Bay's Theorem (Inverse probability):-

Ascertainment of unknown from the new probabilities is called inverse probability. Inverse probability can be calculated only when there is an additional information available from the past records. This theorem was developed by Thomas Bayes in the year 1763.

Formula used in Inverse probability is:

Probability of new product $P(B) = P(A_1 \cap B) + P(A_2 \cap B) + P(A_3 \cap B)$

$P(A_1 \cap B) = P(A_1) \times \frac{P(B)}{A_1}$ $\quad P(A_3 \cap B) = P(A_3) \times \frac{P(B)}{A_3}$

$P(A_2 \cap B) = P(A_2) \times \frac{P(B)}{A_2}$

① There are three persons namely x, y & z for a General Manager post in altd Co. their chance of being selected for the post are in the ratio of 6:4:3. If x is selected the probability that he will introduced a new product is 0.5. The Corresponding probability of the introduction of the new product are 0.7 & 0.4 respectively if y & z are selected, what is the probability that the new product is introduced.

Soln:- The probability of new product is introduced

$P(B) = ?$

Probability of selecting Mr. x $\rightarrow P(A_1) = \frac{6}{17} = 0.46$ (Given)

——— 11 ——— Mr y $\rightarrow P(A_2) = \frac{4}{17} = 0.23$

——— 11 ——— Mr. z $\rightarrow P(A_3) = \frac{7}{17} = 0.23$

Continued →

If x is selected $\frac{P(B)}{A_1} = 0.5$ (Given)

—11— y is selected $\frac{P(B)}{A_2} = 0.7$ (Given)

If z is selected $\frac{P(B)}{A_3} = 0.4$ (Given)

∴ The probability of new product is introduced

$\therefore P(B) = P(A_1 \cap B) + P(A_2 \cap B) + P(A_3 \cap B)$

$= P(A_1) \times \frac{P(B)}{A_1} + P(A_2) \times \frac{P(B)}{A_2} + \frac{P(B)}{A} P(A_3) \times \frac{P(B)}{A_3}$

$= (0.46 \times 0.5) + (0.31 \times 0.7) + (0.23 \times 0.4)$

$= 0.23 + 0.217 + 0.092$

$= 0.539$

∴ The probability of new product is introduced is 0.539

Page no - 64 problem no - 10 (Question Bank)
(April-May-2019 Q11-4)

Soln:- The probability of that the new product will be launched by the new MD is $P(B) = ?$

∴ probability of promotion of Mr. A → $P(A_1) = 0.40$

∴ —"— Mr B → $P(A_2) = 0.25$

—"— Mr C → $P(A_3) = 0.65$

probability that a new product is launched

by Mr. A = $\frac{P(B)}{A_1} = 0.5$

by Mr. B = $\frac{P(B)}{A_2} = 0.80$

by Mr. C = $\frac{P(B)}{A_3} = 0.60$

probability of new product will be launched $P(B)$..

$$P(B) = P(A_1 \cap B) + P(A_2 \cap B) + P(A_3 \cap B)$$

$$= P(A_1) \times \frac{P(B)}{A_1} + P(A_2) \times \frac{P(B)}{A_2} + P(A_3) \times \frac{P(B)}{A_3}$$

$$= (0.40 \times 0.50) + (0.25 \times 0.8) + (0.65 \times 0.60)$$

$$= 0.20 + 0.20 + 0.39$$

$$= 0.79$$

∴ probability of new product will be launched by the new MD is 0.79