Engineering Mathematics-IV

Probability Practice Questions:

1. Find the probability that a leap year selected at random will contains 53 Sundays.

   Ans: $\frac{2}{7}$

2. From 6 positive and 8 negative integers, four numbers are chosen at random and multiplied. Find the probability that the product is positive.

   Ans: $\frac{505}{1001}$

3. If A, B, and C are 3 independent events, then prove that (AUB) and C are independent.
4. If A and B are two events with P(A)=1/3, P(B)=1/4, P(AUB)=1/2, then find

   (i). P(A|B) (ii). P(B|A) (iii). P(A∩ $\overline{B}$) (iv). P(A|$\overline{B}$)

   Ans: (i). $\frac{1}{3}$ (ii). $\frac{1}{4}$ (iii). $\frac{1}{4}$ (iv). $\frac{1}{3}$

5. A lot consists of 10 good articles, 4 with minor defects and 2 with major defects. 2 articles are chosen from the lot at random (without replacement). Find the probability that,
   (i) Both are good
   (ii) Both have major defects
   (iii) At least one is good
   (iv) At most one is good
   (v) Exactly one is good
   (vi) Neither has major defects
   (vii) Neither is good

   Ans: (i). $\frac{3}{8}$ (ii). $\frac{1}{120}$ (iii). $\frac{7}{8}$ (iv). $\frac{5}{8}$ (v). $\frac{1}{2}$ (vi). $\frac{5}{8}$ (vii). $\frac{91}{120}$ (vii). $\frac{1}{8}$

6. The odds that a person X speaks the truth are in the ratio $3:2$ and the person Y speaking the truth is in the ratio $5:3$. In what percentage of cases are they likely to contradict each other on an identical point.
   Ans: $\frac{19}{40}$
7. There are three true coins and one false coin with head on both sides. A coin is chosen at random and tossed four times. If head occurs all the four times, what is the probability that the false coin has been chosen and used?

Ans: $\frac{16}{19}$

8. Urn A contains 5 black balls, 6 white balls, and Urn B contains 8 black balls and 4 white balls. Two balls are transferred from B to A and then a ball is drawn from A.
   (i). What is the probability that this ball is white?
   (ii). Given that the ball drawn is white, what is the probability that **at least** one white ball was transferred to A?
   Ans: (i). $\frac{220}{429}$ (ii). $\frac{34}{55}$

9. In general when A and B play 12 games of chess, 6 are won by A, 4 are won by B and 2 end in draw. They agree to play a tournament consisting of 3 games. Find the probability that,
   (i). A wins all 3 games
   (ii). 2 games end in a draw
   (iii). A and B win alternatively
   (iV). B wins at least one game.

   Ans: (i). $\frac{1}{8}$ (ii). 0.694 (iii). $\frac{5}{36}$ (iv). $\frac{19}{27}$

10. A table has three identical drawers. In one drawer, there are 2 gold coins. In the second, there are 2 silver coins, and in the third, one silver and one gold coin kept. Suppose a drawer is pulled at random and a coin is taken at random. If this coin proves to be a gold coin, what is the probability that the coin in the drawer is also gold?
    Ans: $\frac{2}{3}$

11. For a certain binary communication channel, the probability that a transmitted '0' is received as '0' is 0.95 and the probability that a transmitted '1' is received as '1' is 0.90. If the probability that a '0' is transmitted is 0.4, find the probability that
    (i) a '1' is received
    (ii) a '1' was transmitted given that a '1' was received.

    Ans: (i) 0.56 (ii) $\frac{27}{28}$

12. A bag contains 5 balls and it is not known how many of them are white. Two balls are drawn from the bag at random and they are noted to be white. What is the chance that all the balls in the bag are white?
    Ans: ½
13. **A** and **B** throw alternatively a pair of dice. **A** wins if he throws 6 before **B** throws 7 and **B** wins if he throws 7 before **A** throws 6. If **A** begins, find his chances of winning the game.
    Ans: $\frac{30}{61}$
14. An urn contains 4 tickets numbered 1, 2, 3, 4 and another contains 6 tickets numbered 2, 4, 6, 7, 8, 9. If one of the two urns is chosen at random and a ticket is drawn at random from the chosen urn, find the probabilities that the ticket drawn bears the number
    (a) 2 or 4
    (b) 3
    (c) 1 or 9

    Ans: (a) $\frac{5}{12}$ (b) $\frac{1}{8}$ (c) $\frac{5}{24}$
15. A chartered accountant applies for a job in 2 firms X and Y. He estimates that the probability of his being selected in firm X is 0.7 and being rejected at firm Y is 0.5 and the probability of at least one of his applications being rejected is 0.6. What is the probability that he will be selected in one of the firms?
    Ans: 0.8

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