(i) Conditional Probability

Level I

1. If P(A) = 0.3, P(B) = 0.2, find P(B/A) if A and B are mutually exclusive events.
2. Find the probability of drawing two white balls in succession from a bag containing 3 red and 5 white balls respectively, the ball first drawn is not replaced.

LEVEL II

3. A dice is thrown twice and sum of numbers appearing is observed to be 6. what is the conditional probability that the number 4 has appeared at least once.

LEVEL III

4. If $P(A)=\frac{3}{8}$, $P(B)=\frac{1}{2}$ and $P(A\cap B)=\frac{1}{2}$, find $P(\overline{A}/\overline{B})$ and $P(\overline{B}/\overline{A})$

(ii)Multiplication theorem on probability

LEVEL II

5. A bag contains 5 white, 7 red and 3 black balls. If three balls are drawn one by one without replacement, find what is the probability that none is red.
6. The probability of A hitting a target is $\frac{3}{7}$ and that of B hitting is $\frac{1}{3}$.They both fire at the target.

   Find the probability that (i) at least one of them will hit the target, (ii) Only one of them will hit the target.

LEVEL III

7. A class consists of 80 students; 25 of them are girls and 55 are boys, 10 of them are rich and the remaining poor; 20 of them are fair complexioned. what is the probability of selecting a fair complexioned rich girl.
8. Two integers are selected from integers 1 through 11. If the sum is even, find the probability that both the numbers are odd.

(iii) Independent Events

LEVEL I

9. A coin is tossed thrice and all 8 outcomes are equally likely.
   E : "The first throw results in head" F : "The last throw results in tail"
   Are the events independent?
10. Given $P(A) = \frac{1}{4}$, $P(B) = \frac{2}{3}$ and $P(A \cup B) = \frac{3}{4}$. Are the events independent?
11. If A and B are independent events, Find P(b) if $P(A \cup B) = 0.60$ and $P(A) = 0.35$.

(iv) Bayes' theorem, partition of sample space and Theorem of total probability

LEVEL I

12. A bag contains 6 red and 5 blue balls and another bag contains 5 red and 8 blue balls. A ball is drawn from the first bag and without noticing its color is put in the second bag. A ball is drawn from the second bag. Find the probability that the ball drawn is blue in color.
13. A card from a pack of 52 cards is lost. From the remaining cards of the pack, two cards are drawn and are found to be both hearts. Find the probability of the lost card being a heart.
14. An insurance company insured 2000 scooter and 3000 motorcycles. The probability of an accident involving scooter is 0.01 and that of motorcycle is 0.02. An insured vehicle met with an accident. Find the probability that the accidental vehicle was a motorcycle.
15. A purse contains 2 silver and 4 copper coins. A second purse contains 4 silver and 3 copper coins. If a coin is pulled at random from one of the two purses, what is the probability that it is a silver coin.
16. Two thirds of the students in a class are boys and the rest are girls. It is known that the probability of a girl getting first class is 0.25 and that of a boy is getting a first class is 0.28. Find the probability that a student chosen at random will get first class marks in the subject.

LEVEL II

17. Find the probability of drawing a one-rupee coin from a purse with two compartments one of which contains 3 fifty-paise coins and 2 one-rupee coins and other contains 2 fifty-paise coins and 3 one- rupee coins.
18. Suppose 5 men out of 100 and 25 women out of 1000 are good orator. An orator is chosen at random. Find the probability that a male person is selected. Assume that there are equal number of men and women.

19. A company has two plants to manufacture bicycles. The first plant manufactures 60 % of the bicycles and the second plant 40 %. Out of that 80 % of the bicycles are rated of standard quality at the first plant and 90 % of standard quality at the second plant. A bicycle is picked up at random and found to be standard quality. Find the probability that it comes from the second plant.

LEVEL III

20. A letter is known to have come either from LONDON or CLIFTON. On the envelope just has two consecutive letters ON are visible. What is the probability that the letter has come from
(i) LONDON (ii) CLIFTON?
21. A test detection of a particular disease is not fool proof. The test will correctly detect the disease 90 % of the time, but will incorrectly detect the disease 1 % of the time. For a large population of which an estimated 0.2 % have the disease, a person is selected at random, given the test, and told that he has the disease. What are the chances that the person actually have the disease.
22. Given three identical boxes I, II and III each containing two coins. In box I, both coins are gold coins, in box II, both are silver coins and in box III , there is one gold and one silver coin.
A person chooses a box at random and takes out a coin. If the coin is of gold, what is the probability that the other coin in the box is also of gold? **[CBSE 2011]**

(v) Random variables & probability distribution Mean & variance of random variables

LEVEL I

23. Two cards are drawn successively with replacement from a well-shuffled deck of 52 cards. Find the probability distribution of the number of spades
24. 4 defective apples are accidentally mixed with 16 good ones. Three apples are drawn at random from the mixed lot. Find the probability distribution of the number of defective apples.
25. A random variable X is specified by the following distribution

X	2	3	4
P(X)	0.3	0.4	0.3

Find the variance of the distribution.