Exemplar Problem

Q. 75 Refer to question 74 above. If the probability that exactly two of the three balls were red, then the first ball being red, is

(a) $\frac{1}{3}$ (b) $\frac{4}{7}$ (c) $\frac{15}{28}$ (d) $\frac{5}{28}$

Sol. *(b)* Let E_1 = Event that first ball being red

and E_2 = Event that exactly two of the three balls being red

$$\therefore \quad P(E_1) = P_R \cdot P_R \cdot P_R + P_R \cdot P_R \cdot P_{\overline{R}} + P_R \cdot P_{\overline{R}} \cdot P_R + P_R \cdot P_{\overline{R}} \cdot P_{\overline{R}}$$

$$= \frac{5}{8} \cdot \frac{4}{7} \cdot \frac{3}{6} + \frac{5}{8} \cdot \frac{4}{7} \cdot \frac{3}{6} + \frac{5}{8} \cdot \frac{3}{7} \cdot \frac{4}{6} + \frac{5}{8} \cdot \frac{3}{7} \cdot \frac{2}{6}$$

$$= \frac{60 + 60 + 60 + 30}{336} = \frac{210}{336}$$

$$P(E_1 \cap E_2) = P_R \cdot P_{\overline{R}} \cdot P_R + P_R \cdot P_R \cdot P_{\overline{R}}$$

$$= \frac{5}{8} \cdot \frac{3}{7} \cdot \frac{4}{6} + \frac{5}{8} \cdot \frac{4}{7} \cdot \frac{3}{6} = \frac{120}{336}$$

$$\therefore \quad P(E_2 / E_1) = \frac{P(E_1 \cap E_2)}{P(E_1)} = \frac{120/336}{210/336} = \frac{4}{7}$$