**MATHEMATICS**

**PAGEMAKER10**

**probaBIlity**

Q1. A car is parked among cars standing in row, but not at either end. On his return, the owner find that exactly of the places are still occupied. The probability that both the places neighbouring has car are empty is

(a)

(b)

(c)

(d) none of these

L1Difficulty1

Qtag Mathematics

Qcreator Pagemaker10

Q2. If two events and are such that and then is equal to

(a)

(b)

(c)

(d)

L1Difficulty1

Qtag Mathematics

Qcreator Pagemaker10

Q3. There are 100 students in a collage class of which 36 are bys studying statistics and 13 girls not studying statistics. If there are 55 girls in all, the probability that a boy picked up at random is not studying statistics, is

(a)

(b)

(c)

(d) none of these

L1Difficulty1

Qtag Mathematics

Qcreator Pagemaker10

Q4. A fair coin is tossed times. If the probability that head occurs 6 times is equal to the probability that head occurs 8 times, then the value of is

(a) 14

(b) 12

(c) 24

(d) 36

L1Difficulty1

Qtag Mathematics

Qcreator Pagemaker10

Q5. One of the two events must happen. Given that the chance of one is two-third of the other, the odds in favour of the other are

(a) 3 : 5

(b) 2 : 5

(c) 3 : 2

(d) none of these

L1Difficulty1

Qtag Mathematics

Qcreator Pagemaker10

Q6. A student takes his examination in four subjects He estimates his chance of passing in as in as in as and in as To qualify he must pass in and at least two other subjects. The Probability that he qualifies is

(a)

(b)

(c)

(d) none of these

L1Difficulty1

Qtag Mathematics

Qcreator Pagemaker10

Q7. Seven chits are numbered 1 to 7. Four are drawn one by one with replacements. The probability that the least number on any selected chit is 5, is

(a)

(b)

(c)

(d) none of these

L1Difficulty1

Qtag Mathematics

Qcreator Pagemaker10

Q8. For any two independent events and is

(a)

(b)

(c)

(d) none of these

L1Difficulty1

Qtag Mathematics

Qcreator Pagemaker10

Q9. In order to get atleast once a head with probability 0.9, the number of times a coin needs to be tossed is

(a) 3

(b) 4

(c) 5

(d) none of these

L1Difficulty1

Qtag Mathematics

Qcreator Pagemaker10

Q10. A man alternately tosses a coin and throws a dice beginning with the coin. The probability that he gets a head before he gets 5 or 6 in the dice is

(a)

(b)

(c) 1/3

(d) none of these

L1Difficulty1

Qtag Mathematics

Qcreator Pagemaker10

Q11. The probabilities of three events and are and If and then

(a)

(b)

(c)

(d) none of these

L1Difficulty1

Qtag Mathematics

Qcreator Pagemaker10

Q12. A determinant is chosen at random from the set of all determinants of order 2 with elements 0 or 1 only. The probability that value of the determinant chosen is positive is

(a)

(b)

(c)

(d) none of these

L1Difficulty1

Qtag Mathematics

Qcreator Pagemaker10

Q13. An unbiased dice with faces 1, 2, 3, 4, 5 and 6 is round 4 times. Out of four face values obtained the probability that the minimum face value obtained the probability that the minimum face value is not less than 2 and the maximum face value is not greater than 5 is

(a)

(b)

(c)

(d)

L1Difficulty1

Qtag Mathematics

Qcreator Pagemaker10

Q14. A man is known to speak truth 3 out of 4 times. He throws a dice and reports that it is six. The probability that it is actually six is

(a)

(b)

(c)

(d) none of these

L1Difficulty1

Qtag Mathematics

Qcreator Pagemaker10

Q15. A bag contains 10 mangoes out of which 4 are rotten, two mangoes are taken out together. If one of them is found to be good, the probability that other is also good, is

(a)

(b)

(c)

(d)

L1Difficulty1

Qtag Mathematics

Qcreator Pagemaker10

Q16. Ram and Shyam throw with one dice for a prize of Rs. 88 which is to be won by the player who throws 1 first. If Ram starts, then mathematical expectation for Shyam is

(a) Rs. 32

(b) Rs. 40

(c) Rs. 48

(d) none of these

L1Difficulty1

Qtag Mathematics

Qcreator Pagemaker10

Q17. Three of the six vertices of a regular hexagon are chosen at random. The probability that the triangle with three vertices is equilateral equals

(a)

(b)

(c)

(d)

L1Difficulty1

Qtag Mathematics

Qcreator Pagemaker10

Q18. An unbiased die is tossed until a number greater than 4 appears. The probability that an even number of tosses is needed is

(a)

(b)

(c)

(d)

L1Difficulty1

Qtag Mathematics

Qcreator Pagemaker10

Q19. If and are the complementary events of events and respectively and if then

(a)

(b)

(c)

(d)

L1Difficulty1

Qtag Mathematics

Qcreator Pagemaker10

Q20. The odds in favour of standing first of three students appearing in an examination are 1 : 2, 2 : 5 and 1 : 7 respectively. The probability that either of them will stand first, is

(a)

(b)

(c)

(d)

L1Difficulty1

Qtag Mathematics

Qcreator Pagemaker10

**Solutions**

S1. Ans. (a)

Sol.

Total number of selection of places for cars (except the owner’s car) out of places

If neighbouring place are empty, then cars must be parked in places

So, the favourable cases =

 Required probability

S2. Ans. (c)

Sol.

We have,

S3. Ans. (c)

Sol.

Number of students = 100

Number of girls = 55

 Number of boys =

Out of 45 boys 36 boys are studying Statistics.

 Number of boys not studying Statistics =

 Probability that a boy picked up at random is not studying Statistics =

S4. Ans. (a)

Sol.

We have,

 or

S5. Ans. (c)

Sol.

Let the given events be and

Then

The events and are exhaustive

Since and are mutually exclusive

 and

Since odds in favour of are

S6. Ans. (b)

Sol.

Different possibilities to qualify are

(i) passes in and fails in

(ii) passes in and fails in

(iii) passes in and fails in

(iv) passes in all the four subjects and

These are mutually exclusive possibilities.

 Required probability

 .

S7. Ans. (c)

Sol.

 or or in one draw =

 Probability that in each of 3 draws, the chit bears 5 or

 or =

S8. Ans. (a)

Sol.

Since

and

S9. Ans. (b)

Sol.

Probability of getting atleast one head in tosses.

Hence least value of

S10. Ans. (a)

Sol.

Probability of getting head and probability of throwing 5 or 6 with a dice = .

He starts with a coin and alternatively tosses the coin and throws the dice and he will win if he gets a head before he gets 5 or 6. Hence

Probability =

S11. Ans. (a)

Sol.

 …(1)

and

S12. Ans. (c)

Sol.

Since each element of the determinant can be placed in two ways 0 or 1, total number of ways =

Since value of the determinant is + ve, so we have only 3 cases :

Hence the required probability =

S13. Ans. (a)

Sol.

In a single throw the favourable points are 2, 3, 4 and 5 whose number is 4.

 All possible outcomes are 6

 Probability that in a single throw the minimum face value is not less than 2 and the maximum face value is not greater than

Since the dice is rolled four times and all the four throws are independent events therefore the required probability

 .

S14. Ans. (a)

Sol.

Let denotes the event that a six occurs and the event that the man reports that it is a six.

Then the probability that it is actually a six is given by

Now

Hence

S15. Ans. (c)

Sol.

Number of ways of selecting 2 good mangos

The number of ways that at least one of the two selected mangoes is to be good

Required probability =

S16. Ans. (b)

Sol.

Probability of winning of Shyam

Mathematical expectation for Shyam = Rs.

 = Rs. 40.

S17. Ans. (c)

Sol.

3 vertices out of 6 can be chosen in ways

Only 2 equilateral triangles can be formed, and .

****

 Favourable ways = 2

Required probability =

S18. Ans. (b)

Sol.

 probability of successs

probability of failure

Probability that the success occurs in even number of tosses

S19. Ans. (a)

Sol.

 and are disjoint]

S20. Ans. (a)

Sol.

Let the three student be and

Let denote the events of standing first of the three students respectively

Given, odds in favour of

odds in favour of

and odds in favour of

Since events are mutually exclusive

**LEVEL-II**

Q1. are three events such that If then

(a)

(b)

(c)

(d) none of these

L3Difficulty3

Qtag Mathematics

Qcreator Pagemaker10

Q2. The probability that certain electronic component fails when first used is 0.10. If it does not fail immediately, the probability that it lasts for one year is 0.99. The probability that a new component will last for one year is

(a) 0.891

(b) 0.692

(c) 0.92

(d) none of these

L3Difficulty3

Qtag Mathematics

Qcreator Pagemaker10

Q3. Three groups are contesting for position on the Board of Directors of a company. The probabilities of their winning are 0.5, 0.3, 0.2 respectively. If the group wins, the probability of introducing a new product is 0.7 and the corresponding probabilities for group and are 0.6 and 0.5 respectively. The probability that the new product will be introduced, is

(a)

(b)

(c)

(d) none of these

L3Difficulty3

Qtag Mathematics

Qcreator Pagemaker10

Q4. If and and then

(a)

(b)

(c)

(d) none of these

L3Difficulty3

Qtag Mathematics

Qcreator Pagemaker10

Q5. A die is loaded so that the probability of face is proportional to The probability of an even number occurring when the die is rolled, is

(a)

(b)

(c)

(d) none of these

L3Difficulty3

Qtag Mathematics

Qcreator Pagemaker10

Q6. If and are the independent random variables and then

(a)

(b)

(c)

(d) none of these

L3Difficulty3

Qtag Mathematics

Qcreator Pagemaker10

Q7. A fair coin is tossed 99 times. If is the number of times heads occurs is maximum when is

(a) 49

(b) 50

(c) 51

(d) none of these

L3Difficulty3

Qtag Mathematics

Qcreator Pagemaker10

Q8. Suppose follows a binomial distribution with parameters and where If is independent of and then is equal to

(a)

(b)

(c)

(d) none of these

L3Difficulty3

Qtag Mathematics

Qcreator Pagemaker10

Q9. Numbers are selected at random one at a time, from the numbers 00, 01, 02,…,99 with replacement. An event occurs if and only if the product of the two digits of a selected number is 18. If four numbers are selected, then the probability that E occurs at least 3 times, is

(a)

(b)

(c)

(d) none of these

L3Difficulty3

Qtag Mathematics

Qcreator Pagemaker10

Q10. The mean and variance of a binomial variable are 2 and 1 respectively. The probability that takes values greater than 1, is

(a)

(b)

(c)

(d) none of these

L3Difficulty3

Qtag Mathematics

Qcreator Pagemaker10

Q11. If A and B are such events that and then is equal to

(a)

(b)

(c)

(d)

L3Difficulty3

Qtag Mathematics

Qcreator Pagemaker10

Q12. An ordinary cube has four blank faces, one face marked 2, another marked 3. Then the probability of obtaining a total of exactly 12 in 5 throws is

(a)

(b)

(c)

(d) none of these

L3Difficulty3

Qtag Mathematics

Qcreator Pagemaker10

Q13. A person draws a card from a pack of playing cards, replaces it and shuffles the pack. He continues doing this until he shows a spade. The chance that he will fail the first two times is

(a)

(b)

(c)

(d)

L3Difficulty3

Qtag Mathematics

Qcreator Pagemaker10

Q14. One hundred identical coins, each with probability of showing up heads, are tossed. If and the probability of heads showing on 50 coins is equal to that of heads showing on 51 coins, the value of is

(a) 1/2

(b) 49/101

(c) 50/101

(d) 51/101

L3Difficulty3

Qtag Mathematics

Qcreator Pagemaker10

Q15. If and are two events such that and then

(a)

(b)

(c)

(d) none of these

L3Difficulty3

Qtag Mathematics

Qcreator Pagemaker10

Q16. A point is selected at random from the interior of a circle. The probability that the point is closer to the centre than the boundary of the circle is

(a)

(b)

(c)

(d) none of these

L3Difficulty3

Qtag Mathematics

Qcreator Pagemaker10

Q17. From a box containing 20 tickets of value 1 to 20, four tickets are drawn one by one. After each draw, the ticket is replaced. The probability that the largest value of tickets drawn is 15 is

(a)

(b)

(c)

(d) none of these

L3Difficulty3

Qtag Mathematics

Qcreator Pagemaker10

Q18. If the integers and are chosen at random between 1 and 100 then the probability that a number of the form is divisible by 5 is

(a)

(b)

(c)

(d)

L3Difficulty3

Qtag Mathematics

Qcreator Pagemaker10

Q19. In an entrance test there are multiple choice questions. There are four possible answers to each question of which one is correct. The probability that a student knows the answer to a question is 90%. If he gets the correct answer to a question, then the probability that he was guessing is

(a)

(b)

(c)

(d)

L3Difficulty3

Qtag Mathematics

Qcreator Pagemaker10

Q20. A person draws a card from a pack of 52 playing cards, replaces it and shuffles the pack. He continues doing this until be draws a spade, the chance that he will fail in the first two draws is

(a)

(b)

(c)

(d)

L3Difficulty3

Qtag Mathematics

Qcreator Pagemaker10

**Solutions**

S1. Ans. (c)

Sol.

Let

Since

But given and

or or

S2. Ans. (a)

Sol.

Given: probability that electronic component fails when first used i.e.,

and let Probability of new component to last for one year

Obviously the two events are mutually exclusive and exhaustive.

 and

S3. Ans. (b)

Sol.

Given and

So the events are exhaustive.

If Probability of introducing a new product, then as given

 and

S4. Ans. (b)

Sol.

 or

S5. Ans. (b)

Sol.

Since the probability of the faces are proportional to the numbers on them, we can take the probabilities of faces, as respectively.

Since one of the faces must occur, we have

or

 The probability of an even number

S6. Ans. (a)

Sol.

For random variable and for random variable

Now

 and are independent]

S7. Ans. (a, b)

Sol.

Putting and we have and

For maximum value of

 and

Hence the maximum value of occur at and 49.

S8. Ans. (b)

Sol.

For to be independent of and ,

S9. Ans. (a)

Sol.

Out of the numbers those numbers the product of whose digits is 18 are 29, 36, 63, 92 only 4.

Let be the random variable, showing the number of times occurs in 4 selections.

Then occurs at least 3 times) = or

S10. Ans. (c)

Sol.

Given: mean

and Variance

Dividing (2) by (1), then

From (1),

The binomial distribution is

Now,

S11. Ans. (c)

Sol.

S12. Ans. (c)

Sol.

Total number of ways =

To find the favourable no. of ways, a total of 12 in 5 throws can be obtained in the following two ways only :

 One blank and four

or Three and two

The no of ways in case

and the no. of ways in case

 the favourable no. of ways.

 = 5 + 10 = 15.

Hence the required probability =

S13. Ans. (a)

Sol.

Required probability

S14. Ans. (d)

Sol.

Let be the number of coins showing heads and let Then, since we have

S15. Ans. (a, c)

Sol.

As the minimum value of

we get

As the maximum value of we get

S16. Ans. (c)

Sol.

 the area of the circle of radius

 the area of the circle of radius

****

 the required probability

S17. Ans. (b)

Sol.

The probability of drawing a number less than or equal to 15 in a draw =

The probability of drawing the ticket of value 15 in a draw =

 the required probability =

S18. Ans. (a)

Sol.

We know has 1, 3, 9, 7 at the units place for respectively, where

Clearly, will be divisible by 5 if has 3 or 7 in the unit place and has 7 or 3 in the units place or has 1 or 9 in the units place and has 9 or 1 in the units place.

 For any choice of the digit in the units place of is 2, 4, 6, 0 or 8. It is divisible by 5 only when this digit is 0.

 the required probability =

S19. Ans. (c)

Sol.

We define the following events

 He knows the answer

 He does not know the answer

 He gets the correct answer

Thus

 required probability =

S20. Ans. (b)

Sol.

The required probability

**LEVEL-III**

Q1. For two events and if and then

(a) is subevent of

(b) and are mutually exclusive

(c) and are independent and

(d) none of the above

L5Difficulty5

Qtag Mathematics

Qcreator Pagemaker10

Q2. and throw a dice. The probability that ’s throw is not greater than ’sis

(a)

(b)

(c)

(d)

L5Difficulty5

Qtag Mathematics

Qcreator Pagemaker10

Q3. A six faced die is so biased that it is twice likely to show an even number as compared to an odd number when thrown. The die is thrown twice. The probability that the sum of the two numbers is even is

(a)

(b)

(c)

(d) none of these

L5Difficulty5

Qtag Mathematics

Qcreator Pagemaker10

Q4. biscuits are distributed among boys at random. The probability that particular boy gets biscuits is

(a)

(b)

(c)

(d)

L5Difficulty5

Qtag Mathematics

Qcreator Pagemaker10

Q5. These are four balls of different colours and four boxes of colours, same as those of the balls. The number of ways in which the balls, one each in a box, could be placed such that a ball does not go to a box of its own colour is

(a)

(b)

(c)

(d) none of these

L5Difficulty5

Qtag Mathematics

Qcreator Pagemaker10

Q6. The altitude through of meets at and the circumscribed circle at . If and the ordinate of the orthocentre being a natural number. The probability that the orthocentre lies on the lines is

(a)

(b)

(c)

(d) none of these

L5Difficulty5

Qtag Mathematics

Qcreator Pagemaker10

Q7. Two small squares on a chess board are chosen at random. Probability that they have a common side is

(a)

(b)

(c)

(d) none of these

L5Difficulty5

Qtag Mathematics

Qcreator Pagemaker10

Q8. Three winning tickets are drawn from an urn of 100 tickets. The probability of winning for a person who buys 4 tickets is

(a)

(b)

(c)

(d) none of these

L5Difficulty5

Qtag Mathematics

Qcreator Pagemaker10

Q9. A five digit number is selected at random. Then the probability that the digits in the odd places are odd and in the even places are even (no digit being repeated) is

(a)

(b)

(c)

(d)

L5Difficulty5

Qtag Mathematics

Qcreator Pagemaker10

Q10. The probabilities of four cricketers and scoring more than 50 runs in a match are and It is known that exactly two of the players scored more than 50 runs in a particular match. The probability that these players were and is

(a)

(b)

(c)

(d) none of these

L5Difficulty5

Qtag Mathematics

Qcreator Pagemaker10

Q11. number is picked up at random from the numbers The probability that it is of the form (where is

(a)

(b)

(c)

(d)

L5Difficulty5

Qtag Mathematics

Qcreator Pagemaker10

Q12. The numbers are arranged in a random order. The probability that the digits appear as neighbours in that order is

(a)

(b)

(c)

(d)

L5Difficulty5

Qtag Mathematics

Qcreator Pagemaker10

Q13. If then the probability that the graph of the function is strictly above the -axis is

(a)

(b)

(c)

(d)

L5Difficulty5

Qtag Mathematics

Qcreator Pagemaker10

Q14. Fifteen coupons are numbered 1, 2, 3,… 15. Seven coupons are selected at random one at a time with replacement. The probability that the largest number appearing on the selected coupon is 9, is

(a)

(b)

(c)

(d) none of these

L5Difficulty5

Qtag Mathematics

Qcreator Pagemaker10

Q15. A bag contains white and 3 black balls. Balls are drawn one by one without replacement till all the black balls are drawn. The probability that this procedure for drawing balls will come to an end at the th draw is

(a)

(b)

(c)

(d) none of these

L5Difficulty5

Qtag Mathematics

Qcreator Pagemaker10

Q16. Suppose persons are sitting in a row. Two of them are selected at random. The probability that they are not together is

(a)

(b)

(c)

(d) none of these

L5Difficulty5

Qtag Mathematics

Qcreator Pagemaker10

Q17. A fair die is tossed eight times. Probability that on the eighth throw a third six is observed is

(a)

(b)

(c)

(d) none of these

L5Difficulty5

Qtag Mathematics

Qcreator Pagemaker10

Q18. A natural number is chosen at random from the first one hundred natural numbers. The probability that is

(a)

(b)

(c)

(d)

L5Difficulty5

Qtag Mathematics

Qcreator Pagemaker10

Q19. Four whole numbers taken at random are multiplied together. What is the chance that the last digit in the product is 1, 3, 7 or 9?

(a)

(b)

(c)

(d)

L5Difficulty5

Qtag Mathematics

Qcreator Pagemaker10

Q20. 4 five-rupee coins, 3 two-rupee coins and 2 one-rupee coins are stacked together in a column at random. The probability that the coins of the same denomination are consecutive is

(a)

(b)

(c)

(d) none of these

L5Difficulty5

Qtag Mathematics

Qcreator Pagemaker10

**Solutions**

S1. Ans. (c)

Sol.

Thus, A and B are independent

Also,

S2. Ans. (b)

Sol.

If throws 1, then can throw only 1, if throws 2, then can throw 1 and 2 and so on

 the required probability

S3. Ans. (a)

Sol.

Probability that the sum is even = Probability that the sum is odd.

S4. Ans. (a)

Sol.

It is a case of Bernoullian trials with number of trials and probability, = (a success in one trial)

 successes) =

S5. Ans. (b)

Sol.

The exhaustive cases are

The favourable cases are

 the required probability =

S6. Ans. (c)

Sol.

Let the orthocentre be

 can take the values 1, 2, 3, 4, 5, 6

 reqd. prob.

S7. Ans. (c)

Sol.

There are 64 small squares on a chess board.

 Total number of ways to choose two squares

For favourable ways we must choose two consecutive small squares for any row or any column

 Number of favourable ways

 Required probability

S8. Ans. (b)

Sol.

The required probability =

S9. Ans. (d)

Sol.

The odd places can be filled up in ways and the even places in ways. the favourable number of ways =

The number of five digit numbers =

Hence the required probability =

S10. Ans. (a)

Sol.

Let be the even that exactly two players scored more than 50 runs then

 1/3

Let be the event that and scored more than 50 runs, then

 Required probability =

S11. Ans. (b)

S12. Ans. (d)

Sol.

Exhaustive number of cases =

Assuming the set of numbers as one the favourable cases =

 Probability =

S13. Ans. (c)

Sol.

The total length of the interval in which lies =

If the graph of is entirely above the -axis, the discriminant of the above quadratic expression must be negative.

But for the event to happen.

The length of this interval .

Hence, the required probability =

S14. Ans. (d)

Sol.

Total ways =

For favourable ways, we must have 7 coupons numbered from 1 to 9 so that ‘9’ is selected at least once. Thus, total number of favourable ways are,

 Required probability

S15. Ans. (b)

Sol.

If the procedure for drawing balls has to come to an end at the th draw, all but one black ball must be drawn in the first draws.

 The prob. of the reqd. event

 .

S16. Ans. (a)

Sol.

The total number of ways of choosing 2 persons out of is

After selecting two persons when the remaining persons sit in a row places are created between them in which 2 persons can be arranged in ways.

So, required probability is

S17. Ans. (b)

Sol.

Third six occurs on 8th trial. It means that in first 7 trials we must have exactly 2 sixes and 8th trial must result in a six.

 Required probability

 .(5/6

S18. Ans. (b)

Sol.

=

 for i.e. 18natural numbers.

 Reqd. prob.

S19. Ans. (a)

Sol.

If the product of the four numbers ends in one of the digits 1, 3,7, or 9, each number should have the last digit as one of these 4 digits.

 the number of favourable cases =

Total number of all possible cases =

Hence, the required probability

S20. Ans. (b)

Sol.

 and