9. Three boxes A, B, C contain balls as shown below

	White	Red	Black
A	2	2	1
B	3	4	2
C	4	2	3

A die is thrown to decide which box is to be chosen. A is chosen if 1 or 2 turns up; B is chosen if 3 or 4 turns up; C is chosen if 5 or 6 turns up. Having chosen the box, a ball is chosen at random from it

I. Probability for the ball to be red is 16/44

II : If the drawn ball is of red colour, the probability that it is from box B is 5/8.

Which of the above statement(s) is/are correct

1. I only 2. II only
3. both I and II 4. neither I nor II

10. **I :** A man is known to speak truth 3 out of 4 times. He throws a die and reports that it is 6. The probability that it is actually 1 is 1/6

II : A man is known to speak truth 2 out of 3 times. He throws a die and reports that it is 1.The 4. A player tosses two fair coins. He wins Rs. 5/- if two heads occur, Rs. 2/- if one head occurs and Rs. 1/- if no head occurs. Then how much should he pay to play the game if it is to be fair probability that it is actually 1 is 2/6.

Which of the following statement is correct

1. only I 2. only II
3. both I and II 4. neither I nor II

11. The probability that Australia wins a match against India in a cricket match is 1/3. India and Australia play 3 matches

I. The probability that Australia wins atleast one match is 4/27

II : The probability that Australia looses all the three matches is 8/27

Which of the above statements is correct

1. I only 2. II only
3. both I and II 4. neither I nor II

12. I : A single die is rolled twice in succession. The probability that the number showing on the second toss is greater than that on the first rolling is 4/27.

II : The probability that a boy gets a scholarships is 0.8 and another boy B is 0.9. the probability that atleast one of them gets the scholarship is 0.98.

Which of the above statements is true

1. I only 2. II only
3. both I and II 4. neither I nor II

13. The probability for a contractor to get a road contract is 2/3 and get a building contract is 5/9. The probability to get at least one contract is 4/5.

I : The probability that we gets both the contracts is 18/45

II : The probability that he gets exactly one contract is 17/45

Which of the above statements is are true

1. I only 2. II only
3. both I and II 4. neither I nor II

14. An unbiased coin is tossed to get 2 points for turning up a head and one point for the tail. If three unbiased coins are tossed simultaneously, then the probability of getting

I : a total of odd no. of points is 2/3

II : a total of 4 or 5 is 3/4

Which of the above statements is / are correct

1. I only 2. II only
3. both I and II 4. either I nor II

15. Six faces of a unbiased die are numbered with 2, 3, 5, 7, 11 and 13. If two such dice are thrown then the probability that the sum on the uppermost faces of the dice.

I : is an odd no. is 5/18

II : is a no. greater than 20 is 1/9

Which of the above statements (I, II) are true

1. I only 2. II only
3. both I and II 4. neither I nor II

16. A, B are two events in a random experiment such that $0 < P(A) < 1$ and $P(B) \neq 1$.

Assertion (A) :- $P\left(\frac{A}{B^e}\right) = \frac{P(A) - P(A \cap B)}{1 - P(B)}$

Reason (R) :- $P\left(\frac{A}{B}\right) = \frac{P(A I B)}{P(B)}$

1. both A and R are true and R is the correct explanation of A
2. both A and R are true and R is not the correct explanation of A
3. A is true but R is false
4. A is false but R is true

17. A, B are two events of a simple space

Assertion (A) : A, B are mutually exclusive

$\Rightarrow P(A) \leq P(\bar{B})$

Reason (R):- A, B are mutually exclusive

$\Rightarrow P(A) + P(B) \leq 1$

1. both A and R are true and R is the correct explanation of A
2. both A and R are true and R is not the correct explanation of A
3. A is true but R is false
4. A is false but R is true

18. A and B be two independent events of a sample space such that P(A) = 0.2, P(B) = 0.5

LIST-I	LIST-II
A) P(B/A)	1. 0.2
B) P(A/B)	2. 0.1
C) $P(A \cap B)$	3. 0.3
D) $P(A \cup B)$	4. 0.6
	5. 0.5

The correct match for List-I from List-II

	A	B	C	D
1.	4	5	3	1
2.	5	1	2	4
3.	3	1	2	4
4.	2	1	4	5

19. An electrical shopkeeper purchases bulbs from three manufacturers A, B, C. He purchases 25% of his stock from A, 45% from B and 30% from C. In the past purchases he found 2% of C's bulbs, 1% of B's bulbs, 1% of A's bulbs were defective. Assuming that, the shopkeeper chooses a bulb and found it to be defective

LIST-I	LIST-II
A) The probability of choosing A and purchasing a d bulb from it is	1) 0.0025
B) The probability of choosing B and purchasing a defective bulb from it is	2) 0.0045
C) The probability of choosing C and purchasing a defective bulb from it is	3) 0.0060
D) The probability that the defective bulb was purchased from C is	4) 0.65
	5) 0.46

The correct Match for LIST-I from LIST-II is

	A	B	C	D
1.	4	5	2	3
2.	5	2	3	1
3.	2	3	1	5
4.	1	2	3	5

20. A problem is given to two students A and B whose chances of solving it are $\frac{1}{3},\frac{1}{5}$ respectively then

LIST-I	LIST-II
A) probability that the problem is solved is	1) 7/15
B) probability that the problem not solved is	2) 4/15
C) probability that the problem solved by A only is	3) 6/15
D) probability that the problem solved by B only is	4) 2/15
	5) 8/15

The correct match for LIST-I from LIST-II is

	A	B	C	D
1.	2	1	5	4
2.	3	5	1	4
3.	1	5	2	4
4.	2	1	5	3

21. A, B are two events of a sample space such that P(A) > 0, P(B) > 0.

LIST-I	LIST-II
A) $P(A\cup B)^1$ where A and B are independent events	1) $P(A\cap B)$
B) $P(A\cup B)$ where A and B are independent events	2) 1
C) $P(A/B) + P(A^1/B)$	3) $1-P(A^1).P(B^1)$
D) $P(A) . P(B/A)$	4) $[1-P(A)][1-P(B)]$
	5) 0

The correct match for LIST-I from LIST-II is

	A	B	C	D
1.	4	3	2	1
2.	5	4	3	2
3.	4	3	2	5
4.	4	3	5	1

22. A, B are two events of a sample space such that

$$P(A)=\frac{3}{2}P(B)=\frac{1}{2},P(A\cap B)=\frac{2}{15}$$

LIST-I	LIST-II
A) P(A/B) =	1) 3/5
B) P(B/A) =	2) 1/2
C) $P(A^1/B^1)$ =	3) 4/15
D) $P(B^1/A^1)$ =	4) 2/5
	5) 9/20

The correct match for LIST-I from LIST-II is

	A	B	C	D
1.	4	3	2	1
2.	5	4	3	2
3.	4	3	2	5
4.	3	4	5	1

23. If A,B,C are three independent events of an experiment such that $P(A\cap B^c\cap C^c)=\frac{1}{4}$, $P(A^c\cap B\cap C^c)=\frac{1}{8}$, $P(A^c\cap B^c\cap C^c)=\frac{1}{4}$ then the increasing order of P(A), P(B) and P(C)

1.P(A) <P(B) <P(C) 2.P(B) <P(A) <P(C)
3.P(A) <P(C) <P(B) 4.P(B) <P(C) <P(A)

24. A bag contains 12 two rupee coins, 7 one rupee coins and 4 half a rupee coins. If three coins are selected at random, p= probability that the sum of the three coins is maximum, q= probability that the sum of the three coins is minimum, r=probability that each coin is of different value.
Arrange p,q and r in increasing order of magnitude.
1. p,q,r 2.q,p,r 3.r,q,p 4.r,p,q

KEY

1. 2	2. 3	3. 2	4. 4	5. 1
6.1	7. 2	8.2	9. 4	10. 4
11. 2	12.2	13. 2	14. 2	15. 1
16. 1	17. 1	18. 2	19. 4	20. 3
21. 1	22. 4	23.1	24.3	

LEVEL - V

COMPREHENSIVE QUESTIONS

I. If A, B are two non empty finite sets then the cartesian product of A, B is denoted by A x B. Any subset of cartesian product of two sets is a relation. A function is a relation between two sets. But every relation need not be a function. Injective functions are the functions such that the distinct objects will have distinct images. If the function is such that co-domain is equal to range then the function is said to be the surjective function. Inverse functions are possible only if the functions are bijective

1. If A, B are two finite sets such that n(A)=3, n(B)=4 and if a relation defined from A to B is taken at random probability that it is a function is

1) $\frac{1}{64}$ 2) $\frac{1}{32}$ 3) $\frac{1}{8}$ 4) $\frac{1}{16}$

2. A is a set such that n(A)=4 and a function is taken at random from all the functions that can be defined on A it self probability that it is a one-one function

1) $\frac{1}{8}$ 2) $\frac{3}{32}$ 3) $\frac{4}{9}$ 4) $\frac{9}{16}$

3. If P, Q are two subsets of A and n(A)=5, then the probability that P, Q are disjoint sets is

1) $\left(\frac{3}{4}\right)^2$ 2) $\left(\frac{3}{4}\right)^3$ 3) $\left(\frac{1}{4}\right)^5$ 4) $\left(\frac{3}{4}\right)^5$

4. If A, B are two finite sets such that n(A)=4, n(B)=2. From the functions that can be defined from B to A if a function is selected at random probability that for that function, inverse function exists is

1) $\frac{1}{16}$ 2) $\frac{1}{2}$ 3) 0 4) $\frac{1}{4}$

II. The arrangement of real or complex numbers in rectangular array is called a matrix. If in a matrix no.of rows is ‘m’ and no.of columns is ‘n’ then the matrix is said to be of type mxn. A sub matrix is the matrix obtained by deleting some rows or columns or both rows and columns from the given matrix. If all the elements of a matrix, each is zero then the matrix is called null matrix. If all the elements in the principal diagonal of a square matrix are same and other elements each is zero then the matrix is called a scalar matrix. Associated with every square matrix there exists a real number called determinant of the matrix. Singular matrices are having the determinant value zero.

1. By using the elements 0, 1 only, 2 x 2 matrices are formed and if a matrix is chosen at random probability that the matrix is a non singular matrix

1) $\frac{3}{16}$ 2) $\frac{3}{8}$ 3) $\frac{1}{16}$ 4) $\frac{1}{4}$

2. From all the submatrices of a matrix of type 3x4 a matrix is chosen at random probability that it is of type 2 x 2 is

1) $\frac{1}{35}$ 2) $\frac{2}{35}$ 3) $\frac{6}{35}$ 4) $\frac{4}{35}$

3. By using the elements 0, 1 only 2 x 2 matrices, are formed and if a matrix is chosen from them then the probability that the matrix is a scalar matrix is

1) $\frac{1}{16}$ 2) $\frac{3}{16}$ 3) $\frac{3}{8}$ 4) $\frac{1}{8}$

4. From all the rectangular sub matrices of a matrix of type 4x4 a matrix is chosen at random then the probability that it is 2x4 matrix is

1) $\frac{3}{14}$ 2) $\frac{13}{14}$ 3) $\frac{1}{4}$ 4) $\frac{1}{16}$

III. There are three routes A, B, C from the house to the office on any day the selection of each route is independent of the others. On a rainy day the probabilities that the officer is late to the office if he selected the routes A, B, C are $\frac{1}{6},\frac{1}{5},\frac{1}{15}$ respectively. Using the above data, answer the following questions

1. What is the probability that the officer is late to the office?

1) $\frac{13}{30}$ 2) $\frac{13}{90}$ 3) $\frac{13}{150}$ 4) $\frac{13}{180}$

2. If the officer is late to the office, then find the proability that he travelled through route B or route C?

1) $\frac{4}{13}$ 2) $\frac{9}{13}$ 3) $\frac{5}{13}$ 4) $\frac{8}{13}$

3. What is the probability that the officer reached the office right on time on that day?

1) $\frac{77}{90}$ 2) $\frac{7}{9}$ 3) $\frac{77}{150}$ 4) $\frac{73}{150}$

4. If the officer reached the office right on time what is the probability that he selected the route A?

1) $\frac{15}{77}$ 2) $\frac{52}{77}$ 3) $\frac{25}{77}$ 4) $\frac{62}{77}$

KEY

I.	1. 1	2. 2	3. 4	4. 3
II.	1. 2	2. 3	3. 1	4. 1
III.	1. 2	2. 4	3. 1	4. 3

PREVIOUS EAMCET QUESTIONS

2006

1. If A and B are two independent events such that $P(B)=\frac{2}{7}$, $P(A\cup B^c)=0.8$ then P(A)=

1. 0.1 2. 0.2 3. 0.3 4. 0.4

2. A number 'n' is chosen at random from {1,2,3,...1000}. The probability that 'n' is a number that leaves remainder 1 when divided by '7' is...

1. $\frac{71}{500}$ 2. $\frac{143}{1000}$ 3. $\frac{72}{500}$ 4. $\frac{71}{1000}$

3. In the random experiment of tossing two un biased dice.Let 'E' be the event of getting the sum 8 and 'F ' be the event of getting even numbers on both the dice then

I : $P(E)=\frac{7}{36}$ II : $P(F)=\frac{1}{3}$

Which of the following is correct statement

1. Both I and II are true 2.Neither I nor II are true
3. I is true , II is false 4.I is false, II is true

4. Seven balls are drawn simultaneously from a bag containing 5 white and 6 green balls. The probability of drawing 3 white and 4 green balls is

1. $\frac{7}{^{11}c_7}$ 2. $\frac{^5c_3+{}^6c_4}{^{11}c_7}$ 3. $\frac{^5c_2\times{}^6c_2}{^{11}c_7}$ 4. $\frac{^6c_3\times{}^5c_4}{^{11}c_7}$

2005

5. A coin and a six faced die, both unbiased, are thrown simultaneously. The probability of getting a head on the coin and an odd number on the die is

1. 1/2 2. 3/4 3. 1/4 4. 2/3

6. A number n is chosen at random from S = {1, 2, 3, ..., 50}. Let

A = $\left\{n\in S: n+\frac{50}{n}>27\right\}$,

B = $\{n\in S: n \text{ is a prime}\}$ and

C = $\{n\in S: n \text{ is a square}\}$. The correct order of their probabilities is

1. P(A) < P(B) < P(C) 2. P(A) > P(B) > P(C)
3. P(B) < P(A) < P(C) 4. P(A) > P(C) > P(B)

7. Box A contains 2 black and 3 red balls while box B contains 3 black and 4 red balls. Out of these two boxes one is selected at random and the probability of choosing box A is double that of box B. If a red ball is drawn from the selected box, then the probability that it has come from box B is

1. 21/41 2. 10/31 3. 12/31 4. 13/41

2004

8. An unbiased coin is tossed to get 2 points for turning up a head and one point for the tail. If three unbiased coins are tossed simultaneously, then the prob. of getting a total of odd no. of points is

1. 1/2 2. 1/4 3. 1/8 4. 3/8

9. Suppose E and F are two events of a random expt. If the probability of occurrence of E is 1/5 and the probability of occurence of F given E is 1/10, then the probability of non-occurrence of at least one of the events E and F is
1. 1/18 2. 1/2 3. 49/50 4. 1/50

10. Six faces of a unbiased die are numbered with 2, 3, 5, 7, 11 and 13. If two such dice are thrown, then the probability that the sum on the uppermost faces of the dice is an odd number is
1. 5/18 2. 5/36 3. 13/18 4. 25/36

2003

11. If P(A $\cup$ B) = 0.8, P(A $\cap$ B) = 0.3 then $P(\overline{A}) + P(\overline{B}) =$
1. 0.3 2. 0.5 4. 0.7 4. 0.9

12. A coin is tossed n times. The probability of getting head atleast once is greater than 0.8. Then the least value of such n is
1. 2 2. 3 3. 4 4. 5

13.. A box X contains 2 white and 3 black balls and another bag Y contains 4 white and 2 black balls. One bag is selected at random and a ball is drawn from it. Then the probability for the ball chosen be white is
1. 2/15 2. 7/15 3. 8/15 4. 14/15

2002

14. A bag contains 5 black balls, 4 white balls and 3 red balls. If a ball is selected at random, the probability that it is a black or a red ball is
1. $\frac{1}{3}$ 2. $\frac{1}{4}$ 3. $\frac{5}{12}$ 4. $\frac{2}{3}$

15. The probability of getting qualified in IIT-JEE and EAMCET by a student are respectively $\frac{1}{5}$ and $\frac{3}{5}$. The probability that the student gets qualified for one of these tests is
1. $\frac{3}{25}$ 2. $\frac{17}{25}$ 3. $\frac{22}{25}$ 4. $\frac{8}{25}$

16. One die and a coin (both unbiased) are tossed simultaneously. The probability of getting 5 on the top of the die and tail on the coin is
1. $\frac{1}{2}$ 2. $\frac{1}{12}$ 3. $\frac{1}{6}$ 4. $\frac{1}{8}$

2001

17. In a competition A, B and C are participating. The probability that A wins is twice that of B, the probability that B wins is twice that of C. Then the probability that A loses is
1. $\frac{1}{7}$ 2. $\frac{2}{7}$ 3. $\frac{4}{7}$ 4. $\frac{3}{7}$

18. The probability that a number selected at random from the set of members {1, 2, 3, ... 100} is a cube is
1. $\frac{1}{25}$ 2. $\frac{2}{25}$ 3. $\frac{3}{25}$ 4. $\frac{4}{25}$

19. If S is a sample space, $P(A)=\frac{1}{3}P(B)$ and $S = A \cup B$ where A and B are two mutually exclusive events, then P(A) =
1. $\frac{1}{4}$ 2. $\frac{1}{2}$ 3. $\frac{3}{4}$ 4. $\frac{3}{8}$

2000

20. The probability of choosing at random a number divisible by 6 or 8 from among 1 to 90 numbers is
1. $\frac{1}{6}$ 2. $\frac{11}{90}$ 3. $\frac{1}{30}$ 4. $\frac{23}{90}$

21. The probability of two events A and B to occur are 0.25 and 0.40 respectively. The probability that both A and B occur is 0.15. The probability that neither A nor B occurs is
1. 0.35 2. 0.65 3. 0.5 4. 0.75

1999

22. The probability of getting a total score of 7 when two unbiased dice are thrown simultaneously is
1. $\frac{7}{36}$ 2. $\frac{29}{36}$ 3. $\frac{1}{6}$ 4. $\frac{5}{6}$

23. One of the two events A and B must occur. If $P(A)=\frac{2}{3}$ P(B), the odds in favour of B are
1. 1:3 2. 2:1 3. 2:3 4. 3:2

24. A single letter is selected at random from the word PROBABILITY. The probability that it is a vowel is
1. $\frac{3}{11}$ 2. $\frac{4}{11}$ 3. $\frac{2}{11}$ 4. $\frac{1}{11}$

1998

25. If A and B are two mutually exclusive events such that $P(A)=\frac{1}{2}P(B)$ and $A \cup B = S$, the sample space, then P(A) =
1. $\frac{2}{3}$ 2. $\frac{1}{3}$ 3. $\frac{1}{4}$ 4. $\frac{3}{4}$

26. A problem in EAMCET examination is given to three students A, B and C, whose chances of solving it are $\frac{1}{2},\frac{1}{3},\frac{1}{4}$ respectively. The probability that the problem will be solved is
1. $\frac{3}{4}$ 2. $\frac{1}{24}$ 3. $\frac{1}{4}$ 4. $\frac{23}{24}$

27. Two dice are thrown at a time and the sum of the numbers on them is 6. The probability of getting the number 4 on any one of them is
1. $\frac{2}{5}$ 2. $\frac{1}{5}$ 3. $\frac{2}{3}$ 4. $\frac{1}{3}$

1997

28. The probability of choosing at random a number that is divisible by 6 or 8 from among 1 to 90 is
1. $\frac{1}{6}$ 2. $\frac{11}{90}$ 3. $\frac{1}{30}$ 4. $\frac{23}{90}$

29. If A and B are two events such that $P(A \cup B)=\frac{5}{6}$, $P(A \cap B)=\frac{1}{3}, P(A)=\frac{2}{3}$, then A and B are
1. dependent events 2. independent events
3. mutually exclusive events
4. mutually exclusive and independent events

30. Two unbiased six faced dice are thrown. The probability that the sum of the numbers on their faces is a prime number greater than 5 is

1. $\frac{1}{6}$ 2. $\frac{1}{2}$ 3. $\frac{2}{9}$ 4. $\frac{4}{9}$

1996

31. The key for a door is in a bunch of 10 keys. A man attempts to open the door by trying keys at random discording the wrong key. The probability that the door is opened in fifth trial is

1. $\frac{1}{10}$ 2. $\frac{2}{10}$ 3. $\frac{3}{10}$ 4. $\frac{4}{10}$

32. Two dice are rolled simultaneously. The probability that the sum of the two numbers on the dice is a prime number is

1. $\frac{1}{4}$ 2. $\frac{5}{36}$ 3. $\frac{5}{12}$ 4. None

33. A and B are two events such that $P(A)=0.4,$ $P(A\cup B)=0.7$. If A and B are independent then P(B) =

1. 0.3 2. 0.4 3. 0.5 4. None

1996 (RE-EXAMINATION)

34. The probability that a number selected at random from the set of numbers {1, 2, 3, 4, ... 100} is a cube is

1. $\frac{1}{25}$ 2. $\frac{2}{25}$ 3. $\frac{3}{25}$ 4. $\frac{4}{25}$

35. When two dice are thrown the probability of getting a sum of 10 or 11 is

1. $\frac{7}{36}$ 2. $\frac{5}{36}$ 3. $\frac{5}{18}$ 4. $\frac{7}{18}$

1995

36. If A and B are two events such that $P(A)=\frac{1}{4}, P(B)=\frac{1}{2}$ and $P(A\cup B)=\frac{5}{8}$ then $P(A\cap B)=$

1. $\frac{3}{8}$ 2. $\frac{1}{8}$ 3. $\frac{2}{8}$ 4. $\frac{5}{8}$

37. The probability that A can solve a problem in mathematics is $\frac{2}{3}$ and that of B can solve it is $\frac{3}{4}$. If both of them try to solve the problem independently then the probability that the problem will be solved is

1. $\frac{11}{12}$ 2. $\frac{7}{12}$ 3. $\frac{5}{12}$ 4. $\frac{9}{12}$

1994

38. The probability of getting a total of 10 in a single throw of two dice is

1. $\frac{1}{9}$ 2. $\frac{1}{12}$ 3. $\frac{1}{6}$ 4. $\frac{5}{6}$

39. If A, B, C are any three events and P(S) denotes the probability of S happening, then $P\{A\cap(B\cup C)\}=$

1. $P(A)+P(B)+P(C)-P(A\cap B)-P(A\cap C)$
2. $P(A)+P(B)+P(C)-P(B).P(C)$
3. $P(A\cap B)+P(A\cap C)-P(A\cap B\cap C)$
4. $P(B\cap C)+P(A\cap B)-P(A\cap B\cap C)$

40. In a class of 125 students, 70 passed in mathematics, 55 passed in statistics and 30 in both. The probability that a student selected at random from that class has passed in only one subject

1. $\frac{13}{25}$ 2. $\frac{3}{25}$ 3. $\frac{17}{25}$ 4. $\frac{8}{25}$

41. A problem is given to 3 students. Their chances of solving it individualy are $\frac{1}{3},\frac{1}{4}$ and $\frac{1}{5}$. The probability that the problem will be solved is

1. $\frac{2}{5}$ 2. $\frac{3}{5}$ 3. $\frac{4}{5}$ 4. None

1992

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

1. $\frac{1}{3}$ 2. $\frac{8}{13}$ 3. $\frac{5}{13}$ 4. $\frac{2}{3}$

43. Box A contains 3 red and 2 black balls. Box B contains 2 red and 3 black balls. One ball is drawn at random from box A and placed in box B. Then one ball is drawn at random from the box B and placed in A. The probability that the composition of balls in the two boxes remains unaltered is

1. $\frac{9}{30}$ 2. $\frac{4}{15}$ 3. $\frac{17}{30}$ 4. $\frac{16}{30}$

1991

44. When two dice are thrown, the probability of getting equal numbers is

1. $\frac{1}{6}$ 2. $\frac{1}{2}$ 3. $\frac{1}{4}$ 4. $\frac{1}{3}$

45. Two dice are thrown simultaneously. The probability of getting even numbers on both the dice is

1. $\frac{3}{6}$ 2. $\frac{1}{4}$ 3. $\frac{3}{36}$ 4. $\frac{1}{9}$

46. The probability of a problem being solved by students are $\frac{1}{2}$ and $\frac{1}{3}$. The probability of problem being solved is

1. $\frac{2}{3}$ 2. $\frac{4}{3}$ 3. $\frac{1}{3}$ 4. 1

47. When two balls are drawn from a bag containing 2 white, 4 red and 6 black balls, the chance for both of them to be red is

1. $\frac{5}{11}$ 2. $\frac{3}{11}$ 3. $\frac{1}{11}$ 4. None

48. A lot consists of 12 good pencils, 6 with minor defects and 2 with major defects. A pencil is drawn at random. The probability that this pencil is not defective is

1. $\frac{3}{5}$ 2. $\frac{3}{10}$ 3. $\frac{2}{5}$ 4. $\frac{1}{2}$

49. 7 coupons are numbered 1 to 7. Four are drawn one by one with replacement. The probability that the least number appearing on any selected coupon is greater than or equal to 5 is

1. $\left(\frac{3}{7}\right)^4$ 2. $\frac{6}{7^3}$ 3. $5,3,\frac{4}{7^3}$ 4. $\left(\frac{3}{4}\right)^4$

1990

50. Three mangoes and three apples are in a box. If two fruits are chosen at random, the probability that one is a mango and the other is an apple is

1. $\frac{3}{5}$ 2. $\frac{5}{6}$ 3. $\frac{1}{36}$ 4. None

51. A card is drawn out of a pack of 52 cards numbered 2 to 53. The probability that the number on the card is a prime number less than 20 is

1. $\frac{5}{13}$ 2. $\frac{3}{13}$ 3. $\frac{2}{13}$ 4. $\frac{1}{13}$

1989

52. A card is drawn at random from a pack of 100 cards numbered 1 to 100. The probability of drawing a number which is a square is

1. $\frac{1}{10}$ 2. $\frac{9}{10}$ 3. $\frac{2}{25}$ 4. $\frac{23}{25}$

53. Three balls are drawn from a collection of 7 white, 12 green and 4 red balls. The probability that each is of different colour is

1. $\frac{7\times12\times4}{^{23}c_3}$ 2. $\frac{(7+12+4)}{^{23}c_3}$

3. $\frac{(7\times12\times4)}{23^3}$ 4. None

54. At a selection, the probability of selection of A is $\frac{1}{7}$ and that of B is $\frac{1}{5}$. The probability that both of them would not be selected is

1. $\frac{1}{35}$ 2. $\frac{2}{5}$ 3. $\frac{24}{35}$ 4. None

1988

55. The probability of getting a number between 1 and 100 which is divisible by 1 and itself is

1. $\frac{1}{4}$ 2. $\frac{1}{2}$ 3. $\frac{25}{98}$ 4. None

56. If A and B are two events such that $P(A\cup B)=0.7$ and $P(A)=0.4$, the value of P(B), if A and B are mutually exclusive is

1. 0.3 2. 0.4 3. 0.5 4. None

57. If A and B are two events such that $P(A\cup B)=0.65$ and $P(A\cap B)=0.15$, then $P(\overline{A})+P(\overline{B})=$

1. 0.6 2. 0.8 3. 1.2 4. 1.4

58. The probability of solving a problem by three students A, B and C respectively are $\frac{1}{3},\frac{1}{4}$ and $\frac{1}{5}$ respectively. Then the probability that the problem will not be solved is

1. $\frac{4}{5}$ 2. $\frac{3}{5}$ 3. $\frac{2}{5}$ 4. None

1987

59. If a card is drawn from a well shuffled pack of 52 cards, then the probability that it is a spade or queen is

1. $\frac{17}{52}$ 2. $\frac{15}{52}$ 3. $\frac{4}{13}$ 4. $\frac{3}{13}$

60. If two balls are drawn from a bag containing 3 white, 4 black and 5 red balls, then the probability that the drawn balls are of different colours is

1. $\frac{60}{66}$ 2. $\frac{47}{66}$ 3. $\frac{12}{60}$ 4. None

61. The chance that a leap year selected at random will contain 53 sundays is

1. 1/7 2. 2/7 3. 3/7 4. None

1986

62. An experiment yields 3 mutually exclusive and exhaustive events A, B and C. If $P(A)=2P(B)=3P(C)$ then P(A) =

1. $\frac{1}{11}$ 2. $\frac{2}{11}$ 3. $\frac{23}{11}$ 4. $\frac{6}{11}$

1985

63. The probability that a leap year will have 53 tuesdays is

1. $\frac{1}{7}$ 2. $\frac{2}{7}$ 3. $\frac{3}{7}$ 4. None

64. The probability of drawing a card which is at least a spade or a king from a well shuffled pack of cards is

1. $\frac{1}{4}$ 2. $\frac{1}{13}$ 3. $\frac{4}{13}$ 4. None

1984

65. A bag contains 3 red, 4 white and 7 black balls. The probability of drawing a red or a black ball is

1. $\frac{2}{7}$ 2. $\frac{5}{7}$ 3. $\frac{3}{7}$ 4. $\frac{4}{7}$

66. 5 different Engineering, 4 different Mathematics and 2 different Chemistry books are placed in a shelf at random. The probability that the books of each kind are all together is

1. $\frac{\angle5\angle4\angle2}{\angle11}$ 2. $\frac{\angle3\angle5\angle4\angle2}{\angle11}$

3. $\frac{\angle5\angle6}{\angle11}$ 4. None

KEY

1.3	2.2	3.2	4.3	5. 3
6. 2	7. 2	8. 1	9. 3	10. 1
11. 4	12. 2	13. 3	14. 4	15.2
16.2	17. 4	18. 1	19. 1	20. 4
21.3	22.3	23.4	24.2	25.2
26. 1	27.1	28. 4	29. 2	30. 3
31. 1	32. 3	33. 3	34. 1	35. 2
36. 2	37. 1	38. 2	39. 3	40. 1
41. 2	42. 3	43. 3	44. 1	45. 2
46.1	47. 3	48. 1	49. 1	50. 1
51. 3	52. 1	53. 1	54. 3	55. 3
56. 1	57. 3	58. 3	59. 3	60. 2
61. 2	62. 4	63.2	64.3	65.2
66. 2				

PREVIOUS AIEEE QUESTIONS

2007

1. A pair of fair dice are thrown independently three times. The probability of getting a score of exactly twice is

1. $\frac{1}{729}$ 2. $\frac{8}{9}$ 3. $\frac{8}{729}$ 4. $\frac{8}{243}$

2. Two aeroplanes I and II bomb a target in succession .The probability of I and II scoring a hit corrctly are 0.3 and 0.2 respectively. The second plane will bomb only if the first misses the target. The probability that the target hit by the second plane is

1. 0.06 2. 0.14 3. 0.2 4.0.7

2005

3. Let A and B be two events such that $P(\overline{A \cup B}) = \frac{1}{6}$, $P(A \cap B) = \frac{1}{4}$ and $P(\overline{A}) = \frac{1}{4}$, where $\overline{A}$ stands for complement of event A. Then events A and B are

1. equally likely and mutually exclusive
2. equally likely but not independent
3. indepenent but not equally likely
4. mutually exclusive and independent

4. Three houses are available in a locality 3 persons apply for the houses. Each applies for one house without consulting others. The probability that all the three apply for the same house is

1. 2/9 2. 1/9 3. 8/9 4. 7/9

2004

5. The probability that A speaks truth is 4/5, while this probability for B is 3/4. The probability that they contradict each other when asked to speak on a fact is

1. 7/20 2. 1/5 3. 3/20 4. 4/5

2003

6. Five horses are in a race. Mr. A selects two of the horses at random and bets on them. The probability that Mr. A selected the winning horse is

1. 4/5 2. 3/5 3. 1/5 4. 2/5

7. Events A, B, C are mutually exclusive events such that P(A) = $\frac{3x+1}{3}$, $P(B) = \frac{1-x}{4}$ and P(C) = $\frac{1-2x}{4}$. The set of possible values of x are in the interval

1. $\left[\frac{1}{3}, \frac{1}{2}\right]$ 2. $\left[\frac{1}{3}, \frac{2}{3}\right]$

3. $\left[\frac{1}{3}, \frac{13}{3}\right]$ 4. [0, 1]

2002

8. A problem in mathematics is given to three students A, B, C and their respective probabilities of solving the problem are $\frac{1}{2}, \frac{1}{3}, \frac{1}{4}$. Probability that the problem is solved is

1. 1/2 2. 1/3 3. 2/3 4. 3/4

9. A and B play a game where each is asked to select a number from 1 to 25. If the two numbers match, both of them win a prize. The probability that they will not win a prize in a single trial is

1. 1/25 2. 2/25 3. 24/25 4. 23/25

10. If A and B are two mutually exclusive events, then

1. $P(A) > P(\overline{B})$ 2. $P(A) < P(\overline{B})$

3. P(A) < P(B) 4. none

11. The probability of India winning a test match against West Indies is 1/2. Assuming independence from match to match the probability that in a three match series India's second win occurs at the third test is

1. 2/3 2. 1/2 3. 1/4 4. 1/8

12.. A biased coin with probability p(0 < p < 1) of getting a head is tossed until a head apears for the first time. If 2/5 is the probability that the no. of tosses required is even, then p =

1. 2/5 2. 3/5 3. 1/3 4. 2/3

13. A fair die is tossed 8 times. The probability that a third six is observed on the eighth throw is

1. $\frac{{}^7C_2 \text{ x } 5^5}{6^6}$ 2. $\frac{{}^7C_2 \text{ x } 5^5}{6^7}$

3. $\frac{{}^7C_2 \text{ x } 5^5}{6^8}$ 4. None

KEY

1.4	2.2	3. 3	4. 2	5. 1
6. 4	7. 1	8. 4	9. 3	10. 4
11. 3	12. 3	13. 3		

DISCRETE RANDOM VARIABLE

- **SAMPLE SPACE (S):** The set of all possible elementary events in a random trial or experiment is called sample space for that trial and it is denoted by S.
- **DISCRETE SAMPLE SPACE:** A sample space S is called discrete if it is countable or having finite number of sample points. For example:
  - In rolling of a die S = {1, 2, 3, 4, 5, 6} and it is a discrete sample space.
  - In tossing of a coin S = {H, T} and it is a discrete sample space.
- **CONTINUOUS SAMPLE SPACE:** If the number of sample points in a sample space is not countable then it is called as continuous sample space. For example:
  S = {all possible real values in the interval 1 to 2}
- **RANDOM VARIABLE:** Let S be a sample space associated with a random experiment. Then a real valued function $X : S \to R$ is called a random function or random variable.
- **DISCRETE RANDOM VARIABLE:** A real valued function defined on discrete sample space S is called a discrete random variable.

- **CONTINUOUS RANDOM VARIABLE:** A random variable X defined on continuous sample space S, which can take all real values in an interval (a, b) is called a continuous random variable.
- **DISCRETE RANDOM VARIABLE:** If a discrete variable X can assume values $X_1, X_2, X_3, ...X_n$ with respective probabilities $P(X_1),\ P(X_2),\ P(X_3)$ ..... $P(X_n)$ such that $P(X_i) \geq 0, \forall i$ and $\Sigma P(X_i) = 1$, then X is said to be a discrete random variable.
- **PROBABILITY MASS FUNCTION:** If X is a discrete random variable which can assume values X_i; $i = 1,2,3,.....$ with respective probabilities P_i; $i = 1,2,3.....$ such that $\sum_{\in^0 =1}^{\infty} P_i = 1,$ then $P(X = x_i) = P_i;\ i = 1,2,3,.....$ is called probability mass function of a discrete random variable X.**OR** If any function P(X=x) gives the probabilities of various values of a discrete random variable X in its range, then that function is called probability mass function.
- **PROBABILITY DISTRIBUTION:** The set of ordered pairs $\{x_i, P(x_i)\}$ is called the probability distribution of a discrete random variable X.
- **MEAN & VARIANCE:** If $\{x_i, P(x_i)\}$ is the probability distribution of a discrete random variable X, then its:
  - Mean or Average $(\bar{x}\ or\ \mu)$: Expected value of x or mathematical expectation of x:E(x) or First moment about origin: $\mu_1'(0)$ is defined as $\bar{x} = \mu = \mu_1'(0) = \Sigma x_i P(x_i)$.
  - 2nd moment about origin = $\mu_2'(0)$ is defined as $\mu_2'(0) = E(x^2) = \Sigma x_i^2 P(x_i)$.
  - Variance σ^2 or second moment about mean or 2nd central moment = μ_2.

$$\sigma^2 = \mu_2 = E\{x - E(x)\}^2$$
$$= E(x^2) - \{E(x)\}^2$$
$$= \mu_2^1(0) - \mu_1^1(0)^2$$
$$\Sigma^1 xi^2 P(x_i) - \{\Sigma xi P(xi)\}^2$$

- **CUMULATIVE DISTRIBUTION FUNCTION (CDF) (OR) DISTRIBUTION FUNCTION (DF):** If x is a discrete random variable, then the probability that x takes values less than or equal to a particular value x_k (in its range) is called CDF or simply DF and it is denoted by F(x). Symbolically

$$F(x) = P(x \leq x_k) = \sum_{i=1}^{k} P(x = xi)$$

PROPERTIES OF CDF: If the range of the random variable x is from $-\alpha$ to $+\alpha$, then:
- $F(-\alpha) = 0$ i.e., $\lim_{x\to-\infty} F(x) = 0$
- $F(+\alpha) = 1$ i.e., $\lim_{x\to\infty} F(x) = 1$
- The limits of F(x) are [0, 1] i.e., $0 \leq F(x) \leq 1$
- F(x) is a non-decreasing function. i.e., for every a, b(a < b). $F(a) \leq F(b)$ and further $P(c < x \leq d) = F(d) - F(c)$
- F(x) is right continuous at every point.

- If the mean of the random variable x is $\bar{x}$, then the mean of the random variable $ax \pm b$, where a and b are constants is $a\bar{x} \pm b$.
- If the variance of the random variable x is σ^2, then the variance of the random variable $ax \pm b$, when a and b are constants is $a^2 \times \sigma^2$.
- The positive square root of variance σ^2 is called the standard deviation σ.

LEVEL-1

1. Expected number of heads when we toss n unbiased coins is
   1. 2n 2. n 3. $\frac{n}{2}$ 4. $\frac{n}{4}$
2. The mean or average number of heads when we toss 10 unbiased coins is
   1. 20 2. 10 3. 5 4. 15
3. The mathematical expectation of sum of points when we throw n symmetrical dice is
   1. 7n 2. $7\times\frac{n}{2}$ 3. $\frac{n}{2}$ 4. $\frac{7n}{3}$
4. The mathematical expectation of sum of points when 2 symmetrical dice are rolled is
   1. 14 2. 7 3. $\frac{7}{2}$ 4. $\frac{14}{3}$
5. The mean or average number of points when we throw a symmetrical die is
   1. 14 2. 7 3. $\frac{7}{2}$ 4. $\frac{14}{3}$
6. A coin is tossed successively until for the 1st time head occurs. The expected number of tosses required is
   1. 4 2. 2 3. 1 4. 5
7. A random variable x has the following probability distribution $\begin{matrix} X = x: & 1 & 2 & 3 & 4 \\ P(X = x) & k & 2k & 3k & 4k \end{matrix}$, then the value of K is
   1. 10 2. $\frac{1}{10}$ 3. $\frac{1}{5}$ 4. $\frac{1}{15}$
8. A random variable X has the following probability distribution $\begin{matrix} X = x: & 1 & 2 & 3 & 4 \\ P(X = x) & k & 2k & 3k & 4k \end{matrix}$, then the mean value of x is
   1. 1 2. 2 3. 3 4. 4

9. If the probability distribution of a random variable X

$$X = x_i: \quad 0 \quad 1 \quad 2 \quad 3$$

is $P(X = x_i) \quad \frac{1}{3} \quad \frac{1}{2} \quad 0 \quad \frac{1}{6}$, then the mean value of x is

1. 1 2. 2 3. 1.5 4. 2.5

10. If x is a random variable with the following probability distribution $\begin{matrix} X=x: & -3 & 6 & 9 \\ P(X=xi): & \frac{1}{6} & \frac{1}{2} & \frac{1}{3} \end{matrix}$, then E(x) =

1. 11 2. $\frac{11}{2}$ 3. $\frac{11}{3}$ 4. $\frac{11}{4}$

11. If x is a random variable with the following probability distribution $\begin{matrix} X=x: & -3 & 6 & 9 \\ P(X=x): & \frac{1}{6} & \frac{1}{2} & \frac{1}{3} \end{matrix}$, then the variance of x, V(x)=

1. 65 2. $\frac{65}{2}$ 3. $\frac{65}{3}$ 4. $\frac{65}{4}$

12. If a random variable x has the following probability distribution $\begin{matrix} X=x_i & :0 & 1 & 2 & 3 \\ P(X=x_i) & :2K^2 & 3K^2 & 5K^2 & 6K^2 \end{matrix}$, then the value of K is

1. $\frac{1}{4}$ 2. $\frac{-1}{4}$ 3. $\pm\frac{1}{4}$ 4. $\frac{1}{2}$

13. If a random variable x has the following probability distribution $\begin{matrix} X=xi: & 0 & 1 & 2 & 3 \\ P(X=xi): & 2K^2 & 3K^2 & 5K^2 & 6K^2 \end{matrix}$, then the mean value of x is

1. $\frac{33}{16}$ 2. $\frac{31}{16}$ 3. $\frac{35}{16}$ 4. $\frac{29}{16}$

14. If the probability distribution of a random variable x is $\begin{matrix} X=xi: & -2 & -1 & 0 & 1 & 2 & 3 \\ P(X=xi): & 0.1 & K & 0.2 & 2K & 0.3 & K \end{matrix}$, then the value of K is

1. 0.3 2. 0.2 3. 0.1 4. 0.4

15. If the probability distribution of a random variable x is $\begin{matrix} X=xi: & -2 & -1 & 0 & 1 & 2 & 3 \\ P(X=xi): & 0.1 & K & 0.2 & 2K & 0.3 & K \end{matrix}$, then the mean value of x is

1. 0.6 2. 0.8 3. 1.0 4. 0.3

16. If the probability distribution of a random variable x is $\begin{matrix} X=xi: & -2 & -1 & 0 & 1 & 2 & 3 \\ P(X=xi): & 0.1 & K & 0.2 & 2K & 0.3 & K \end{matrix}$, then second moment about 0 i.e., $M_2^1(0) =$

1. 2.16 2. 2.8 3. $\sqrt{2.16}$ 4. $\sqrt{2.8}$

17. If the probability distribution of a random variable x is $\begin{matrix} X=xi: & -2 & -1 & 0 & 1 & 2 & 3 \\ P(X=xi): & 0.1 & K & 0.2 & 2K & 0.3 & K \end{matrix}$, then the variance of x is

1. 2.16 2. 2.8 3. $\sqrt{2.16}$ 4. $\sqrt{2.8}$

18. If the probability distribution of a random variable x is $\begin{matrix} X=xi: & -2 & -1 & 0 & 1 & 2 & 3 \\ P(X=xi): & 0.1 & K & 0.2 & 2K & 0.3 & K \end{matrix}$, then the standard deviation of x is

1. 2.16 2. 2.8 3. $\sqrt{2.16}$ 4. $\sqrt{2.8}$

19. The value of K, if the probability distribution of a discrete random variable x is $\begin{matrix} X=x: & 1 & 2 & 3 \\ P(X=x): & \frac{1}{K^2} & \frac{2}{K^2} & \frac{3}{K^2} \end{matrix}$

1. $\sqrt{6}$ 2. $-\sqrt{6}$ 3. $\pm\sqrt{6}$ 4. 6

20. If a random variable X takes value 0 and 1 with respective probabilities $\frac{2}{3}$ and $\frac{1}{3}$ then the expected value of X is

1. $\frac{2}{3}$ 2. $\frac{1}{3}$ 3. 0 4. 1

21. The variance of the random variable x whose probability distribution is given by $\begin{matrix} X=x: & -1 & 0 & +1 \\ P(X=x): & 0.4 & 0.2 & 0.4 \end{matrix}$, is

1. 0.4 2. 0.6 3. 0.8 4. 1.0

22. The variance of the random variable x whose probability distribution is given by $\begin{matrix} X=x: & 0 & 1 & 2 & 3 \\ P(X=x): & \frac{1}{3} & \frac{1}{2} & 0 & \frac{1}{6} \end{matrix}$, is

1. 0.5 2. 1 3. 1.5 4. 2.0

23. The value of K, if the probability distribution of a random variable X is $\begin{matrix} X=x: & 1 & 2 & 3 \\ P(X=x): & \frac{1}{K} & \frac{2}{K} & \frac{3}{K} \end{matrix}$

1. $\frac{1}{6}$ 2. 6 3. $\sqrt{6}$ 4. $\frac{1}{\sqrt{6}}$

24. A random variable X has the following probability distribution $\begin{matrix} X=x: & 1 & 2 & 3 & 4 \\ P(X=x): & 0.4 & 0.3 & 0.2 & 0.1 \end{matrix}$, then its mean is

1. 4 2. 3 3. 2 4. 1

25. A random variable X has the following probability distribution $\begin{matrix} X=x: & 1 & 2 & 3 & 4 \\ P(X=x): & 0.1 & 0.2 & 0.3 & 0.4 \end{matrix}$, then the mean value of X is

1. 1 2. 2 3. 3 4. 4

26. A random variable X has its range {1, 2, 3} with respective probabilities P(X=1)=K, P(X=2)=2K,

P(X=3)=3K, then the value of K is

1. $\frac{1}{4}$ 2. $\frac{1}{5}$ 3. $\frac{1}{6}$ 4. $\frac{1}{8}$

27. A random variable X has its range X = {3, 2, 1} with the probabilities $\frac{1}{2}, \frac{1}{3}$ and $\frac{1}{6}$ respectively. The mean value of X is

1. $\frac{5}{3}$ 2. $\frac{7}{3}$ 3. 3 4. 4

28. A random variable X has the following probability distribution

$X = xi$:	0	1	2	3
$P(X = xi)$:	$\frac{2}{6}$	$\frac{3}{6}$	$\frac{0}{6}$	$\frac{1}{6}$

then the mean and variance of X are

1. 1, 1 2. 1, 2 3. 2, 1 4. 2, 2

29. A random variable X has its range X = {0, 1, 2} and the probabilities are given by $P(X=0)=3K^2$, $P(X=1)=4K-10K^2, P(X=2)=5K-1$ where K is a constant, then the value of K is

1. 1 2. 2 3. $\frac{1}{7}$ 4. $\frac{2}{7}$

30. A random variable X has its range X = {0, 1, 2} and the probabilities are given by $P(x=0)=3K^2$, $P(X=1)=4K-10K^2, P(X=2)=5K-1$ where K is a constant, $P(0<X<3)$ is

1. $\frac{3}{49}$ 2. $\frac{27}{49}$ 3. $\frac{37}{49}$ 4. $\frac{47}{49}$

31. The range of a random variable X is 1, 2, 3, 4 .... and the probabilities are given by $P(X=k)=\frac{C^k}{\angle k}$; $k=1,2,3,4.....$, then the value of C is

1. 2 2. $\log_2 e$ 3. $\log_e 2$ 4. 4

32. If $P(X=x)=C\left(\frac{2}{3}\right)^x; x=1,2,3,4,.....$ is a probability mass function, the value of C is

1. $\frac{1}{4}$ 2. $\frac{1}{3}$ 3. $\frac{1}{2}$ 4. $\frac{1}{6}$

33. The value of C for which $P(X=K)=CK^2$ can be the probability mass function of a random variable X that takes value 0, 1, 2, 3, 4 is

1. $\frac{1}{30}$ 2. $\frac{1}{10}$ 3. $\frac{1}{3}$ 4. $\frac{1}{15}$

34. Let the discrete random variable X = x has the probabilities given by $\frac{x}{6}$ for x=0, 1, 2, 3, then its mean is

1. $\frac{1}{3}$ 2. $\frac{5}{3}$ 3. $\frac{7}{3}$ 4. $\frac{9}{3}$

35. A random variable x takes values 0, 1, 2, its mean is 1.2. If P(X=0)=0.3, then P(X=1)=

1. 0.2 2. 0.3 3. 0.5 4. 0.4

36. A random variable X takes values -1, 0, +1. Its mean is 0.6 and if P(X=0)=0.2, then P(X=1)=

1. 0.7 2. 0.5 3. 0.1 4. 0.2

37. A random variable X takes value 0, 1, 2. Its mean is 1.3. If P(X=0)=0.2, then P(X=2)=

1. 0.3 2. 0.4 3. 0.5 4. 0.2

38. In a business venture a man can make a profit of Rs. 2000/- with probability of 0.4 or have a loss of Rs. 1000/- with probability 0.6. His expected profit is

1. Rs. 800/- 2. Rs. 600/-
3. Rs. 200/- 4. Rs. 400/-

39. The probability that the value of certain stock will remain the same is 0.46. The probability that its value will increase by Rs. 0.50 or Rs. 1/- per share are respectively 0.17 and 0.23 and the probability that its value will decrease by Rs. 0.25 per share is 0.14. The expected gain per share is

1. Rs. 0.75 2. Rs. 0.25
3. Rs. 0.28 4. Rs. 0.50

40. If a random variable X takes values $(-1)^k 2^k / K$; $k=1,2,3,....$ with probabilities $P(X=k)=\frac{1}{2^k}$, then E(X) =

1. $\log_e 2$ 2. $\log_2 e$ 3. $\log_e\left(\frac{1}{2}\right)$ 4. $\log_e\left(\frac{1}{4}\right)$

41. If it rains a dealer in rain coats can earn Rs. 500/- a day. If it is fair he will lose Rs. 40/- a day. His mean profit if the probability of a fair day is 0.6 is

1. Rs. 230/- 2. Rs. 460/- 3. Rs. 176/- 4. Rs. 88/-

42. A box contains 6 tickets. Two of the tickets carry a prize of Rs. 5/- each, the other four a prize of Rs.1/-. If one ticket is drawn. The mean value of prize is

1. Rs. 2.5 2. Rs. $\frac{7}{3}$ 3. Rs. $\frac{5}{3}$ 4. Rs. $\frac{4}{3}$

43. Two unbiased coins whose faces are marked 1 and 2 are tossed. The mean value of the total of the numbers is

1. 3 2. 4 3. 5 4. 2

44. Three coins whose faces are marked 1 and 2 are tossed. The expected sum of numbers on their faces is

1. 4 2. 4.5 3. 5 4. 6

45. The probability that there would be 1, 2 or 3 persons riding a bicycle are 0.85, 0.12 and 0.03 respectively. The expected number of persons per bicycle is

1. 2 2. 1 3. 1.18 4. 3

46. A tosses an unbiased coin 3 times. If he gets a head all the 3 times he is to get a prize of $Rs.160/-$ along with his entry fee of Rs. 16/-, otherwise he loses his entry fee. The mathematical expectation of his profit is

1. 20 2. 14 3. 6 4. 12

47. A lottery sells 10,000 tickets at Rs. 1/- per ticket. A prize of Rs. 5000/- will be given to a winner of the draw. Suppose you have bought one ticket, how much should you expect to win

1. Rs. 1/- 2. Rs. $\frac{1}{2}$ 3. Rs. $-\frac{1}{2}$ 4. Rs. 2/-

48. An urn A contains 4 white and 6 red balls. Three balls are drawn at random the expected number of white balls drawn is
1. 3.0 2. 1.8 3. 1.2 4. 1.6

49. An urn A contains 4 white and 6 red balls. Three balls are drawn at random the expected number of red balls drawn is
1. 3.0 2. 1.8 3. 1.2 4. 1.6

50. 4 bad apples accidentally got mixed up with 20 good apples. In a draw of 2 apples at random, expected number of bad apples is
1. 1 2. $\frac{2}{3}$ 3. $\frac{1}{3}$ 4. $\frac{1}{6}$

51. Two cards are drawn simultaneously from a well shuffled pack of 52 cards. The expected number of aces is
1. $\frac{4}{13}$ 2. $\frac{3}{13}$ 3. $\frac{2}{13}$ 4. $\frac{1}{13}$

52. From a lot of 10 items containing 3 defectives, a sample of 4 items is drawn at random without replacement. The expected number of defective items is
1. 3 2. 1.8 3. 1.2 4. 2.8

53. From a lot of 10 items containing 3 defectives, a sample of 4 items is drawn at random without replacement. The expected number of good items is
1. 3 2. 2.8 3. 1.2 4. 1.8

54. Two cards are drawn one after another with replacement from a well shuffled pack of 52 cards. The expected number of aces is
1. $\frac{4}{13}$ 2. $\frac{3}{13}$ 3. $\frac{2}{13}$ 4. $\frac{1}{13}$

55. Two cards are drawn one after another without replacement from a well shuffled pack of 52 cards. The expected number of aces is
1. $\frac{4}{13}$ 2. $\frac{3}{13}$ 3. $\frac{2}{13}$ 4. $\frac{1}{13}$

56. The cumulative distribution function of a random variable x is defined as
1. $P(X > x_k)$ 2. $P(X \geq x_k)$
3. $P(X \leq x_k)$ 4. $P(X < x_k)$

57. If F(x) is the cumulative distributive function of a random variable x whose range is from $-\alpha -$ to $+\alpha$, then $P(X < -\alpha) =$
1. 1 2. $\frac{1}{2}$ 3. 0 4. $\frac{1}{3}$

58. If the range of the random variable X is from $-\alpha$ to $+\alpha$, the limits of F(X) are
1. 0 to α 2. $-\alpha$ to 0 3. -1 to +1 4. 0 to 1

59. If the range of the random variable X is from a to b, a<b, F(X<a)=
1. 0 2. 1 3. 0.5 4. 3

60. If the range of the random variable X is from a to b then $F(X \leq b)$ is
1. 0 2. 1 3. 0.5 4. 2

61. If the variance of the random variable X is 5, then the variance of the random variable -3X is
1. 15 2. 45 3. -45 4. 60

62. If the variance of a random variable X is σ^2, then the variance of the random variable X-5 is
1. $5\sigma^2$ 2. $25\sigma^2$ 3. σ^2 4. $2\sigma^2$

63. If the variance of the random variable X is 4, then the variance of the random variable 5X+10 is
1. 100 2. 10 3. 50 4. 25

64. If the variance of the random variable X is 9, the S.D. of the random variable -4X+8 is
1. 144 2. 27 3. 12 4. 16

KEY

1. 3	2. 3	3. 2	4. 2	5. 3
6. 2	7. 2	8. 3	9. 1	10. 2
11. 4	12. 3	13. 2	14. 3	15. 2
16. 2	17. 1	18. 3	19. 3	20. 2
21. 3	22. 2	23. 2	24. 3	25. 3
26. 3	27. 2	28. 1	29. 4	30. 3
31. 3	32. 3	33. 1	34. 3	35. 1
36. 1	37. 3	38. 3	39. 3	40. 3
41. 3	42. 2	43. 1	44. 2	45. 3
46. 3	47. 2	48. 3	49. 2	50. 3
51. 3	52. 3	53. 2	54. 3	55. 3
56. 3	57. 3	58. 4	59. 1	60. 2
61. 2	62. 3	63. 1	64. 3	

HINTS

2. $\mu = \frac{10}{2} = 5$

4. $E(X) = \frac{7}{2} \times 2 = 7$

6. The expected number of tosses required $= \frac{1}{p} = \frac{1}{\frac{1}{2}} = 2$
(where 'p' denotes the probability of getting a head).

7. $\Sigma P(X = x_i) = 1 \Rightarrow 10k = 1$

11. $V(x) = \left(9.\frac{1}{6} + 36.\frac{1}{2} + 81.\frac{1}{3}\right) - \left(\frac{11}{2}\right)^2 = \frac{65}{4}$

12. $16K^2 = 1 \Rightarrow k = \pm\frac{1}{4}$

22. $\sigma^2(x) = \left(0^2.\frac{1}{3} + 1^2.\frac{1}{2} + 2^2.0 + 3^2.\frac{1}{6}\right) - \left(0.\frac{1}{3} + 1.\frac{1}{2} + 2.0 + 3.\frac{1}{6}\right)^2 = 1$

38. The profit is the random variable 'x'

$X = x_i$	2000	-1000
$P(X = x_i)$	0.4	0.6

Mean profit = E(x) = 200

39.

$X = x_i$	0	$\frac{1}{2}$	1	$-\frac{1}{4}$
$P(X = x_i)$	0.46	0.17	0.23	0.14

The given price per share is random variable X.

$E(X) = 0 + \frac{0.17}{2} + 0.23 - \frac{0.14}{4} = Rs.0.28$

51. Expected number of aces $= 2 \times \frac{4}{52} = \frac{2}{13}$

61. If $V(X) = \sigma^2$ then variance of $aX \pm b$ i.e., $V(aX \pm b) = a^2 \times \sigma^2$

LEVEL-2

1. A random variable X has its range X = {0, 1, 2} with respective probabilities $P(X=0) = 3K^3$, $P(X=1) = 4K - 10K^2$, $P(X=2) = 5K - 1$, then the value of K is

1. 2 2. 1 3. $\frac{1}{3}$ 4. $2, 1, \frac{1}{3}$

2. The range of a random variable X is {1, 2, 3, 4, ...} and the probabilities are $P(X = K) = \frac{3^{CK}}{\angle K}$; $K = 1, 2, 3, 4, ...$, then the value of C is

1. $\log_e 3$ 2. $\log_e 2$
3. $\log_3(\log_e 2)$ 4. $\log_2(\log_e 3)$

3. A player tosses two fair coins. He wins Rs. 5/- if two heads occur, Rs. 2/- if one head occurs and Rs. 1/- if no head occurs. Then his expected gain is

1. Rs. $\frac{8}{3}$ 2. $\frac{7}{3}$ 3. Rs. 2.5 4. Rs. 1.5

4. A player tosses two fair coins. He wins Rs. 5/- if two heads occur, Rs. 2/- if one head occurs and Rs. 1/- if no head occurs. Then how much should he pay to play the game if it is to be fair

1. Rs. $\frac{8}{3}$ 2. $\frac{7}{3}$ 3. Rs. 2.5 4. Rs. 1.5

5. You have been offered the chance to play a dice game in which you will receive Rs. 20/- each time if the total of the points on the two dice is 6 if it costs you Rs. 2.50 per toss to participate should you play or not say yes or no

1. Yes 2. No

6. You have been offered the chance to play a dice game in which you will receive Rs. 20/- each time if the total of the points on the two dice is 6 what will be your decision if it costs Rs. 3/- per toss instead of Rs. 2.50/-

1. Yes 2. No

7. A discrete random variable X, can take all possible integer values from 1 to K, each with a probability $\frac{1}{K}$. Its mean is

1. K 2. K+1 3. $\frac{K+1}{2}$ 4. $\frac{K+1}{4}$

8. A discrete random variable X, can take all possible integer values from 1 to K, each with a probability $\frac{1}{K}$. Its variance is

1. $\frac{K^2}{4}$ 2. $\frac{(K+1)^2}{4}$ 3. $\frac{K^2-1}{12}$ 4. $\frac{K^2-1}{6}$

9. Let X be the random variable with the probability distribution function $f(X) = \frac{e^{-4}.4^x}{x!}; x = 0, 1, 2, 3, ...$ then the standard deviation of X is

1. 2 2. 4 3. 16 4. $\sqrt{2}$

10. A random variable X takes the values -2, -1, 1 and 2 with probabilities $\frac{1-a}{4}, \frac{1+2a}{4}, \frac{1-2a}{4}$ and $\frac{1+a}{4}$ respectively then

1. a can have any real value
2. $-\frac{1}{2} \le a \le \frac{1}{2}$ 3. $-1 \le a \le 1$
4. $\frac{1}{4} \le a \le \frac{1}{3}$

KEY

1. 3	2. 3	3. 3	4. 3	5. 1
6. 2	7. 3	8. 3	9. 1	10. 2

HINTS

1. $\Sigma P(X = x_i) = 1 \Rightarrow 1, 2, \frac{1}{3}$ when k=1, 2 probabilities violate the limits. Hence $k = \frac{1}{3}$

9. Given distribution is a P.D. with parameter $4 = \lambda$, $\therefore S.D = \sqrt{\lambda} = 2$

10. If E is any event $0 \le P(E) \le 1$

LEVEL - 4

1. The probability distribution of a random variable X is given below

$(X = x)$:	1	2	3	4	5
$p(X = x)$:	K	2K	3K	4K	5K

$A: p(2 \le x < 4)$ $B: p(x \ge 4)$
$C: p(x \le 3)$ $D: p(3 \le x \le 5)$

Arrange A, B, C, D in ascending order of magnitude

1. A, C, D, B 2. A, B, C, D
3. A, C, B, D 4. B, A, C, D

2. The range of a random variable X is $\{0, 1, 2\}$ and $P(X=0) = 3K^3, P(X=1) = 4K - 10K^2$, $P(x=2) = 5K - 1$. Then we have

1. $P(X=0) < P(X=2) < P(X=1)$
2. $P(X=0) < P(X=1) < P(X=2)$
3. $P(X=1) + P(X=0) = P(X=2)$
4. $P(X=1) > P(X=0) + P(X=2)$

3. A random variable X has the probability distribution

X : 1 2 3 4 5 6 7 8

$P(X)$ 0.15 0.23 0.12 0.10 0.20 0.08 0.07 0.05

Events E= {X is a prime number} and F= {X / X < 4}

I : $P\left(\overline{E \cup F}\right) = 0.23$

II : $P\left(\overline{E} \cup \overline{F}\right) = 0.65$

Which of I, II is (are) true

1. I only 2. II only
3. both I and II 4. neither I nor II

KEY

1. 3 2. 2 3. 3

PREVIOUS EAMCET QUESTIONS

2005

1. If the range of a random variable X is {0, 1, 2, 3, ...} with $P(X=k) = \frac{(k+1)a}{3^k}$ for $k \geq 0$, then a =

1. 2/3 2. 4/9 3. 8/27 4. 16/81

2004

2. A person who tosses an unbiased coin gains two points for turning up a head and loses one point for a tail. If three coins are tossed and the total score X is observed, then the range of X is

1. $\{0,3,6\}$ 2. $\{-3,0,3\}$
3. $\{-3,0,3,6\}$ 4. $\{-3,3,6\}$

2003

3. A random variable X takes the values 0, 1, 2, 3 and its mean is 1.3. If $P(X=3) = 2P(X=1)$ and $P(X=2) = 0.3,$ then $P(X=0) =$

1. 0.1 2. 0.2 3. 0.3 4. 0.4

2002

4. A random variable X takes the values 0, 1 and 2. If P(X=1)=P(X=2) and P(X=0)=0.4, then the mean value of the random variable X is

1. 0.2 2. 0.5 3. 0.7 4. 0.9

2001

5. The probability distribution of a random variable X is given below. Its mean is

$X = xi:$	1	2	3
$P(X = xi):$	$\frac{1}{4}$	$\frac{1}{8}$	$\frac{5}{8}$

1. $\frac{19}{8}$ 2. $\frac{5}{18}$ 3. 1 4. $\frac{4}{5}$

2000

6. The probability distribution of a random variable X is given below, then K =

$X = xi:$	1	2	3	4
$P(X = xi):$	$2K$	$4K$	$3K$	K

1. $\frac{1}{4}$ 2. $\frac{1}{5}$ 3. $\frac{1}{10}$ 4. $\frac{1}{15}$

1999

7. A random variable X has the following probability distribution, then C =

$X = x:$	1	2	3	4
$P(X = x):$	C	$2C$	$3C$	$4C$

1. 0.1 2. 0.2 3. 10 4. 20

1998

8. A random variable X follows the following distribution

$X = xi:$	1	2	3	4
$P(X = xi):$	$\frac{2}{6}$	$\frac{3}{6}$	$\frac{0}{6}$	$\frac{1}{6}$

, then the mean and variance are

1. 1, 1 2. 1, 2 3. 2, 1 4. 2, 2

9. A random variable X has the following distribution

$X = xi:$	1	2	3	4
$P(X = xi):$	K	$2K$	$3K$	$4K$

The value of K and P(X<3) are equal to

1. $\frac{1}{10}, \frac{3}{5}$ 2. $\frac{1}{10}, \frac{3}{10}$ 3. $\frac{3}{10}, \frac{1}{10}$ 4. $\frac{1}{24}, \frac{5}{12}$

1997

10. A random variable X takes the values -1, 0, +1. Its mean is 0.6. If P(X=0)=0.2, then find P(X=1) and P(X=-1)

1. 0.2, 0.8 2. 0.3, 0.7 3. 0.7, 0.1 4. 0.4, 0.2

1995

11. If X is a random variable with the following probability distribution given below

$X = x:$	0	1	2	3
$P(X = x):$	K	$3K$	$3K$	K

the value of K and its variance are

1. $\frac{1}{8}, \frac{22}{27}$ 2. $\frac{1}{8}, \frac{23}{27}$ 3. $\frac{1}{8}, \frac{24}{27}$ 4. $\frac{1}{8}, \frac{27}{36}$

1994

12. The value of C for which $P(X = k) = CK^2$ can serve the probability function of a random variable X that takes values 0, 1, 2, 3, 4 is

1. $\frac{1}{30}$ 2. $\frac{1}{10}$ 3. $\frac{1}{3}$ 4. $\frac{1}{15}$

1992

13. A random variable X takes values -1, 0, +1. Its mean is 0.6. If P(X=0)=0.2 then P(X=1)=

1. 0.1 2. 0.3 3. 0.7 4. 0.6

KEY

1. 2 2. 3 3. 4 4. 4 5. 1
6. 3 7. 1 8. 3 9. 2 10. 3
11. 4 12. 1 13. 3

AIEEE - 2005

1. A random variable X has the probability distribution

X :	1	2	3	4	5	6	7	8
p(x)	0.15	0.23	0.12	0.10	0.20	0.08	0.07	0.05

for the events E = {X is a prime number} and F = {X < 4}, the probability $P(E \cup F)$ is

1. 0.35 2. 0.77 3. 0.87 4. 0.50

KEY

1. 2

BINOMIAL DISTRIBUTION

BERNOULLIAN TRIALS OR BERNOULLI TRIALS: Random trials which result either in the success or failure of an event A, with constant probability of success p and that of failure 1-p=q are called as bernoullian trials. For example:

- In tossing of an unbiased coin, if we consider getting head upwards as a success then the probability of success $p=\frac{1}{2}$. The probability of failure $q=1-\frac{1}{2}=\frac{1}{2}$ and it is true for every trial.
- In rolling of a symmetrical die, if we consider getting a face with 6 points upward as a success then $p=\frac{1}{6}$ and $q=1-\frac{1}{6}=\frac{5}{6}$ and it is also true for every trial.

BINOMIAL DISTRIBUTION

The probability of x successes in n independent bernoullian trials is given by $p(X=x)={}^nc_x p^x q^{n-x}$; $x=0,1,2,3,.....n$; $p\ge 0, q\ge 0$ and $p+q=1$ and it is called as B.D.

Here n & p are called as the parameters of B.D.

- A discrete random variable x is said to follow B.D. with parameters n, p, if its probability mass function is given by $p(X=x)={}^nc_x p^x q^{n-x}$; $x=0,1,2,3,.....n$; $p\ge 0, q\ge 0$ and $p+q=1$. By substituting x=0,1,2,......r......n in $p(X=x)={}^nc_x p^x q^{n-x}$; we can respectively obtain the probabilities of 0,1,2,3,.....r.....n successes. They are:

$$P(X=0)={}^nc_0 p^0 q^{n-0}$$
$$P(X=1)={}^nc_1 p^1 q^{n-1}$$
$$P(X=2)={}^nc_2 p^2 q^{n-2}$$
$$-----------$$
$$-----------$$
$$P(X=r)={}^nc_r p^r q^{n-r}$$
$$-----------$$
$$-----------$$
$$P(X=n)={}^nc_n p^n q^{n-n}$$

- The above probabilities are various terms of the binomial expansion $(q+p)^n={}^nc_0 q^n p^0+{}^nc_1 q^{n-1}p^1+{}^nc_2 q^{n-2}p^2+.....+{}^nc_r q^{n-r}p^r+.......+......+{}^nc_n q^{n-n}p^n$ and hence the name.
- The originator of B.D. was James Bernoulli (1654-1705) and so it is also some times called as Bernoulli distribution.

THE CHARACTERISTICS OF B.D.:

- The mean of random binomial variate X is np.

  i.e., $\bar{x}=np \ or \ np=\bar{x}$. $\therefore n=\frac{\bar{x}}{p}, p=\frac{\bar{x}}{n}$
- The variance of r.b.v. x is npq.

  i.e., $\sigma^2=npq$

  Now $q=\frac{\sigma^2}{\bar{x}}\left(\frac{npq}{np}\right)$
- The S.D. of r.b.v. x is $\sqrt{npq}$

  i.e., $\sigma=\sqrt{npq}$
- In binomial distribution $\bar{x}>\sigma^2 \ or \ \sigma^2<\bar{x}$

  i.e., $np>npq \ or \ npq<np$
- If $p=q=\frac{1}{2}$, then the distribution is said to be a symmetrical binomial distribution. The mode is that value of variable with maximum probability.
- The mode of B.D. depends on the value of np+p.

  CASE-1: If np+p=k, where k is an integer, then there will be two modes namely k & k-1. In this case the distribution is said to be a Bi-modal binomial distribution.

  CASE-2: If np+p=k+f, where k is an integer and f is a proper fraction then there will be only one mode namely k. i.e., the integral part of np+p will be the mode. In this case the distribution is said to be uni-modal binomial distribution.
- If we consider n independent bernoullian trials as one experiment and if we repeat such an experiment N times, then the expected frequency or the theoretical frequency of x successes is given by

$$f(X=x) = N\times p(X=x)$$
$$= N\times {}^nc_x p^x q^{n-x}, x=0,1,2,3,....n$$

and this is called as Binomial frequency distribution.

LEVEL-1

1. The probability of obtaining 2 heads when an unbiased coin is tossed 5 times is

   1. $\frac{5}{8}$ 2. $\frac{4}{9}$ 3. $\frac{5}{16}$ 4. $\frac{4}{16}$

2. Six unbiased coins are tossed once. The probability of obtaining atleast one head is

   1. $\frac{58}{64}$ 2. $\frac{63}{64}$ 3. $\frac{60}{64}$ 4. $\frac{61}{64}$

3. Six unbiased coins are tossed the probability of obtaining atleast two heads is

   1. $\frac{50}{64}$ 2. $\frac{55}{64}$ 3. $\frac{57}{64}$ 4. $\frac{60}{64}$

4. The probability of answering 6 out of 10 questions correctly in a true or false examination is

1. ${}^{10}C_4\left(\frac{1}{2}\right)^4$ 2. ${}^{10}C_6\left(\frac{1}{2}\right)^6$

3. ${}^{10}C_6\left(\frac{1}{2}\right)^{10}$ 4. ${}^{10}C_6\left(\frac{1}{2}\right)^8$

5. A machine manufacturing screws is known to produce 5% defectives. In a random sample of 15 screws the probability that there are exactly 3 defectives is

1. $\frac{16}{20}$ 2. $\frac{17}{20}$

3. ${}^{15}C_3\left(\frac{1}{20}\right)^3\left(\frac{19}{20}\right)^{12}$ 4. $\frac{18}{20}$

6. The incidence of occupational disease in an industry is such that the workers have a 20% chance of suffering from it. The probability that out of 6 workers chosen at random not even one will suffer from that disease is

1. $\left(\frac{1}{5}\right)^6$ 2. $\left(\frac{4}{5}\right)^6$ 3. $\left(\frac{1}{5}\right)^1$ 4. $\left(\frac{1}{6}\right)^1$

7. On the average if it rains on 5 days in every 30, the probability that there will be rain on exactly three days of a given week is

1. ${}^{7}C_3\left(\frac{1}{6}\right)^3$ 2. ${}^{7}C_3\left(\frac{5}{6}\right)^3$

3. ${}^{7}C_3\left(\frac{1}{6}\right)^3\left(\frac{5}{6}\right)^4$ 4. ${}^{7}C_3\left(\frac{1}{6}\right)^4$

8. A and B play a game in which A's chance of winning is $\frac{1}{5}$. In a series of 6 games, theprobability that A will win all the 6 games is

1. ${}^{6}C_2\left(\frac{1}{5}\right)^6$ 2. ${}^{6}C_6\left(\frac{1}{5}\right)^6\left(\frac{4}{5}\right)^0$

3. $\left(\frac{4}{5}\right)^6$ 4. ${}^{6}C_6\left(\frac{1}{5}\right)^6$

9. The mean of binomial distribution is 6 and its S.D. is $\sqrt{2}$, then the number of trials n is

1. 7 2. 8 3. 9 4. 10

10. A symmetrical die is rolled 720 times. Getting a face with four points is considered to be a success. The mean and variance of the number of successes is

1. 20, 120 2. 120, 100 3. 100, 100 4. 50, 50

11. The probability that a bomb dropped from a plane strikes the target is $\frac{1}{5}$. The probability that out of 6 bombs dropped atleast 2 bombs strike the target

1. 0.345 2. 0.246 3. 0.543 4. 0.426

12. The probability of getting atleast two heads when an unbiased coin is tossed three times is

1. $\frac{1}{4}$ 2. $\frac{1}{3}$ 3. $\frac{1}{2}$ 4. $\frac{1}{8}$

13. The probability that in a family of 4 children there will be atleast one boy is

1. $\frac{13}{16}$ 2. $\frac{15}{16}$ 3. $\frac{14}{16}$ 4. $\frac{12}{16}$

14. The probability of a man hitting the target is $\frac{1}{4}$. If he fires 7 times the probability of his hitting the target atleast once is

1. $\left(\frac{3}{4}\right)^7$ 2. $1-\left(\frac{3}{4}\right)^7$ 3. $\left(\frac{1}{4}\right)^7$ 4. $1-\left(\frac{1}{4}\right)^7$

15. The probability of happening of an event in an experiment is 0.4. The probability of happening of the event atleast once, if the experiment is repeated 3 times under similar conditions is

1. 0.216 2. 0.784 3. 0.64 4. 0.32

16. Five cards are drawn successively with replacement from a well shuffled pack of 52 cards. The probability that all the five cards are spades

1. ${}^{5}C_5\left(\frac{1}{4}\right)^5$ 2. $\frac{5}{52}$ 3. $\left(\frac{3}{4}\right)^5$ 4. $\left(\frac{3}{4}\right)^2$

17. For a binomial distribution $\bar{x}=4,\sigma^2=3$ then the distribution of x is

1. $\left(\frac{1}{4}+\frac{3}{4}\right)^{16}$ 2. $\left(\frac{3}{4}+\frac{1}{4}\right)^{16}$ 3. $\left(\frac{1}{2}+\frac{1}{2}\right)^{16}$ 4. $\left(\frac{1}{2}+\frac{1}{2}\right)^8$

18. A binomial distribution has a mean of 5 and variance 4. The number of trials is

1. 20 2. 16 3. 25 4. 10

19. The standard deviation σ of $(q+p)^{16}$ is 2. The mean of the distribution is

1. 2 2. 8 3. 16 4. 20

20. If the difference between the mean and variance of a binomial distribution for 5 trials is $\frac{5}{9}$, then the distribution is

1. $\left(\frac{1}{3}+\frac{2}{3}\right)^5$ 2. $\left(\frac{1}{4}+\frac{3}{4}\right)^5$ 3. $\left(\frac{2}{3}+\frac{1}{3}\right)^5$ 4. $\left(\frac{3}{4}+\frac{1}{4}\right)^5$

21. For a binomial distribution mean is 6 and S.D. is $\sqrt{2}$. The distribution is

1. $\left(\frac{2}{3}+\frac{1}{3}\right)^9$ 2. $\left(\frac{1}{3}+\frac{2}{3}\right)^9$ 3. $\left(\frac{1}{5}+\frac{4}{5}\right)^9$ 4. $\left(\frac{4}{5}+\frac{1}{5}\right)^9$

22. For a binomial distribution n = 20, q = 0.75. The mean of the distribution is

1. 10 2. 15 3. 5 4. 20

23. The binomial distribution whose mean is 9 and the variance is 2.25 is

1. $(0.25+0.75)^{12}$ 2. $(0.75+0.25)^{12}$

3. $\left(\frac{1}{3}+\frac{2}{3}\right)^{12}$ 4. $\left(\frac{2}{3}+\frac{1}{3}\right)^{12}$

24. If X is binomial variate with E(X) = 5 and variance 4. The parameters of the distribution are

1. $\frac{1}{4},20$ 2. $\frac{1}{5},20$ 3. $25,\frac{1}{5}$ 4. $\frac{1}{25},\frac{1}{5}$

25. In a binomial distribution AM=3, variance=4. The statement is

1. True 2. False
3. We cannot say 4. None

26. A symmetrical die is thrown four times and getting a multiple of 2 is considered to be a success. The mean and variance of success are

1. 4, 2 2. 2, 1 3. 0, 2 4. 1, 2

27. Two cards are drawn successively with replacement from a well shuffled pack of 52 cards. The variance of the number of aces is

1. $\frac{2\times1}{13}$ 2. $2\times\frac{1}{13}\times\frac{12}{13}$

3. $\frac{12}{13}\times\frac{12}{13}$ 4. $\frac{1}{13}\times\frac{1}{13}$

28. If for a binomial distribution mean = $\frac{10}{3}$ and sum of mean and variance is $\frac{40}{9}$. The parameters are

1. $\frac{2}{3},10$ 2. $\frac{2}{3},20$ 3. $5,\frac{2}{3}$ 4. $4,\frac{2}{3}$

29. If for a binomial distribution $\overline{x}=\frac{6}{5}$ and the difference between mean and variance is $\frac{6}{25}$. The number of trials is

1. 8 2. 7 3. 6 4. 5

30. If for a binomial distribution with n = 16, the ratio of mean to variance is $\frac{5}{4}$, then the probability of success is

1. $\frac{4}{5}$ 2. $\frac{2}{3}$ 3. $\frac{1}{5}$ 4. $\frac{1}{4}$

31. If for a B.D. with n=12, the ratio of variance to mean is $\frac{1}{3}$, then the probability of 10 successes is

1. ${}^{15}C_{10}\left(\frac{2}{3}\right)^{10}\left(\frac{1}{3}\right)^{2}$ 2. ${}^{12}C_{10}\left(\frac{2}{3}\right)^{10}\left(\frac{1}{3}\right)^{2}$

3. $\left(\frac{2}{3}\right)^{10}$ 4. $\left(\frac{1}{3}\right)^{10}$

32. The value of $B\left(3;4,\frac{1}{4}\right)$ is

1. $\frac{5}{64}$ 2. $\frac{1}{16}$ 3. $\frac{3}{64}$ 4. $\frac{1}{64}$

33. The probability is 0.02 that an item produced by a factory is defective. A shipment of 10,000 items is sent to warehouse. The expected number of defective items is

1. 400 2. 300 3. 200 4. 100

34. In six throws of a die, getting 4 or 5 is considered a success. The mean number of successes is

1. 4 2. 3 3. 2 4. 1

35. A symmetrical die is thrown three times. If getting a six is considered to be a success, the probability of atleast two successes is

1. $\frac{4}{27}$ 2. $\frac{3}{27}$ 3. $\frac{2}{27}$ 4. $\frac{1}{27}$

36. A fair die is rolled 180 times. The expected number of six's is

1. 50 2. 30 3. 10 4. 5

37. Of the bolts produced by a factory 2% are defective. In a shipment of 3600 bolts from the factory, the expected number of defective bolts is

1. 144 2. 72 3. 36 4. 18

38. If for a BD the mean is 6 and standard deviation is $\frac{1}{\sqrt{2}}$, then the probability of success is

1. $\frac{11}{12}$ 2. $\frac{10}{12}$ 3. $\frac{9}{12}$ 4. $\frac{8}{12}$

39. A symmetrical die is rolled 6 times. If getting an odd number is a success, the probability of atmost 5 successes is

1. $\frac{60}{64}$ 2. $\frac{63}{64}$ 3. $\frac{120}{164}$ 4. $\frac{10}{14}$

40. If A and B are two equally strong table tennis players, the probability that A beats B in exactly three games out of 4 games is

1. $\frac{1}{6}$ 2. $\frac{1}{5}$ 3. $\frac{1}{4}$ 4. $\frac{1}{2}$

41. Team A has probability $\frac{2}{3}$ of winning whenever it plays. If A plays 4 games the probability that A loses all the games is

1. $\left(\frac{2}{3}\right)^{4}$ 2. $\left(\frac{1}{3}\right)^{4}$

3. ${}^{4}C_{0}\left(\frac{2}{3}\right)^{4}$ 4. ${}^{4}C_{0}\left(\frac{2}{3}\right)^{6}$

42. In a binomial distribution mean = $\frac{11}{4}$ and variance = $\frac{15}{16}$, then the probability of success is

1. $\frac{1}{2}$ 2. $\frac{29}{44}$ 3. $\frac{1}{4}$ 4. $\frac{3}{4}$

43. The mean and variance of B.D. are 6, 4. The parameters of the distribution

1. $12,\frac{1}{2}$ 2. $9,\frac{2}{3}$ 3. $10, 0.6$ 4. $18,\frac{1}{3}$

44. In a binomial distribution with n=10, $p=\frac{2}{5}$, the mode of the B.D. is

1. 6 2. 5 3. 4 4. 3

45. 6 symmetrical dice are thrown 729 times. The number of times you expect exactly three dice showing a four or five is

1. 160 2. 240 3. 12 4. 6

46. If the mean of a binomial distribution is 25 then its standard deviation lies in the interval given below

1. [0, 5] 2. [0, 5) 3. (0, 5] 4. [0, 25]

47. If a random variable X follows B.D. with mean 2.4 and variance 1.44, the number of independent trials n is

1. 10 2. 8 3. 6 4. 2

48. If X is a binomial variate with n=6 and 9P(X=4)=P(X=2) the parameter p is

1. $\frac{3}{4}$ 2. $\frac{1}{3}$ 3. $\frac{1}{4}$ 4. $\frac{1}{2}$

49. In a binomial distribution mean is 4.8 and variance is 2.88, then the parameter n is

1. 8 2. 12 3. 16 4. 20

50. A fair coin is tossed 6 times. The variance of number of heads is

1. 3 2. $\frac{3}{2}$ 3. $\frac{3}{4}$ 4. 2

51. The number of parameters of B.D. are

1. 4 2. 3 3. 2 4. 1

52. Six unbiased coins are tossed once. The probability of obtaining atleast two heads is

1. $\frac{63}{64}$ 2. $\frac{57}{64}$ 3. $\frac{1}{64}$ 4. $\frac{1}{32}$

53. A student is given 6 questions in a true or false examination. If he gets 4 or more correct answers he passes the examination. The probability that he passes the examination is

1. $\frac{5}{32}$ 2. $\frac{7}{32}$ 3. $\frac{11}{32}$ 4. $\frac{3}{32}$

54. A machine manufacturing screws is known to produce 5% defectives. In a random sample of 15 screws the probability that there are exactly 3 defectives is

1. $\left(\frac{1}{2}\right)^3$ 2. $\left(\frac{19}{20}\right)^3$

3. ${}^{15}C_3\left(\frac{1}{20}\right)^3\left(\frac{19}{20}\right)^{12}$ 4. $\left(\frac{1}{20}\right)^3$

55. A machine manufacturing screws is known to produce 5% defectives. In a random sample of 15 screws the probability that there are not more than 3 defectives is

1. ${}^{15}C_3\left(\frac{1}{20}\right)^{12}$ 2. $\sum_{x=4}^{15}{}^{15}C_x\left(\frac{1}{20}\right)^x\left(\frac{19}{20}\right)^{15-x}$

3. $\sum_{x=0}^{3}{}^{15}C_x\left(\frac{1}{20}\right)^x\left(\frac{19}{20}\right)^{15-x}$ 4. $\sum_{x=0}^{3}{}^{15}C_x\left(\frac{1}{20}\right)^x\left(\frac{19}{20}\right)^{15}$

56. The incidence of occupational disease in an industry is such that the workers have a 20% chance of suffering from it. The probability that out of 6 workers chosen at random, exactly four will suffer is

1. $\left(\frac{1}{5}\right)^4$ 2. $\left(\frac{4}{5}\right)^4$

3. ${}^6C_4\left(\frac{1}{5}\right)^4\left(\frac{4}{5}\right)^2$ 4. $\left(\frac{4}{5}\right)^2$

57. The incidence of occupational disease in an industry is such that the workers have a 20% chance of suffering from it. The probability that out of 6 workers chosen at random, not even one will suffer from that disease is

1. $\left(\frac{1}{5}\right)^6$ 2. $\left(\frac{4}{5}\right)^6$ 3. $\left(\frac{1}{5}\right)^0$ 4. $\left(\frac{1}{5}\right)^3$

58. On the average if it rains on 10 days in every 30, the probability that there will be rain on atleast three days of a given week is

1. ${}^7C_3\left(\frac{1}{3}\right)^3\left(\frac{2}{3}\right)^4$ 2. $\sum_{x=3}^{7}{}^7C_x\left(\frac{1}{3}\right)^x\left(\frac{2}{3}\right)^{7-x}$

3. $\sum_{x=4}^{7}{}^7C_x\left(\frac{1}{3}\right)^x\left(\frac{2}{3}\right)^{7-x}$ 4. $\sum_{x=2}^{7}{}^7C_x\left(\frac{1}{3}\right)^x\left(\frac{2}{3}\right)^{7-x}$

59. A and B play a game in which A's chance of winning is $\frac{1}{5}$. In a series of 6 games, the probability that A will win atleast three games is

1. ${}^6C_3\left(\frac{1}{5}\right)^x\left(\frac{4}{5}\right)^{6-x}$ 2. $\sum_{x=3}^{7}{}^6C_3\left(\frac{4}{5}\right)^x\left(\frac{1}{5}\right)^{6-x}$

3. $\sum_{x=3}^{6}{}^6C_x\left(\frac{1}{5}\right)^x\left(\frac{4}{5}\right)^{6-x}$ 4. $\sum_{x=3}^{5}{}^6C_x\left(\frac{4}{5}\right)^x\left(\frac{1}{5}\right)^{6-x}$

60. The mean of B.D. is 6 and its S.D. and $\sqrt{2}$. The probability of x successes is

1. $\left(\frac{2}{3}\right)^x$ 2. $\left(\frac{1}{3}\right)^x$

3. ${}^9C_x\left(\frac{2}{3}\right)^x\left(\frac{1}{3}\right)^{9-x}$ 4. ${}^6C_x\left(\frac{1}{3}\right)^x\left(\frac{2}{3}\right)^{9-x}$

61. A symmetrical die is tossed twice. Getting a four is considered to be a success. The mean and variance of number of successes is

1. $\frac{2}{3},\frac{5}{18}$ 2. $\frac{1}{3},\frac{5}{18}$ 3. $\frac{1}{3},\frac{1}{3}$ 4. $\frac{1}{18},\frac{1}{18}$

62. A fair coin is tossed four times. The probability that tails exceed heads in number is

1. $\frac{1}{4}$ 2. $\frac{5}{16}$ 3. $\frac{7}{16}$ 4. $\frac{9}{16}$

63. If the sum of mean and variance of B.D. for 5 trials is 1.8, the binomial distribution is

1. $(0.8+0.2)^5$ 2. $(0.2+0.8)^5$

3. $(0.8+0.2)^{10}$ 4. $(0.2+0.8)^{10}$

64. If for a binomial distribution n = 4 and 6P(X=4)=P(X=2), the probability of success is

1. $\frac{3}{4}$ 2. $\frac{1}{2}$ 3. $\frac{1}{3}$ 4. $\frac{1}{4}$

65. If for a binomial distribution with n = 5, 4p(X=1)=P(X=2), the probability of success is

1. $\frac{1}{3}$ 2. $\frac{2}{3}$ 3. $\frac{1}{4}$ 4. $\frac{1}{8}$

66. A family has six children. The probability that there are fewer boys than girls, if the probability of any particular child being a boy is $\frac{1}{2}$ is

1. $\frac{5}{32}$ 2. $\frac{7}{32}$ 3. $\frac{11}{32}$ 4. $\frac{9}{32}$

67. The probability of a man hitting the target is $\frac{1}{4}$. If he fires 7 times, the probability of hitting the target exactly six times is

1. $\left(\frac{1}{4}\right)^6$ 2. $1-\left(\frac{3}{4}\right)^1$

3. ${}^7C_6\left(\frac{1}{4}\right)^6\left(\frac{3}{4}\right)^1$ 4. ${}^7C_6\left(\frac{1}{4}\right)^1\left(\frac{3}{4}\right)^6$

68. The probability that a student is not a swimmer is $\frac{1}{5}$. Out of 5 students the probability that exactly four are swimmers is

1. $\left(\frac{4}{5}\right)^4$ 2. $\left(\frac{1}{5}\right)^4$

3. ${}^5C_4\left(\frac{4}{5}\right)^4\left(\frac{1}{5}\right)^1$ 4. ${}^5C_4\left(\frac{1}{5}\right)^4\left(\frac{4}{5}\right)^1$

69. The probability that a student is not a swimmer is $\frac{1}{5}$. Out of 5 students the probability that atleast four are swimmers is

1. ${}^5C_4\left(\frac{4}{5}\right)^4\left(\frac{1}{5}\right)^1$ 2. $\left(\frac{9}{5}\right)\left(\frac{4}{5}\right)^4$

3. $\frac{6}{5}\left(\frac{4}{5}\right)^4$ 4. $\frac{4}{5}\left(\frac{6}{5}\right)^4$

70. If on an average 1 vessel in every 10 is wrecked, the probability that out of 5 vessels expected to arrive, 4 at least will arrive safely is

1. $(0.9)^4$ 2. $6\times(0.9)^4$

3. $1.4\times(0.9)^4$ 4. $4\times(0.9)^4$

71. The chance that a person with two dice, the faces of each being numbered 1 to 6, will throw aces exactly 4 times in 6 trials is

1. $\left(\frac{1}{36}\right)^4$ 2. $\left(\frac{35}{36}\right)^4$

3. ${}^6C_4\left(\frac{1}{36}\right)^4\left(\frac{35}{36}\right)^2$ 4. ${}^6C_4\left(\frac{35}{36}\right)^4\left(\frac{1}{36}\right)^2$

72. If 10% of the attacking air crafts are expected to be shot down before reaching the target, the probability that out of 5 aircrafts atleast four will be shot before they reach the target is

1. $4\left(\frac{1}{10}\right)^4$ 2. $5\left(\frac{1}{10}\right)^4$

3. $4.6\left(\frac{1}{10}\right)^4$ 4. $6\left(\frac{1}{10}\right)^4$

73. A production process is supposed to contain 5% defective items. The probability that a sample of 8 items will contain less than 2 defective items is

1. $\left(\frac{19}{20}\right)^7$ 2. $27\times\left(\frac{19}{20}\right)^7$

3. $\frac{27\times19^7}{20^8}$ 4. $\frac{9\times5^7}{10^8}$

74. A box contains 3 red marbles and 2 white marbles. A marble is drawn and replaced three times from the box. The probability that exactly one red marble is drawn is

1. $\frac{3}{5}$ 2. $\frac{9}{125}$ 3. $\frac{36}{125}$ 4. $\frac{6}{125}$

75. A fair coin is tossed 12 times. The variance of number of heads is

1. 4 2. 3 3. 2 4. 1

76. Two symmetrical dice are thrown 200 times. Getting a sum of 9 points is considered to be a success. The probability distribution of successes is

1. $\left(\frac{1}{9}+\frac{8}{9}\right)^{200}$ 2. $\left(\frac{8}{9}+\frac{1}{9}\right)^{200}$

3. $\left(\frac{4}{5}+\frac{1}{5}\right)^{200}$ 4. $\left(\frac{1}{5}+\frac{4}{5}\right)^{200}$

77. The probability of A winning a game is $\frac{2}{3}$. In a series of 4 such games the probability that A will win more than half of the games is

1. $\frac{32}{81}$ 2. $\frac{33}{81}$ 3. $\frac{16}{27}$ 4. $\frac{8}{27}$

78. If X is a binomial variable with E(X)=2 and v(X)= $\frac{4}{3}$, the probability of x successes is

1. ${}^6C_x\left(\frac{1}{3}\right)^x\left(\frac{2}{3}\right)^{6-x}$ 2. ${}^6C_x\left(\frac{2}{3}\right)^x\left(\frac{1}{3}\right)^{6-x}$

3. $\left(\frac{2}{3}\right)^x\left(\frac{1}{3}\right)^{6-x}$ 4. $\left(\frac{1}{3}\right)^x\left(\frac{2}{3}\right)^{6-x}$

79. A box contains 6 red and 4 white marbles. A marble is drawn and replaced three times from the box. The probability that one white marble is drawn

1. $\frac{53}{125}$ 2. $\frac{54}{125}$ 3. $\frac{56}{125}$ 4. $\frac{52}{125}$

80. A box contains 6 red and 4 white marbles. A marble is drawn and replaced three times from the box. The probability that two white marbles are drawn

1. $\frac{34}{125}$ 2. $\frac{36}{125}$ 3. $\frac{38}{125}$ 4. $\frac{32}{125}$

81. A box contains 6 red and 4 white marbles. A marble is drawn and replaced three times from the box. The probability that atleast one white marble is drawn

1. $\left(\frac{3}{5}\right)^3$ 2. $1-\left(\frac{3}{5}\right)^3$ 3. $\left(\frac{2}{5}\right)^3$ 4. $1-\left(\frac{2}{5}\right)^3$

82. Team A has the probability $\frac{2}{5}$ of winning, when ever it plays. If A plays 4 games, the probability that A wins more than half of the games is

1. $\frac{22}{125}$ 2. $\frac{112}{625}$ 3. $\frac{116}{625}$ 4. $\frac{110}{625}$

83. A fair die is tossed 1620 times. If getting a face with 6 points is considered as a success, then E(x) = ..., V(x) = ...

1. 270, 270 2. 270, 225
3. 270, 25 4. 27, 250

84. The probability of getting a total of 9 twice in 6 tosses of a pair of dice is

1. $\left(\frac{8}{9}\right)^4$ 2. ${}^6C_2\left(\frac{1}{9}\right)^2\left(\frac{8}{9}\right)^4$

3. ${}^6C_2\left(\frac{8}{9}\right)^2\left(\frac{1}{9}\right)^4$ 4. $\left(\frac{1}{9}\right)^2$

85. The probability of getting a total of 9 atleast twice in 6 tosses of a pair of dice is

1. ${}^6C_2\left(\frac{1}{9}\right)^2\left(\frac{8}{9}\right)^4$ 2. $1-\left\{\sum_{x=2}^{6}{}^6C_x\left(\frac{1}{9}\right)^x\left(\frac{8}{9}\right)^{6-x}\right.$

3. $\sum_{x=2}^{6}{}^6C_x\left(\frac{1}{9}\right)^x\left(\frac{8}{9}\right)^{6-x}$ 4. $\sum_{x=2}^{6}{}^6C_x\left(\frac{8}{9}\right)^x\left(\frac{1}{9}\right)^{6-x}$

86. If the probability of a defective bolt is 0.1. The mean and standard deviation for the distribution of defective bolts in a total of 400 .... & ....

1. 40, 36 2. 40, 6 3. 20, 6 4. 10, 6

87. A random variable X is binomially distributed with mean 12 and variance 8. The parameters of the distribution are ...... & ....

1. $18, \frac{1}{3}$ 2. $36, \frac{1}{3}$ 3. $36, \frac{2}{3}$ 4. $18, \frac{2}{3}$

88. If in a random experiment the probability of getting a success is twice that of a failure, then the probability of getting 6 successes in 10 trials is

1. ${}^{10}C_6\left(\frac{1}{3}\right)^6\left(\frac{2}{3}\right)^4$ 2. ${}^{10}C_6\left(\frac{2}{3}\right)^6\left(\frac{1}{3}\right)^4$

3. ${}^{10}C_4\left(\frac{2}{3}\right)^4\left(\frac{1}{3}\right)^6$ 4. ${}^{10}C_4\left(\frac{1}{3}\right)^4\left(\frac{2}{3}\right)^6$

89. In a binomial distribution n=9 and $p=\frac{1}{3}$. The probability of mode is

1. ${}^9C_3\left(\frac{1}{3}\right)^3\left(\frac{2}{3}\right)^6$ 2. ${}^9C_3\left(\frac{2}{3}\right)^3\left(\frac{1}{3}\right)^6$

3. ${}^9C_6\left(\frac{2}{3}\right)^6\left(\frac{1}{3}\right)^3$ 4. ${}^9C_6\left(\frac{1}{3}\right)^6\left(\frac{2}{3}\right)^3$

90. The probability that a bulb produced by a factory will fuse after 100 days of use is 0.05. The probability that out of 5 such bulbs none of them fuse after 100 days is

1. $(0.05)^5$ 2. $(0.95)^5$

3. $1-(0.95)^5$ 4. $1-(0.05)^5$

91. The probability that a bulb produced by a factory will fuse after 100 days of use is 0.05. The probability that out of 5 such bulbs not more than one will fuse after 100 days is

1. 0.25×0.95^4 2. $1.20\times(0.95)^4$

3. $(0.95)^4$ 4. $(0.25)^4$

92. The probability that a bulb produced by a factory will fuse after 100 days of use is 0.05. The probability that out of 5 such bulbs atleast one will fuse after 100 days of use is

1. $(0.95)^5$ 2. $(0.05)^5$

3. $1-(0.95)^5$ 4. $1-(0.05)^5$

93. If four throws with a pair of dice, the probability of throwing a double atleast once is

1. $\left(\frac{5}{6}\right)^4$ 2. $1-\left(\frac{5}{6}\right)^4$ 3. $1-\left(\frac{1}{6}\right)^4$ 4. $\left(\frac{1}{6}\right)^4$

94. An experiment succeeds twice as often as it fails . The chance that in the next six trials, there shall be atleast four successes is

1. ${}^6C_4\left(\frac{2}{3}\right)^4\left(\frac{1}{3}\right)^2$ 2. $\sum_{x=0}^{4}{}^6C_x\left(\frac{2}{3}\right)^x\left(\frac{1}{3}\right)^{6-x}$

3. $\sum_{x=4}^{6}{}^6C_x\left(\frac{2}{3}\right)^x\left(\frac{1}{3}\right)^{6-x}$ 4. $\sum_{x=6}^{8}{}^6C_x\left(\frac{2}{3}\right)^x\left(\frac{1}{3}\right)^{6-x}$

95. For a binomial distribution the mean and variance are respectively 4 and 3. The probability of getting a non-zero success is

1. $\left(\frac{1}{4}\right)^{16}$ 2. $\left(\frac{3}{4}\right)^{16}$ 3. $1-\left(\frac{3}{4}\right)^{16}$ 4. $1-\left(\frac{1}{4}\right)^{16}$

96. The binomial distribution for which mean + 2 variance = 4, mean + variance = 3 is

1. $\left(\frac{1}{3}+\frac{2}{3}\right)^{4}$ 2. $\left(\frac{2}{3}+\frac{1}{3}\right)^{4}$ 3. $\left(\frac{1}{2}+\frac{1}{2}\right)^{4}$ 4. $\left(\frac{1}{3}+\frac{1}{3}\right)^{4}$

97. In a binomial distribution consisting of 5 independent trials, the probability of 1 and 2 successes are 0.4096 and 0.2048 respectively. The parameter p of the distribution is

1. $\frac{1}{3}$ 2. $\frac{1}{4}$ 3. $\frac{1}{5}$ 4. $\frac{1}{6}$

98. The mean and variance of a discrete random variable x are 6 and 2 respectively. Assuming x to follow B.E. $P(5 \le x \le 7)$ is

1. $\sum_{x=5}^{7} {}^{9}C_x\left(\frac{1}{3}\right)^{x}\left(\frac{2}{3}\right)^{9-x}$ 2. $\sum_{x=5}^{7} {}^{9}C_x\left(\frac{2}{3}\right)^{x}\left(\frac{1}{3}\right)^{9-x}$

3. $\sum_{x=5}^{7} {}^{6}C_x\left(\frac{2}{3}\right)^{x}\left(\frac{1}{3}\right)^{6-x}$ 4. $\sum_{x=5}^{7} {}^{6}C_x\left(\frac{1}{3}\right)^{x}\left(\frac{2}{3}\right)^{6-x}$

99. A card is drawn and replaced four times from an ordinary pack of 52 playing cards. The probability that at least once heart is drawn

1. $\left(\frac{3}{4}\right)^{4}$ 2. $1-\left(\frac{1}{2}\right)^{4}$ 3. $1-\left(\frac{3}{4}\right)^{4}$ 4. $\left(\frac{1}{2}\right)^{4}$

100. A card is drawn and replaced three times from an ordinary pack of 52 playing cards. The probability that two spades are drawn is

1. $\frac{9}{64}$ 2. $\frac{1}{64}$ 3. $\frac{37}{64}$ 4. $\frac{3}{64}$

101. A card is drawn and replaced three times from an ordinary pacfk of 52 playing cards. The probability that three spades are drawn is

1. $\frac{9}{64}$ 2. $\frac{1}{64}$ 3. $\frac{37}{64}$ 4. $\frac{3}{64}$

102. A card is drawn and replaced three times from an ordinary pack of 52 playing cards. The probability that atleast one spade is drawn is

1. $\frac{9}{64}$ 2. $\frac{1}{64}$ 3. $\frac{37}{64}$ 4. $\frac{3}{64}$

103. 5 cards are drawn one after an other successively with replacement from a well shuffled pack of 52 cards. The probability that all the 5 cards are spades

1. $\left(\frac{3}{4}\right)^{5}$ 2. $1-\left(\frac{3}{4}\right)^{5}$ 3. $\left(\frac{1}{4}\right)^{5}$ 4. $1-\left(\frac{1}{4}\right)^{5}$

104. 5 cards are drawn one after an other successively with replacement from a well shuffled pack of 52 cards. The probability that none is a spade is

1. $1-\left(\frac{3}{4}\right)^{5}$ 2. $\left(\frac{3}{4}\right)^{5}$ 3. $\left(\frac{1}{4}\right)^{5}$ 4. $1-\left(\frac{1}{4}\right)^{5}$

105. A box contains 'a' white and 'b' black balls. 'c' balls are drawn at random with replacement. The expected number of white balls drawn is

1. $\frac{a}{a+b}$ 2. $\frac{ac}{a+b}$ 3. $\frac{bc}{a+b}$ 4. $\frac{b}{a+b}$

106. A box contains 'a' white and 'b' black balls. 'c' balls are drawn at random with replacement. The expected number of black balls drawn is

1. $\frac{b}{a+b}$ 2. $\frac{ac}{a+b}$ 3. $\frac{bc}{a+b}$ 4. $\frac{c}{a+b}$

107. If the mean and variance of binomial variate X are 2 and 1 respectively, then the probability that X takes a value greater than one is equal to

1. $\frac{5}{16}$ 2. $\frac{7}{16}$ 3. $\frac{11}{16}$ 4. $\frac{9}{16}$

108. The probability that India wins a cricket test match against England is $\frac{1}{3}$. If India and England play 3 matches, the probability that India will win atleast one match is

1. $\frac{8}{27}$ 2. $\frac{19}{27}$ 3. $\frac{1}{27}$ 4. $\frac{9}{27}$

109. An unbiased die with faces marked 1, 2, 3, 4, 5, 6 is rolled four times. Out of 4 face values obtained, the probability that the minimum face value is not less than 2 and maximum face value is not more than 5 all the 4 times is

1. $\frac{16}{81}$ 2. $\frac{1}{81}$ 3. $\frac{80}{81}$ 4. $\frac{65}{81}$

110. In 15 throws of a die 4 or 5 is considered to be a success. The mean number of success is

1. 3 2. 4 3. 5 4. 6

111. A symmetrical die is thrown 6 times. If getting an odd number is a success, the probability of at the most 5 successes is

1. $\frac{5}{64}$ 2. $\frac{15}{64}$ 3. $\frac{63}{64}$ 4. $\frac{36}{64}$

112. In a B.D. n = 400, $p=\frac{1}{5}$. Its standard deviation is

1. $10\times\sqrt{2}$ 2. $\frac{1}{800}$ 3. 4 4. 8

113. For a B.D. $\bar{x}=4, \sigma=\sqrt{3},$ then P(X=r)=

1. ${}^{16}C_r\left(\frac{1}{4}\right)^{r}\left(\frac{3}{4}\right)^{16-r}$ 2. ${}^{12}C_r\left(\frac{1}{4}\right)^{r}\left(\frac{3}{4}\right)^{12-r}$

3. ${}^{12}C_r\left(\frac{2}{3}\right)^{r}\left(\frac{1}{3}\right)^{12-r}$ 4. ${}^{12}C_r\left(\frac{3}{4}\right)^{r}\left(\frac{1}{4}\right)^{12-r}$

114. Let X be a binomially distributed variate with mean 10 and variance 5. Then p(x>10) is

1. $\frac{1}{2^{20}}\sum_{k=11}^{20} {}^{20}C_k$ 2. $\frac{1}{2^{20}}\sum_{k=1}^{11} {}^{20}C_k$

3. $\frac{1}{2^{20}}\sum_{k=11}^{20} {}^{10}C_k$ 4. $\sum_{k=11}^{20} {}^{20}C_k\left(\frac{2}{3}\right)^{30-k}$

115. If the mean of a binomial distribution with 9 trials is 6, then its variance is

1. 2 2. 3 3. 4 4. $\sqrt{2}$

116. X follows a binomial distribution with parameters n = 6 and p. If 4p(x=4)=p(x=2) then p=

1. $\frac{1}{2}$ 2. $\frac{1}{4}$ 3. $\frac{1}{6}$ 4. $\frac{1}{3}$

117. In an experiment success is twice that of failure. If the experiment is repeated 6 times, the probability that atleast 4 times favourable is

1. $\frac{64}{729}$ 2. $\frac{192}{729}$ 3. $\frac{240}{729}$ 4. $\frac{496}{729}$

118. The probability that a candidate secure a seat in engineering through EAMCET is $\frac{1}{10}$. Seven candidates are selected at random from a centre. The probability that exactly two will get seats is

1. $15(0.1)^2(0.9)^5$ 2. $20(0.1)^2(0.9)^5$

3. $21(0.1)^2(0.9)^5$ 4. $23(0.1)^2(0.9)^5$

KEY

1. 3	2. 2	3. 3	4. 3	5. 3
6. 2	7. 3	8. 2	9. 3	10. 2
11. 1	12. 3	13. 2	14. 2	15. 2
16. 1	17. 2	18. 3	19. 2	20. 3
21. 2	22. 3	23. 1	24. 3	25. 2
26. 2	27. 2	28. 3	29. 3	30. 3
31. 2	32. 3	33. 3	34. 3	35. 3
36. 2	37. 2	38. 1	39. 2	40. 3
41. 2	42. 2	43. 4	44. 3	45. 1
46. 2	47. 3	48. 3	49. 2	50. 2
51. 3	52. 2	53. 3	54. 3	55. 3
56. 3	57. 2	58. 2	59. 3	60. 3
61. 2	62. 2	63. 1	64. 2	65. 2
66. 3	67. 3	68. 3	69. 2	70. 3
71. 3	72. 3	73. 3	74. 3	75. 2
76. 2	77. 3	78. 1	79. 2	80. 2
81. 2	82. 2	83. 2	84. 2	85. 3
86. 2	87. 2	88. 2	89. 1	90. 2
91. 2	92. 3	93. 2	94. 3	95. 3
96. 3	97. 3	98. 2	99. 3	100. 1
101. 2	102. 3	103. 3	104. 2	105. 2
106. 3	107. 3	108. 2	109. 1	110. 3
111. 3	112. 4	113. 1	114. 1	115. 1
116. 4	117. 4	118. 3		

HINTS

4. $p=\frac{1}{2}, q=\frac{1}{2}, n=10$

10. $n=720,\quad p=\frac{1}{6},\quad q=\frac{5}{6},\quad mean(\mu)=120,$

$\text{variance}(\sigma^2)=100$

14. $n=7, p=\frac{1}{4}, q=\frac{3}{4}, x\ge 1$

$p(x\ge 1)=1-P(x=0)=1-{}^7C_0\left(\frac{3}{4}\right)^7\left(\frac{1}{4}\right)^0$

$=1-\left(\frac{3}{4}\right)^7$

21. $np=6, \sqrt{npq}=\sqrt{2}\Rightarrow q=\frac{1}{3}, p=\frac{2}{3}, n=6$

25. Always A.M > Variance.
Hence the statement is false.

28. $np=\frac{10}{3}; np(1+q)=\frac{40}{9}\Rightarrow q=\frac{1}{3}, p=\frac{2}{3}, n=5$

$np-npq=\frac{6}{25}$

29. $np=\frac{6}{5}; np^2=\frac{6}{25}\Rightarrow p=\frac{1}{5}, n=6$

32. $B\left(3,4,\frac{1}{4}\right)$ i.e., P(X=3) when $n=4, p=\frac{1}{4}$

$B(x,n,p)\Rightarrow P(X=3)={}^4C_3\left(\frac{3}{4}\right)^1\left(\frac{1}{4}\right)^3=\frac{3}{64}$

35. $n=3, p=\frac{1}{6}, q=\frac{5}{6}$

$P(X\ge 2)={}^3C_2\left(\frac{5}{6}\right)^1\left(\frac{1}{6}\right)^2+{}^3C_3\left(\frac{5}{6}\right)^0\left(\frac{1}{6}\right)^3$

$=\frac{16}{216}=\frac{2}{27}$

39. $n=6, p=\frac{1}{2}, q=\frac{1}{2}$

$P(X\le 5)=1-P(X=6)=1-\frac{1}{64}=\frac{63}{64}$

42. $np=\frac{11}{4}, npq=\frac{15}{16}\Rightarrow q=\frac{15}{44}$

$\therefore$ Probability of a failure = $\frac{15}{44}$

46. Standard deviation lies in the interval $[0,\sqrt{\mu})$.

$\sigma^2<\bar{x}$ i.e., $\sigma^2<25$ i.e., $\sigma<5$

59. $n=6, p=\frac{1}{5}, q=\frac{4}{5};$

$P(x\ge 3)=\sum_{x=3}^{6}{}^6C_x\left(\frac{1}{5}\right)^x\left(\frac{4}{5}\right)^{6-x}$