

# JEE Main 2024 Physics Question Paper April 4 Shift 2

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

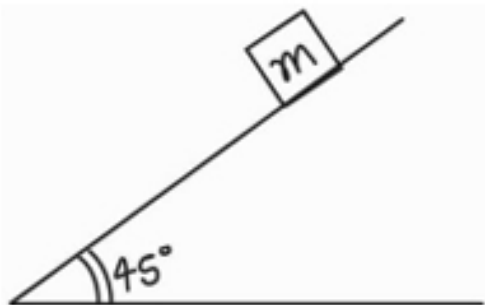
Read the following instructions very carefully and strictly follow them:

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. Position of a particle performing SHM is given by  $x = 100 \sin(\omega t + \pi/3)$ . Find its initial velocity if time period is 3.14 sec.

2. Find the value of friction coefficient between block and the inclined for body to just start sliding.



3. Find potential difference between points P and Q in the given figure. Magnetic field is perpendicular to the plane of rotation.



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4. In a YDSE setup, slit width are  $d$  and  $4d$ , find the ratio of maximum intensity to minimum intensity.

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5. A bus moving with  $72 \text{ km/hr}$  stops in 4 seconds due to uniform retardation. Find the value of stopping distance.

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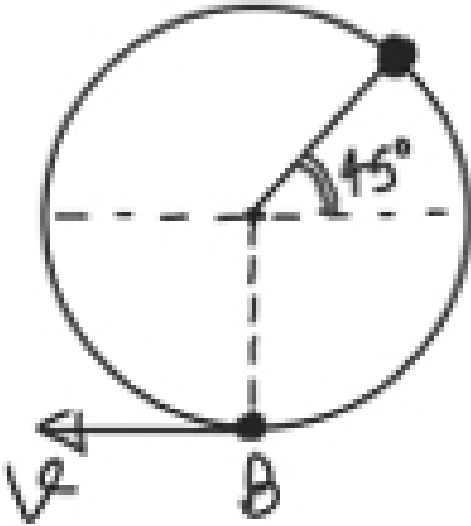
6. Find the total flux through the cube if charge  $Q$  is present at the centre of its one face.

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7. Two wires A and B of same length are made of same material. Radius of B is double of radius of A. Find resistance of B if resistance of A is  $2 \Omega$ .

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8. A particle of mass  $2 \text{ kg}$  attached to a massless string is released from the given position. Find its velocity when it reaches point B. Length of the string is  $14 \text{ m}$ .

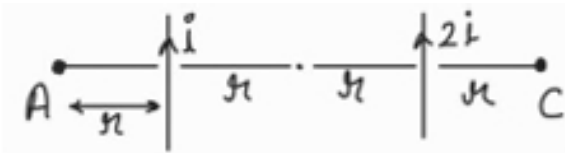



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9. If power consumed by an electrical instrument is 500 watts at 200 volts, then find power consumed at 100 volts.

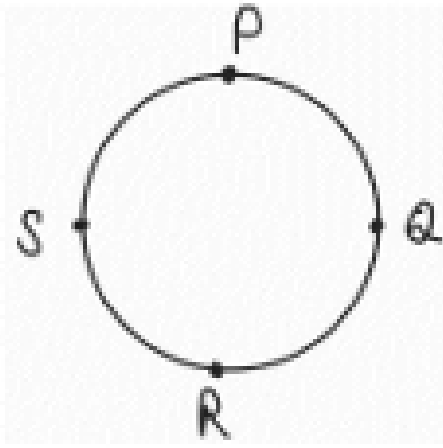
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10. Find the ratio of magnitude of magnetic field at point A and B if the wires are infinitely long.




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11. A particle travels on a circle of radius 2m from P to S. Find the displacement of the particle.



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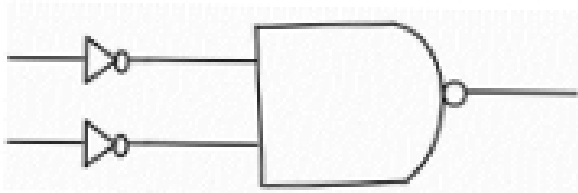
12. Determine the weight of a man standing at a height of  $2R$  (where  $R$  is radius of Earth) from the Earth's surface. Given mass of the man = 90 kg.

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13. 3 kg mass is displaced by 2 cm towards 2 kg mass. How much should 2 kg mass be displaced towards 3 kg such that the centre of mass remains at the same point?

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14. Identify the logic gate.



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15. In an thermodynamic process, the value of  $\gamma$  is  $\frac{3}{2}$ . If 1 mol of gas is taken from volume 20 Litre to 60 Litre, then Find the value of work done in the process. Initial pressure is 5 atm.

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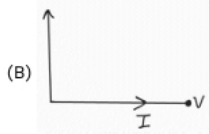
16. Find order of wavelength of X-rays, gamma rays, microwaves, and ultraviolet rays.

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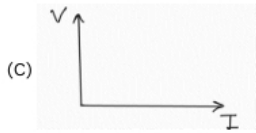
17. Match the following:



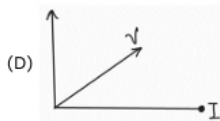
(i) Capacitive



(ii) Inductive



(iii) Resistive



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18. Find out rotational and translational degree of freedom of  $CH_4$  gas molecule.

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19. A spring mass system has a total energy  $E$  and if mass is doubled then what is total energy?

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20. Find relation between  $T$  (time period of satellite),  $R$  (radius of satellite),  $G$  (gravitational constant),  $M$  (mass of satellite).

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21. In a Bohr's atom an electron revolves in an orbit whose orbital number  $n = 4$ . Find out the value of angular momentum.

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22. Assertion: The number of photons increases with increase in frequency of light.  
Reason: The maximum kinetic energy increases with increase in frequency of incident light.

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23. Magnetic moment is  $0.5 \text{ A/m}^2$ , strength of magnetic field  $B = 0.8 \times 10^{-16} \text{ T}$ , then find the work done for brining the magnet from most stable to least stable position.

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24. Statement 1: Contact angle in tube depends on both liquid and tube material.  
Statement 2: Height of the capillary is independent of its radius of curvature.

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