Multiple-Choice Test

Chapter 01.06
Propagation of Errors

1. If $A = 3.56 \pm 0.05$ and $B = 3.25 \pm 0.04$, the values of $A + B$ are
   (A) $6.81 \le A + B \le 6.90$
   (B) $6.72 \le A + B \le 6.90$
   (C) $6.81 \le A + B \le 6.81$
   (D) $6.71 \le A + B \le 6.91$

2. A number A is correctly rounded to 3.18 from a given number B. Then $|A - B| \le C$, where C is
   (A) 0.005
   (B) 0.01
   (C) 0.18
   (D) 0.09999

3. Two numbers A and B are approximated as C and D, respectively. The relative error in $C \times D$ is given by
   (A) $\left|\left(\frac{A-C}{A}\right)\right| \times \left|\left(\frac{B-D}{B}\right)\right|$
   (B) $\left|\left(\frac{A-C}{A}\right)\right| + \left|\left(\frac{B-D}{B}\right)\right| + \left|\left(\frac{A-C}{A}\right)\right| \times \left|\left(\frac{B-D}{B}\right)\right|$
   (C) $\left|\left(\frac{A-C}{A}\right)\right| + \left|\left(\frac{B-D}{B}\right)\right| - \left|\left(\frac{A-C}{A}\right)\right| \times \left|\left(\frac{B-D}{B}\right)\right|$
   (D) $\left(\frac{A-C}{A}\right) - \left(\frac{B-D}{B}\right)$

4. The formula for normal strain in a longitudinal bar is given by $\in = \frac{F}{AE}$ where
   F = normal force applied
   A = cross-sectional area of the bar
   E = Young's modulus
   If $F = 50 \pm 0.5\,\text{N}$, $A = 0.2 \pm 0.002\ \text{m}^2$, and $E = 210 \times 10^9 \pm 1 \times 10^9\ \text{Pa}$, the maximum error in the measurement of strain is
   (A) 10^{-12}
   (B) 2.95×10^{-11}
   (C) 1.22×10^{-9}
   (D) 1.19×10^{-9}

5. A wooden block is measured to be 60 mm by a ruler and the measurements are considered to be good to 1/4th of a millimeter. Then in the measurement of 60 mm, we have _____ significant digits.
   (A) 0
   (B) 1
   (C) 2
   (D) 3

6. In the calculation of the volume of a cube of nominal size 5", the uncertainty in the measurement of each side is 10%. The uncertainty in the measurement of the volume would be
   (A) 5.477%
   (B) 10.00%
   (C) 17.32%
   (D) 30.00%

Complete solution