

Class XI
(Error Analysis)

Q1) A physical quantity Q is given by $Q = \frac{A^2 B^{3/2}}{C^4 D^{1/2}}$
 The percentage errors in A, B, C and D are $1\%, 2\%, 4\%$ and 2% respectively. Find the percentage error in the quantity Q .

Q2) The specific resistance σ of a thin wire of radius r cm, resistance $R \Omega$ and length L cm is given by

$$\sigma = \frac{\pi r^2 R}{L}$$

If $r = 0.26 \pm 0.02$ cm, $R = 32 \pm 1 \Omega$ and $L = 78 \pm 0.001$ cm find the percentage error in σ .

Q3) The radius of a sphere is (5.3 ± 0.1) cm. Calculate the percentage error in its volume.

Q4) The radius of a sphere is (5.0 ± 0.1) cm. Calculate its surface area within proper error limits.

Q5) Distinguish between accuracy and precision.

Q6) The mass and radius of the earth are 5.975×10^{24} kg and 6.37×10^6 m respectively. Calculate the average earth's density to correct significant figures. Take $\pi = 3.142$

Q7) State the number of significant figures in the following measurements.

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|-------------------------------|---------------------------------------|
| (i) 0.009 m^2 | (iv) $1.90 \times 10^{11} \text{ kg}$ |
| (ii) 5.049 Nm^2 | (v) 0.020800 m |
| (iii) 0.1890 g cm^3 | (vi) 5.308 J |

Q8) If n^{th} division of main scale coincides with $(n+1)^{\text{th}}$ division of vernier scale, find the least count of the vernier. Given one main scale division is equal to 'a' units.

Q9) Which of the following measurements is most accurate and which is most precise?

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|------------------------|------------------------|
| (i) 4.00 mm | (ii) 4.00 cm |
| (iii) 4.00 m | (iv) 40.00 m |