ASSIGNMENT 2

BT21BTECH11005 - MANIKANTA

PROBLEM:-Given three identical Boxes A, B and C, Box A contains 2 gold and 1 silver coin, Box Bcontains 1 gold and 2 silver coins and Box C contains 3 silver coins. A person chooses a Box at random and takes out a coin. If the coin drawn is of silver, find the probability that it has been drawn from the Box which has the remaining two coins also of silver.

SOLUTION:-
given,three boxes are equally likely
so,

$$P(A) = \frac{1}{3}, P(B) = \frac{1}{3}, P(C) = \frac{1}{3}$$

NO. OF GOLD COINS (GC) and SILVER COINS(SC) in the given three boxes are:-

BOX	GOLD COIN(GC)	SILVER COIN(SC)
A	2	1
B	1	2
C	0	3

TABLE I
NO. OF COINS IN THREE BOXES

Probability of GOLD COINS(GC) snd SILVER COINS(SC) in the given three boxes are:-

BOX	Pr(GOLD COIN)	Pr(SILVER COIN)
A	$P(G \mid A) = \frac{2}{3}$	$P(S \mid A) = \frac{1}{3}$
B	$P(G \mid B) = \frac{1}{3}$	$P(S \mid B) = \frac{2}{3}$
C	$P(G \mid C) = 0$	$P(S \mid C) = 1$

TABLE II
PROBABILITY OF GC AND SC IN THREE BOXES

now, by using BAYES THEOREM
Probability that the coin drawn is silver from box

C,is equal to

$$P(C \mid S) = \frac{P(C)P(\frac{S}{C})}{P(A)P(\frac{S}{A}) + P(B)P(\frac{S}{B}) + P(C)P(\frac{S}{C})} \tag{1}$$

$$= \frac{\frac{1}{3} \times 1}{\frac{1}{3} \times \frac{1}{3} + \frac{1}{3} \times \frac{2}{3} + \frac{1}{3} \times 1} \tag{2}$$

$$= \frac{\frac{1}{3}}{\frac{1}{9} + \frac{2}{9} + \frac{1}{3}} \tag{3}$$

$$= \frac{1}{3} \times \frac{9}{6} \tag{4}$$

$$P(C \mid S) = \frac{1}{2} \tag{5}$$

$\therefore$ from(5),

Probability that the coin drawn is silver from box $C = \frac{1}{2}$.