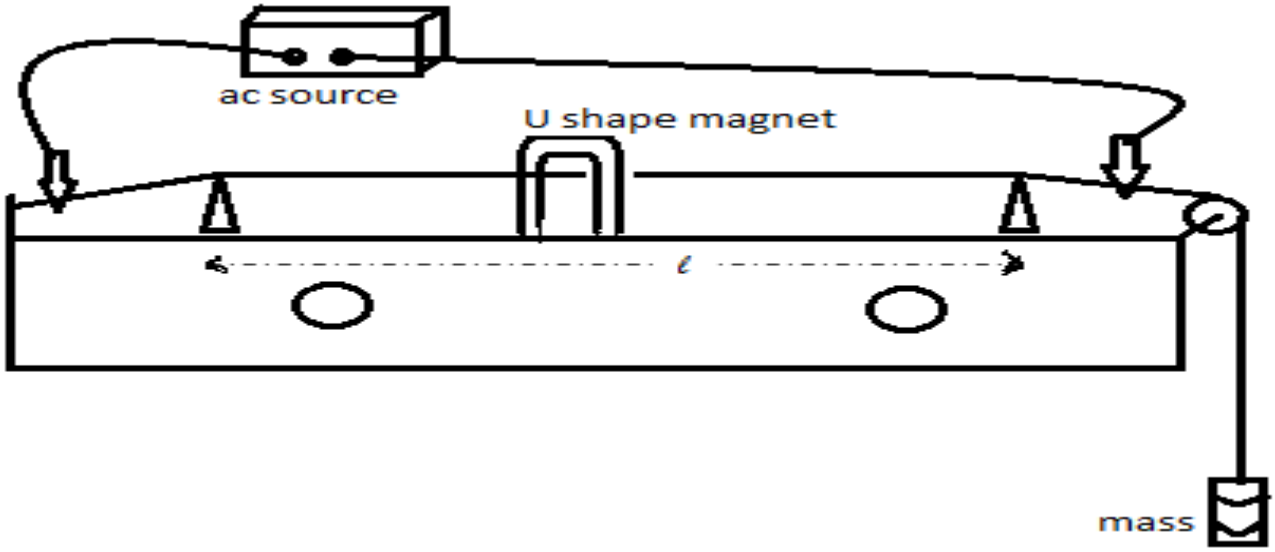

Sl no.	Mass suspended m in kg	Resonating length ℓ			l^2 in cm²	$\frac{m}{\ell^2}$ in kg/cm²
		1	2	Mean ℓ cm		
1	0.5					
2	0.6					
3	0.7					
4	0.8					
5	0.9					
6	1					

mean $\frac{m}{\ell^2}$ = ... kg/cm²

= ..... kg/m²

μ= $\frac{M}{L}$ linear density of wire (mass per length) =**1.27** $\times$ 10^{-3} **kg/m**

frequency of ac is given by $n = \sqrt{\frac{g}{4\mu}\left(\frac{m}{\ell^2}\right)}$

use enough brackets as given, while entering values in calculator

$n = \sqrt{(9.8 * \left(\frac{m}{l^2}\right) \div (4 * 1.27 \times 10^{-3}))}$ = ... Hz

THE SONOMETER – 3 (freq of ac)

AIM

To determine frequency of ac using a sonometer

APPARATUS

Sonometer, slotted weights, step down transformer (6V) ,crocodile clips ,horse shoe magnet

THEORY

At resonance the natural frequency of vibration n of the sonometer wire becomes equal to the applied frequency of ac and then the wire vibrates with maximum amplitude

The frequency of transverse vibration produced in a stretched string is given by

$$n = \frac{1}{2\ell}\sqrt{\frac{T}{\mu}}$$

ℓ=resonating length of sonometer wire

T= mg Tension in the string

μ= $\frac{M}{L}$ linear density of wire (mass per unit length)

at resonance the frequency of ac is given by

$$n = \sqrt{\frac{g}{4\mu}\left(\frac{m}{\ell^2}\right)}$$

PROCEDURE

The sonometer wire is stretched by suspending a constant mass 500 gm. The experiment is set as shown in the fig. the bridges are kept close and ac supply is switched on. The position of magnet is adjusted at the midway between the bridges. Distance between bridges A and B is adjusted till paper rider vibrates vigorously and is thrown off. Distance between the bridges gives the resonating length. The experiment is repeated once again and mean length for that corresponding mass is calculated. Then find $\frac{m}{\ell^2}$**.** Experiment is repeated by changing m as 600,700,800,900,1000 gm and mean $\frac{m}{\ell^2}$ is calculated.

Total mass **(M)** and length of the sonometer wire (**L**) is measured and linear density can be calculated by using the equation **μ=** $\frac{M}{L}$

RESULT

Frequency of ac mains, n = …….. Hz