1. Ans. (A,C)

Fact base

2. Ans.(D)

3. Ans.(A,B,C,D)

Adjacent face centeres atoms touches each other.

$\therefore$ 10^{th} & 11^{th} spheres are adjacent to 14^{th} sphere.

10^{th} & 12^{th} sphere are at distance = a = $2\sqrt{2}r$

Each opposite faces have two such planes passing through face diagonal.

$\therefore$ Total such planes = $2 \times 3 = 6$.

4. Ans.(D)

$$t_{1/2} \propto \frac{1}{a^{n-1}}$$

$$\frac{20}{40} = \left(\frac{10}{20}\right)^{n-1}$$

$$\frac{1}{2} = \left(\frac{1}{2}\right)^{n-1}$$

$\Rightarrow n = 1 = 1 \Rightarrow n = 2$

5. Ans.(C)

$$A \xrightarrow[k_0(t_{1/2})_0]{\text{Zero order}} B \qquad A \xrightarrow[k_1(t_{1/2})_1]{1^{st}\text{ order}} P$$

Given : k_0 = Rate constant for zero order

k_1 = Rate constant for 1^{st} order

$$(t_{1/2})_0 = \frac{[A]_0}{2k_0}\ ,\ (t_{1/2})_1 = \frac{0.693}{k_1}$$

$$\therefore \frac{[A]_0}{2k_0} = \frac{0.693}{k_1}$$

$$\frac{k_1[A]_0}{k_0} = 2 \times 0.693 \text{ .....(1)}$$

$$\frac{R_1(\text{Rate of } 1^{st} \text{ order reaction})}{R_0(\text{Rate of zero order reaction})} = \frac{k_1[A]_0^1}{k_0} = 2 \times 0.693$$

6. Ans.(A)

Sol. $\log K = \log A - \frac{Ea}{2.303R} \times \frac{1}{T}$ ....(1)

$\uparrow \quad \uparrow \quad \uparrow$

$y \quad C + m \quad n$

$C = \log A = 16 \Rightarrow \boxed{A = 10^{-16}}$

From eq(1) $\log K_1 = \log A = \frac{Ea}{2.303R} \times \frac{1}{T}$

$$\Rightarrow \log\left(\frac{0.693}{6930}\right) = \log A - \frac{Ea}{2.303}\times\frac{1}{T} \quad ....(2)$$

Also $\log\left(\frac{0.693}{0.693\times10^{-6}}\right) = \log A - \frac{Ea}{2.303}\times\frac{1}{T}$ ....(3)

From eq(2) and eq(3)

$$\boxed{\frac{T'}{T} = 2}$$

7. Ans.(A,C,D)

Sol . In 10 sec $A(g) \rightarrow B(g)$

R.O.R $\quad \frac{8-6}{10} \quad \frac{4-0}{10}$

$\frac{2}{10} \quad \frac{4}{10}$

(A) Rate of formation of B = 2 rate of disappereance of A

(B) Order of reaction is 0.5 (complex reaction)

$\frac{1}{2}A(g) \quad \rightarrow \quad B(g)$

$P0 = 8 \qquad 0$

$O = P_0 - \frac{P}{2} \qquad P$

$P = 2 \times 8 = 16$ atm exerts after 40 min.

8. Ans.(A)

$$\log k = \frac{-Ea}{2.303R}\left(\frac{1}{T}\right) + \log A$$

$$\text{slope} = \frac{-Ea}{2.303R} \Rightarrow -5000 = \frac{-Ea}{2.303R}$$

$$E_a = \frac{2.303\times8.314\times5000}{1000}\text{kJk}^{-1}\text{mol}^{-1} = 95.7 \text{ kJ K}^{-1}\text{mol}^{-1}$$

10. Ans.(A)

Sol. $K_{ov} = \frac{k_1k_3}{k_2}$

$\therefore E_{ov} = E_1 + E_3 - E_2$

$= 60 + 10 - 30 = 40$ kJ.