WEEKLY TEST MEDICAL PLUS -03 TEST - 05 RAJPUR
SOLUTION Date 18-08-2019

[PHYSICS]

15. $v = KT^a \rho^b \lambda^c$

$LHS = [M^0 LT^{-1}]$

$RHS = [ML^{-2}]^a [ML^{-3}] b [L]^c$

$= [M^{a+b} L^{-3b+c} T^{-2a}]$

According to homogeneity principle,

LHS = RHS

$\therefore \quad [M^0 LT^{-1}] = [M^{a+b} L^{-3b+c} T^{-2a}]$

$\therefore \quad a + b = 0$

$\therefore \quad a = -b \quad$ (i)

$-3b + c = 1 \quad$ (ii)

$-2a = -1 \quad$ (iii)

$\therefore \quad a = \frac{1}{2}$

16. Given, $A = 1.0 \text{ m} \pm 0.2 \text{ m}$, $B = 2.0 \text{ m} \pm 0.2 \text{ m}$

Let, $Y = \sqrt{AB} = \sqrt{(1.0)(2.0)}\ 1.414 \text{ m}$

Rounding off to two significant digit $Y = 1.4$ m

$$\frac{\Delta Y}{Y} = \frac{1}{2}\left[\frac{\Delta A}{A} + \frac{\Delta B}{B}\right]$$

$$= \frac{1}{2}\left[\frac{0.2}{1.0} + \frac{0.2}{2.0}\right] = \frac{0.6}{2 \times 2.0}$$

$$\Rightarrow \quad \Delta Y = \frac{0.6Y}{2 \times 2.0} = \frac{0.6 \times 1.4}{2 \times 2.0} = 0.212$$

Rounding off to one significant digit

$\Delta Y = 0.2$ m

Thus, correct value for

$\sqrt{AB} = r + \Delta r = 1.4 \pm 0.2$ m

17. $g = 4\pi^2 \cdot \frac{l}{T^2}$

$$\Rightarrow \quad \frac{\Delta g}{g} \times 100 = \frac{\Delta l}{l} \times 100 + 2\frac{\Delta T}{T} \times 100$$

$$= \frac{\Delta l}{l} \times 100 + 2 \cdot \frac{\Delta t}{t} \times 100$$

$$= \frac{0.1}{20.0} \times 100 + 2 \times \frac{1}{90} \times 100$$

$$= \frac{100}{200} + \frac{200}{90} = \frac{1}{2} + \frac{20}{9} \cong 3\%$$

18. In the sum or difference of measurements we do not retain significant digits in those places after the decimal in which there were no significant digits in any one of the original values.

19. $\frac{\Delta\rho}{\rho} = \frac{\Delta M}{M} + \frac{\Delta V}{V}$

$$= \left[\frac{0.001}{10.000} + \frac{0.01}{10.00}\right] = 10^{-4} + 10^{-3}$$

$= 0.1 \times 10^{-3} + 10^{-3} = 1.1 \times 10^{-3}$

$$\Delta\rho = 1.1 \times 10^{-3} \times \frac{10.000}{10.00}$$

$= 1.1 \times 10^{-3} = 0.0011$ g cm^{-3}.

20. Since the least count of microscope is 0.001 cm, so it can measure correctly upto third decimal place.

21. Here, S = (13.8 ± 0.2) cm; t = (4.0 ± 0.3)s

$\therefore \quad V = \frac{13.8}{4.0} = 3.45 \text{ m s}^{-1}$

Also, $\frac{\Delta V}{V} = \pm\left(\frac{\Delta S}{S} + \frac{\Delta t}{t}\right)$

$$= \pm\left(\frac{0.2}{13.8} + \frac{0.3}{4.0}\right) = \pm 0.0895$$

$\Delta V = \pm 0.0895 \times 3.45 = \pm 0.3$
(rounding off to one place of decimal)
V = (3.45 ± 0.3) ms^{-1}.

22. Area = 5.7 × 3.4 = 19.38 cm^2 = 19.4 cm^2
(rounding off to one significant digit)

$$= \frac{\Delta A}{A} = \pm\left(\frac{\Delta l}{l} + \frac{\Delta b}{b}\right) = \pm\left(\frac{0.1}{5.7} + \frac{0.2}{3.4}\right) = \pm 1.48 / 19.38$$

$\Delta A = \pm (1.48/19.38) \times 19.38 = \pm 1.48$
$= + 1.5$ (rounding off to one signifiant digit)
Area = (19.4 ± 1.5) cm^2

[CHEMISTRY]

60.
61.
62. Electronic configuration reveals atomic number 16, i.e., the element is S. The next element in its group is Se.
63. For isoelectronic atom and ions, higher the atomic number, smaller is the size. O^{2-}, F^{-}, Na^{+} and Mg^{2+} all have 10 electrons.
64. N^{3-}, O_2^{2-} and F^{-} are isoelectronic with 10 electrons each. More the number of protons, smaller is the size.
65. These species are isoelectronic with 18 electrons each. Ca^{2+} has highest atomic number (20) and so lowest size. S^{2-} has lowest atomic number (16) and so the largest size.
66. $K > K^{+}$ and $F > F^{-}$.
67. For a small difference of electronegativities of two bonded length is the sum of their covalent radii
Bond length of C–Cl bond = Covalent radius of C + Covalent radius of Cl
= 77.1 + 99 = 176.1 pm