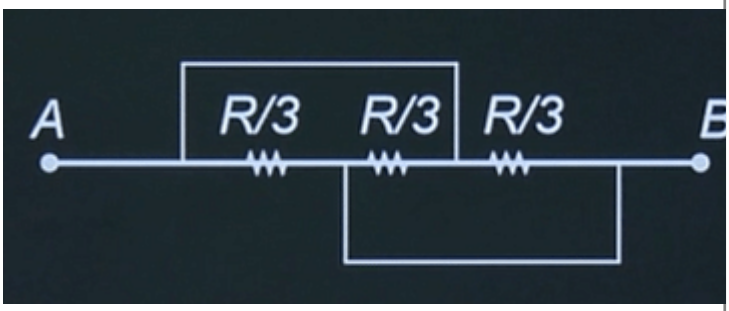
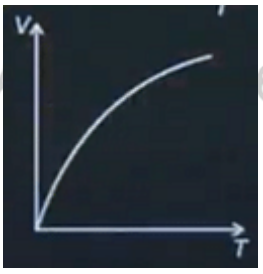
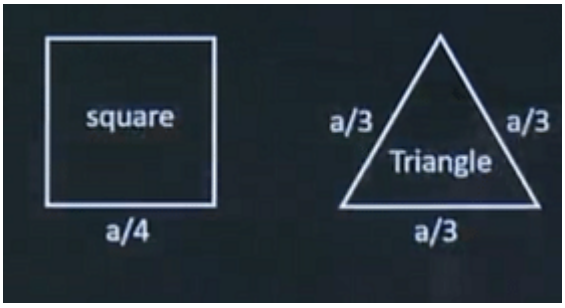
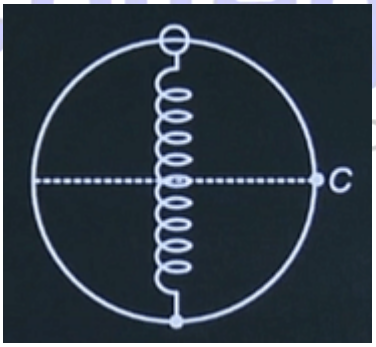
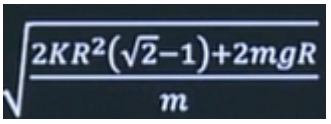
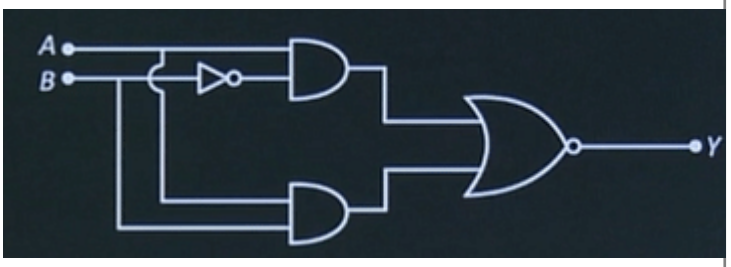
JEE Main 28 January 2025 Shift 1

Physics Question Paper with Answer Key

Q.No.	Questions	Answers
1	Find equivalent resistance across A to B. 	R/9
2	A uniform wire of linear charge density λ is placed along the y-axis. The locus of equipotential surface is	$x^2 + z^2$ = Constant
3	Which of following reaction is correct? (Where symbols have their usual meanings)	$n \rightarrow p + e^- + \nu^-$
4	The graph of root mean square velocity versus temperature is	
5	A coin is placed at the bottom of a hemispherical container filled with a liquid of refractive index μ. Find the least refractive index if the coin is visible to an observer at E. 	√2

6	In the given figure, the square and the triangle have same resistance per unit length. Find the ratio of their resistances about adjacent corners. 	27/32
7	**Assertion:** Work done by the central force is independent of path. **Reason:** Potential energy is associated with every force.	Both Assertion and Reason are incorrect.
8	There is a smooth ring of radius R in vertical plane. A spring of natural length R and elastic constant K is vertical across along a diameter. The free end is connected to bead of mass m and when slightly disturbed it reaches point C with speed where V is 	
9	The equivalent logic gate for the circuit shown below is 	

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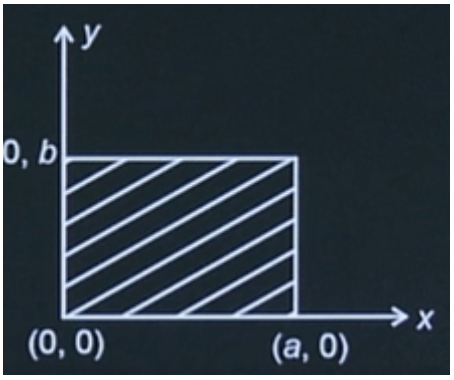
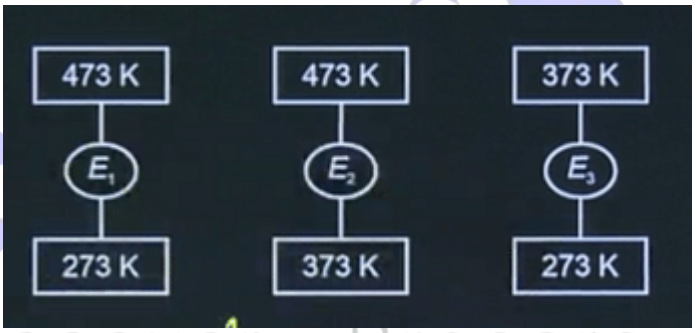
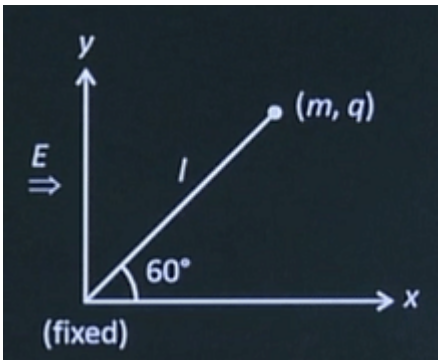
10	Surface mass density varies as $\sigma = \sigma_0 x/ab$ for the given plane sheet. Find the position of centre of mass for the distribution given 	2a/3, b/2
11	ζ_1, ζ_2 and ζ_3 are the efficiencies of the three Carnot engines E_1, E_2 and E_3 operating between temperatures shown in the figure. Choose the correct option relating to the efficiencies. 	$\zeta_2 + \zeta_3 > \zeta_1$
12	A simple pendulum of length l and both of mass m is placed on smooth horizontal surface as shown. When electric field of strength E is switched on, the bob passes the x-axis with speed v then 	$v = \sqrt{qEl/m}$

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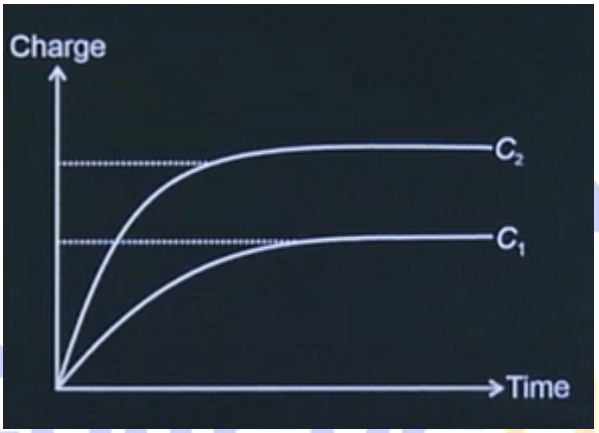
13	**Statement 1:** Velocity of sound in solids is more compared to that in gases. **Statement 2:** Bulk modules of gas are more than that of solids.	Statement 1 is correct Statement 2 is incorrect.
14	The dimensions of Young's modules of elasticity per unit length is $M^aL^bT^c$ then $\|a + b + c\|$ is	3
15	To capacitor C_1 and C_2 are connected across same battery and store energies U_1 and U_2 respectively at steady state. Choose the correct option by observing the graph of charge vs time shown below. 	$C_1<C_2$, $U_1<U_2$
16	Energy of photon of wavelength λ is E_0 which is equal to kinetic energy of proton of mass m_p. The ratio of de Broglie wavelengths of proton and photon is	$1/c\sqrt{E_0/2m_p}$
17	In a YDSE, the distance of the 10^{th} bright fringe from the central maxima is 10 mm when light of wavelength used is 600 nm. Find the distance (in mm) of the 10^{th} bright fringe from the central maxima if light of wavelength 660 nm is used instead.	11 mm
18	The energy associated with a cylindrical region due to an EM wave $E = 100\sin(kx - \omega t)$ is u_0. Find the equation of EM wave for which a cylinder of same length and half the diameter (as previous one) contains same energy U_0.	$200\sin(kx-\omega t)$

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19	The lengths of a rectangular sheet are measured from a screw gauge of pitch 0.75 mm and number of division on circular scale = 15. Find maximum possible error in measurement of area.	0.375 mm^2
20	There are two prisms of refractive indices of 1.54 and 1.72 respectively. If ray is not deviating after passing through two prisms, then find prism angle of second prism if prism angle of first prism is 4°.	3°

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