# ©゙" doubtnut 

## MATHS

## BOOKS - DISHA PUBLICATION MATHS

## (HINGLISH)

## PROBABILITY -2

## Jee Main 5 Years At A Glance

1. A bag contains 4 red and 6 black balls. A ball is drawn
at random from the bag, its colour is observed and this
ball along with two additional balls of the same colour are returned to the bag. If now a ball is drawn at random
from the bag, then the probability that this drawn ball is red, is
A. $\frac{2}{5}$
B. $\frac{1}{5}$
C. $\frac{3}{4}$
D. $\frac{3}{10}$

## Answer: A

## - Watch Video Solution

2. Let $A, B$ and $C$ be three events, which are pair-wise independent and $\bar{E}$ denotes the complement of an
event E. If $P(A \cap B \cap C)=0$ and $P C)>0$, then $P[(\bar{A} \cap \bar{B}) \mid C]$ is equal to :
A. $P(A)+P(\bar{B})$
B. $P(\bar{A})-P(\bar{B})$
C. $P(\bar{A})-P(B)$
D. $P(\bar{A})+P(\bar{B})$

## Answer: C

## - Watch Video Solution

3. If two different numbers are taken from the set $\{0,1,2,3,, 10\}$; then the probability that their sum as
well absolute difference are both multiple of 4 , is:
(2) $\frac{7}{55}$ (3) $\frac{6}{55}$ (4) $\frac{12}{55}$
A. $\frac{7}{55}$
B. $\frac{6}{55}$
C. $\frac{12}{55}$
D. $\frac{14}{55}$

## Answer: B

## D Watch Video Solution

4. $A$ box contains 15 green and 10 yellow balls. If 10 balls are randomly drawn, one-by-one, with replacement, then the variance of the number of green balls drawn is
A. $\frac{6}{25}$
B. $\frac{12}{5}$
C. 6
D. 4

## Answer: B

## - Watch Video Solution

5. Three persons $P, Q$ and $R$ independentlytry to hit a target. If the probabilities oftheir hitting the target are $\frac{3}{4}, \frac{1}{2}$ and $\frac{5}{8}$ respectively, then the probability that thetarget is hit by $P$ or $Q$ but not by $R$ is:
A. $\frac{21}{64}$
B. $\frac{9}{64}$
C. $\frac{15}{64}$
D. $\frac{39}{64}$

## Answer: A

## - Watch Video Solution

6. An unbiased coin is tossed eight times. The probability of obtaining at least one head and at least one tail is :
A. $\frac{255}{256}$
B. $\frac{127}{128}$
C. $\frac{63}{64}$
D. $\frac{1}{2}$

Answer: B

## - Watch Video Solution

7. Let two fair six-faced dice $A$ and $B$ be thrown
simultaneously. If $E_{1}$ is the event that die $A$ shows up four, $E_{2}$ is the event that die B shows up two and $E_{3}$ is the event that the sum of numbers on both dice is odd, then which of the following statements is NOT true ? (1)
$E_{1}$ and $E_{2}$ are independent. (2) $E_{2}$ and $E_{3}$ are independent. (3) $E_{1}$ and $E_{3}$ are independent. (4) $E_{1}, E_{2}$ and $E_{3}$ are independent.
A. $E_{1}$ and $E_{3}$ are independent.
B. $E_{1}, E_{2}$ and $E_{3}$ are independent.
C. $E_{1}$ and $E_{2}$ are independent
D. $E_{2}$ and $E_{3}$ are independent.

## Answer: B

## D Watch Video Solution

8. If $A$ and $B$ are any two events such that $P(A)=\frac{2}{5}$ and $P(A \cap B)=\frac{3}{20}$ then the conditional probability
$P\left(A \mid\left(A^{\prime} \cup B^{\prime}\right)\right)$ where $A^{\prime}$ denotes the complement of $A$ is equal to
A. $\frac{11}{20}$
B. $\frac{5}{17}$
C. $\frac{8}{17}$
D. $\frac{1}{4}$

## Answer: B

## - Watch Video Solution

9. Let x be set containing 10 elements and $p(x)$ be its power set. If $A$ and $B$ are picked up at random from $p(x)$, with replacement, then probability that $A$ and $B$ have equal number of elements, is
A. $\frac{2^{10}-1}{2^{10}}$
B. $\frac{20 C_{10}}{2^{10}}$
C. $\frac{2^{10}-1}{2^{20}}$
D. $\frac{20 C_{10}}{2^{20}}$

## Answer: D

## - Watch Video Solution

10. Let $A$ and $B$ be two events such that $P \overline{(A \cup B})=\frac{1}{6}, P(A \cap B) \operatorname{and} P(\bar{A})=\frac{1}{4}$, where $\bar{A}$
stands for the complement of the event A . Then the events $A$ and $B$ are-
A. independent but not equally likely.
B. independent and equally likely.
C. mutually exclusive and independent.
D. equally likely but not independent.

## Answer: A

## - Watch Video Solution

11. If $X$ has binomial distribution with mean np and variance npq, then $\frac{P(X=r)}{P(X=r-1)}$ is equal to
A. 2-p
B. 3-p
C. $\frac{p}{2}$
D. $\frac{p}{3}$

## Answer: B

## - Watch Video Solution

## Exercise 1 Concept Builder

1. Abhay speaks the truth only $60 \%$. Hasan rolls a dice
blindfolded and asks Abhay to tell him if the outcome is
a 'prime'. Abhay says, "NO". What is the probability that the outcome is really 'prime'?
A. 0.5
B. 0.75
C. 0.6
D. None of these

## Answer: D

## - Watch Video Solution

2. Let $A$ and $B$ be two events such that $P\left(A \cap B^{\prime}\right)=0.20, P\left(A^{\prime} \cap B\right)=0.15, P\left(A^{\prime} \cap B^{\prime}\right)=0.1$
, then $p(A / B)$ is equal to ,

> A. $\frac{11}{14}$
> B. $\frac{2}{11}$
C. $\frac{2}{7}$
D. $\frac{1}{7}$

## Answer: A

## - Watch Video Solution

3. Given two independent events, if the probability that exactly one of them occurs is $\frac{26}{49}$ and the probability that none of them occurs is $\frac{15}{49}$, then the probability of more probable of the two events is:
A. $\frac{4}{7}$
B. $\frac{6}{7}$
C. $\frac{3}{7}$
D. $\frac{5}{7}$

## Answer: A

## - Watch Video Solution

4. A bag contains $n+1$ coins. If is known that one of these coins shows heads on both sides, whereas the other coins are fair. One coin is selected at random and tossed. If the probability that toss results in heads is $7 / 12$, then find the value of $n$.
A. 3
B. 4
C. 5
D. None of these

## Answer: C

## - Watch Video Solution

5. A bag contains 12 white pearls and 18 black pearls. Two pearls are drawn in succession without replacement. The probability that the first pearl is white and the second is black, is
A. $\frac{32}{145}$
B. $\frac{28}{143}$
C. $\frac{36}{145}$
D. $\frac{36}{143}$

## Answer: C

## - Watch Video Solution

6. A pair of unbiased dice are rolled together till a sum of either 5 or 7 is obtained. Then find the probability that 5 comes before 7 .
A. 1
B. $\frac{2}{5}$
C. $\frac{1}{5}$

## D. None of these

## Answer: B

## - Watch Video Solution

7. Two sets of candidates are competing for the position on the board of directors of a company. The probabilities that the first and second sets will win are 0.6 and 0.4 respectively. If the first set wins, the probability of introducing a new product is 0.8 and the corresponding probability if the second set wins is 0.3 . What is the probability that the new product will be introduced?
B. 0.7
C. 0.6
D. 0.3

## Answer: C

## - Watch Video Solution

8. In a class $30 \%$ students like tea, $20 \%$ like coffee and
$10 \%$ like both tea and coffee. A student is selected at random then what is the probability that he does not like tea if it is known that he likes coffee?
A. $\frac{1}{2}$
B. $\frac{3}{4}$
C. $\frac{1}{3}$
D. None of these

## Answer: A

## - Watch Video Solution

9. Given two bags $A$ and $B$ as follows : Bag $A$ contains 3 red and 2 white balls and bag B contains 2 red and 5 white balls. A bag is selected at random, a ball is drawn and put into the other bag, then a ball is drawn from the second bag. The probability that both balls drawn are of the same colour is
A. $\frac{187}{1680}$
B. $\frac{901}{1680}$
c. $\frac{439}{1680}$
D. None of these

## Answer: B

## - Watch Video Solution

10. If $E_{1}$ and $E_{2}$ are two events such that $P\left(E_{1}\right)=1 / 4$, $P\left(E_{2} / E_{1}\right)=1 / 2$ and $P\left(E_{1} / E_{2}\right)=1 / 4$, then
A. $E_{1}$ and $E_{3}$ are independent.
B. $E_{1}$ and $E_{2}$ are exhaustive
C. $E_{2}$ is twice as likely to occur as $E_{1}$
D. Probabilities of the events $E_{1} \cap E_{2}, E_{1}$ and $E_{2}$ are in GP.

## Answer: B

## D Watch Video Solution

11. The probability of the simultaneous occurrence of two events $A$ and $B$ is $p$. If the probability that exactly one of $A, B$ occurs is $q$, then which of the following alternatives is incorrect?

$$
\text { A. } P\left(A^{\prime}\right)+P\left(B^{\prime}\right)=2+2 q-p
$$

B. $P\left(A^{\prime}\right)+P\left(B^{\prime}\right)=2-2 p-q$
C. $P(A \cap B \mid A \cup B)=\frac{p}{p+q}$
D. $P\left(A^{\prime} \cap B^{\prime}\right)=1-p-q$

Answer: A

## - Watch Video Solution

12. Probability that a man who is 40 year old, living till 75 years is $\frac{5}{16}$, and another man who is 35 years old living till 70 years is $\frac{3}{7}$ then what is the probability that at least one of them will be alive till 35 years hence?
A. $\frac{11}{28}$
B. $\frac{19}{28}$
C. $\frac{17}{28}$
D. None of these

## Answer: C

## - Watch Video Solution

13. If from each of the three boxes containing 3 white and 1 black, 2 white and 2 black, 1 white and 3 black balls, one ball is drawn at random, then the probability that 2 white and 1 black balls will be drawn, is
A. $\frac{13}{32}$
B. $\frac{1}{4}$
C. $\frac{1}{32}$
D. $\frac{3}{16}$

## Answer: A

## - Watch Video Solution

14. Raj and Sanchita are playing game in which they throw two dice alternately till one of them gets 9 . Which one of the following could be the probability that Sanchita win the game?

$$
\text { A. } \frac{7}{15} \text { or } \frac{8}{15}
$$

B. $\frac{6}{11}$ or $\frac{5}{11}$
C. $\frac{8}{17}$ or $\frac{9}{17}$
D. None of these

## Answer: C

## - Watch Video Solution

15. One ticket is selected at random from 50 tickets numbered $00,01,02, \ldots, 49$. Then the probability that the sum of the digits on the selected ticket is 8 , given that the product of these digits is zero, equals (1) $1 / 14$ (2) $1 / 7$
(3) $5 / 14(4) 1 / 50$
A. $\frac{1}{7}$
B. $\frac{5}{14}$
C. $\frac{1}{50}$
D. $\frac{1}{14}$

## Answer: D

## - Watch Video Solution

16. The chances to fail in Physis are $20 \%$ and the chances
to fail in Mathematics are $10 \%$. What are the chances to fail in atleast one subject ?
A. 0.28
B. 0.38
C. 0.72
D. 0.82

## Answer: A

## - Watch Video Solution

17. A bag contains $a$ white and $b$ black balls. Two players,

AandB alternately draw a ball from the bag, replacing the ball each time after the draw till one of them draws a white ball and wins the game. $A$ begins the game. If the probability of $A$ winning the game is three times that of $B$, then find the ratio $a: b$
A. $3: 4$
B. $4: 3$
C. $2: 1$
D. 1:2

## Answer: C

## - Watch Video Solution

18. A fair coin is tossed repeatedly. If tail appears on first four tosses, them the probability of head appearing that

2 white and 1 black balls will be drawn, is
A. $\frac{1}{2}$
B. $\frac{1}{32}$
C. $\frac{31}{32}$
D. $\frac{1}{5}$

## Answer: A

## - Watch Video Solution

19. A lot contains 20 articles. The probability that the lot contains exactly 2 defective articles is 0.4 and the probability thatthe lot contains exactly 3 defective articles is 0.6 . Articles are drawn in random one by one without replacement andtested till all the defective articles are found. What is the probability that the testing procedure ends at the twelfth testing ?
A. $\frac{99}{1000}$
B. $\frac{97}{1000}$
C. $\frac{93}{1000}$
D. None of these

## Answer: A

## - Watch Video Solution

20. A problem in mathematics is given to three students
$A, B, C$ and their respective probability of solving the problem is $1 / 2,1 / 3$ and $1 / 4$. Probability that the problem is solved is $3 / 4$ b. $1 / 2 \mathrm{c} .2 / 3 \mathrm{~d} .1 / 3$
A. $\frac{3}{4}$
B. $\frac{1}{2}$
C. $\frac{2}{3}$
D. $\frac{1}{3}$

## Answer: A

## - Watch Video Solution

21. 19. A is one of 6 horses entered for a race, and is to be ridden by one of two jockeys $B$ and $C$. It is 2 to 1 that $B$ rides $A$, in whic case all the horses are equally likely to win; if $C$ rides $A$, his chance is trebled what are the odds against his winning
A. $5: 13$
B. 5: 18
C. 13:5
D. None of these

## Answer: C

## - Watch Video Solution

22. The probability that a particular day in the month of July is a rainy day is $\frac{3}{4}$. Two person whose credibility and $\frac{4}{5}$ and $\frac{2}{3}$, respectively, claim that 15 th July was a rainy day. Find the probability that it was really a rainy day.
A. $\frac{12}{13}$
B. $\frac{11}{12}$
C. $\frac{24}{25}$
D. $\frac{29}{30}$

## Answer: C

## - Watch Video Solution

23. Pal's gardner is not dependable, the probability that he will forget to water the rose bush is $2 / 3$. The rosebush is in questionable condition. Any how if watered, the probability of its withering is $1 / 2 \&$ if notwatered then the probability of its withering is $3 / 4$. Pal went out of
station \& after returning he finds thatrose bush has withered. What is the probability that the gardner did not water the rose bush.
A. $\frac{2}{5}$
B. $\frac{1}{2}$
C. $\frac{1}{3}$
D. $\frac{3}{4}$

## Answer: D

## - Watch Video Solution

24. v33.2
A. $\frac{2}{7}$
B. $\frac{2}{3}$
C. $\frac{3}{7}$
D. $\frac{1}{3}$

## Answer: C

## - Watch Video Solution

25. $A$ and $B$ are two independent witnesses in a case. The probability that $A$ will speak the truth is $x$ and the probability that $B$ will speak the truth is $y$. $A$ and $B$ agree on a certain statement. The probability that the statement is true is
A. $\frac{x-y}{x+y}$
B. $\frac{x y}{1+x+y+x y}$
C. $\frac{x-y}{1-x-y+2 x y}$
D. $\frac{x y}{1-x-y+2 x y}$

## Answer: D

## D Watch Video Solution

26. 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 ch
A. $\frac{1}{29}$
B. $\frac{28}{29}$
C. $\frac{15}{29}$
D. $\frac{14}{29}$

## Answer: D

## - Watch Video Solution

27. Probability that A speaks truth is $\frac{4}{5}$. A coin is tossed.

A reports that a appears. The probability that actually there was head is (A) $\frac{4}{5}$ (B) $\frac{1}{2}$ (C) $\frac{1}{5}$ (D) $\frac{2}{5}$
A. $\frac{1}{5}$
B. $\frac{4}{5}$
C. $\frac{3}{5}$
D. $\frac{2}{5}$

## Answer: B

## - Watch Video Solution

28. For $k=1,2,3$ the box $B_{k}$ contains k red balls and
$(k+1)$ white balls.
Let
$P\left(B_{1}\right)=\frac{1}{2}, P\left(B_{2}\right)=\frac{1}{3}$ and $P\left(B_{3}\right)=\frac{1}{6}$.A box is
selected at random and a ball is drawn from it. If a red
ball is drawn, then the probability that it has come from box $B_{2}$, is
A. $\frac{35}{78}$
B. $\frac{14}{39}$
C. $\frac{10}{13}$
D. $\frac{12}{13}$

## Answer: B

## - Watch Video Solution

29. The probability that certain electronic component fail, when first used is 0.10 . If it does not fail immediately,
then the probability that it lasts for one year is 0.99 .
What is the probability that a new component will last for one year?
A. 0.99
B. 0.871
C. 0.891
D. 0.762

## Answer: C

## - Watch Video Solution

30. By examining the chest X-ray, probability that T.B is detected when a person is actually suffering is 0.99 . the probability that the doctor diagnoses incorrectly that a person has T.B. on the basis of X-ray is 0.001 . in a certain city 1 in 100 persons suffers from T.B. A person is selected
at random is diagnosed to have T.B. What is the chance that he actually has T.B.?
A. $\frac{110}{221}$
B. $\frac{2}{223}$
C. $\frac{110}{223}$
D. $\frac{1}{221}$

## Answer: A

## D Watch Video Solution

31. $n$ letters are written to $n$ different persons and addresses on the n envelopes are also written. If the letters are placed in the envelopes at random, the
probability that at least one letter is not placed in the right envelope, is (A) $1-\frac{1}{n}$ (B) $1-\frac{1}{2 n}$ (C) $1-\frac{1}{n^{2}}$
$1-\frac{1}{n!}$
A. $\frac{1}{1!}-\frac{1}{2!}+\frac{1}{3!}-\frac{1}{4!}+\ldots \ldots .(-1)^{n} \frac{1}{n!}$
B. $\frac{1}{2!}+\frac{1}{3!}+\frac{1}{4!}-\frac{1}{5!}+\ldots \ldots . . \frac{.1}{n!}$
C. $\frac{1}{2!}-\frac{1}{3!}+\frac{1}{4!}-\frac{1}{5!}+\ldots \ldots \ldots(-1)^{n} \frac{1}{n!}$
D. None of these

## Answer: C

## D Watch Video Solution

32. A person write 4 letters and addresses 4 envelopes. If the letters are placed in the envelopes at random, then
the probability that all letters are not placed in the right envelopes, is a. $1 / 4$ b. $11 / 24$ c. 15/24 d. 23/24

> A. $\frac{1}{8}$
> B. $\frac{3}{8}$
> C. $\frac{5}{8}$
> D. 1

## Answer: B

## - Watch Video Solution

33. In a telephone enquiry system, the number of phone
calls regarding relevant enquiry follow poisson distribution with an average of five phone calls during

10-minute time intervals. The probability that there is at the most one phone call during a 10-minute time period is
A. $\frac{6}{5^{e}}$
B. $\frac{5}{6}$
C. $\frac{6}{55}$
D. $\frac{6}{e^{5}}$

## Answer: D

## D Watch Video Solution

34. Three letters are written to different persons and addressess to three envelopes are also written. Without
looking at the addresses, the probability that probability that the letters go into right envelopes, is
A. $\frac{1}{2}$
B. $\frac{1}{3}$
C. $\frac{1}{6}$
D. $\frac{5}{6}$

Answer: B

## D Watch Video Solution

35. There are $n$ letters and $n$ addressed envelopes. Find the probability that all the letters are not kept in the right envelope.
A. $\frac{1}{n!}$
B. $1-\frac{1}{n!}$
C. $1-\frac{1}{n}$
D. None of these

## Answer: B

## - Watch Video Solution

36. A fair die is tossed eight times. The probability that a third six is observed in eight throw is $\frac{{ }^{7} C_{10} \times 5^{7}}{6^{7}} \mathrm{~b}$. $\frac{{ }^{7} C_{2} \times 5^{2}}{6^{8}}$ c. $\frac{{ }^{7} C_{2} \times 5^{5}}{6^{6}}$ d. none of these
A. $7 C^{2} \frac{5^{5}}{6^{8}}$
B. $7 C^{3} \frac{5^{3}}{6^{8}}$
C. $7 C^{6} \frac{5^{6}}{6^{8}}$
D. None of these

## Answer: A

## - Watch Video Solution

37. A die is tossed 5 times. Getting and odd number is
cosidered a success. Then, the variance of distribution of
success, is
A. $\frac{8}{3}$
B. $\frac{3}{8}$
C. $\frac{4}{5}$
D. $\frac{5}{4}$

## Answer: D

## - Watch Video Solution

38. The probability that a man can hit a target is $3 / 4$. He tries 5 times. The probability that he will hit the target at least three times is
A. $\frac{471}{364}$
B. $\frac{371}{464}$
C. $\frac{471}{582}$
D. $\frac{459}{512}$

## Answer: D

## - Watch Video Solution

39. A random variable $X$ follows binomial distribution with mean $\alpha$ and variance $\beta$. Then,
A. I is true , II is true, II is a correct explanation for I
B. I is true, II is true, II is not a correct explanation for I
C. I is true, II is false
D. I is false, II is true

## - Watch Video Solution

40. 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?
A. $\frac{5^{9}}{2 \times 6^{9}}$
B. $\frac{5^{10}}{2 \times 6^{10}}$
C. $\frac{5^{9}}{2 \times 6^{10}}$
D. $\frac{5^{10}}{2 \times 6^{9}}$

## - Watch Video Solution

41. A coin tossed five times. What is the probability that heads are observed more than three times?
A. 64
B. 21
C. 32
D. 42

## Answer: D

42. A machine is producing $4 \%$ defective products. Find the probability of getting exactly 4 defectives in a sample of 100 is
[Given
$\log 2=0.30102, \log 3=0.4771, \log e=0.4343$, antilog
$(.2908)=1.954]$
A. 0.192
B. 0.156
C. 0.182
D. 0.1954

## Answer: D

43. Given two independent events, if the probability that exactly one of them occurs is $\frac{26}{49}$ and the probability that none of them occurs is $\frac{15}{49}$, then the probability of more probable of the two events is :
A. $\frac{5}{32}$
B. $\frac{27}{32}$
C. $\frac{23}{32}$
D. $\frac{9}{32}$

Answer: B

## - Watch Video Solution

44. If the probability density function of a random variable X is $f(x)=\frac{x}{2} \quad$ in $\quad 0 \leq x \leq 2$, then $P(X>1.5 \mid X>1)$ is equal to
A. $\frac{7}{16}$
B. $\frac{3}{4}$
C. $\frac{7}{12}$
D. $\frac{21}{64}$

Answer: C

## - Watch Video Solution

45. In a binomial distribution, mean is 3 and standard deviation is $\frac{3}{2}$, then the probability function is
A. $\left(\frac{3}{4}+\frac{1}{4}\right)^{12}$
B. $\left(\frac{1}{4}+\frac{3}{4}\right)^{12}$
C. $\left(\frac{1}{4}+\frac{3}{4}\right)^{9}$
D. $\left(\frac{3}{4}+\frac{1}{4}\right)^{9}$

Answer: A

## - Watch Video Solution

46. A random variable has the following probability distribution

| $\mathrm{x}:$ | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| $\mathrm{p}(\mathrm{x})$ | 0 | 2 p | 2 p | 3 p | $\mathrm{p}^{2}$ | $2 \mathrm{p}^{2}$ | $7 \mathrm{p}^{2}$ | $2 p$ |

The value of $p$ is
A. $\frac{1}{10}$
B. -1
C. $\frac{3}{10}$
D. None of these

## Answer: A

## - Watch Video Solution

47. Probability that Priyanka will pass an exam is ' $k$ ', she appeared in 5 exams and if probability that she will pass is exactly 4 out of 5 then find the value of ' $k$ '
A. $\frac{4}{5}$
B. $\frac{1}{5}$
C. $\frac{2}{5}$
D. None of these

## Answer: A

## - Watch Video Solution

48. A fair coin is tossed 99 times. If $X$ is the number of times heads occur, then $P(X=r)$ is maximum when $r$ is $49,50 \mathrm{~b} .50,51 \mathrm{c} .51,52 \mathrm{~d}$. none of these
A. 49 or 50
B. 50 or 51
C. 51
D. None of these

## Answer: A

## - Watch Video Solution

49. In a binomial distribution $B\left(n, p=\frac{1}{4}\right)$, if the probability of at least one success is greater than or equal to $\frac{9}{10}$, then $n$ is greater than
(2) $\frac{1}{(\log )_{10}^{4}+(\log )_{10}^{3}}$

$$
\begin{equation*}
(\log )_{10}^{4}-(\log )_{10}^{3} \tag{3}
\end{equation*}
$$

$$
4
$$

$(\log )_{10}^{4}-(\log )_{10}^{3}$
(4) $\frac{4}{(\log )_{10}^{4}-(\log )_{10}^{3}}$
A. $\frac{1}{\log _{10} 4+\log _{10} 3}$
B. $\frac{9}{\log _{10} 4-\log _{10} 3}$
C. $\frac{4}{\log _{10} 4-\log _{10} 3}$
D. $\frac{1}{\log _{10} 4-\log _{10} 3}$

## Answer: D

## D Watch Video Solution

50. One hundred identical coins, each with probability ' p ' of showing heads are tossed once. If $0<p<1$ and the probability of heads showing on 50 coins is equal to that of heads showing on 51 coins, then the value of $p$ is
A. $\frac{1}{2}$
B. $\frac{49}{101}$
C. $\frac{50}{101}$
D. $\frac{51}{101}$

## Answer: D

## - Watch Video Solution

51. A bag contains three white, two black and four red balls. If four balls are drawn at random with replacement, the probability that the sample contains just one white ball is
A. $\frac{16}{81}$
B. $\frac{8}{81}$
C. $\frac{32}{81}$
D. $\frac{4}{81}$

## Answer: C

## - Watch Video Solution

52. A fair coin is tossed a fixed number of times. If the probability of getting seven heads is equal to that of getting nine heads, the probability of getting two heads, is

$$
\text { A. } \frac{15}{2^{8}}
$$

B. $\frac{2}{15}$
C. $\frac{15}{2^{13}}$
D. None of these

## Answer: C

## - Watch Video Solution

53. A boy is throwing stones at a target. The probability of hitting the target at any trial is $\frac{1}{2}$ The probability of hitting the target 5th time at the 10th throw is

> A. $\frac{5}{2^{10}}$
> B. $\frac{63}{2^{9}}$
C. $\frac{10 C_{5}}{2^{10}}$
D. None of these

Answer: B

## - Watch Video Solution

54. A pair of fair dice is thrown independently three times. The probability of getting a score of exactly 9 twice is (1) $1 / 729$ (2) $8 / 9(3) 8 / 729$ (4) $8 / 243$
A. $\frac{8}{729}$
B. $\frac{8}{243}$
C. $\frac{1}{729}$
D. $\frac{8}{9}$

## Answer: B

## - Watch Video Solution

55. There is $30 \%$ chance that it rains on any particular day. What is the probability what where is at least one rainy day within a period of 7 days ? Given that there is at least one rainy day, What is the probability that there are at least two rainy days ?

$$
\begin{aligned}
& \text { A. } \frac{\frac{14}{5} \times\left(\frac{7}{10}\right)^{6}}{1+\left(\frac{7}{10}\right)^{7}} \\
& \text { B. }\left(\frac{7}{10}\right)^{6}-\frac{14}{17}
\end{aligned}
$$

C. $\frac{13}{5} \times\left(\frac{7}{10}\right)^{6}$
D. $\frac{1-\frac{14}{15} \times\left(\frac{7}{10}\right)^{6}}{1-\left(\frac{7}{10}\right)^{7}}$

## Answer: D

## - Watch Video Solution

56. Consider the following statements

I: An experiment succeeds twice as often as it fails. Then,
the probability that in the next six trials, there will be atleast 4 successes is $\frac{31}{9}\left(\frac{2}{3}\right)^{4}$

II : The number of times must a man toss a fair coin so that the probability of having atleast one head is more than $90 \%$ is 4 or mor than 4.
A. I is true
B. II is true
C. Both are true
D. Both are false

## Answer: C

## - Watch Video Solution

57. The mean and variance of a random variable $X$ having
a binomial distribution are 4 and 2 respectively. The
$P(X=1)$ is
A. $\frac{1}{4}$
B. $\frac{1}{32}$
C. $\frac{1}{16}$
D. $\frac{1}{8}$

## Answer: B

## - Watch Video Solution

58. The number of events of the binomial distribution for which mean and standard deviation are 10 and $\sqrt{5}$ respectively is
A. 15
B. 12
C. 16
D. 20

## Answer: D

## - Watch Video Solution

59. If X has binomial distribution with mean np and variance npq, then $\frac{P(X=r)}{P(X=r-1)}$ is equal to
A. $\frac{n-k}{k-1} \frac{p}{q}$
B. $\frac{n-k+1}{k} \frac{p}{q}$
C. $\frac{n+1}{k} \frac{q}{p}$
D. $\frac{n-1}{k+1} \frac{q}{p}$

## D Watch Video Solution

60. 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 $\operatorname{Var}(X)$.
A. $\frac{3}{7}, \frac{5}{17}$
B. $\frac{13}{15}, \frac{2}{15}$
C. $\frac{7}{10}, \frac{21}{100}$
D. $\frac{7}{10}, \frac{23}{100}$

Answer: C

## - Watch Video Solution

## Exercise 2 Concept Applicator

1. 3 friends A, B and C play the game "Pahle Hum Pahle

Tum" in which they throw a die one after the other and
the one who will get a composite number $1^{s t}$ will be announced as winner, If A started the game followed by B
and then $C$ then what is the ratio of their winning probabilities?
A. 9:6:4
B. $8: 6: 5$
C. $10: 5: 4$
D. None of these

## Answer: A

## - Watch Video Solution

2. Two events $E$ and $F$ are independent. If $P(E)=0.3$ and $P($
$E \cup F)=0.5$ then $P(E / F)-P(F / E)$ equals to
A. $\frac{2}{7}$
B. $\frac{3}{35}$
C. $\frac{1}{70}$
D. $\frac{1}{7}$

## Answer: C

## - Watch Video Solution

3. The probabilities of four cricketers A, B, C and D scoring more than 50 runs in a match are $\frac{1}{2}, \frac{1}{3}, \frac{1}{4}$ and 1 $\frac{1}{10}$. It is known that exactly two of the players more than

50 runs in a particular match. The probability that these players were $A$ and $B$ is
A. $\frac{27}{65}$
B. $\frac{5}{6}$
C. $\frac{1}{6}$
D. None of these

Answer: A

## - Watch Video Solution

4. consider an event $E=E_{1} \cap E_{2} \cap E_{3}$ find the value of

$$
\mathrm{P}(\mathrm{E}) \quad \text { if } \quad P\left(E_{1}\right)=\frac{2}{5}, P\left(\frac{E_{2}}{E_{1}}\right)=\frac{1}{5}
$$

$P\left(\frac{E_{3}}{E_{1} E_{2}}\right)=\frac{1}{10}$
A. $\frac{2}{125}$
B. $\frac{1}{125}$
C. $\frac{3}{125}$
D. None of these

## - Watch Video Solution

5. $A$ set $A$ has $n$ elements. $A$ subset $P$ of $A$ is selected at random. Returning the elements of P , the set A is formed again and then a subset $Q$ is selected from it. Find the probability that $P$ and $Q$ have no common element.
A. 3667
B. 421
C. 2141
D. 1793

## - Watch Video Solution

6. Rahul has to write a project, Probability that he will get a project copy is ' p ', probability that he will get a blue pen is ' $q$ ' and probability that he will get a black pen is $1 / 2$. If he can complete the project either with blue or with black pen or with both and probability that he completed the project is $\frac{1}{2}$ then $p(1+q)$ is
A. $\frac{1}{2}$
B. 1
C. $\frac{1}{4}$
D. 2

## Answer: B

## - Watch Video Solution

7. 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?
A. $\frac{1}{2}$ and $\frac{1}{4}$
B. $\frac{1}{3}$ and $\frac{1}{2}$
C. $\frac{1}{3}$ and $\frac{1}{4}$
D. $\frac{1}{2}$ and $\frac{1}{3}$

## Answer: A

## - Watch Video Solution

8. For any two independent events $E_{1}$ and $E_{2}$ $P\left\{\left(E_{1} \cup E_{2}\right) \cap\left(\overline{E_{1}} \cap \overline{E_{2}}\right\}\right.$ is
A. $<\frac{1}{4}$
B. $>\frac{1}{4}$
C. $\geq \frac{1}{2}$
D. None of these

## - Watch Video Solution

9. Mr. A randomly picks 3 distinct numbers from the set $\{1,2,3,4,5,6,7,8,9\}$ and arranges them in descending order to form a three digit number. Mr. B randomly picks

3 distinct numbers from the set $\{1,2,3,4,5,6,7,8\}$ and also arranges them in descending order to form a 3 digit number.
Q. The probability that $A$ and $B$ has the same 3 digit number is :
A. probability that Mr. A's 3 digit number is always greater then Mr. B's 3 digit number is $\frac{1}{3}$
B. probability that Mr. A and Mr. B has the same 3
digit numbers is $\frac{1}{84}$
C. probability that Mr. A's 3 digit number is greater then Mr. B's 3 digit number is $\frac{37}{56}$
D. probability that Mr. A's 3 digit number is greater then Mr. B's 3 digit number is $\frac{1}{3}$

## Answer: C

## D Watch Video Solution

10. If $\mathrm{P}(\mathrm{B})=\frac{3}{5}, P(A / B)=\frac{1}{2}$ and $P(A \cup B)=\frac{4}{5}$, then $P(A \cup B)^{\prime}+P\left(A^{\prime} \cup B\right)$ is equal to
A. $\frac{1}{5}$
B. $\frac{4}{5}$
C. $\frac{1}{2}$
D. 1

## Answer: D

## - Watch Video Solution

11. The probability of India winning a test match against

West Indies is $1 / 2$. Assuming independence from match
to match, find the probability that in a match series
Indias second win occurs at the third test.
A. $\frac{2}{3}$
B. $\frac{1}{2}$
C. $\frac{1}{4}$
D. $\frac{1}{8}$

## Answer: C

## - Watch Video Solution

12. A coin is tossed three times in succession. If $E$ is the event that there are at least two heads and $F$ is the event in which first throw is a head, then find $P(E / F)$.
A. $\frac{4}{3}$
B. $\frac{3}{4}$
C. $\frac{1}{4}$
D. $\frac{1}{2}$

## Answer: B

## - Watch Video Solution

13. 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?
A. $P(A) P(B)=\frac{1}{6}$
B. $A$ and $B$ are independent
C. $A$ and $B$ are dependent
D. None of these

## Answer: C

## D Watch Video Solution

14. For two events $A$ and $B$, if $P(A) P\left(\frac{A}{B}\right)=\frac{1}{4}$ and $P\left(\frac{B}{A}\right)=\frac{1}{2}$, then which of the following is not true ?
$A . A$ and $B$ are mutually exclusive events
$B . A$ and $B$ are dependent events
C. $\overline{P\left(\frac{A}{B}\right)}=\frac{3}{4}$
D. None of these

Answer: C

## - Watch Video Solution

15. If $E$ and $F$ are independent events such that
$0<P(E)<1$ and $0<P(F)<1$, then
A. $P(E \mid F)+P(\bar{E} \mid F)=1$
B. $P(E \mid F)+P(E \mid \bar{F})=1$
C. $P(\bar{E} \mid F)+P(E \mid \bar{F})=1$
D. $P(E \mid \bar{F})+P(\bar{E} \mid \bar{F})=0$

Answer: A
16. Two aeroplanes I and II bomb a target in succession.

The probabilities of I and II scoring a hit correctly are 0.3 and 0.2 respectively. The second plane will bomb only if the first misses the target. The probability that the target is hit by the second plane is
A. 0.2
B. 0.7
C. 0.06
D. 0.14

Answer: D
17. If $A$ and $B$ play a series of games in each of which probability that $A$ wins is $p$ and that $B$ wins is $q=1-p$.

Therefore the chance that A wins two games before B
wins three is
A. $\frac{p^{2}}{1+3 q}$
B. $\frac{p^{2}}{1+3 q^{2}}$
C. $p^{2}\left(1+2 q+3 q^{2}\right)$
D. None of these

Answer: C
18. In a competitive examination, an examinee either guesses or copies or knows the answer to amultiple choice question with four choices. The probability that he makes a guess is $\frac{1}{3}$ and the probability that he copies the answer is $1 / 6$. The probability that the answer is correct, given that he copiedit, is $\frac{1}{8}$. Find the probability that he knows the answer to the question, given that he correctly answered

> A. $\frac{24}{29}$
> B. $\frac{1}{4}$
> C. $\frac{3}{4}$
> D. $\frac{1}{2}$

## Answer: A

## - Watch Video Solution

19. Suppose $X$ is a random variable which takes values $0,1,2,3, \ldots . \quad$ and $\quad P(X=r)=p q^{r}, \quad$ where $0<p<1, q=1-p$ and $r=0,1,2, \ldots \ldots$. then :
A. $P(X \geq a)=q^{a}$
B. $P(X \geq a+b \mid X \geq a)=P(X \geq b)$
C. $P(X=a+b \mid X \geq a)=P(X=b)$
D. All of the above

## Answer: D

20. Die A has 4 red and 2 white faces, whereas die B has 2
red and 4 white faces. A coins is flipped once. If it shows
a head, the game continues by throwing die A: if it shows
tail, then die $B$ is to be used. If the probability that die $A$
is used is $32 / 33$ when it is given that red turns up every
time in first $n$ throws, then find the value of $n$.
A. 5
B. 4
C. 6
D. 3

Answer: A
21. $A$ and $B$ are two independent witnesses in a case. The probability that A will speak the truth is x and the probability that $B$ will speak the truth is $y$. $A$ and $B$ agree on a certain statement. The probability that the statement is true is
A. $\frac{x-y}{x+y}$
B. $\frac{x y}{(1+x+y+x y)}$
C. $\frac{x-y}{1-x-y+2 x y}$
D. $\frac{x y}{1-x-y+2 x y}$

## Answer: D

22. Girl students constitute $10 \%$ of I year and $5 \%$ of II year at Roorkee University. During summer holidays 70\% of the I year and $30 \%$ of $I I$ year students are given a project. The chance that I year girl student is on duty in a randomly selected day is
A. $\frac{3}{17}$
B. $\frac{14}{17}$
C. $\frac{3}{10}$
D. $\frac{7}{10}$

Answer: B
23. A man takes a step forward with probability 0.4 and backward with probability 0.6 . The probability that at the end of eleven steps he is just one step away from the starting point, is
A. $\frac{2^{5} \cdot 3^{5}}{5^{10}}$
B. $462 \times\left(\frac{6}{25}\right)^{5}$
C. $231 \times \frac{3^{5}}{5^{10}}$
D. None of these

Answer: B

## D Watch Video Solution

24. If $X$ and $Y$ are independent binomial vatiates $B\left(5, \frac{1}{2}\right)$ and $B\left(7, \frac{1}{2}\right)$ and the value of
$P(X+Y=3)$ is
A. $\frac{35}{47}$
B. $\frac{55}{1024}$
C. $\frac{220}{512}$
D. $\frac{11}{204}$

Answer: B
25. Suppose that the probability that an item produced by a particular machine is defective equals 0.2 . If 10 items produced from this machine are selected at random, the probability that not more than one defective is found is
A. $\frac{1}{e^{2}}$
B. $\frac{2}{e^{2}}$
C. $\frac{3}{e}$
D. None of these

## Answer: C

26. A fair die is thrown 20 times. The probability that on the 10th throw, the fourth six appears is
${ }^{\wedge} 20 C_{10} \times 5^{6} / 6^{20}$
b. $120 \times 5^{7} / 6^{10}$
c. $84 \times 5^{6} / 6^{10}$
d.
none of these
A. $\frac{20 C_{10} \times 5^{6}}{6^{20}}$
B. $\frac{120 \times 5^{7}}{6^{10}}$
c. $\frac{84 \times 5^{6}}{6^{10}}$
D. None of these

## Answer: C

27. A box contains 20 identical balls of which 10 are blue and 10 are green. The balls are drawn at random from the box one at a time with replacement. The probability that a blue ball is drawn 4th time on the 7th draw is
A. $\frac{27}{32}$
B. $\frac{5}{64}$
C. $\frac{5}{32}$
D. $\frac{1}{2}$

## Answer: C

## - Watch Video Solution

28. In a college, $30 \%$ students fail in physics, $25 \%$ fail in

Mathematics and $10 \%$ in both. One student is choosen at random. The probability that she fails in physics, if she has failed in Mathematics is

> A. $\frac{1}{10}$
> B. $\frac{2}{5}$
> C. $\frac{9}{20}$
> D. $\frac{1}{3}$

## Answer: B

29. A person write 4 letters and addresses 4 envelopes. If the letters are placed in the envelopes at random, then the probability that all letters are not placed in the right envelopes, is a. $1 / 4$ b. $11 / 24$ c. 15/24 d. 23/24
A. $\frac{1}{8}$
B. $\frac{3}{8}$
C. $\frac{5}{8}$
D. 1

Answer: B
30. In a bolt factory, machines $A, B$ and $C$ manufacture $60 \%, 25 \%$ and $15 \%$ respectively. Of the total of their outputs $1 \%, 2 \%, 1 \%$ are defectively from these machines respectively. A bold is drawn at random from the total production and found to be defective. From which machine, the defective bolt is most expected to have been manufactured?
A. Machine A
B. Machine B
C. Machine C
D. None of these

