

JEE Main 2024 Physics Question Paper April 9 Shift 2

Time Allowed :3 Hours	Maximum Marks :300	Total Questions :90
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General Instructions

Read the following instructions very carefully and strictly follow them:

1. The test is of 3 hours duration.
2. The question paper consists of 90 questions, out of which 75 are to attempted. The maximum marks are 300.
3. There are three parts in the question paper consisting of Physics, Chemistry and Mathematics having 30 questions in each part of equal weightage.
4. Each part (subject) has two sections.
 - (i) Section-A: This section contains 20 multiple choice questions which have only one correct answer. Each question carries 4 marks for correct answer and -1 mark for wrong answer.
 - (ii) Section-B: This section contains 10 questions. In Section-B, attempt any five questions out of 10. The answer to each of the questions is a numerical value. Each question carries 4 marks for correct answer and -1 mark for wrong answer. For Section-B, the answer should be rounded off to the nearest integer

Physics

1. Find work done to bring a particle from $x = 2$ m to $x = 4$ m if force acting on it is given by $F = x^2 + 2x - 3$

2. Find the dimensional formula of Planck's constant.

3. Find the Kinetic energy of electron emitted from metal surface if energy incident is 4.31 eV and the work function is 3.31 eV.

4. Find the time period of the block of mass $m = 0.5$ kg when force acting on it is given as $F = -50x$.

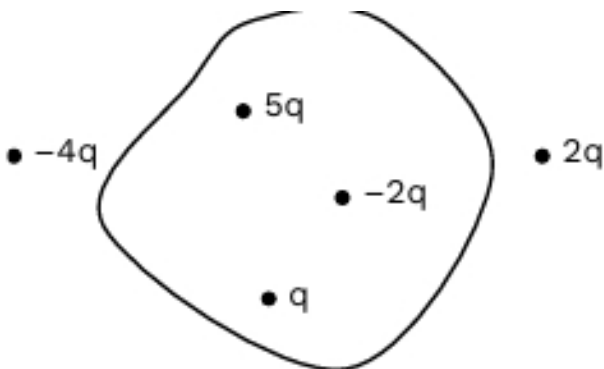
5. Magnitude of resultant of two vectors A and B is $|A + B| = \frac{|B|}{2}$, then find the angle between resultant and A vector. (Given: $(A + B) \cdot B = 0$)

6. When the position of particle varies with the time as $x = 3t^2 - 2t + 4$, find the displacement from $t = 2$ s to $t = 4$ s.

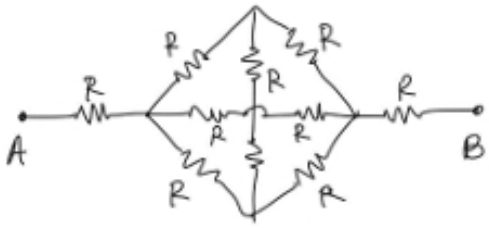
7. Two particles separated by 300m are moving with speed 20m/s each in opposite directions. Acceleration of both the particles is -2 m/s^2 . Find their separation when they both stop.

8. A particle of mass m breaks into two parts of masses $\frac{2m}{3}$ and $\frac{m}{3}$. Find the ratio of their speeds after explosion.

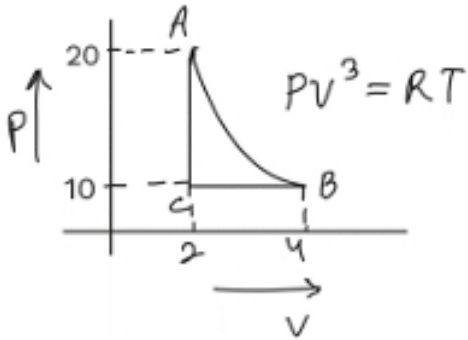
9. Find out the electric flux passing through the given surface.



10. Find R_{eq} about A and B in the given circuit.



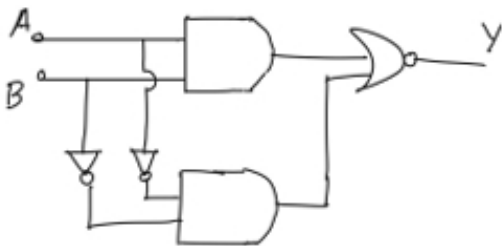
11. Find work done by the gas in the given cyclic process.



12. Kinetic energy of a gas sample is K at -78°C , find the temperature at which its kinetic energy is $2K$.

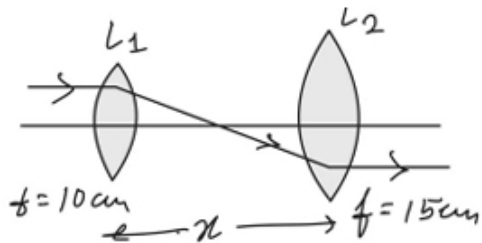
13. When a disc slips on an incline, it takes time t to reach the bottom. If it rolls then it takes time $\left(\frac{\alpha}{\beta}\right)^{\frac{1}{2}} t$. Find the value of $\alpha + \beta$.

14. Find the output y in terms of input A and B .

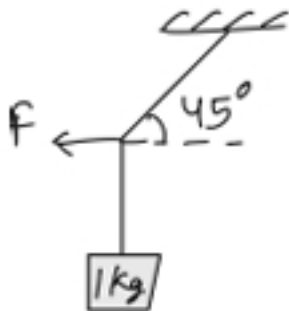


15. Resistance of a wire is 50Ω at 60°C . Find the temperature at which resistance is 62Ω . Thermal coefficient of resistance α is $2.4 \times 10^{-4}^\circ\text{C}^{-1}$.

16. If incident and refracted rays are parallel to the principal axis in the given figure, then find the value of x .

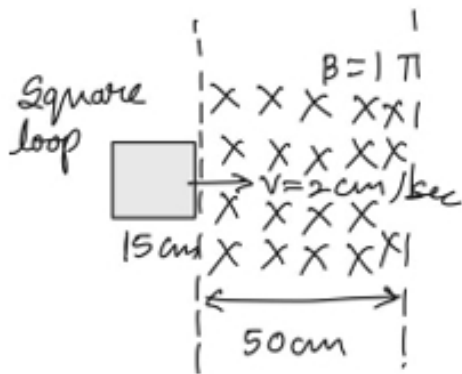


17. Find the value of force required to keep the system (as shown) in equilibrium.



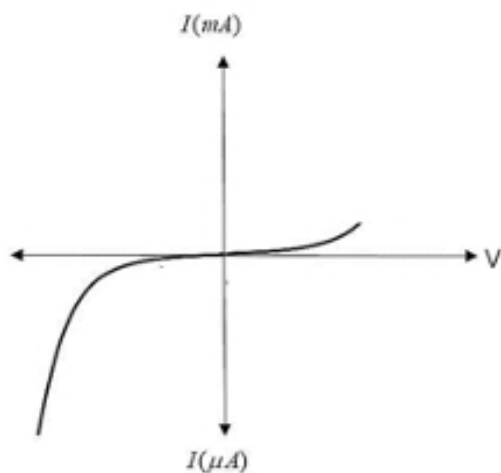
18. Two particles of mass m and $2m$ have the same kinetic energy. Find the ratio of their velocities.

19. A metallic square of sides 15 cm is moving with speed 2 cm/s as shown in the figure. Find the EMF induced in the square 10 sec after it enters the magnetic field region.



20. If the kinetic energy of deuteron and proton particles are the same, and they both enter a magnetic field region perpendicular to the magnetic field, then find the ratio of their radius of circular path.

21. Which of the following represents the graph to the best?



- (1) Zener diode
 - (2) Solar cell
 - (3) Rectifier
 - (4) Transistor
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22. In the given circuit, find the value of resistance.

