PROBABILITY

- Probability is a measure of likelihood that an event will occur.
- Tossing a coin: When a coin is tossed, there are two possible outcomes: either heads (H) or tails (T). We say that the probability of the coin landing H is ½. And the probability of the coin landing T is ½.
- Probability Line: Probability is always between 0 and 1.
- Formula: Probability is the measure of how likely an event is. Probability of an Event = Number of Favorable Outcomes /Total Number of Possible Outcomes Measures the likelihood of an event in the following way: If P(A)>P(B) then event A is more likely to occur than event B. If P(A) = P(B) then events A and B are equally likely to occur.
- Let S be the sample space and let E be the event. Probability = n(E)/n(S).
- P(S) = 1
- 0 <P (E) <1
- For any events A and B we have : P(AUB) = P(A) + P(B) - P(A∩B)
- If A' denotes (not-A), then P(A') = 1 - P(A).

- **Experiment: Any planned process of data collection. It consists of a number of trials (replications) under the same condition.**
- **Random Experiment: An experiment in which all possible outcomes are known and the exact output cannot be predicted in advance, is called a random experiment. Examples: Rolling an unbiased dice. Tossing a fair coin.**
- **Trail and Event : The performance of a random experiment is called a trial and the outcome an event. Example: Throwing of a dice is a trial and the result is an outcome**
- **Exhaustive Cases: All possible outcomes of an event are known as exhaustive cases. Example: In a throw of single dice, the exhaustive cases are 6 but if it is 2 dice the, exhaustive cases would be**
- **Favourable Cases :The number of outcomes which result in the happening of a desired event are called favourable cases. Example: In a single throw of dice, the number of favourable cases of getting a multiple of 3 is two i.e;3**
- **Mutually Exclusive Events: Two or more events are said to be mutually exclusive if both cannot occur simultaneously in the same experiment. Example: In a throw of single coin, either head can come or tail can come.**
- **Equally Likely Cases: Two or more events are said to be equally likely if the possibility of their happening are equal. Example: In a throw of a unbiased coin , the coming up of head or tail is equally likely.**

- **Independent Events: Two events are said to be independent of each other when the happening of one event does not affect the happening of other event and vice versa. Example: 1. Choosing a 3 from a deck of cards, replacing it, AND then choosing an ace as the second card. 2. Rolling a 4 on a single 6-sided die, AND then rolling a 1 on a second roll of the die. When two events A and B are independent, the probability of both occurring is: P(A and B)= P(A). P(B)**
- **Dependent Events: Two events are dependent if the outcome or occurrence of the first affects the outcome or occurrence of the second so that the probability is changed. When two events, A and B, are dependent, the probability of both occurring is: P(A and B) = P(A) ·**
- **P(B|A) where P(B|A) is the conditional probability of an event B in relationship to an event A is the probability that event B occurs given that event A has already occurred. Example: The probability of choosing a jack on the second pick given that a queen was chosen on the first pick (without replacement) is called a conditional probability.**
- **Sample Space: The sample space of an experiment or random trial is the set of all possible outcomes or results of that experiment. Example: If the experiment is tossing a coin, the sample space is typically the set {head, tail}. For tossing two coins, the corresponding sample space would be {(head, head), (head, tail), (tail, head), (tail, tail)}. For tossing a single six-sided die, the typical sample space is {1, 2, 3, 4, 5, 6} (in which the result of interest is the number of pips facing up).**

A pack of cards has 52 cards.

- It has 13 cards of each suit, name Spades, Clubs, Hearts and Diamonds.
- Cards of spades and clubs are black cards.
- Cards of hearts and diamonds are red cards.
- There are Kings, Queens and Jacks. These are all called face cards.

Q1. If two consecutive letters are selected at random from the English alphabet, the probability that they are both consonants is

A.2/5 B.9/25 C.16/25 D.3/5

Q2. Two letters are selected at random from the set of English alphabets. What is the probability that (i) both are vowels?

A.3/65 B.9/65 C. 15/25 D.3/5

(ii) one is a vowel and the other is a consonant?

A.21/65 B. 7/13 C.3/5 D. 5/16

Q3. Three unbiased coins are tossed together, the probability of getting at least one tail is ?

A.1/8 B.7/8 C.3/8 D.5/8

Q4. Six unbiased coins are tossed together. The probability that the number of heads exceeds the number of tails is ?

A.21/64 B.11/32 C.1/6 D.5/16

Q5. It an unbiased coin is flipped 5 times, the probability that the same face does not show up in any three consecutive flips is

A.1/2 B.5/8 C.3/8 D.7/8

Q6. . Two fair dice are thrown one alter the other. What is the probability that the first die shows up a number greater than that on the second die?

A.30/36 B.15/36 C.6/36 D.3/36

Q7.If four fair dice are thrown together, then the probability that the sum them together is either 19 or 23.

A.4/108 B.12/108 C.64/1296 D.1

Q8. Find the probability that a number between 1 and 20 selected at random is divisible by either 3 or 5.

A.2/5 B.3/5 C.4/9 D.2/7

Q9.Find the probability, that a rectangle selected at random from a 8 x 8 chess board is a square.

A.0 B.17/108 C. 64/1296 D. 1

Q10.Six letters are to be placed in six addressed envelopes. If the letters arc placed at random into the envelopes, the probability that

(i) all of them arc placed into corresponding envelopes is : A.1 B.0 C.1/6! D.6/6!

(ii) exactly one letter is placed in a wrongly addressed envelope is :

A.1 B.0 C.1/6! D.1/5!

(iii) at least one letter is placed in a wrongly addressed envelopes is :

A.0 B.6!-5!/5! C.6!-1/6! D.1

Q11. Two cards are drawn at random from a well-shuffled pack of cards. What is the probability that (i) both are kings or both are queens?

A.14/221 B. 55 /221 C.2/221 D.66/221

(ii) both are jacks or both are blacks?

A.44/221 B.14/221 C.5/221 D.2/221

(iii) both are kings or both are spades?

A.14/221 B.16/221 C.2/221 D. 55/221

Q12. Three mountaineers Arvind, Jayesh and Mohit are climbing up a mountain with their respective probabilities of reaching the summit being 1/3, 1/5 and 1/4 respectively. What is the probability that

(i)all of them reach the summit? A.3/60 B.1/60 C.1 D.0

(ii) at least one of them reaches the summit? A.59/60 B.53/60 C.17/60 D.3/5

(iii) exactly one of them reaches the summit? A.11/30 B.13/30 C.19/30 D.17/30

Q13. Two cards are drawn at random from a well shuffled pack of cards. Given that both the cards are red, what I's the probability that the cards have (I) the same number on them?

A.9/325 B.64/325 C.144/325 D.288/325

(II) Different numbers on them and should belong to different suits?

A.72/325 B.81/325 C.144/325 D. 288/325

14. A bag contains 5 five-rupee coins, 8 two-rupee coins and 7 one-rupee coins. If four coins are drawn from the bag at random, then find the odds in favour of the draw yielding the maximum possible amount.

A. 1: 968 B. 968 : 969 C. 1 : 969 D. 969

Q15.From a box containing a dozen bulbs, of which exactly one half are good, four bulbs are chosen at random to fit into the four bulb holders in a room. The probability that the room gets lighted is ?

A. **B.** **C.** **D.**

Q16. If A and B are two possible events of an experiment such that $P(A \cup B) = 0.7$, P(A) = 0.4, then find P(B) given that (I) A and B are mutually exclusive events.

A. 0.3 **B. 0.4** **C. 0.2** **D. 0.5**

(ii) A and B are independent events.

A. 0.5 **B. 0.3** **C. 0.6** **D. 0.2**

THANKYOU