Exercise-I

1.	C	**2.**	A	**3.**	C	**4.**	C	**5.**	B	**6.**	B	**7.**	B
8.	B	**9.**	A	**10.**	B	**11.**	B	**12.**	A	**13.**	C	**14.**	C
15.	C	**16.**	C	**17.**	D	**18.**	C	**19.**	D	**20.**	B	**21.**	C
22.	B	**23.**	A	**24.**	C	**25.**	B	**26.**	A	**27.**	A	**28.**	A
29.	A	**30.**	C	**31.**	B	**32.**	C	**33.**	A	**34.**	D	**35.**	C,D
36.	B,C	**37.**	A,C,D	**38.**	A,C,D						

Exercise-II

1. (i) hollow sphere > solid sphere, (ii) hollow sphere = solid sphere **2.** (a) 450 (b) 449 (c) 12 : 14 : 59

(d) (i) 1 (ii) $\frac{900}{451}$ s (iii) $\frac{1}{450\times10^{-5}}$ s **3.** (a) $h^1 = h\{1 + \alpha_c \Delta\theta\}$, $A^1 = A\{1 + 2\alpha_s \Delta\theta\}$, $v^1 = Ah\{1 + 3\alpha_s \Delta\theta\}$

volume of liquid $V_w = Ah_1(1 + \gamma_L \Delta\theta)$

(b) $h^1 = h\{1 + \gamma_L \Delta\theta\}$ (c) (i) $\gamma_L < 3\alpha_c$ (ii) $\gamma_L > 3\alpha_c$ (iii) $\gamma_L = 3\alpha_c$.

(d) $\Delta V = Ah(\gamma_L - 3\alpha_c)\Delta\theta$ (e) $3h\alpha_c = h_1\gamma_L$

(f) (i) $h_1(1 - 3\alpha_c\Delta\theta)$, (ii) $h_1(1 + \gamma_L \Delta\theta)$, (iii) (1) $\gamma_L > 2\alpha_c$ (2) $\gamma_L < 2\alpha_c$ (3) $\gamma_L = 2\alpha_c$.

4. $Y_R = \left(\frac{1}{9} + 27\times37\times10^{-6}\right)/°C$ **5.** (a) $V_0 d_0 g\left(\frac{1+3\alpha_s\Delta\theta}{1+\gamma_L\Delta\theta}\right)$ (b) (i) $\gamma_L < 3\alpha_s$ (ii) $\gamma_L > 3\alpha_s$ (iii) $\gamma_L = 3\alpha_s$.

6. 5 sec slow **7.** 10000 N **8.** 4×10^{-6} m/°C **9.** $5\alpha/3$ **10.** h/5R **11.** 3V/20 **12.**10 cm, 40 cm

13. (a) All tie (b) 50°X, 50°Y, 50°W. **14.** –40°C or –40°F

Exercise-III

1. 2×10^{-4} C **2.** B,D **3.** A **4.** $\gamma_l = 2\alpha_s$ **5.** 4