



## **(PHY101) Assignment # 2 Solution**

**Semester: SPRING 2023**

**PHYSICS (PHY101)**

**Total Marks: 25**

**Due Date:**

**24th July, 2023**

### **Objective:**

The assignment has been designed to enhance your knowledge and understanding about Laws of Physics and application of Physics in our daily life.

### **Instructions:**

- Please read the following instructions carefully before solving & submitting assignment:
- To solve this assignment, you should have good command over **16 to 38 video lectures**.
- The assignment will not be accepted after due date.
- Zero marks will be awarded to the assignment that does not open or the file is corrupt.

- The assignment file must be an MS word (doc) file format; Assignment will not be accepted in any other format.
- Use Math Type or Equation Editor etc for mathematical symbols.
- Zero marks will be awarded to the assignment if copied (from other student or copied from handouts or internet).
- Don't wait for the last date to submit your assignment.

**For any query about the assignment, contact only**

**phy101@vu.edu.pk**

**Do not post queries related to assignment on MDB.**

## **Question #1**

**Marks = 05**

Is it true or wrong to say that Current decreases when passing through a resistor and then increases again upon exiting? Provide a good argument for your answer, whether it is yes or no.

**Answer:**

No, it is not correct to say that current decreases when passing through a resistor and then increases again upon exiting. The current remains constant throughout a series circuit, including when it passes through a resistor. According to Ohm's Law, the current (I) flowing through a resistor is directly proportional to the voltage (V) applied across it and inversely proportional to the resistance (R) of the resistor. The relationship is given by the formula:

$$I = V/R$$

**Here's a logical argument supporting this:**

**In a series circuit, the current remains the same at any given point. This is because the current flowing through one component is equal to the current flowing through any other component connected in series.**

**When current flows through a resistor, it encounters resistance. According to Ohm's Law, if the resistance ( $R$ ) increases, the current ( $I$ ) will decrease for a given voltage ( $V$ ). As the current passes through the resistor, energy is dissipated in the form of heat due to the resistance. However, the total current entering the resistor must be the same as the total current leaving it since the circuit is in series.**

**Therefore, the current remains constant both before and after passing through the resistor.**

### **Question #2**

**Marks = 05**

Using the law of Physics, explain this concept, “why do waves change path when their speed changes”? Explain this phenomenon, for instance, using the mechanical comparison in the photo shown.



**Answer:**

Refraction of waves involves a change in the direction of waves as they pass from one medium to another.

Refraction, or bending of the path of the waves, is accompanied by a change in speed

and wavelength of the waves. So if the media (or its properties) are changed, the speed of the wave is changed. Thus, waves passing from one medium to another will undergo refraction.

In given figure we clearly see that its first path is straight and its medium is dry road, and it enters into Water(ice) its change its speed and path as well by the phenomenon of refraction

**Question # 3****Marks = 05**

A physics student asserted that he had determined that a substance (material) had a refractive index of 0.85. Give your professional judgement on this claim. Give a good argument to support it or negate it.

## **Answer:**

Based on the information provided, it is clear that the physics student's claim of a refractive index of 0.85 is not possible. The refractive index is a dimensionless quantity that represents the ratio of the speed of light in a vacuum to the speed of light in a particular medium. It is always a positive value greater than or equal to 1. A logical argument to support this: The refractive index ( $n$ ) of any material is defined as the ratio of the speed of light in a vacuum ( $c$ ) to the speed of light in that material ( $v$ ):  $n = c/v$ . The speed of light in a vacuum is a constant value of approximately  $3 \times 10^8$  meters per second (m/s). Since the speed of light in a vacuum is always greater than the speed of light in any other medium, the refractive index ( $n$ ) will always be greater than or equal to 1.

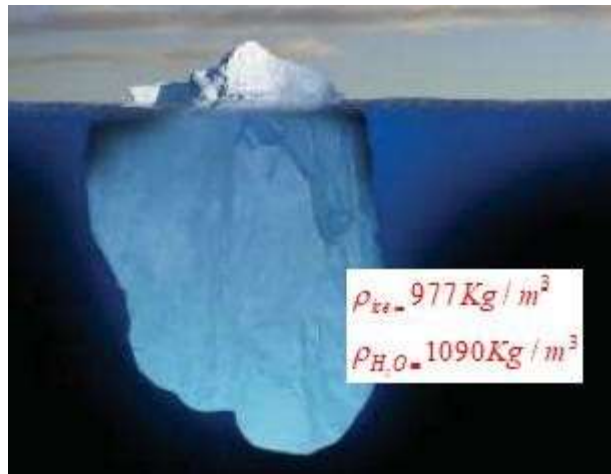
A refractive index value of 0.85 would imply that the speed of light in the material is greater than the speed of light in a vacuum, which contradicts the fundamental principles of physics.

Therefore, based on these scientific principles, it can be concluded that a refractive index value of 0.85 for a material is not possible.

### Question # 4

Marks = 10

What portion (percentage) of this iceberg lies beneath the surface of the water? Use the density values listed in the figure. Use the law of physics to compute it.



**Answer:**

$$F_B = W \cdot \rho_{\omega} g V_{\omega} = \frac{V_{\omega}}{V_i} = \frac{977}{1090} = 0.89633 = 8.963\%$$

Here  $V_{\omega}$  = Volume of water is displaced by the iceberg =  
volume of the iceberg below the surface

$V_i$  = Volume of the iceberg

**WORD FILE**

