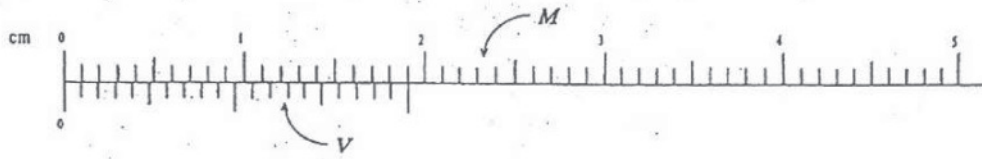


2002 A/L Structured Essay Question No (01)

1. Figure shows a part of the main scale (M) and vernier scale (V) of a certain vernier calliper when their respective zero marks coincide. (Note that the figure is enlarged.)

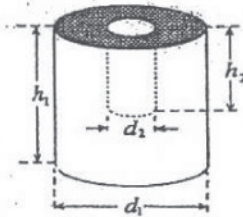


- (a) (i) What is the length of a vernier division in mm?

 (ii) Hence or otherwise determine the least count of the instrument.

 (iii) According to the above figure, what is the least distance (in mm) of the vernier scale that has to be moved in order to make a vernier scale mark coincide once again with a main scale mark?

(b)

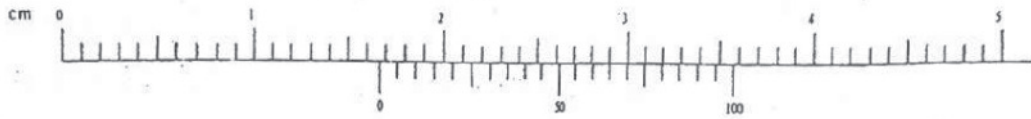


A cylindrical metal piece has a cylindrical hole as shown in the figure. In order to determine accurate values of the following measurements which part of the vernier calliper (out of external jaws, internal jaws and depth bar) would you use?

- (i) For the measurement of d_1
 (ii) For the measurement of h_1
 (iii) For the measurement of d_2
 (iv) For the measurement of h_2

Write down an expression for the volume V of the metal in terms of d_1 , h_1 , d_2 and h_2 .

- (d) (i) When d_2 was measured using the vernier calliper mentioned above, the position of the vernier scale obtained relative to the main scale is shown below. What is the value of d_2 ?



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(ii) What is the fractional error of this d_2 measurement? (Simplification is **not** expected)

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