CHAPTER 16

PROBABILITY

THINGS TO BE REMEMBERED

1. If a coin is tossed 'n' times, the no. of events in the sample space is 2^n
2. If a die is thrown 'n' times, the no. of events in the sample space is 6^n
3. If E be an equally likely and exhaustive, then probability of the event E is

$$P(E)=\frac{No.of\ elementary\ events\ \ favourable\ to\ E}{Total\ \ no.\ of\ \ events}$$

.

E.g.: If a die is thrown once,

$$P(a\ head)=\frac{1}{2}$$

$$P(a\ tail)=\frac{1}{2}$$

Note: For an event E,

i) Each $p_i \geq 0$

ii) sum of the probabilities is equal to 1.

i.e., $\sum p_i = 1$, where $i = 1, 2, 3, \ldots n$

In the above example, $\sum p_i = \frac{1}{2}+\frac{1}{2}=1$

4. If E be an event. Then

$$P(not\ E)=1-P(E)=1-\frac{1}{2}=\frac{1}{2}$$

5. Addition Theorem1: If E and F are two mutually exclusive events,

$$P(E\ or\ F)=P(E\cup F)=P(E)+P(F)$$

6. Addition Theorem 2: If E and F are two mutually exclusive events,

$$P(E\ or\ F)=P(E\cup F)=P(E)+P(F)-P(E\cap F)$$

$$P(E\ and\ F)=P(E\cap F)=P(E)+P(F)-P(E\cup F)$$

Note:

7. If A, B and C are three mutually exclusive events, then

$$P(A\ or\ B\ or\ C)=P(A\cup B\cup C)=P(A)+P(B)+P(C)$$

8. If A, B and C are three not mutually exclusive events, then

$$P(A\cup B\cup C)=P(A)+P(B)+P(C)-P(A\cap B)-P(B\cap C)-P(A\cap C)+P(A\cap B\cap C)$$

9. $P(not\ E\ and\ not\ F)=P(neither\ E\ nor\ F)=1-P(E\cup F)$

10. $P(not\ E\ or\ not\ F)=P(neither\ E\ or\ F)=1-P(E\cap F)$

11. $P(both\ will\ not\ qualify)=P(not E\ \ and\ \ not F)$

12. $P(atleast\ one\ of\ them\ will\ not\ \ qualify)$

$$=1-P(E\cup F)'=1-P(E\cap F)$$

13. $P(only\ \ one\ \ of\ \ them\ \ will\ \ qualify)$

$$=P(E)+P(F)-2P(E\cap F)$$

14. $P(E\ but\ not\ F)=P(E)-P(E\cap F)$

15. $P(F\ \ but\ not\ E)=P(F)-P(E\cap F)$

IMPROVEMENT 2018

1. a) Consider the experiment in which a coin is tossed repeatedly until a head comes up. Write the sample space. (1)

   b) If A and B are two events of a sample space with $P(A)=0.54, P(B)=0.69$ and $P(A\cap B)=0.35$, $P(A'\cap B')$ (2)

   c) 3 cards are drawn from a well shuffled pack of 52 cards. Find the probability that
      i) all the 3 cards are diamond. (1)
      ii) at least one of the cards is non-diamond. (1)
      iii) one card is king and two are jacks. (1)

MARCH 2018

2. If A and B are events such that $P(A)=\frac{1}{4}; P(B)=\frac{1}{2}; P(A\cap B)=\frac{1}{6}$ then find:
   a) $P(A \text{ or } B)$ (1)
   b) P (not A and not B) (1)

3. One card is drawn at random from a pack of 52 playing cards. Find the probability that,
   a) the card drawn is black. (1)
   b) the card drawn is a face card. (1)
   c) the card drawn is a black face card. (1)

IMPROVEMENT 2017

4. a) If $P(A)=\frac{2}{11}$, then $P(A')=$ ..... (1)

   b) Four cards are drawn from a well- shuffled deck of 52 cards. What is the probability of obtaining 3 diamonds and one shade? (4)

MARCH 2017

5. a) Match the following: (3)

i) $P(A)=\frac{1}{4}$ then $P(notA)=$	1) $\frac{1}{2}$
ii) If $P(A)=\frac{1}{3}, P(B)=\frac{1}{4}$ and $P(A\cup B)=\frac{1}{12}$ then $P(A\cap B)=$	2) 0
iii) If S is the sample space then P(S)	3) $\frac{3}{4}$
	4) 1

   b) Two dice are thrown at random. Find the probability of ……..
   i) getting a doublet
   ii) getting sum of the numbers on the dice 8 (2)

IMPROVEMENT 2016

6. a) If $P(A')=0.8$ write the value of $P(A)$. (1)

   b) In a class of 60 students; 30 selected for NCC, 32 selected for NSS and 24 selected both NCC and NSS. If one of these students is selected at random, find the probability that:
      i) the student selected for NCC or NSS. (2)
      ii) the student has selected neither NCC nor NSS. (2)

MARCH 2016

7. a) In a random experiment, 6 coins are tossed simultaneously. Write the number of sample points in the sample space. (1)
   i) 2^2 ii) 2^4 iii) 2^6 iv) 2^8

b) Given that $P(A)=0.5, P(B)=0.6,$ $P(A\cap B)=0.3$. *Find* $P(A')$, $P(A\cup B), P(A'\cap B')$ and $P(A'\cup B')$ (4)

IMPROVEMENT 2015

8. a) If A and B are mutually exclusive and exhaustive events then $P(A)+P(B)=.....$

i) 0 ii) 1 iii) $\frac{1}{2}$ iv) 2 (1)

b) Two student A and B appeared in an exami- nation. The probability that A will qualify the examination is 0.25 and B will qualify is 0.45 and both will qualify the examination is 0.2. Find the probability that:

i) Both A and B will not qualify the examination.

ii) One of them will qualify the examination. (4)

MARCH 2015

9. a) The number of outcomes in the sample space of the random experiment of throwing two dice is …… (1)

i) 6^3 ii) 6 iii) 6^2 iv) 12

b) Two students, Anil and Ashima appeared in an examination. The probability that Anil will qualify the examination is 0.05 and that Ashima will qualify the examination is 0.10. The probability that both will qualify the examination is 0.02. Find the probability that both will not qualify the examination. (3)

IMPROVEMENT 2014

10. If A and B are two events such that $P(A)=0.42, P(B)=0.48$ and $P(A\cap B)=0.16$ then, find:

i. $P(not\ A)$ (2)

ii. $P(not\ B)$ (1)

iii. $P(A\cup B)$ (2)

MARCH 2014

11. a) A coin is tossed repeatedly until a head comes up. Write the sample space. (1)

b) If A and B are two events in a random experiment, then $P(A\cup B)=P(A)+P(B)-.....$ (1)

c) Let $P(A)=\frac{1}{35}, P(B)=\frac{1}{5}, P(A\cap B)=\frac{1}{15}$ Find P(not A and not B). (1)

d) A bag contains 9 discs of which 4 are red, 3 are blue, and 2 are yellow. A disc is drawn at random from the bag. Calculate the probability that it will be

i) Red (1)

ii) Not yellow (1)

IMPROVEMENT 2013

12. The probability that Ramu will pass the examination in both mathematics and physics is 0.5, the probability of passing neither mathematics nor Physics is 0.1 the probability of passing mathematics is 0.75.

a) What is the probability of passing mathematics or physics? (1)

b) What is probability of passing physics? (3)

MARCH 2013

13. a) If A and B are two events in a random experiment, then

$P(A)+P(B)-P(A\cap B)=.....$ (1)

b) Given $P(A)=0.5, P(B)=0.6$ and $P(A\cap B)=0.3$ find $P(A\cup B)$ and $P(A')$. (2)

c) Two dice are thrown simultaneously. Find the probability of getting a doublet (same number on both dice).

IMPROVEMENT 2012

14. a) A coin is drawn repeatedly until a tail comes up. What is the sample space for this random experiment? (1)

b) Three coins are tossed once. Find the probability of getting:

i) No head

ii) Exactly one head

iii) Atleast one head

iv) Atleast two heads (3)

MARCH 2012

15. 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 this student is selected at random, find.

a) The probability that student opted for NCC or NSS. (2)

b) The probability that the student opted for exactly one of NCC or NSS. (2)

IMPROVEMENT 2011

16. A bag contains 3 white, 4 black and 2 yellow balls. Two balls are drawn at random.

a) Find the probability that the two balls drawn are of the same colour. (2)

b) Find the probability that none of the balls drawn are yellow inn colour. (2)

MARCH 2011

17. i) If $\frac{2}{11}$ is the probability of an event A, then what is the probability of the Event 'not A' ? (1)

ii) If $P(A)=\frac{3}{5}$ *and* $P(B)=\frac{1}{5}$, then find $P(A\cup B)$ if A and B are mutually exclusive events. (1)

iii) A coin is tossed twice. What is the probability that atleast one tail occurs? (2)

IMPROVEMENT 2010

18. If M and N are two events such that $P(M)=\frac{1}{4}, P(N)=\frac{1}{2}, P(M\cap N)=\frac{1}{6}$. Find

a) P (M or N) (2)

b) P(not M and not N) (2)

MARCH 2010

19. Two students, A and B, appeared in an examination. The probability that A passes the exam is 0.25 and that B passes is 0.45. Also the

probability that both will pass is 0.1. Find the probability that

i. Both will not pass. (2)

ii. Only one of them will pass. (2)

IMPROVEMENT 2009

20. i) Three coins are tossed once. Write the sample space of the experiment. (1)

ii) One card is drawn from a well s shuffled pack of 52 cards. If each outcome is equally likely, calculate the probability that the card will be a diamond. (2)

iii) If A and B are two events of a random experiment such that $P(A)=\frac{1}{4}, P(B)=\frac{1}{2}$ and $P(A \text{ and } B)=\frac{1}{8}$, then find P(A or B) and P(not A and not B). (2)

MARCH 2009

21. a) If P(A)=0.5, P(B)=0.2,then find $P(A \cup B)'$ (Given that A and B are mutually exclusive) (1)

b) A pair of dice is thrown, and then estimates the event of 'getting an even number on the first die'. (1)

c) A bag contains 9 balls of which 4 are rd, 3are white and 2 are green. If a ball is drawn at random, then:

i) Calculate the probability that it is not white. (1)

ii) It is either white or green (1)