

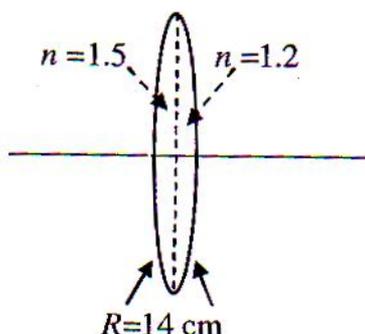
Ambiguities in IIT JEE 2012

PHYSICS

PAPER-1

Single Correct Choice Type

A bi-convex lens is formed with two thin plano-convex lenses as shown in the figure. Refractive index n of the first lens is 1.5 and that of the second lens is 1.2. Both the curved surfaces are of the same radius of curvature $R = 14$ cm. For this bi-convex lens, for an object distance of 40 cm, the image distance will be



- a) – 280.0 cm b) 40.0 cm c) 21.5 cm d) 13.3 cm

Problem with the question :

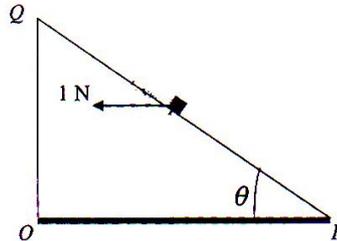
“For an object distance of 40 cm”

In this statement the object distance alone is mentioned but nothing about its nature is described. So the student might get confused with nature of object and has a freedom to choose any one of them. If he takes a real object he will get the answer as **40.0 cm (option B)**. If he takes a virtual object he will get the answer as **13.3 cm (option D)**

Recommended key : B or D

Multiple Correct Answer Type

A small block of mass of 0.1 kg lies on a fixed inclined plane PQ which makes an angle θ with the horizontal. A horizontal force of 1 N acts on the block through its center of mass as shown in the figure. **The block remains stationary if** (take $g = 10\text{ m/s}^2$)



- a) $\theta = 45^\circ$
- b) $\theta > 45^\circ$ and a frictional force acts on the block towards P .
- c) $\theta > 45^\circ$ and a frictional force acts on the block towards Q .
- d) $\theta < 45^\circ$ and a frictional force acts on the block towards Q .

Problem with the question :

“The block remains stationary if”

After reading this statement the student has to consider only the option(s) which always satisfy the given statement. Option ‘A’ is only correct. In option C if “ $\theta > 45^\circ$ friction force acts on the block towards Q” but the block may or may not be stationary.

If the statement was given as **“The block may remain stationary”** the student will be forced to consider all the possible options satisfying the given statement. In this case the options ‘A’ and ‘C’ will be correct options.

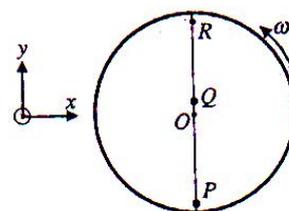
Recommended key : A

PAPER-2

Single Correct Choice Type

Consider a disc rotating in the horizontal plane with a constant angular speed ω about its centre O . **The disc has a shaded region on one side of the diameter and an unshaded region on the other side as shown in the figure.** When the disc is in the orientation as shown, two pebbles P and Q are simultaneously projected at an angle towards R . **The velocity of projection is in the $y - z$ plane and is same for both pebbles with respect to the disc.** Assume that (i) they land back on the disc before the disc has completed $\frac{1}{8}$ rotation, (ii) **their range is less than half the disc radius**, and (iii) ω remains constant throughout. Then

- a) P lands in the shaded region and Q in the unshaded region
- b) P lands in the unshaded region and Q in the shaded region
- c) Both P and Q land in the unshaded region
- d) Both P and Q land in the shaded region



Problem(s) with the question :

1. “The disk has a shaded region on one side of the diameter and an unshaded region on the other side as shown in the figure”

The shaded region in the question paper is not distinctly visible and requires the student to make an extremely careful observation in a well lit environment to find this shaded part.

2. “Their range is less than half the disc radius”

The frame of observation in which the range is considered, ie ‘earth frame’ or ‘disk frame’ is not mentioned.

If we consider this statement alone and take the range in earth frame the answer will be ‘A’

3. **“The velocity of projection is in the $y - z$ plane and is same for both pebbles with respect to the disc”.**

By considering this statement alone **option ‘C’** is the correct answer.

Comments :

Having both the mentioned statements in the question makes it an **Inconsistent question**.

Recommendation : Delete

Multiple Correct Answer Type

A current carrying infinitely long wire is kept along the diameter of a circular wire loop, without touching it. The correct statement(s) is(are)

- a) The emf induced in the loop is zero if the current is constant
- b) The emf induced in the loop is **finite** if the current is constant
- c) The emf induced in the loop is zero if the current decreases at a steady rate
- d) The emf induced in the loop is **finite** if the current decreases at a steady rate

Problem in the options :

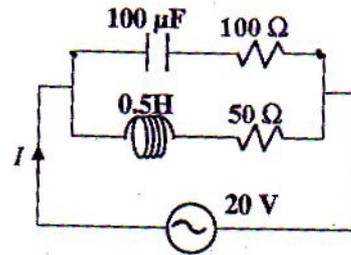
The induced emf is zero in all the cases considered. But since zero is finite (not infinity) all the **options A,B,C & D** are correct.

The word '**finite**' might arise a **slight confusion** in the students and they might end up opting for **A & C** only.

Recommended key : ABCD or AC

In the given circuit, the AC source has $\omega = 100 \text{ rad/s}$. Considering the inductor and capacitor to be ideal, the correct choice(s) is(are)

- a) The current through the circuit, I is 0.3 A
- b) The current through the circuit, I is $0.3\sqrt{2} \text{ A}$
- c) The voltage across 100Ω resistor = $10\sqrt{2} \text{ V}$
- d) The voltage across 50Ω resistor = 10 V



Problem in the options :

For current through the circuit we get $\frac{1}{\sqrt{10}} \text{ A}$ as the answer, for which 0.3 A might be chosen as an approximate answer.

Since in the remaining options the values are not approximated this might confuse the student and may or may not pick **option 'A'**

Recommended key : C or AC