EXERCISE 13.1 - Question No. 1

Given that E and F are events such that $P(E) = 0.6$, $P(F) = 0.6$,

$P(F) = 0.3$ and $P(E \cap F) = 0.2$, find $P(E \mid F)$ and $P(F \mid E)$.

EXERCISE 13.1 - Question No. 2

Compute $P(A \mid B)$. if $P(B) = 0.5$ and $P(A \cap B) = 0.32$

EXERCISE 13.1 - Question No. 3

If $P(A) = 0.8$, $P(B) = 0.5$ and $P(B \mid A) = 0.4$, find (i)

$P(A \cap B)$ (ii) $P(A \mid B)$ (iii) $P(A \cup B)$

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EXERCISE 13.1 - Question No. 4

Evaluate $P(A \cup B)$, if $2P(A) = P(B) = \frac{5}{13}$ and $P(A \mid B) = \frac{2}{5}$

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EXERCISE 13.1 - Question No. 5

If $P(A) = \frac{6}{11}$, $P(B) = \frac{5}{11}$ and $P(A \cup B) = \frac{7}{11}$, find (i) $P(A \cap B)$ (ii) $P(A \mid B)$ (iii) $P(B \mid A)$

EXERCISE 13.1 - Question No. 6

Determine $P(E \mid F)$ in : A coin is tossed three times, where (i) E : Head on third toss, F : heads on first two tosses (ii) E : at least two heads, F : at most two heads (iii) E : at most two tails, F : at least one tail

EXERCISE 13.1 - Question No. 7

Determine $P(E \mid F)$ in : Two coins are tossed once, where (i) E: tail appears on one coin, F : one coin shows head (ii) E : no tail appears, F : no head appears

EXERCISE 13.1 - Question No. 8

Determine P (E|F) in : A die is thrown three times, E : 4 appears on the third toss, F: 6 and 5 appears respectively on first two tosses

EXERCISE 13.1 - Question No. 9

Determine P (E|F) in : Mother father and son line up at random for a family picture E: son on one end. F: father in middle

EXERCISE 13.1 - Question No. 10

A black and a red dice are rolled. (a) Find the conditional probability of obtaining a sum greater than 9. Given that the black die resulted in a 5. (b) Find the conditional probability of obtaining the sum 8? given that the red die resulted in a number less than 4.

EXERCISE 13.1 - Question No. 11

A fair die is rolled. Consider events $E = \{1, 3, 5\}$, $F = \{2, 3\}$ and $G = \{2, 3, 4, 5\}$ Find (i) $P(E \mid F)$ and $P(F \mid E)$ (ii) $P(E \mid G)$ and $P(G \mid E)$ (iii) $P((E \cup F) \mid G)$ and $P((E \cap F) \mid G)$

EXERCISE 13.1 - Question No. 12

Assume that each born child is equally likely to be a boy or a girl . If a family has two children, what is the conditional probability that both are girls given that (i) the youngest is a girl (ii) at least one is a girl?

EXERCISE 13.1 - Question No. 13

An instructor has a question bank consisting of 300 easy True / False questions. 200 difficult True / False questions. 500 easy multiple choice questions and 400 difficult multiple choice questions. If a question is selected at random from the question bank, what is the probability that it will be an easy question given that it is a multiple choice question?

EXERCISE 13.1 - Question No. 14

Given that the two numbers appearing on throwing two dice are different. Find the probability of the event the sum of numbers on the dice is 4.

EXERCISE 13.1 - Question No. 15

Consider the experiment of throwing a die. if a multiple of 3 comes tip. throw the die again and if any other number comes, toss a coin Find the conditional probability of the event the coin shows a tail, given that at least one die shows a 3.

EXERCISE 13.1 - Question No. 16

In each of the Exercises choose the correct answer: If $P(A) = \frac{1}{2}$, $P(B) = 0$, then $P(A \mid B)$ is (a) 0 (b) $\frac{1}{2}$ (c) not defined (d) 1

EXERCISE 13.1 - Question No. 17

In each of the Exercises choose the correct answer: If A and B are events such that P(A|B), then (a) $A \subset B$ but $A \neq B$ (b) $A = B$ (c) $A \cap B = \varphi$ (d) $P(A) = P(B)$

EXERCISE 13.2 - Question No. 1

If $P(A) = \frac{3}{5}$ and $P(B) = \frac{1}{5}$, find $P(A \cap B)$ if A and B are independent events.

EXERCISE 13.2 - Question No. 2

Two cards are drawn at random and without replacement from a pack of 52 playing cards. Find the probability that both the cards are black.

EXERCISE 13.2 - Question No. 3

A box of oranges is inspected by examining three randomly selected oranges drawn without replacement. If all the three oranges are good, die box is approved for sale, otherwise, it is rejected. Find the probability that a box containing 15 oranges out of which 12 are good and 3 are bad ones will be approved for sale.

EXERCISE 13.2 - Question No. 4

A fair coin and an unbiased die are tossed. Let A be the event head appears on the coin and B be the event 3 on the die. Check whether A and B are independent events or not.

EXERCISE 13.2 - Question No. 5

A die marked 1, 2, 3 in red and 4, 5, 6 in green is tossed. Let A be the event, the number is even, and B be the event, the number is red. Are A and B independent?

EXERCISE 13.2 - Question No. 6

Let E and F be events with $P(E) = \frac{3}{5}$, $P(F) = \frac{3}{10}$ and $P(E \cap F) = \frac{1}{5}$. Are E and F independent?

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EXERCISE 13.2 - Question No. 7

Given that the events A and B are such that $P(A) = \frac{1}{2}$, $P(A \cap B) = \frac{3}{5}$ and $P(B) = p$. Find p if they are (i) mutually exclusive (ii) independent.

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EXERCISE 13.2 - Question No. 8

Let A and B be independent events with $P(A) = 0.3$ and

$P(B) = 0.4$ Find (i) $P(A \cap B)$ (ii) $P(A \cup B)$ (iii) $P(A \mid B)$ (iv)

$P(B \mid A)$

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EXERCISE 13.2 - Question No. 9

If A and B are two events such that $P(A) = \frac{1}{4}$, $P(B) = \frac{1}{2}$ and

$P(A \cap B) = \frac{1}{8}$, find P (not A and not B).

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EXERCISE 13.2 - Question No. 10

If A and B are two events such that $P(A) = \frac{1}{2}$, $P(B) = \frac{7}{12}$ and P(not A or not B) = $\frac{1}{4}$. State whether A and B are independent?

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EXERCISE 13.2 - Question No. 11

Given two independent events A and B such that$P(A) = 0.3$, $P(B) = 0.6$. Find (i) P(A and B) (ii) P(A and not B) (iii) P(A or B) (iv) P(neither A nor B)

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EXERCISE 13.2 - Question No. 12

A die is tossed thrice. Find the probability of getting an odd number at least once.

EXERCISE 13.2 - Question No. 13

Two balls are drawn at random with replacement from a box containing 10 black and 8 red balls. Find the probability that (i) both balls are red. (ii) first ball is black and second is red. (iii) one of them is black and other is red.

EXERCISE 13.2 - Question No. 14

Probability of solving specific problem independently by A and B are $\frac{1}{2}$ and $\frac{1}{3}$ respectively. If both try to solve the problem independently find the probability that (i) the problem is solved (ii) exactly one of them solves the problem.

EXERCISE 13.2 - Question No. 15

One card is drawn at random from a well shuffled deck of 52 cards. In which of the following cases are the events E and F independent? (i) E : the card drawn is a spade F : the card drawn is an ace (ii) E : the card drawn is black F : the card drawn is a king (iii) E : the card drawn is a king or queen F : the card drawn is a queen or jack.

EXERCISE 13.2 - Question No. 16

In a hostel 60% of the students read Hindi news paper, 40% read English news paper and 20% read both Hindi and English news papers. A student is selected at random. (a) Find the probability that she reads neither Hindi nor English news papers. (b) If she reads Hindi news paper, find the probability that she reads English news paper. (c) If she reads English news paper, find the probability that she reads Hindi news paper.

EXERCISE 13.2 - Question No. 17

The probability of obtaining an even prime number on each die, when a pair of dice is rolled is (A) 0 (B) $\frac{1}{3}$ (C) $\frac{1}{12}$ (D) $\frac{1}{36}$

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EXERCISE 13.2 - Question No. 18

Two events A and B will be independent, if (A) A and B are mutually exclusive (B) $P(A'B') = [1 - P(A)][1 - P(B)]$ (C) $P(A) = P(B)$ (D) $P(A) + P(B) = 1$

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EXERCISE 13.3 - Question No. 1

An um contains 5 red and 5 black balls. A ball is drawn at random, its colour is noted and is returned to the urn. Moreover, 2 additional balls of the colour drawn are put in the um and then a ball is drawn at random. What is the probability that the second ball is red?

EXERCISE 13.3 - Question No. 2

A bag contains 4 red and 4 black balls, another bag contains 2 red and 6 black balls. One of the two bags is selected at random and a ball is drawn from the bag which is found to be red. Find the probability that the ball is drawn from the first bag.

EXERCISE 13.3 - Question No. 3

Of the students in a college, it is known that 60% reside in hostel and 40% are day scholars (not residing in hostel). Previous year results report that 30% of all students who reside in hostel attain A grade and 20% of day scholars attain A grade in their annual examination. At the end of the year, one student is chosen at random from the college and he has an A grade, what is the probability that the student is a hostlier?

EXERCISE 13.3 - Question No. 4

In answering a question on a multiple choice test, a student either knows the answer or guesses. Let $\frac{3}{4}$ be the probability that he knows the answer and $\frac{1}{4}$ be the probability that he guesses. Assuming that a student who guesses at the answer with probability 1/4. what is the probability that the student knows the answer given that he answers correctly.?

EXERCISE 13.3 - Question No. 5

A laboratory blood test is 99% effective in detecting a certain disease when it is in fact, present. However, the test also yields a false positive result for 0.5% of the healthy person tested (i.e. if a healthy

person is tested, then, with probability 0.005, the test will imply he has the disease). If 0.1 percent of the population actually has the disease, what is the probability that a person has the disease given that his test result is positive?

EXERCISE 13.3 - Question No. 6

There are three coins. One is a two headed coin (having head on both faces), another is a biased coin that comes up heads 75% of the time and third is an unbiased coin. One of the three coins is chosen at random and tossed, it shows heads, what is the probability that it was the two headed coin?

EXERCISE 13.3 - Question No. 7

An insurance company insured 2000 scooter drivers, 4000 car drivers and 6000 truck drivers. The probability of an accidents are 0.01, 0.03 and 0.15 respectively. One of the insured persons meets with an accident. What is the probability that he is a scooter driver?

EXERCISE 13.3 - Question No. 8

A factory has two machines A and B. Past record shows that machine A produced 60% of the items of output and machine B produced 40%

of the items. Further, 2% of the items produced by machine A and 1% produced by machine B were defective. All the items are put into one stockpile and then one item is chosen at random from this and is found to be defective. What is the probability that it was produced by machine B?

EXERCISE 13.3 - Question No. 9

Two groups are competing for the position on the Board of directors of a corporation. The probabilities that the first and the second groups will win are 0.6 and 0.4 respectively. Further, if the first group wins, the probability of introducing a new product is 0.7 and the

corresponding probability is 0.3 if the second group wins. Find the probability that the new product introduced was by the second group.

EXERCISE 13.3 - Question No. 10

Suppose a girl throws a die. If she gets a 5 or 6, she tosses a coin three times and notes the number of heads. If she gets 1, 2, 3 or 4, she tosses a coin once and notes whether a head or tail is obtained. If she obtained exactly one head, what is the probability that she threw 1, 2, 3 or 4 with the die?

EXERCISE 13.3 - Question No. 11

A manufacturer has three machine operators A, B and C. The first operator A produces 1% defective items, where as the other two operators B and C produce 5% and 7% defective items respectively. A is on the job for 50% of the tune, B is on the job for 30% of the time and C is on the job for 20% of the time. A defective item is produced, what is the probability that it was produced by A?

EXERCISE 13.3 - Question No. 12

A card from a pack of 52 cards is lost. From the remaining cards of the pack, two cards are drawn and are found to be both diamonds. Find the probability of the lost card being a diamond.

EXERCISE 13.3 - Question No. 13

Probability that A speaks truth is $\frac{4}{5}$. A coin is tossed. A reports that a head appears. The probability that actually there was head is (A) $\frac{4}{5}$ (B) $\frac{1}{2}$ (C) $\frac{1}{5}$ (D) $\frac{2}{5}$

EXERCISE 13.3 - Question No. 14

If A and B are two events such that $A \subset B$ and $P(B) \neq 0,$ them which of the following is correct? (A) $P(A \mid B) = \frac{P(B)}{P(A)}$ (B) $P(A \mid B) < P(A)$ (C) $P(A \mid B) \geq P(B)$ (D) none of these

EXERCISE 13.4 - Question No. 1

State which of the following are not the probability distributions of a random variable. Give reasons for your answer.

EXERCISE 13.4 - Question No. 2

An urn contains 5 red and 2 black balls. Two balls are randomly drawn. Let X represent the number of black balls. What are the possible values of X? Is X a random variable?

EXERCISE 13.4 - Question No. 3

Let X represent the difference between the number of heads and the number of tails obtained when a coin is tossed 6 times. What are possible values of X?

EXERCISE 13.4 - Question No. 4

Find the probability distribution of (i) number of heads in two tosses of a coin. (ii) number of tails in the simultaneous tosses of three corns. (iii) number of heads in four tosses of a com.

EXERCISE 13.4 - Question No. 5

Find the probability distribution of the number of successes in two tosses of a die, where a success is defined as (i) number greater than 4 (ii) six appears on at least one die

EXERCISE 13.4 - Question No. 6

From a lot of 30 bulbs which include 6 defectives, a sample of 4 bulbs is drawn at random with replacement. Find the probability distribution of the number of defective bulbs.

EXERCISE 13.4 - Question No. 7

A coin is biased so that the head is 3 times as likely to occur as tail. If the coin is tossed twice, find the probability distribution of number of tails.

EXERCISE 13.4 - Question No. 8

A random variable X has the following probability distribution:

Determine (i) k (ii) $P(X < 3)$ (iii) $P(X > 6)$ (iv) $P(0 < X < 3)$

EXERCISE 13.4 - Question No. 9

The random variable X has a probability distribution P(X) of the following form, where k is some number : P(X) = $\{(k, \quad \text{if} \quad x = 0), (2k, \quad \text{if} \quad x = 1), (3k, \quad \text{if} \quad x = 2), (0 otherwise)$

(a) Determine k. (b) Find P $(X < 2)$, P $(X \leq 2)$, P$(X \geq 2)$

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EXERCISE 13.4 - Question No. 10

Find the mean number of heads in three tosses of a fair coin.

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EXERCISE 13.4 - Question No. 11

Two dice are thrown simultaneously. If X denotes the number of sixes, find the expectation of X.

EXERCISE 13.4 - Question No. 12

Two numbers are selected at random (without replacement) from the first six positive integers. Let X denote the larger of the two numbers obtained. Find E(X).

EXERCISE 13.4 - Question No. 13

Let X denote the sum of the numbers obtained when two fair dice are rolled. Find the variance and standard deviation of X.

EXERCISE 13.4 - Question No. 14

A class has 15 students whose ages are 14, 17, 15, 14, 21, 17, 19, 20, 16, 18, 20, 17, 16, 19 and 20 years. One student is selected in such a manner that each has the same chance of being chosen and the age X of the selected student is recorded. What is the probability distribution of the random variable X? Find mean, variance and standard deviation of X.

EXERCISE 13.4 - Question No. 15

In a meeting, 70% of the members favour and 30% oppose a certain proposal. A member is selected at random and we take X = 0 if he opposed, and X = 1 if he is in favour. Find E(X) and Var (X).

EXERCISE 13.4 - Question No. 16

The mean of the numbers obtained on throwing a die having written 1 on three faces, 2 on two faces and 5 on one face is (A) 1 (B) 2 (C) 5 (D) $\frac{8}{3}$

EXERCISE 13.4 - Question No. 17

Suppose that two cards are drawn at random from a deck of cards. Let X be the number of aces obtained. Then the value of E(X) is (A) $\frac{37}{221}$ (B) $\frac{5}{13}$ (C) $\frac{1}{13}$ (D) $\frac{2}{13}$

EXERCISE 13.5 - Question No. 1

A die is thrown 6 times. If getting an odd number is a success, what is the probability of (i) 5 successes? (ii) at least 5 successes? (iii) at most 5 successes?

EXERCISE 13.5 - Question No. 2

A pair of dice is thrown 4 times. If getting a doublet is considered a success, find the probability of two successes.

EXERCISE 13.5 - Question No. 3

There are 5% defective items in a large bulk of items. What is the probability that a sample of 10 items will include not more than one defective item?

EXERCISE 13.5 - Question No. 4

Five cards are drawn successively with replacement from a well-shuffled deck of 52 cards. What is the probability that (i) all the five cards are spades? (ii) only 3 cards are spades? (iii) none is a spade?

EXERCISE 13.5 - Question No. 5

The probability that a bulb produced by a factory will fuse after 150 days of use is 0.05. Find the probability that out of 5 such bulbs (i) none (ii) not more than one (iii) more than one (iv) at least one will fuse after 150 days of use.

EXERCISE 13.5 - Question No. 6

A bag consists of 10 balls each marked with one of the digits 0 to 9. If four balls are drawn successively with replacement from the bag, what is the probability that none is marked with the digit 0?

EXERCISE 13.5 - Question No. 7

In an examination, 20 questions of true-false type are asked. Suppose a student tosses a fair coin to determine his answer to each question. If the com falls heads, he answers true1; if it falls tails, he answers false1. Find the probability that he answers at least 12 questions correctly.

EXERCISE 13.5 - Question No. 8

Suppose X has a binomial distribution $B\left(6, \frac{1}{2}\right)$. Show that $X = 3$ is the most likely outcome. (Hint: $P(x = 3)$ is the maximum among all $P(x_i), x_i = 0, 1, 2, 3, 4, 5, 6$)

EXERCISE 13.5 - Question No. 9

Oil a multiple choice examination with three possible answers for each of the five questions, what is the probability that a candidate would get four or more correct answers just by guessing?

EXERCISE 13.5 - Question No. 10

A person buys a lottery ticket in 50 lotteries, in each of which his chance of winning a prize is $\frac{1}{100}$. What is the probability that he will win a prize (a) at least once (b) exactly once (c) at least twice?

EXERCISE 13.5 - Question No. 11

Find the probability of getting 5 exactly twice in 7 throws of a die.

EXERCISE 13.5 - Question No. 12

Find the probability of throwing at most 2 sixes in 6 throws of a single die.

EXERCISE 13.5 - Question No. 13

It is known that 10% of certain articles manufactured are defective.

What is the probability that in a random sample of 12 such articles, 9 are defective?

EXERCISE 13.5 - Question No. 14

In a box containing 100 bulbs, 10 are defective. The probability that out of a sample of 5 bulbs, none is defective is (A) 10-1 (B) $\left(\frac{1}{2}\right)^5$ (C) $\left(\frac{9}{10}\right)^5$ (D) $\frac{9}{10}$

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EXERCISE 13.5 - Question No. 15

The probability that a student is not a swimmer is $\frac{1}{5}$. Then the probability that out of five students, four are swimmers is (A) $\hat{} \, 5C_4 \frac{\left(\frac{4}{5}\right)^{41}}{5}$ (B) $\frac{\left(\frac{4}{5}\right)^{41}}{5}$ (C) $\hat{} \, 5C_1 \frac{1}{5}\left(\frac{4}{5}\right)^4$ (D) None of these

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MISCELLANEOUS EXERCISE - Question No. 1

A and B are two events such that $P(A) \neq 0$. Find $P(B \mid A)$, if (i) A is a subset of B (ii) $A \cap B = \varphi$

MISCELLANEOUS EXERCISE - Question No. 2

A couple has two children, (i) Find the probability that both children are males, if it is known that at least one of the children is male. (ii) Find the probability that both children are females, if it is known that the elder child is a female.

MISCELLANEOUS EXERCISE - Question No. 3

Suppose that 5% of men and 0.25% of women have grey hair. A grey haired person is selected at random. What is the probability of this person being male? Assume that there are equal number of males and females.

MISCELLANEOUS EXERCISE - Question No. 4

Suppose that 90% of people are right-handed. What is the probability that at most 6 of a random sample of 10 people are right-handed?

MISCELLANEOUS EXERCISE - Question No. 5

An urn contains 25 balls of which 10 balls bear a mark X and the remaining 15 bear a mark Y. A ball is drawn at random from the urn, its mark is noted down and it is replaced. If 6 balls are drawn in this way, find the probability that (i) and nbsp; and nbsp; and nbsp; all will bear X mark. (ii) and nbsp; and nbsp; not more than 2 will bear Y mark, (iii) at least one ball will bear Y mark. (iv) the number of balls with X mark and Y mark will be equal.

MISCELLANEOUS EXERCISE - Question No. 6

In a hurdle race, a player has to cross 10 hurdles. The probability that he will clear each hurdle is $\frac{5}{6}$. What is the probability that he will

knock down fewer than 2 hurdles?

MISCELLANEOUS EXERCISE - Question No. 7

A die is thrown again and again until three sixes are obtained. Find the probability of obtaining the third six in the sixth throw of the die.

MISCELLANEOUS EXERCISE - Question No. 8

If a leap year is selected at random, what is the chance that it will contain 53 Tuesdays?

MISCELLANEOUS EXERCISE - Question No. 9

An experiment succeeds twice as often as it fails. Find the probability that in the next six trials, there will be atleast 4 successes.

MISCELLANEOUS EXERCISE - Question No. 10

How many times must a man toss a fair com so that the probability of having at least one head is more than 90%?

MISCELLANEOUS EXERCISE - Question No. 11

In a game, a man wins a rupee for a six and loses a rupee for any other number when a fair die is thrown. The man decided to throw a die thrice but to quit as and when he gets a six. Find the expected value of the amount he wins / loses.

MISCELLANEOUS EXERCISE - Question No. 12

Suppose we have four boxes A,B,C and D containing coloured marbles as given below : One of the boxes has been selected at random and a single marble is drawn from it. If the marble is red, what is the probability that it was drawn from box A? box B?, box C?

MISCELLANEOUS EXERCISE - Question No. 13

Assume that the chances of a patient having a heart attack is 40%. It is also assumed that a meditation and yoga course reduce the risk of heart attack by 30% and prescription of certain drug reduces its chances by 25%. At a time a patient can choose any one of the two options with equal probabilities. It is given that after going through one of the two options the patient selected at random suffers a heart attack. Find the probability that the patient followed a course of meditation and yoga?

MISCELLANEOUS EXERCISE - Question No. 14

If each element of a second order determinant is either zero or one, what is the probability that the value of the determinant is positive? (Assume that the individual entries of the determinant are chosen independently, each value being assumed

MISCELLANEOUS EXERCISE - Question No. 15

An electronic assembly consists of two subsystems, say, A and B. From previous testing procedures, the following probabilities are assumed to be known: P(A fails) = 0.2 P(B fails alone) = 0.15 P(A and B fail) = 0.15 Evaluate the following probabilities (i) P(A fails B has failed) (ii) P(A fails alone)

MISCELLANEOUS EXERCISE - Question No. 16

Bag I contains 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 from Bag II. The ball so drawn is found to be red in colour. Find the probability that the transferred ball is black.

MISCELLANEOUS EXERCISE - Question No. 17

If A and B are two events such that $P(A) \neq 0$ and $P(B \mid A) = 1$; then (A) $A \subset B$ (B) $B \subset A$ (C) $B = \varphi$ (D) $A = \varphi$

MISCELLANEOUS EXERCISE - Question No. 18

If $P(A \mid B) > P(A)$, then which of the following is correct: (A)

$P(B \mid A) <$; $P(B)$ (B) $P(A \cap B) < P(A) \cdot P(B)$ (c)

$P(B \mid A) > P(B)$ (D) $P(B \mid A) = P(B)$

MISCELLANEOUS EXERCISE - Question No. 19

If A and B are any two events such that

$P(A) + P(B) - P(AandB) = P(A)$? then (A) $P(B \mid A) = 1$ (B)

$P(A \mid B) = 1$ (C) $P(B \mid A) = 0$ (D) $P(A \mid B) = 0$

SOLVED EXAMPLES - Question No. 1

If $P(A) = \frac{7}{13}$, $P(B) = \frac{9}{13}$ and $P(A \cap B) = \frac{4}{13}$, evaluate $P(A \mid B)$.

SOLVED EXAMPLES - Question No. 2

A family has two children. What is the probability that both the children are boys given that at-least one of them is a boy?

SOLVED EXAMPLES - Question No. 3

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

SOLVED EXAMPLES - Question No. 4

In a school there are 1000 students, out of which 430 are girls. It is known that out of 430, 10% of the girls study in class XII. What is the probability that a student chosen randomly studies in Class XII given that the chosen student is a girl?

SOLVED EXAMPLES - Question No. 5

A die is thrown three times. Events A and B are defined as below: A : 4 on the third throw B : 6 on the first and 5 on the second throw Find the probability of A given that B has already occurred.

SOLVED EXAMPLES - Question No. 6

A die is thrown twice and the stun of the numbers appearing is observed to be 6. What is the conditional probability that the number 4 has appeared at least once?

SOLVED EXAMPLES - Question No. 7

Consider the experiment of tossing a coin. If the coin shows head, toss it again but if it shows tail then throw a die. Find the conditional probability of the event that the die shows a number greater than 4 given that there is at least one tail.

SOLVED EXAMPLES - Question No. 8

An urn contains 10 black and 5 white balls. Two balls are drawn from the nm one after the other without replacement. What is the

probability that both drawn balls are black?

SOLVED EXAMPLES - Question No. 9

Three cards are drawn successively, without replacement from a pack of 52 well shuffled cards. What is the probability that first two cards are kings and the third card drawn is an ace?

SOLVED EXAMPLES - Question No. 10

A die is thrown. If E is the event the number appearing is a multiple of 3 and F be the event the number appearing is even then find

whether E and F are independent?

SOLVED EXAMPLES - Question No. 11

An unbiased die is thrown twice. Let the event A be odd number on the first throw and B the event odd number on the second throw. Check the independence of the events A and B.

SOLVED EXAMPLES - Question No. 12

Three coins are tossed simultaneously. Consider the event E three heads or three tails, F at least two heads and G at most two heads. Of

the pairs (EE), (E, G) and (F,G), which are independent? Which are dependent?

SOLVED EXAMPLES - Question No. 13

Prove that if E and F are independent events, then so are the events E and F.

SOLVED EXAMPLES - Question No. 14

If A and B are two independent events, then the probability of occurrence of at least one of A and B is given by $1 - P'(A)P'(B)$

SOLVED EXAMPLES - Question No. 15

A person has undertaken a construction job. The probabilities are 0.65 that there will be strike. 0.80 that the construction job will be completed on time if there is no strike, and 0.32 that the construction job will be completed on time if there is a strike. Determine the probability that the construction job will be completed on time.

SOLVED EXAMPLES - Question No. 16

Bag I contains 3 red and 4 black balls while another Bag II contains 5 red and 6 black balls. One ball is drawn at random from one of the bags and it is found to be red. Find the probability that it was drawn from Bag II.

SOLVED EXAMPLES - Question No. 17

Given three identical boxes I, II and III, each containing two coins. In box L both coins are gold coins, in box II, both are silver coins and in the box III, There is one gold and one silver coin. A person chooses a box at random and takes out a coin. If the coin is of gold, what is the probability that the other coin in the box is also of gold?

SOLVED EXAMPLES - Question No. 18

Suppose that the reliability of a HIV test is specified as follows: Of people having HIV. 90% of the test detects the disease but 10% go undetected. Of people free of HIV, 99% of the test are judged HTV-ive but 1% are diagnosed as showing H3V+ive. From a large population of which only 0.1% have HIV one person is selected at random, given the HIV test, and the pathologist reports him/her as HIV+ive. What is the probability that the person actually has HIV?

SOLVED EXAMPLES - Question No. 19

In a factory which manufactures bolts, machines A. B and C manufacture respectively 25%, 35% and 40% of the bolts. Of their outputs, 5, 4 and 2 percent are respectively defective bolts. A bolt is drawn at random from the product and is found to be defective. What is the probability that it is manufactured by the machine B?

SOLVED EXAMPLES - Question No. 20

A doctor is to visit a patient. From the past experience, it is known that the probabilities that he will come by train, bus, scooter or by other means of transport are respectively $\frac{3}{10}, \frac{1}{5}, \frac{1}{10} and \frac{2}{5}$. The probabilities that he will be l

SOLVED EXAMPLES - Question No. 21

A man is known to speak truth 3 out of 4 times. He throws a die and reports that it is a six. Find the probability that it is actually a six.

SOLVED EXAMPLES - Question No. 22

A person plays a game of tossing a coin thrice. For each head, he is given Rs 2 by the organiser of the game and for each tail, he has to give Rs 1.50 to the organiser. Let X denotes the amount gained or lost

by the person. Show that X is a random variable and exhibit it as a function on the sample space of the experiment.

SOLVED EXAMPLES - Question No. 23

A bag contains 2 white and 1 red balls. One ball is drawn at random and then put back in the box after noting its colour. The process is repeated again. If X denotes the number of red balls recorded in the two draws, describe X.

SOLVED EXAMPLES - Question No. 24

Two cards are drawn successively with replacement from a well-shuffled deck of 52 cards. Find the probability distribution of the number of aces.

SOLVED EXAMPLES - Question No. 25

Find the probability distribution of number of doublets m three throws of a pair of dice.

SOLVED EXAMPLES - Question No. 26

Let X denote the number of hours you study during a randomly selected school day The probability that X can take the values x. has the following form, where k is some unknown constant. `P(X=x)={0. 1 if x=0,k x if x=1 , 2k(5-x) if x=3 or 4, 0 otherwise

SOLVED EXAMPLES - Question No. 27

Let a pair of dice be thrown and the random variable X be the sum of the numbers that appear on the two dice. Find the mean or expectation of X.

SOLVED EXAMPLES - Question No. 29

Two cards are drawn simultaneously (or successively without replacement) from a well shuffled pack of 52 cards. Find the mean, variance and standard deviation of the number of kings.

SOLVED EXAMPLES - Question No. 30

Six balls are drawn successively from an um containing 7 red and 9 black balls. Tell whether or not the trials of drawing balls are Bernoulli trials when after each draw the ball drawn is (i) replaced (ii) not replaced in the urn.

SOLVED EXAMPLES - Question No. 31

If a fair coin is tossed 10 times, find the probability of (i) exactly six heads (ii) at least six heads (iii) at most six heads

SOLVED EXAMPLES - Question No. 32

Ten eggs are drawn successively with replacement from a lot containing 10% defective eggs. Find the probability that there is at least one defective egg.

SOLVED EXAMPLES - Question No. 33

Coloured balls are distributed in four boxes as shown in the following table: A box is selected at random and then a ball is randomly drawn from the selected box. The colour of the ball is black, what is the probability that ball drawn is from the box III?

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SOLVED EXAMPLES - Question No. 34

Find the mean of the Binomial distribution $B\left(4, \frac{1}{3}\right)$.

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SOLVED EXAMPLES - Question No. 35

The probability of a shooter hitting a target is $\frac{3}{4}$. How many minimum number of times must he/she fire so that the probability of hitting the target at least once is more than 0.99?

SOLVED EXAMPLES - Question No. 36

A and B throw a die alternatively till one of them gets a 6 and wins the game. Find their respective probabilities of winning, if A starts first.

SOLVED EXAMPLES - Question No. 37

If a machine is correctly set up. it produces 90% acceptable items. If it is incorrectly set up, it produces only 40% acceptable items. Past experience shows that 80% of the set ups are correctly done. If after a certain set up, the machine produces 2 acceptable items, find the probability that the machine is correctly setup.