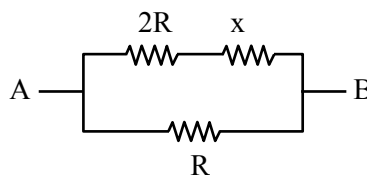
Ans. (1)

Sol. $w = 100 \text{ J} = nR\Delta T$ for isobaric process.

$$Q = nC_p\Delta T = \left(\frac{f}{2} + 1\right)nR\Delta T$$

$$= \frac{7}{2} \cdot (100) = 350 \text{ Joule.}$$

23. For the given network, the net resistance across AB = x. Then find the value of x :



- (1) $x = R(\sqrt{2} - 1)$ (2) $x = R(\sqrt{3} + 1)$
 (3) $x = R(\sqrt{2} + 1)$ (4) $x = R(\sqrt{3} - 1)$

Ans. (4)

Sol. $\frac{(2R + x)R}{3R + x} = x$

$$2R^2 + xR = 3Rx + x^2$$

$$x^2 + 2Rx - 2R^2 = 0$$

$$x = \frac{-2R \pm \sqrt{4R^2 + 8R^2}}{2}$$

$$= \frac{-2R \pm 2\sqrt{3}R}{2}$$

$$= R(\sqrt{3} - 1)$$

24. V_{rms} of O_2 gas at 47°C is equal to V_{rms} of H_2 at what temp in celsius:

- (1) -253°C (2) -20°C
 (3) $+20^\circ\text{C}$ (4) $+253^\circ\text{C}$

Ans. (1)

Sol. $V_{rms} = \sqrt{\frac{3RT}{M}}$

$$V_{rmsO_2} = V_{rmsH_2}$$

$$T_{O_2} = 273 + 47 = 320\text{K}$$

$$\sqrt{\frac{3RT_{O_2}}{M_{O_2}}} = \sqrt{\frac{3RT_{H_2}}{M_{H_2}}}$$

$$\frac{T_2}{M_{O_2}} = \frac{T_{H_2}}{M_{H_2}}$$

$$\frac{320}{32} = \frac{T_{H_2}}{2}$$

$$T_{H_2} = 20\text{K}$$

$$T_{H_2} = -253^\circ\text{C}$$



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25. Energy of an electron in Bohr's model is $-0.04E_0$ eV, where E_0 is ground state energy. If L is angular momentum of electron & h is Planck's constant then $\frac{2\pi L}{h}$ is:

Ans. (5)

Sol. angular momentum $L = \frac{nh}{2\pi}$

$$n = \frac{2\pi L}{h}$$

$$\text{Energy } E = -\frac{13.6}{n^2} \cdot z^2 = -0.04 \times \left(\frac{+13.6}{1} \cdot z^2 \right)$$

$$n^2 = 25$$

$$\boxed{n = 5}$$

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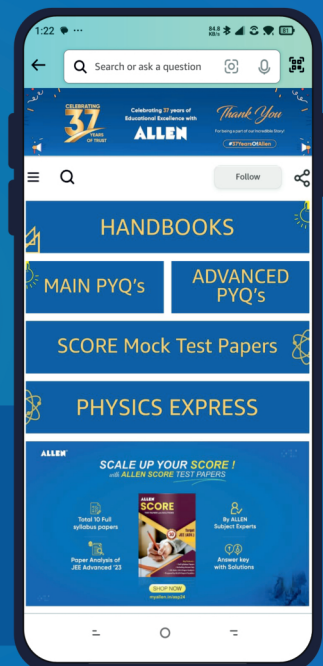
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