CHAPTER - 16

PROBABILITY

1. A box contains 25 tickets numbered from 1 to 25. One ticket is drawn at random. Find the probability of getting a number which is divisible by (i) 5 (ii) 8.

2. A die is thrown, find the probability of getting (i) a prime number
(ii) a number ≥ 3.

3. A die is thrown, find the probability of getting (i) a number > 6
(ii) a number < 6

4. A card is selected from a pack of 52 cards. Find the probability that the card is (i) an ace (ii) a black card.

5. A card is drawn from a deck of 52 cards. What is the probability that the card is (i) Club (ii) Heart

6. Two cards are drawn from a pack of 52 cards. Find the probability that both the cards are (i) Spade (ii) One is heart and other is diamond.

7. Four cards are drawn from a well shuffled deck of 52 cards. What is the probability of obtaining 3 diamond and one spade?

8. Find the probability that when a hand of 7 cards is drawn from a well shuffled deck of 52 cards, it contains (i) All kings (ii) 3 kings.

9. Find the probability that when a hand of 7 cards is drawn from a deck of 52 cards, it contains at least 3 queens.

10. A fair coin with 1 marked on one face and 6 marked on the other and a fair die are both tossed, find the probability that the sum of the numbers that turn up is (i) 3 (ii) 12.

11. There are 4 men and 6 women on the city council. If one council member is selected for a committee at random, how likely is that is (i) a woman (ii) a man.

12. A committee of two persons is selected from 2 men and 2 women. What is the probability that the committee will have (i) no man (ii) one man (iii) two men.

13. Three coins are tossed once. Find the probability of getting (i) 3 heads (ii) 2 heads (iii) no head (iv) at least 2 heads (v) at most 2 heads, (vi) 3 tails (vii) exactly 2 tails (viii) no tail.

14. A letter is chosen at random from the word `ASSASSINATION'. Find the probability that a letter is (i) a vowel (ii) consonant.

15. A numberlock of a suitcase has 4 wheels, each labelled with ten digits from 0 to 9. A lock opens with a sequence of four digits with no repeats. What is the probability of a person getting the right sequence to open the suitcase?

16. In a certain lottery 10,000 tickets are sold and ten equal prizes are awarded. What is the probability of not getting prize if you buy (i) one ticket (ii) 10 tickets.

17. Six boys and six girls sit in a row at random. Find the probability that (i) 6 girls sit together (ii) the boys and girls sit alternately.

18. One card is drawn from a well shuffled deck of 52 cards. If each outcome is equally likely, calculate the probability that the card will be (i) a diamond (ii) not an ace (iii) a black card (iv) not a diamond.

19. An urn contains 3 red, 4 blue and 2 green balls. Three balls are drawn at random without replacement of the urn. Find the probability that the three balls have different colours.

20. In a box there are 2 red, 3 black and 4 white balls. Out of these, three balls are drawn together. Find the probability of these being of same colour.

21. A box contains 10 red, 20 blue and 30 green marbles. 5 marbles are drawn from the box, what is the probability that (i) all will be blue, (ii) all will be green.

22. Three identical dice are rolled. Find the probability that the same number will appear on each of them.

23. In class XI, 40% of students study Mathematics, 30% study Biology and 10% study both. If a student is selected at random from a class, find the probability that he will be studying Mathematics or Biology.

24. In entrance test that is graded on the basis of two exams. The probability of a randomly chosen student passing the first exam is 0.8 and passing the second exam is 0.7 and probability of passing atleast one of them is 0.95. What is the probability of passing both.

25. Two students Anil and Anu appeared in an exam. The probability that Anil will pass the exam is 0.05 and the probability that Anu will pass the exam is 0.10. The probability that both will pass the exam is 0.02. Find the probability that
    (i) both Anil and Anu will not pass the exam.
    (ii) at least one of them will not pass the exam.

26. 3 letters are dictated to 3 persons and an envelope is addressed to each of them. The letters are inserted into the envelopes at random so that each envelope contains exactly one letter. Find the probability that atleast one letter is in its proper envelope.

27. Probability of two events A and B are 0.25 and 0.40 respectively. The probability that both A and B occurs is 0.15. Find the probability that neither of them occur.

28. Given P(A)=0.35, P(B)=0.73, P(A∩B)=0.14.

    Find (i) P(AUB) (ii) $P(A \cap \overline{B})$ (iii) $P(\overline{A} \cap B)$
    (iv) $P(\overline{A} U \overline{B})$ (v) $P(\overline{A} \cap \overline{B})$

29. If A, B, C are three mutually exclusive and exhaustive events such that 3P(A)=2P(B)=P(C) then find P(A).

30. Suppose an integer from 1 through 1000 is chosen at random. Find the probability that the integer is a multiple of 2 or multiple of 10.

31. A and B are two events such that P(A)=0.54, P(B)=0.69 and P(A∩B)=0.35. Find (i) P(AUB) (ii) $P(A^{I} \cap B^{I})$ (iii) $P(A \cap B^{I})$ (iv) $P(B \cap A^{I})$

32. If E and F are events such that $P(E) = \frac{1}{4}$, $P(F) = \frac{1}{2}$ and $P(E \cap F) = \frac{1}{8}$. Find
    (i) P(E or F) (ii) P (not E or not F).

33. Given P(A)=0.42, P(B)=0.48 and P(A and B)=0.16 Find (i) P (not A)
    (ii) P (not B) (iii) P (A or B).

34. In a class of 60 students, 30 opted for NCC, 32 opted for NSS and 24 opted for both NCC and NSS. If one of these students is selected at random, find the probability that (i) the student opted for NCC or NSS.
    (ii) the student has opted NSS but not NCC.

35. Suppose that each child born is equally likely to be a girl or a boy. Consider a family with exactly 3 children. Find the probability that (i) exactly one child is girl (ii) no child is a girl.

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Answers

1. n(s)=25 (i) $= \frac{1}{3}$ (ii) $\frac{3}{25}$

2. n(s)=6 (i) $\frac{3}{6} = \frac{1}{2}$ (ii) $\frac{4}{6} = \frac{2}{3}$

3. n(s)=6 (i) $\frac{0}{6} = 0$ (ii) $\frac{5}{6}$

4. n(s)=$^{52}C_1$=52 (i) $\frac{^4C_1}{^{52}C_1} = \frac{4}{25}$ (ii) $\frac{^{26}C_1}{^{52}C_1} = \frac{26}{52} = \frac{1}{3}$

5. n(s)=$^{52}C_1$=52 (i) $\frac{^{13}C_1}{52} = \frac{1}{4}$ (ii) $\frac{^{13}C_1}{52} = \frac{1}{4}$

6. n(s)=$^{52}C_2$=1326 (i) $\frac{^{13}C_2}{^{52}C_2} = \frac{1}{17}$ (ii) $\frac{^{13}C_1 \times ^{13}C_1}{^{52}C_2} = \frac{13}{102}$

7. n(s)=$^{52}C_4$=62475 $P(A) = \frac{^{13}C_3 \times ^{13}C_1}{^{52}C_4} = \frac{858}{62475}$

8. n(s)=$^{52}C_7$ (i) $\frac{^4C_4 \times ^{48}C_3}{^{52}C_7} = \frac{1}{7735}$ (ii) $\frac{^4C_3 \times ^{48}C_4}{^{52}C_7} = \frac{9}{1547}$

9. n(s)=$^{52}C_7$ $P(A) = \frac{^4C_3 \times ^{48}C_4 + ^4C_4 \times ^{48}C_3}{^{52}C_7} = \frac{46}{7735}$

10. n(s)=2x6=12 (i) $P(A) = \frac{1}{12}$ (ii) $P(B) = \frac{1}{12}$

11. n(s)= $^{10}C_1$=10 (i) $\frac{^6C_1}{10} = \frac{3}{5}$ (ii) $\frac{^4C_1}{10} = \frac{2}{5}$

12. n(s)= $^4C_2$=6 (i) $\frac{^2C_2}{6} = \frac{1}{6}$ (ii) $\frac{^2C_1 \times ^2C_1}{6} = \frac{2}{3}$ (iii) $\frac{1}{6}$

13. n(s)=2x2x2=8 (i) $\frac{1}{8}$ (ii) $\frac{3}{8}$ (iii) $\frac{1}{8}$ (iv) $\frac{3}{8} + \frac{1}{8} = \frac{1}{2}$ (v) $\frac{1}{8} + \frac{3}{8} + \frac{3}{8} = \frac{7}{8}$

(vi) $\frac{1}{8}$ (vii) $\frac{3}{8}$ (viii) $\frac{1}{8}$

14. n(s)=13 (i) $\frac{6}{13}$ (ii) $\frac{7}{13}$

15. $n(s)= {}^{10}C_4=5040, \quad P(A) = \frac{1}{5040}$

16. $n(s)=10,000$ (i) $P(A) = \frac{{}^{10}C_1}{10000} = \frac{1}{10000}, \quad P(A^I) = 1 - \frac{1}{1000} = \frac{999}{1000}$

(ii) $P(B) = \frac{{}^{10}C_{10}}{10000} = \frac{1}{10000}, \quad P(B^I) = \frac{9999}{10000}$

17. $n(s)=12!$ (i) $\frac{7!6!}{12!} = \frac{1}{132}$ (ii) $\frac{6!6!x2}{12!} = \frac{1}{462}$

18. $n(s)= {}^{52}C_1=52$ (i) $\frac{13}{52} = \frac{1}{4}$ (ii) $P(A) = \frac{4}{52}, \ P(A^I) = \frac{12}{13}$ (iii) $\frac{26}{52} = \frac{1}{2}$

(iv) $P(B) = \frac{1}{4}$ (v) $P(B^I) = 1 - \frac{1}{4} = \frac{3}{4}$

19. $n(s)= {}^{9}C_3$ $P(A) = \frac{{}^{3}C_1.{}^{4}C_1.2C_1}{{}^{9}C_3} = \frac{2}{7}$

20. $n(s)= {}^{9}C_3$ $P(A) = \frac{{}^{3}C_3+{}^{4}C_3}{{}^{9}C_3} = \frac{5}{84}$

21. $n(s)= {}^{60}C_5$ (i) $\frac{{}^{20}C_5}{{}^{60}C_5} = \frac{34}{11977}$ (ii) $\frac{{}^{30}C_5}{{}^{60}C_5} = \frac{351}{13452}$

22. $n(s)=6x6x6=216, \quad P(A) = \frac{6}{216} = \frac{1}{36}$

23. $n(s)=100$ $P(MUB) = 0.6$

24. $P(A \cap B)=0.55$

25. (i) $P((A \cap B)^I) = 1-P(A \cap B) = 0.98$
(ii) $P((AUB)^I) = 1-P(AUB) = 0.87$

26. $n(s) = 6$ $P(A) = \frac{4}{6} = \frac{2}{3}$

27. $P(AUB)=0.50$ $P(A^I \cap B^I)=1-0.50=0.50$

28. (i) 0.94 (ii) 0.21 (iii) 0.59 (iv) 0.86 (v) 0.06

29. $P(A)+P(B)+P(C)=1, \ P(A)= \frac{2}{11}$

30. $n(s)=1000$ $P(A) = \frac{500}{1000}, \ P(B) = \frac{100}{1000}, \ P(A \cap B) = \frac{100}{1000}$ $P(AUB)= \frac{1}{2}$

31. (i) 0.88 (ii) 0.12 (iii) 0.19 (iv) 0.34

32. (i) P(EUF) = $\frac{5}{8}$ (ii) $P(E^{I} \cap F^{I}) = \frac{3}{8}$

33. (i) $P(A^{I}) = 0.58$, (ii) (i) $P(B^{I}) = 0.52$ (iii) 0.74

34. n(s)=60 $P(A) = \frac{30}{60} = \frac{1}{2}$ $P(B) = \frac{32}{60} = \frac{8}{15}$

35. (i) n(A)=3, n(s)=8, $P(A) = \frac{3}{8}$

(ii) n(s)=8, n(B)=1, $P(B) = \frac{1}{8}$

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