

1998 A/L Structured Essay Question No (01)

1. You are provided with suitable measuring instruments and a piece of light string to determine the density of the material of a metal ball, whose mass is of the order of 100 g. The metal ball has a hook of the same material permanently attached to it.
- (a) If you have access to a set of spring balances having mass ranges of 75 g, 150 g, 200 g, and 500 g which one would you select for the mass measurement? Give the main reason for your selection.
(2 lines)
- (b) A student performing this experiment obtained following measurements correctly for the diameter of the ball.
3.523 cm, 3.519 cm, 3.551 cm, 3.542 cm, 3.521 cm state the reason why the readings are different.
(one line)
- (c) Indicate the measuring instrument he may have used assuming that he has selected a suitable instrument for this purpose. (one line)
- (d) Considering the fluctuation of the above readings, suggest another measuring instrument with a different accuracy that can also be used to obtain the diameter of the ball, Give reason for your choice.
Instrument : (one line)
Reason : (2 lines)
- (e) If the mass of the ball with the hook is m and the diameter of the ball is D write down an expression for the density. Assume that the mass of the hook is $\frac{m}{50}$ (2 lines)
- (f) If a suitable measuring cylinder and water are provided, indicate major steps of an alternative method which gives the volume of the ball. (3 lines)
- (g) If the scale of the measuring cylinder can be read with sufficient accuracy, write down two advantages of the method mentioned in (f) over the method indicated in (b) (2 lines)