MATHEMATICS CLASS XII
CHAPTER – 13 PROBABILITY

Q.1. Evaluate P(A ∪ B) if 2 P(A) = P(B) = $\frac{5}{13}$ and P (A|B) = $\frac{2}{5}$.

Q.2. If A and B are two events associated with same random experiment such that P(A) = 0.4, P(B) = 0.8 and P(B|A) = 0.6, then find P(A|B), P(A∪B) and P($\overline{B}$|$\overline{A}$).

Q.3. A die is thrown twice and the sum of the numbers appearing is observed to be 7. What is the conditional probability that the number 2 has appeared atleast once?

Q.4. Ten cards numbered 1 to 10 are placed in a box, and one card is drawn randomly. If it is known that the number on the card drawn is more than 3, what is the probability that it is an even number?

Q.5. Two numbers are selected at random from numbers 1 to 11. If the sum is even, then find the probability that both numbers are odd.

Q.6. 12 Cards numbered 1 to 12 are placed in a box, mixed up thoroughly and then a card is drawn at random from the box. If is known that the number on the drawn card is more than 3, then find the probability that it is an even number.

Q.7. Two digits are selected at random from the digit 1 to 9. If the sum is even, then find the probability that both digits are odd.

Q.8. One card is drawn from a well-shuffled pack of 52 cards. If E is the event 'the card drawn is a king or a queen' and F is the event ' the card drawn is a queen or an ace' then find the probability of conditional E/F.

Q.9. (i) I roll two dice and get a sum more than 9. What is the probability that the number on the first die is even?

(ii) I roll two dice and get an even number on the first die. What is the probability that sum is more than 9?

Q.10. In a certain school 20% of the students failed in English, 15% of the students failed in Mathematics and 10% of the students failed in both English and Mathematics. A student is selected at random. If he passed in English, what is the probability that he also passed in Mathematics?

Q.11. 60% students read Hindi newspaper, 40% students read Tamil newspaper and 20% students read both Hindi and Tamil newspaper. Find the probability that a student selected at random reads

(i) Tamil newspaper given that he has already read Hindi newsapaper.

(ii) Hindi newspaper given that he has already read Tamil newspaper.

(iii) Neither Hindi nor Tamil newspaper.

What values are being promoted in this question?

Q.12. A bag contains 10 white balls and 15 black balls. Two balls are drawn in succession without replacement. Find the probability that the first ball is white and the second is black.

Q.13. A bag contains 19 tickets, numbered 1 to 19. A ticket is drawn and then another ticket is drawn without replacement. Find the probability that both tickets will show even numbers.

Q.14. A bag contains 4 red, 3 blue and 2 white balls. If three balls are drawn one by one(without replacement), then what is the probability that all three balls are red?

Q.15. Two balls are drawn one after another (without replacement) from a bag containing 2 white, 3 red and 5 blue balls. What is the probability that atleast one ball is red?

Q.16. The probability of happening of event A is 'a' and that of the event B happening is 'b'. Given that A and B are independent events, calculate the probabilities that'

(i) both the events A and B happen

(ii) both events A and B do not happen

(iii) event A happens and B does not happen

(iv) event B happens bot A does not happen

(v) the event B does not happen.

Q.17. If A and B are two independent events such that $P(\overline{A})$ = 0.65, P(A $\cup$ B) = 0.65 and P(B) = p, then find the value of p.

Q.18. A bag contains 50 tickets numbered 1, 2, 3, …. , 50 of which five are drawn at random and arranged in ascending order of the numbers appearing on the tickets ($x_1 < x_2 < x_3 < x_4 < x_5$). Find the probability that x_3 = 30.

Q.19. A committee of 5 persons is to be constituted from a group of 6 gents and 8 ladies. If the selection is made randomly, then find the probability that there are 3 ladies and 2 gents in the committee.

Q.20. Four persons are chosen at random from a group containing 3 men. 2 women and 4 children. Find the probabilities that exactly two of them are children.

Q.21. Two balls are drawn at random from a bag containing 5 white and 7 black balls.

(i) What is the probability that both balls are white?

(ii) What are the odds in favour of drawing two black balls?

(iii) What is the probability of drawing one white and one black balls?

Q.22. A box contains 9 red balls, 5 blue balls and 6 green balls. 3 balls are drawn from the box at random. Find the probability that

(i) all will be blue   **(ii)** atleast one will be green.

Q.23. An urn contains 9 balls, 2 balls, 2 of which are white , 3 blue and 4 black. 3 balls are drawn at random from the urn. What is the chance that

(i) the three balls will be different colours

(ii) 2 balls will be of same colour and the third of a different colour

(iii) three balls will be of same colour?

Q.24. Two cards are drawn at random from a pack of 52 cards. Find the probability that the cards are either both red or both aces.

Q.25. Four cards are drawn successively from a pack of 52 cards. What is the probability of

(i) drawing 4 aces if cards are replaced

(ii) drawing 4 aces if cards are not replaced

(iii) drawing all cards of different suits if cards are replaced

(iv) drawing all cards of different suits if cards are not replaced?

Q.26. A bag contains 5 red marbles and 3 black marbles. Three marbles are drawn one by one without replacement. What is the probability that atleast one of the three marbles drawn be black, if the first marble is red?

Q.27. A bag contains 5 white, 3 red and 2 blue balls. Four balls are drawn one by one without replacement. Find the probability of drawing atleast one white ball.

Q.28. A speaks truth in 60% of the cases, while B in 90% of the cases. In what percent of cases are they likely to contradicting each other in stating the same fact? In the cases of contradiction do you think, the statement of B will carry more weigth as he speaks truth in more number of cases than A?

Q.29. Probability of solving a specific problem independently by A and B are $\frac{1}{2}$ and $\frac{1}{3}$ respectively. If both try to solve the problem independently, then find the probability that

(i) the problem is solved

(ii) exactly one of them solves the problem.

Q.30. Two horses are considered for a race. The probability of selection of the first horse is $\frac{1}{3}$. What is the probability that :

(i) both of them will be selected.

(ii) only one of them will be selected.

(iii) none of them will be selected.

Q.31. An article manufactured by a company consists of two parts A and B. In the process of manufactured of part A, 9 out of 104 parts may be defected. Similarly, 5 out 100 parts are likely to be defective in the manufacture of part B. Calculate the probability that the article manufactured will not be defective.

Q.32. A candidate is selected for interview of management trainee for 3 companies. For the first company, there are 12 candidates, for the second there are 15 candidates and for the third, there are 10 candidates. Find the probability that he is selected in atleast one of the companies.

Q.33. A problem in mathematics is given to three students whose chances of solving it are $\frac{1}{3}$, $\frac{2}{7}$ and $\frac{3}{8}$ respectively. If all the three try to solve the problem simultaneously, then find the probability that exactly one of them can solve it.

Q.34. A can hit a target 4 times in 5 shots; B 3 times in 4 shots; C twice in 3 shots. They fire a volley. What is the probability that atleast two shots hit?

Q.35. A and B throw two dice each. Find the probability that A gets a sum of 9 and B gets a higher sum.

Q.36. A and B throw a pair of dice turn by turn. The first to throw 9 is awarded a prize. If A starts the game, show that the probability of A getting the prize is $\frac{9}{17}$.

Q.37. A, B and C in order toss a coin. The first one to throw a head wins. What are their respective chances of winning? Assume that the game may continue indefinitely.

Q.38. Marksmen A and B compete by taking turns to shoot a target. Odds in favour of A hitting the target (in a single try) are 3 : 2 and the odds in favour of B hitting the target (in a single try) are 4 : 3. Calculate the probability of A winning the competition if he gets the first chance to shoot.

Q.39. A ball is drawn from an urn containing one red ball and one black ball. If the ball drawn is red, a coin is tossed; if it is black, a die is thrown. What is the probability of

(i) each elementary event

(ii) getting a head

(iii) getting an even number?

Q.40. If A is an event in a sample space S, show that A and S are independent.

Q.41. If P(A) = 0.2, P(B) = p, P(A ∪ B) = 0.6 and A and B are given to be independent events, find the value of p.

Q.42. A bag contains 5 red, 6 white and 7 black balls. Two balls are drawn at random. What is the probability that both balls are red or both are black?

Q.43. There are 2 red and 3 black balls in a bag, 3 balls are taken out at random from the bag. Find the probability of getting 2 red and 1 black ball or 1 red and 2 black balls.

Q.44. A bag contains 5 white, 7 red and 4 black balls. Four balls are drawn one by one with replacement. What is the probability that none is white?

Q.45. Two balls are drawn at random from a bag containing 3 white, 3 red, 4 green and 4 black balls, one by one without replacement. Find the probability that both the balls are of different colours.

Q.46. A bag contains 1 white, 5 red and 4 black balls. If three balls are drawn one by one without replacement, then find the probability of drawing a white ball followed by two red balls.

Q.47. A bag contains 25 tickets, numbered 1 to 25. A ticket is drawn and then another ticket is drawn without replacement. Find the probability that both tickets are even numbered.

Q.48. Two cards are drawn without replacement from a well-shuffled pack of 52 cards find the probability that one is a spade and the other is a queen of red colour.

Q.49. In bag A, there are 5 white and 8 red balls, in bag B, 7 white and 6 balls, and in bag C, 6 white and 5 red balls. One bag is taken out at random from each bag. Find the probability that all the three balls are of the same colour.

Q.50. Four-digit numbers are formed by using the digits 1, 2, 3, 4 and 5 without repeating any digit. Find the probability that a number, chosen at random, is an odd number.

Q.51. In a group of students, there are 3 boys and 3 girls. Four students are to be selected at random from the group. Find the probability that either 3 boys and 1 girl, or 3 girls and 1 boy are selected.

Q.52. In a group of students, there are 3 boys and 3 girls. Four students are to be selected at random from the group. Find the probability that either 3 boys and 1 girls, or 3 girls and 1 boy are selected.

Q.53. 3 cards are drawn from a pack of well-shuffled 52 cards. Find the probability that

(i) all the three cards are of the same suit

(ii) one is a king, the other is a queen and the third is a jack

Q.54. These are 4 letters and 4 addressed envelopes. Find the probability that all the letters are not dispatched in the right envelope.

Q.55. A problem in Mathematics is given to four students A, B, C, D. Their chances of solving the problem respectively are $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$ and $\frac{1}{5}$. What is the probability that the problem will be solved?

Q.56. The probability that a boy will not pass M.B.A. examination is $\frac{3}{5}$ and that a girl will not pass is $\frac{4}{5}$. Calculate the probability that atleast one of them passes

the examination. What ideal conditions a student should keep in mind while appearing in an examination.

Q.57. P speaks truth in 70% of the cases and Q in 80% of the cases. In what percent of cases are they likely to agree in stating the same fact?

Q.58. Redo the above problem if first ticket is put back after noting the number.

Q.59. A bag contains 5 white and 3 black balls. Four balls. Four balls are successively drawn out without replacement. What is probability that they are alternately of different colours? What would be the probability of this event if balls are drawn with replacement?

Q.60. A bag contains 3 red and 5 black balls and a second nag contains 6 red and 4 black balls. A ball is drawn from each bag. Find the probability that one is red and other is black.

Q.61. A policeman fires four bullets on a dacoit. The probability that the dacoit will be killed by one bullet is 0.6. What is the probability that the decoit is still alive?

Q.62. A and B toss a coin alternately till one of them gets a head and wins the game. If A starts first, then find the probability that B will win the game.

Q.63. A and B throw a pair of dice alternately. In order to win, they have to get a sum of 8. Find their respective probabilities of winning if A starts the game.

Q.64. There are two bags , one of which contains 3 black and 4 white balls while the other contains 4 blacks and 3 white balls. A die is thrown. If it shows up 1 or

3, a ball is taken from the first bag; but if it shows up any other number, a ball is chosen from the second bag. Find the probability of choosing a black ball.

Q.65. There are two bags. One bag contains six green and three red balls . the second bag contains five green and four red balls. One ball is transferred from the first bag to the second bag. Then one ball is drawn from the second bag. Find the probability that it is a red ball.

Q.66. A purse contains 4 silver and 5 copper coins. A second purse contains 3 silver and 7 copper coins. If a coin is taken out at random from one of the purses, what is the probability that it is a copper coin?

Q.67. For A, B and C the chances of being selected as the manager of a firm are 4 : 1 : 2 repectively. The respective probabilities for them to introduce a radical change in marketing strategy are 0.3, 0.8 and 0.5 respectively. If the change does takes place, find the probability that it is due to the appointment of B.

Q.68. Bag I contain 3 red and 4 black balls and bag II contains 4 red and 5 black balls. One ball is transferred from bag I to bag II and then a ball is drawn at random from bag II. If the ball so drawn is red, then find the probability that the transferred ball is black.