

2007 A/L Structured Essay Question No (03)

3. A student is asked to design an experiment using the resonance phenomenon to determine the speed (v) of transverse waves in a sonometer wire being kept under constant tension. The student is supposed to use a graphical method. A set of tuning forks is provided for this purpose.

(a) If resonance at the fundamental mode was obtained with a tuning fork of frequency f , write down an expression for v in terms of resonance length l , and f .

..... $v =$

(b) Rearrange the expression in (a) above to take the form $y = mx$, where y is the dependent variable. In this experiment choose y in such a way that it is not a reciprocal of a measurement. Identify x .

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(c) State whether you would start the experiment with the tuning fork having the highest frequency or with the tuning fork having the lowest frequency first. Give the reason for your answer.

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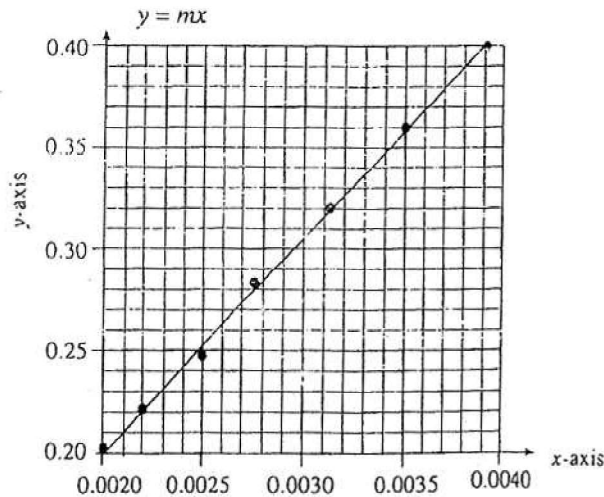
(d) How would you identify the tuning fork with the highest frequency from the given set of tuning forks, only considering their physical dimensions?

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(e) Why is it easier to observe the resonance state of the wire at its fundamental mode of vibration than at an overtone?

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(f) The graph, y against x , obtained by the student is shown below. All quantities are given in SI units.



(i) Label the axes of the graph with units.

(ii) Calculate v from the graph. Clearly indicate the **two** points which you have used to calculate v .

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