80. Two cards are drawn one after another at random without replacement. The probability that both of them may have the different face values is

1. $\frac{4}{13}$ 2. $\frac{6}{13}$ 3. $\frac{16}{17}$ 4. $\frac{12}{13}$

81. An urn A contains 8 black and 5 white balls. A second urn B contains 6 black and 7 white balls. A blind folded persons is asked to draw a ball selecting one of the urns, the probability that the ball drawn is white is

1. $\frac{5}{13}$ 2. $\frac{6}{13}$ 3. $\frac{7}{13}$ 4. $\frac{9}{13}$

82. An urn A contains 8 black and 5 white balls. A second urn B contains 6 black and 7 white balls. A blind folded person is asked to draw a ball selecting one of the urns, the probability that the ball drawn is black is

1. $\frac{5}{13}$ 2. $\frac{6}{13}$ 3. $\frac{7}{13}$ 4. $\frac{9}{13}$

83. There are 3 white and 2 black balls in a bag X and 2 white and 4 black balls in an other bag Y. If a bag is selected at random and then a ball is drawn at random, the probability that it is white is

1. $\frac{2}{15}$ 2. $\frac{4}{15}$ 3. $\frac{7}{15}$ 4. $\frac{8}{15}$

84. A purse contains 4 copper and 3 silver coins. The second purse contains 6 copper and 2 silver coins. A coin is taken out at random from one of the purses choosing at random. The probability that it is a copper coin is

1. $\frac{29}{56}$ 2. $\frac{19}{56}$ 3. $\frac{37}{56}$ 4. $\frac{9}{56}$

85. There are 2 bags one of which contains 3 black and 4 white balls, while the other contains 4 black and 3 white balls. A die is cast, if face 1 or 3 turns up a ball in taken from the 1st bag and if any other face turns up a ball is taken from the second bag. The probability of choosing a black ball is

1. $\frac{5}{21}$ 2. $\frac{10}{21}$ 3. $\frac{11}{21}$ 4. $\frac{6}{21}$

86. There are 2 white and 4 black balls in an urn A and 4 white and 7 black balls in another urn B. One ball is transfered from urn A to B. Now one ball is drawn at random from B. The probability that it is white is

1. $\frac{25}{39}$ 2. $\frac{15}{39}$ 3. $\frac{13}{36}$ 4. $\frac{14}{39}$

87. A bag contains 6 white and 4 black balls. Two balls are drawn at random and one is found to be white. The probability that the other ball is also white is

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

88. In a bag there are 6 white and 4 black balls. Two balls are drawn one after an other without replacement. If the 1st ball is known to be white, the probability that the 2nd ball drawn is also white is

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

89. An urn contains 5 white and 7 black balls. A second urn contains 7 white and 8 black balls. One ball is transfered from the 1st urn to the 2nd urn without noticing its colour. A ball is now drawn at random from the 2nd urn. The probability that it is white is

1. $\frac{8}{92}$ 2. $\frac{89}{192}$ 3. $\frac{9}{92}$ 4. $\frac{98}{192}$

90. 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 rotten is

1. $\frac{5}{13}$ 2. $\frac{7}{13}$ 3. $\frac{8}{13}$ 4. $\frac{9}{13}$

91. One bag contains 5 white and 3 black balls and an other contains 4 white, 5 red balls. Two balls are drawn from one of them choosing at random. The probability that they are of different colours is

1. $\frac{15}{56}$ 2. $\frac{5}{18}$ 3. $\frac{275}{504}$ 4. $\frac{275}{624}$

92. A bag contains 6 white and 4 black balls. An other bag contains 4 white and 6 black balls. A die is rolled and if it shows a prime number a ball is taken from the 1st bag otherwise a ball is taken from the second bag. The probability that the ball drawn is white is

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

93. If the letters of the word RANDOM be arranged at random, the probability that there are exactly 2 letters in between A and O is

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

94. If the letters of the word QUESTION are arranged at random, the probability that there will be exactly 2 letters in between Q and U is

1. $\frac{{}^6P_2}{\angle 8}$ 2. $\frac{{}^6P_2 \times \angle 5}{\angle 8}$

3. $\frac{{}^6P_2 \times \angle 5 \times 2}{\angle 8}$ 4. $\frac{{}^6P_2 \times 2}{\angle 8}$

95. If four letters are placed into 4 addressed envelopes at random, the probability that at least one letter will go wrong is

1. $\frac{1}{4}$ 2. $\frac{3}{4}$ 3. $\frac{23}{24}$ 4. $\frac{1}{24}$

96. If four letters are placed into 4 addressed envelopes at random, the probability that exactly one letter will go wrong is

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

97. If four letters are placed into 4 addressed envelopes at random, the probability that exactly two letters will go wrong is

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

98. If four letters are placed into 4 addressed envelopes at random, the probability that exactly three letters will go wrong is

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

99. If four letters are placed into 4 addressed envelopes at random, the probability that all the four letters will go wrong is

1. $\frac{5}{24}$ 2. $\frac{7}{24}$ 3. $\frac{9}{24}$ 4. $\frac{11}{24}$

100. Three newly wedded couples are dancing at a function. If the partner is selected at random the chance that all the husbands are not dancing with their own wives is

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

101. Three newly wedded couples are dancing at a function. If the partner is selected at random the chance that at least one husband is not dancing with his own wife is

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

102. 5 letters are to be placed in 5 addressed envelopes at random. The probability that exactly two letters will go wrong is

1. $\frac{1}{12}$ 2. $\frac{55}{120}$ 3. $\frac{65}{120}$ 4. $\frac{45}{120}$

103. 5 letters are to be placed in 5 addressed envelopes at random. The probability that all the 5 letters will go wrong is

1. $\frac{5}{24}$ 2. $\frac{11}{24}$ 3. $\frac{11}{30}$ 4. $\frac{5}{30}$

103a. If all the letters of the word 'RANDOM' are arranged in all possible ways, then the probability that no letter is in its original position is

1. $\frac{265}{720}$ 2. $\frac{1}{720}$ 3. $\frac{^{6}p_{6}}{720}$ 4. $\frac{1}{6}$

104. The probability that the birthdays of 6 boys will fall exactly in two calender months is

1. $\frac{^{12}c_2}{12^6}$ 2. $\frac{^{12}c_2 \times 2^6}{12^6}$

3. $\frac{^{12}c_2 \times \left(2^6-2\right)}{12^6}$ 4. $\frac{^{12}c_2 \times \left(2^6-3\right)}{12^6}$

105. 2n boys are randomly divided into two subgroups containing n boys each. The probability that the two tallest boys are in different groups is

1. $\frac{1}{2}$ 2. $\frac{n}{2n-1}$ 3. $\frac{(n-1)}{(2n-1)}$ 4. $\frac{2n}{2n-1}$

106. Out of 1st 30 natural numbers (i.e., 1 to 30) three are selected at random. The probability that they are consecutive numbers

1. $\frac{144}{145}$ 2. $\frac{1}{145}$ 3. $\frac{28}{145}$ 4. $\frac{2}{145}$

107. Out of 1st 30 natural numbers (i.e., 1 to 30) three are selected at random. The probability that they are not consecutive is

1. $\frac{1}{145}$ 2. $\frac{144}{145}$ 3. $\frac{28}{145}$ 4. $\frac{2}{145}$

108. Out of 1st 30 natural numbers (i.e., 1 to 30) three are selected at random. The probability that no two are together

1. $\frac{144}{145}$ 2. $\frac{28}{145}$ 3. $\frac{117}{145}$ 4. $\frac{2}{145}$

109. Out of 5 digits 0, 3, 3, 4, 5 five digit numbers are formed. If one number is selected at random out of them. The probability that it is divisible by 5 is

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

110. The numbers 1, 2, 3, 4, ... n are arranged in a row at random. The probability that the digits 1, 2, 3, ... k (k < n) appear as neighbours is

1. $\frac{\angle(n-k+1)}{\angle n}$ 2. $\frac{\angle(n-k+1)}{\angle(n-k)}$

3. $\frac{\angle(n-k+1)\angle k}{\angle n}$ 4. $\frac{\angle(n-k+1)\angle k}{\angle(n-k)}$

111. The numbers 1, 2, 3, 4, ... n are arranged in a row at random. The probability that the digits 1, 2, 3, ... k (k < n) appear as neighbours in that order is

1. $\frac{\angle(n-k+1)}{\angle n}$ 2. $\frac{\angle(n-k+1)}{\angle(n-k)}$

3. $\frac{\angle(n-k+1)\angle k}{\angle n}$ 4. $\frac{\angle(n-k+1)\angle k}{\angle(n-k)}$

112. Cards are drawn from a pack one by one. The probability that exactly 10 cards will be drawn before the first ace is

1. $\frac{241}{1456}$ 2. $\frac{164}{4165}$ 3. $\frac{451}{884}$ 4. $\frac{244}{2065}$

113. A person draws a card from a pack replaces it shuffles the pack, again draws a card replaces it and draws again. This he does until he draws a heart. The probability that he will have to make atleast four draws is

1. $\frac{27}{256}$ 2. $\frac{175}{256}$ 3. $\frac{27}{64}$ 4. $\frac{37}{64}$

114. 5 digited numbers are formed by using {0, 1, 2, 3, 4, 5}. The probability that the selected number is divisible by 6 is

1. $\frac{9}{100}$ 2. $\frac{9}{25}$ 3. $\frac{9}{50}$ 4. $\frac{3}{50}$

115. One ticket is selected at random from 100 tickets numbered 00, 01, 02, ... 99. If S and T are the sum and product of the digits formed on the ticket then the probability for S = 7 and T = 6 is

1. $\frac{1}{50}$ 2. $\frac{1}{25}$ 3. $\frac{1}{100}$ 4. $\frac{49}{50}$

116. A bag contains apples and oranges, five in all and atleast one of each, all combinations being equally likely. If one fruit is selected at random from the bag, assuming all fruits are distinguishable, the probability that it is an orange is

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

117. In the quadratic equation $ax^2+bx+c=0$, the coefficients a, b, c take distinct values from the set {1, 2, 3}. The probability that the roots of the equation are real is

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

118. There are 10 stations between A and B. A train is to stop at three of these 10 stations. The probability that no two of these stations are consecutive is

1. $\frac{^8c_3}{^{10}c_3}$ 2. $\frac{^9c_3}{^{10}c_3}$ 3. $\frac{^7c_3}{^{10}c_3}$ 4. $\frac{^{10}c_3}{^{12}c_3}$

119. Given two events A and B, if the odds against A are 2 to 1, and those in favour of $A\cup B$ are 3 to 1, then

1. $\frac{1}{3}\le P(B)\le\frac{1}{2}$ 2. $\frac{1}{2}\le P(B)\le\frac{3}{4}$

3. $\frac{5}{12}\le P(B)\le\frac{3}{4}$ 4. $0\le P(B)\le 1$

120. If A is an event of a random experiment with non-zero probability, independent of every event of the experiment, then P(A)

1. equals $P(\bar{A})$ 2. equals 1

3. equals $\frac{1}{2}$ 4. cannot be determined

121. A student appears for test I, II and III. The student is successful if he passes either in tests I and II or test I and III. The probabilities of the student passing in test I, II and III are p, q and $\frac{1}{2}$ respectively. If the probability that the student is successful is $\frac{1}{2}$ then

1. $p=q=1$ 2. $p=q=\frac{1}{2}$

3. $p=1,q=0$ 4. $p=1,q=\frac{1}{2}$

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

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

123. There are four machines and it is known that exactly two of them are faulty. They are tested one by one in a random order till both the faulty machines are identified. Then the probability that only two tests are needed is

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

124. If the papers of 4 students can be checked by any one of the seven teachers , then the probability that all the four papers are checked by exactly two teachers is

1. $\frac{12}{49}$ 2. $\frac{2}{7}$ 3. $\frac{32}{343}$ 4. $\frac{2}{343}$

125. The chance of an event happening is the square of the chance of a second event but the odds against the first are the cube of the odds against the second. The chance of each event is

1. $\frac{1}{9},\frac{1}{3}$ 2. $\frac{1}{8},\frac{1}{4}$ 3. $\frac{1}{9},\frac{1}{7}$ 4. $\frac{1}{2},\frac{1}{4}$

126. If four digits from {1, 2, 3, ... 9} are taken at random and multiplied together, then the chance that the last digit in the product be 1, 3, 7 or 9 is

1. $\frac{9}{^9P_4}$ 2. $\frac{1}{10}$ 3. $\frac{1}{^9c_4}$ 4. 0

127. A and B play a game taking alternative chances, the probability for a success is p and failure is q. If A takes the first chance, probability for his success is

1. $\frac{p}{(1-q^2)}$ 2. $\frac{q}{(1-p^2)}$ 3. $p(1-p^2)$ 4. $\frac{1}{1-q^2}$

128. In a team of 10 persons there is a married couple, from them a committee of 5 is to be made, then the probability for the couple being either included or excluded is

1. $\frac{^8c_3}{^{10}c_5}$ 2. $\frac{^8c_5}{^{10}c_5}$ 3. $\frac{2(^8c_5)}{^{10}c_5}$ 4. $\frac{2(^8p_3)}{^{10}p_5}$

129. S = {1, 2, 3, ... 20} if 3 numbers are chosen at random from S, the probability for they are in A.P. is

1. $\frac{3}{38}$ 2. $\frac{35}{33}$ 3. $\frac{33}{35}$ 4. $\frac{1}{38}$

130. A box contains 100 tickets numbered 1, 2, ..., 100. Two tickets are chosen at random. It is given that the maximum number on the two chosen tickets is not more than 10. The probability that the minimum number on them is 5 is

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

131. A positive integer is selected at random. If A be the event that it is divisible by 5 and B be the event that it has zero at the units place, then $A\cup\bar{B}$ is

1. An impossible event 2. a certain event

3. $\bar{A}\cap B$

4. the event that the number has a non-zero digits at the units place

132. If S is a sample space containing 8 elements then the number of events of S

1. 8 2. 64 3. 256 4. 512

133. A box contains tickets numbered 1 to N. n tickets are drawn at random with replacement. The largest number on the selected ticket is K, $(K \le N)$ is

1. $\left(\frac{K}{N}\right)^n$ 2. $\left(\frac{K}{N}\right)^{n-1}$

3. $\frac{K^n - K^{n-1}}{N^n}$ 4. $\frac{K^n - (K-1)^n}{N^n}$

134. An urn contains 6 white and 4 black balls. A fair die whose faces are numbered from 1 to 6 is rolled and number of balls equal to that of the number appearing on the die is drawn from the urn at random. The probability that all those are white is

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

135. The probability that a certain beginner at golf gets a good shot if he uses the correct club is $\frac{1}{3}$ and the probability of a good shot with incorrect club is $\frac{1}{4}$. In his hag there are 5 different clubs, only one of which is correct for the shot in question. If he uses a club at random and takes a stroke the probability that he gets a good shot is

1. $\frac{1}{3}$ 2. $\frac{1}{12}$ 3. $\frac{4}{15}$ 4. $\frac{7}{12}$

136. Four digited numbers without repetition are formed using the digits 2, 3, 4, 5, 6, 7. If one is selected at random the probability that it is divisible by 25 is

1. $\frac{9}{10}$ 2. $\frac{8}{10}$ 3. $\frac{1}{10}$ 4. $\frac{1}{15}$

137. If four dice are thrown together, then the probability that the sum of the numbers appearing on them is 13 is

1. $\frac{5}{216}$ 2. $\frac{35}{324}$ 3. $\frac{11}{432}$ 4. $\frac{11}{216}$

138. First bag contains 5 red and 4 white balls. Second bag contains 7 red and 5 white balls. One ball is drawn from the first bag and two balls are drawn from the second bag. The probability that out of 3 balls drawn, two are white and one is red is

1. $\frac{95}{594}$ 2. $\frac{190}{297}$ 3. $\frac{95}{297}$ 4. $\frac{190}{594}$

139. A bag contains 6 balls two balls are drawn and found them to be red. The probability that five balls in the bag are red

1. $\frac{5}{6}$ 2. $\frac{12}{17}$ 3. $\frac{1}{3}$ 4. $\frac{2}{7}$

140. A bag contains some white and some black balls, all combinations of balls being equally likely. The total number of balls in the bag are 10. If three balls are drawn at random without repalacement and all of them are found to be black, the probability that the bag contains 1 white and 9 black balls

1. $\frac{14}{55}$ 2. $\frac{12}{55}$ 3. $\frac{8}{55}$ 4. $\frac{2}{11}$

KEY

1. 1	2. 3	3. 3	4. 3	5. 2
6. 4	7. 3	8. 4	9. 1	10. 2
11. 4	12. 3	13. 3	14. 2	15. 3
16. 3	17. 2	18. 4	19. 3	20. 3
21. 2	22. 3	23. 3	24. 3	25. 3
26. 3	27. 3	28. 3	29. 3	30. 3
31. 3	32. 3	33. 3	34. 3	35. 3
36. 3	37. 2	38. 2	39. 3	40. 2
41. 3	42. 3	43. 2	44. 2	45. 3
46. 2	47. 3	48. 3	49. 3	50. 2
51. 2	52. 2	53. 3	54. 3	55. 3
56. 3	57. 3	58. 2	59. 3	60. 3
61. 3	62. 4	63. 2	64. 3	65. 3
66. 2	67. 2	68. 2	69. 3	70. 2
71. 2	72. 2	73. 2	74. 3	75. 2
76. 3	77. 3	78. 2	79. 3	80. 3
81. 2	82. 3	83. 3	84. 3	85. 3
86. 3	87. 2	88. 2	89. 2	90. 3
91. 3	92. 1	93. 4	94. 3	95. 3
96. 1	97. 3	98. 2	99. 3	100. 1
101. 3	102. 1	103. 3	103a.1	104. 3
105. 2	106. 2	107. 2	108. 3	109. 3
110. 3	111. 1	112. 2	113. 3	114. 3
115. 1	116. 4	117. 2	118. 1	119. 3
120. 2	121. 3	122. 2	123. 2	124. 1
125. 1	126. 3	127. 1	128. 3	129. 1
130. 1	131. 2	132. 3	133. 4	134. 1
135. 3	136. 4	137. 2	138. 3	139.4
140.1				

HINTS

5. $P\left(\frac{A}{A\cup B}\right) = \frac{P\left[(A\cup B)\cap A\right]}{P(A\cup B)} = \frac{P(A)}{P(A\cup B)}$

8. $P(T_1) = 0.5, P(T_2) = 0.7, P(\overline{T_1}\cap\overline{T_2}) = 0.2$

$P(T_1\cup T_2) = 1 - P(\overline{T_1}\cap\overline{T_2}) = 1 - 0.2 = 0.8$

$P(T_1\cap T_2) = 0.4 \qquad \therefore P\left(\frac{T_2}{T_1}\right) = 0.8$

11. $P(Fair\cap Rich\cap Girl) = P(Fair)$

P(Rich).P(Girl)= $\frac{5}{512}$ Fairness, Richness, Girls all these qualities are independent.

12.

1st group	2nd group	3rd group
G	B	B
B	G	B
B	B	G

16. P(E=3 or 2 favourable critics)

$P(E) = P(ABC) + P(AB\overline{C}) + P(A\overline{B}C) + P(\overline{A}BC)$

$= \frac{209}{343}$

17. $P(E)=P(B_1).P\left(\frac{A}{B_1}\right)+P(B_2).P\left(\frac{A}{B_2}\right)$

$=\frac{1}{2}.\frac{90}{100}+\frac{1}{2}.\frac{55}{100}=\frac{29}{40}$

B_1 =selection of man

B_2 =selection of woman

A=employed

19. $P(E)=P(A).P\left(\frac{H}{A}\right)+P(B).P\left(\frac{H}{B}\right)$

21. $P(M\cup B)=P(M)+P(B)-P(M\cap B)$

$=\frac{10}{30}+\frac{1}{2}-\frac{5}{30}=\frac{2}{3}$

22. $n(S)=100, n(E)=9, P(E)=\frac{9}{100}$

Let $x=1, x^2-1=0\notin S$ hence $x\neq 1$

$x=2, x^2-1=3\in S$ hence $2\in E$

x = 2, 3, 4, 5, 6, 7, 8, 9, 10 $\in$ E

25. $P(\overline{A}).P(B)=\frac{8}{25}$; $P(A).P(\overline{B})=\frac{3}{25}$

verification method.

26. $n(S)={}^{100}C_1, n(A)={}^{55}C_1$

{1, 2, 50, 51, ... 100, 49, 48}

32. $n(A)={}^5C_3+{}^5C_4+{}^5C_5, n(A\cap B)={}^5C_4$

$P\left(\frac{A}{B}\right)=\frac{n(A\cap B)}{n(A)}$; $P\left(\frac{A}{B}\right)=\frac{5}{16}$

33. $\frac{{}^nC_r}{2^n}=\frac{{}^{10}C_2}{2^{10}}=\frac{45}{2^{10}}$

45. $P\left(\frac{B}{A}\right)=P(B)=P(x>a)$

46. P(even) = 2P(odd); P(even)+P(odd)=1

$P(E_1\&O_2)+P(O_1\&E_2)=\frac{2}{3}.\frac{1}{3}+\frac{1}{3}.\frac{2}{3}=\frac{4}{9}$

47. $P(E_1\&E_2)+P(O_1\&O_2)=\frac{2}{3}.\frac{2}{3}+\frac{1}{3}.\frac{1}{3}=\frac{5}{9}$

51. P (Both the dice show less than or equals to 4)

$=\frac{4}{6}.\frac{4}{6}=\frac{4}{9}$. $\therefore P(A)=1-\frac{4}{9}=\frac{5}{9}$

52. n(S)=30. The sum is even if both numbers appeared are different even numbers (or) different odd numbers. n(E)=3.2+3.2=12; $P(E)=\frac{12}{30}=\frac{2}{5}$

61. $P(E)=P(P_1e_2)+P(e_1P_2)-P(2,2)$

$=\frac{3}{6}.\frac{3}{6}+\frac{3}{6}.\frac{3}{6}-\frac{1}{6}.\frac{1}{6}=\frac{17}{36}$

Prime (P) - 2, 3, 5; Even (e)n - 2, 4, 6

62. $n(S)=6^2=36;$

$n(E)=1.0+1.1+1.2+1.3+1.4+1.5=15;$

$P(E)=\frac{5}{12}$

die no. of points on the die turned

1 0 1 1,2 1,2,3 1,2,3,4 1,2,3,4,5

2 1 2 3 4 5 6

66. $n(S)={}^{52}C_5; n(E)={}^{13}C_1.{}^{48}C_1$

$P(E)=\frac{{}^{13}C_1\times{}^{48}C_1}{{}^{52}C_5}$

68. The person draws card untill he draws a spade, hence third trial must be a success.

89. $P(E)=P(B_1).P\left(\frac{A}{B_1}\right)+P(B_2).P\left(\frac{A}{B_2}\right)$

$=\frac{5}{12}.\frac{8}{16}+\frac{7}{12}.\frac{7}{16}=\frac{89}{192}$

91. $P(E)=\frac{1}{2}.\frac{{}^5C_1.{}^3C_1}{{}^8C_2}+\frac{1}{2}.\frac{{}^5C_1.{}^4C_1}{{}^9C_2}=\frac{275}{504}$

Probability of selecting each bag = $\frac{1}{2}$

93. $n(S)=6!n(E)={}^4P_2.2!3!$

$P(E)=\frac{1}{5}$

102. $P(E)=\frac{1}{3!}.\left(\frac{1}{2!}\right)=\frac{1}{12}$

103. $P(E)=\left[\frac{1}{2!}-\frac{1}{3!}+\frac{1}{4!}-\frac{1}{5!}\right]=\frac{11}{30}$

105. $n(S)=\frac{2n!}{(n!)^2}.\frac{1}{2!};n(E)=\frac{(2n-2)!}{((n-1)!)^2}.\frac{1}{2!}.2!$

109. $n(S)=\frac{5!}{2!}-\frac{4!}{2!}=\frac{4\times 4!}{2!}$

$n(E)=\frac{4!}{2!}+\frac{4!}{2!}-\frac{3!}{2!}$

112. $P(A)=\frac{{}^{48}C_{10}}{{}^{52}C_{10}}$ $P(B)=\frac{{}^4c_1}{{}^{42}c_1}$; $P(A).P(B)$

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

114. $n(s)={}^6p_5-{}^5p_4=600$,

$n(A) = Without\, 'O' .....5\ digits,\ without\ '3' .....5\ digits \Big\} 108$

115. $n(s) = {}^{100}C_1, n(A) = (1,6),(6,1) = 2$

116. 1 & 4 $\rightarrow$ 1/4 2 & 3 $\rightarrow$ 1/4 3 & 2 $\rightarrow$ 1/4

4 & 1 $\rightarrow$ 1/4 Ans: $\frac{1}{4}\left[\frac{4}{5}+\frac{3}{5}+\frac{2}{5}+\frac{1}{5}\right] = \frac{1}{2}$

117. $b^2 - 4ac \ge 0, b = 3;\ a = 1\ or\ 2;\ c = 1\ or\ 2$

118. $P(A) = \frac{{}^{(n-r+1)}C_r}{{}^{n}C_r}$

119. $P(A \cup B) - P(A) \le P(B) \le P(A \cup B),$

$\frac{3}{4} - \frac{1}{3} \le P(B) \le \frac{3}{4},\ \frac{5}{12} \le P(B) \le \frac{3}{4}$

120. $P(A \cap A) = P(A) ==> P(A) = 1$

121. $P(E) = P(T_1T_2T_3) + P(T_1T_2\overline{T}_3) + P(T_1\overline{T}_2\overline{T}_3)$

122. No. of tosses 2 4 6 ..... probability =

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

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

123. $P(E) = \frac{2}{4}.\frac{1}{3} = \frac{1}{6}$

125. $p_1 = p_2^2,\ \frac{q_1}{p_1} = \left(\frac{q_2}{p_2}\right)^3$, By verification

126.

$n(s) = {}^9C_4, n(A) = {}^4C_4 . A = \{1,3,7,9\}$

127. Required probability = $\frac{p}{1-q^2}$

128. $n(s) = {}^{10}C_5,$

$n(A) = {}^2C_2 . {}^8C_3 + {}^8C_5 = 2.({}^8C_3)$

129. $n(s) = {}^{20}C_3,$

$n(A) = 10.9,$

$n(A) = (2n-2) + (2n-4) + ...2$

$= n(n-1)$

130. $n(s) = {}^{10}C_2 = 45,$

$n(A) = \{(5,6),(5,7)\ \ (5,8),\ (5,9),\ (5,10)\}$

131. $\Theta\ B \subset A \Rightarrow A \cup \overline{B} = S \Rightarrow A \cup \overline{B}$ is a certain event

132. $n(B)^{n(A)} = 2^8$

133. $n(s) = k^n,\ n(A) = (k)^n - (k-1)^n$

134. 1 2................6

$\left[\frac{{}^6C_1}{{}^{10}C_1} + \frac{{}^6C_2}{{}^{10}C_2} + ...\frac{{}^6C_6}{{}^{10}C_6}\right]\frac{1}{6}$

135. B_1 = choosing correct club,

B_2 = choosing wrong club,

A = getting a good shot,

$$P(E) = P(B_1).P\left(\frac{A}{B_1}\right) + P(B_2).P\left(\frac{A}{B_2}\right)$$

136. $n(s) = {}^6P_4,\ n(A) = {}^4P_2 + {}^4P_2$

137. $n(s) = 6^4;\ n(A) = 140$

138. $\frac{{}^4C_1}{{}^9C_1} \times \frac{{}^7C_1\,{}^5C_1}{{}^{12}C_2} + \frac{{}^5C_1}{{}^9C_1} \times \frac{{}^5C_2}{{}^{12}C_2} = \frac{95}{297}$

LEVEL- III

1. If A, B and C are three events such that $P(A) = 0.3,\ P(B) = 0.4,\ P(C) = 0.8,$ $P(A \cap B) = 0.12,\ P(A \cap C) = 0.28,$ $P(A \cap B \cap C) = 0.09$ and $P(A \cup B \cup C) \ge 0.75,$ then the limits of $P(B \cap C)$ are

1. $[0.32, 0.52]$ 2. $[0.23, 0.48]$

3. $[0.19, 0.44]$ 4. $[0.21, 0.19]$

2. If 3 squares are selected at random on a chess board having 8×8 squares, then the probability that they will be in a diagonal line is

1. $\frac{\left\{{}^8c_3 + 2\left({}^7c_3 + {}^6c_3 + {}^5c_3 + {}^4c_3 + {}^3c_3\right)\right\}}{{}^{64}c_3}$

2. $\frac{2\left\{{}^8c_3 + \left({}^7c_3 + {}^6c_3 + {}^5c_3 + {}^4c_3 + {}^3c_3\right)\right\}}{{}^{64}c_3}$

3. $\dfrac{2\left\{{}^{8}c_3+2\left({}^{7}c_3+{}^{6}c_3+{}^{5}c_3+{}^{4}c_3+{}^{3}c_3\right)\right\}}{{}^{64}c_3}$

4. $\dfrac{\left\{{}^{8}c_3+\left({}^{7}c_3+{}^{6}c_3+{}^{5}c_3+{}^{4}c_3+{}^{3}c_3\right)\right\}}{{}^{64}c_3}$

3. If 4 squares are selected at random on a chess board having 8×8 squares the probability that they will be in a diagonal line is

1. $\dfrac{\left\{{}^{8}c_4+2\left({}^{7}c_4+{}^{6}c_4+{}^{5}c_4+{}^{4}c_4\right)\right\}}{{}^{64}c_4}$

2. $\dfrac{2\left\{{}^{8}c_4+\left({}^{7}c_4+{}^{6}c_4+{}^{5}c_4+{}^{4}c_4\right)\right\}}{{}^{64}c_4}$

3. $\dfrac{2\left\{{}^{8}c_4+2\left({}^{7}c_4+{}^{6}c_4+{}^{5}c_4+{}^{4}c_4\right)\right\}}{{}^{64}c_4}$

4. $\dfrac{\left\{{}^{8}c_4+\left({}^{7}c_4+{}^{6}c_4+{}^{5}c_4+{}^{4}c_4+{}^{3}c_4\right)\right\}}{{}^{64}c_4}$

4. If 8 squares are selected at random on a chess board having 8×8 squares the probability that they will be in a diagonal line is

1. $\dfrac{{}^{8}c_8}{{}^{64}c_8}$ 2. $\dfrac{2\times{}^{8}c_8}{{}^{64}c_8}$ 3. $\dfrac{4\times{}^{8}c_8}{{}^{64}c_8}$ 4. $\dfrac{6\times{}^{8}c_8}{{}^{64}c_8}$

5. Two squares of a chess board having 8×8 squares are selected at random. The probability that they have exactly one corner in common is

1. $\dfrac{\left\{7+2\left(6+5+4+3+2+1\right)\right\}}{{}^{64}c_2}$

2. $\dfrac{2\left\{7+\left(6+5+4+3+2+1\right)\right\}}{{}^{64}c_2}$

3. $\dfrac{2\left\{7+2\left(6+5+4+3+2+1\right)\right\}}{{}^{64}c_2}$

4. $\dfrac{\left\{7+\left(6+5+4+3+2+1\right)\right\}}{{}^{64}c_2}$

6. Two squares of a chess board having 8×8 squares are selected at random the probability that they have a side in common is

1. $\dfrac{56}{{}^{64}c_2}$ 2. $\dfrac{112}{{}^{64}c_2}$ 3. $\dfrac{168}{{}^{64}c_2}$ 4. $\dfrac{268}{{}^{64}c_2}$

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

1. $\dfrac{3}{16}$ 2. $\dfrac{3}{8}$ 3. $\dfrac{5}{8}$ 4. $\dfrac{7}{8}$

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

1. $\dfrac{3}{16}$ 2. $\dfrac{3}{8}$ 3. $\dfrac{5}{8}$ 4. $\dfrac{7}{8}$

9. A determinant is chosen at random from the set of all determinants of order 2 with elements 0 or 1 only. The probability that the determinant is non-zero is

1. $\dfrac{3}{16}$ 2. $\dfrac{3}{8}$ 3. $\dfrac{5}{8}$ 4. $\dfrac{7}{8}$

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

1. $\dfrac{3}{16}$ 2. $\dfrac{3}{8}$ 3. $\dfrac{5}{8}$ 4. $\dfrac{7}{8}$

11. A set P contains n elements. A function from P to P is picked up at random. The probability that this function is onto is

1. $\dfrac{\angle n}{n^n}$ 2. $\dfrac{\angle n-1}{n^n}$

3. $\dfrac{\left(n^n-\angle n\right)}{n^n}$ 4. $\dfrac{\angle n-1}{\angle n}$

12. A set P contains n elements. A function from P to P is picked up at random. The probability that this function is into is

1. $\dfrac{\angle n}{n^n}$ 2. $\dfrac{\angle n-1}{n^n}$

3. $\dfrac{\left(n^n-\angle n\right)}{n^n}$ 4. $\dfrac{\angle n-1}{\angle n}$

13. Let S be a set containing n elements. If two sets A and B of S are picked at random from the set of all sub sets of S, then the probability that A and B have the same number of elements is

1. $\dfrac{2^n}{2^{2n}}$ 2. $\dfrac{{}^{2n}c_n}{2^n}$ 3. $\dfrac{{}^{2n}c_n}{2^{2n}}$ 4. $\dfrac{{}^{2n}c_n}{3^{2n}}$

14. A is a set containing n elements. A subset P of A is chosen at random. The set A is reconstructed by replacing the elements of the subset of P. A subset Q of A is chosen at random. The probability that P and Q have no common element is

1. $\dfrac{2^n}{3^n}$ 2. $\dfrac{2^n}{4^n}$ 3. $\dfrac{3^n}{4^n}$ 4. $\dfrac{3^n}{5^n}$

15. 5 cards are drawn at random from a well shuffled pack of 52 playing cards. If it is known that there will be at least 3 hearts, the probability that all the 5 are hearts is

1. $\dfrac{{}^{13}c_5}{{}^{52}c_5}$ 2. $\dfrac{{}^{13}c_5}{{}^{13}c_3\times{}^{39}c_2+{}^{13}c_4\times{}^{39}c_1+{}^{13}c_5}$

3. $\dfrac{{}^{13}c_5}{{}^{13}c_3+{}^{13}c_4+{}^{13}c_5}$ 4. $\dfrac{{}^{13}c_5}{{}^{13}c_3\times{}^{13}c_4\times{}^{13}c_5}$

16. 5 cards are drawn at random from a well shuffled pack of 52 playing cards. If it is known that there will be at least 3 hearts, the probability that there are 4 hearts is

1. $\frac{{}^{13}c_4}{{}^{13}c_3 + {}^{13}c_4 + {}^{13}c_5}$

2. $\frac{{}^{13}c_4}{{}^{13}c_3 \times {}^{39}c_2 + {}^{13}c_4 \times {}^{39}c_1 + {}^{13}c_5}$

3. $\frac{{}^{13}c_4 \times {}^{39}c_1}{{}^{13}c_3 \times {}^{39}c_2 + {}^{13}c_4 \times {}^{39}c_1 + {}^{13}c_5}$

4. $\frac{{}^{13}c_5}{{}^{13}c_3 \times {}^{13}c_4 \times {}^{13}c_5}$

17. 5 cards are drawn at random from a well shuffled pack of 52 playing cards. If it is known that there will be at least 3 hearts, the probability that there are 3 hearts is

1. $\frac{{}^{13}c_3}{{}^{13}c_3 + {}^{13}c_4 + {}^{13}c_5}$

2. $\frac{{}^{13}c_3 \times {}^{39}c_2}{{}^{13}c_3 \times {}^{39}c_2 + {}^{13}c_4 \times {}^{39}c_1 + {}^{13}c_5}$

3. $\frac{{}^{13}c_3}{{}^{13}c_3 \times {}^{39}c_2 + {}^{13}c_4 \times {}^{39}c_1 + {}^{13}c_5}$

4. $\frac{{}^{13}c_3}{{}^{13}c_3 \times {}^{13}c_4 \times {}^{13}c_5}$

18. Two cards are drawn at random from a well shuffled pack of 52 playing cards. If one is found to be a king card, the probability that the other card is also king is

1. $\frac{3}{13}$ 2. $\frac{32}{33}$ 3. $\frac{1}{33}$ 4. $\frac{2}{33}$

19. Two cards are drawn one after an other at random from a well shuffled pack of 52 playing cards, if the 1st card is known to be king the probability that the second card is also king is

1. $\frac{12}{13}$ 2. $\frac{1}{13}$ 3. $\frac{1}{17}$ 4. $\frac{12}{17}$

20. 20 pairs of shoes are there in a closet. Four shoes are selected at random. The probability that they are pairs is

1. $\frac{{}^{20}c_4}{{}^{40}c_4}$ 2. $\frac{{}^{20}c_2}{{}^{40}c_4}$ 3. $\frac{{}^{20}c_2}{{}^{20}c_2}$ 4. $\frac{{}^{20}c_4}{{}^{20}c_4}$

21. 20 pairs of shoes are there in a closet. Four shoes are selected at random. The probability that there is exactly one pair is

1. $\frac{{}^{20}c_1}{{}^{40}c_4}$ 2. $\frac{{}^{20}c_1 \times \left({}^{38}c_2 - 19\right)}{{}^{40}c_4}$

3. $\frac{{}^{20}c_1 \times {}^{38}c_2}{{}^{40}c_4}$ 4. $\frac{{}^{20}c_1 \times {}^{19}c_2}{{}^{40}c_4}$

22. 20 pairs of shoes are there in a closet. Four shoes are selected at random. The probability that there is at least one pair is

1. $\frac{40}{40} \times \frac{38}{39} \times \frac{36}{38} \times \frac{34}{37}$ 2. $1 - \frac{40}{40} \times \frac{38}{39} \times \frac{36}{38} \times \frac{34}{37}$

3. $\frac{1 - {}^{20}c_4}{{}^{40}c_4}$ 4. $\frac{1 - {}^{40}c_4}{{}^{20}c_4}$

23. 10 pairs of shoes are there in a closet. Four shoes are selected at random. The probability that there will be at least one pair is

1. $\frac{224}{343}$ 2. $\frac{10}{{}^{10}c_4}$ 3. $\frac{99}{323}$ 4. $\frac{89}{323}$

24. 8 pairs of shoes are there in a closet. Four shoes are selected at random. The probability that there will be at least one pair is

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

25. The probability that the birth days of 12 girls will fall on 12 different calender months of a year is

1. $\frac{1}{12^{11}}$ 2. $\frac{{}^{12}c_{12}}{12^{12}}$ 3. $\frac{{}^{12}p_{12}}{12^{12}}$ 4. $\frac{{}^{12}p_{12}}{12^{6}}$

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

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

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

27. A lot contains 20 articles. The probability that the lot contains exactly 2 defective articles is 0.4 and the probability that it contains exactly 3 defective articles is 0.6. Articles are drawn from the lot at random one by one, without replacement and tested till all defective articles are found. The probability that the testing procedure ends at the 12th testing is

1. $\frac{11}{1900}$ 2. $\frac{44}{1900}$ 3. $\frac{66}{1900}$ 4. $\frac{99}{1900}$

28. A lot contains 50 defective and 50 non-defective bulbs. Two bulbs are drawn at random, one at a time, with replacement. The events A, B, C are defined as A = {the first bulb is defective}, B = {the second bulb is non defective}, C = {the two bulbs are both defective or both non defective}. Then
(i) A, B, C are pair wise independent
(ii) A, B, C are independent
1. only (1) is true 2. (i) and (ii) are true
3. only (ii) is true 4. (i) and (ii) are false

29. An urn contains 2 white and 2 black balls. A ball is drawn at random. If it is white it is not replaced into the urn. Otherwise it is replaced along with ball of the same colour. The process is repeated. The probability that the third ball drawn is black is

1. $\frac{15}{29}$ 2. $\frac{11}{30}$ 3. $\frac{7}{30}$ 4. $\frac{23}{30}$

30. Set A has m elements and set B has n elements. All the relations from A to B are formed. If a relation is taken at random, the probability that the relation is a function is

1. $\frac{n^m}{2^{mn}}$ 2. $\frac{m^n}{2^{mn}}$ 3. $\frac{m^m}{2^{mn}}$ 4. $\frac{n^n}{2^{mn}}$

31. The excepted number of failures preceding the first success in an infinite series of independent trials with constant probability p is

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

32. A box contains 2 fifty paise coins, 5 twentyfive paise coinis and a certain number $n(\geq 2)$ of ten and five paise coins. Five coins are taken out of the box at random. The probability that the total value of these 5 coins is less than one rupee and fifty paise is

1. $\frac{10(n+2)}{{}^{(n+7)}c_5}$ 2. $1-\frac{10(n+2)}{{}^{(n+7)}c_5}$

3. $\frac{5(n+2)}{{}^{(n+2)}c_5}$ 4. $1-\frac{5(n+2)}{{}^{n}c_5}$

33. A box contains 3 red and 7 white balls. One ball is drawn at random and in its place a ball of the other colour is placed in the box. Now if one ball is drawn from the box then the probability that it is red is

1. 0.98 2. 0.89 3. 0.43 4. 0.34

34. If n positive integers are taken at random and multiplied together, then the chance that the last digit in the product is 2, 4, 6 or 8 is

1. $\frac{5^n-3^n}{5^n}$ 2. $\frac{4^n-2^n}{5^n}$ 3. $\frac{3^n-2^n}{5^n}$ 4. $\frac{3^n-2^n}{4^n}$

35. A and B are two independent witness cases. The probability that A will speak truth is x and the probability that B will speak the truth is y. A and B agree in a certain statement. The probability that the statement is true is

1. $\frac{xy}{1-xy}$ 2. $\frac{xy}{1-x-y+2xy}$

3. $\frac{2xy}{x-y}$ 4. $\frac{xy}{1-x-y}$

36. Given that the sum of two non-negative quantities is 200, the probability that their product is not less than 3/4 times their greatest product value is

1. $\frac{1}{2}$ 2. $\frac{7}{16}$ 3. $\frac{9}{16}$ 4. $\frac{10}{16}$

37. Purse I contains a one rupee coin and nine 50 paise coins and purse II contains ten 50 paise coins. 9 coins are transferred from purse I to purse II and again from purse II to purse I randomly. The probability of finding one rupee coin in the purse I after these transfers is

1. $\frac{1}{10}$ 2. $\frac{9}{19}$ 3. $\frac{10}{19}$ 4. $\frac{9}{10}$

38. Two numbers X and Y are chosen at random (without replacement) from among the numbers 1, 2, 3, ... 3n. The probability that X^3+Y^3 is divisible by 3 is

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

39. A subset A of X = {1, 2, 3, ..., 100} is chosen at random. The set X is reconstructed by replacing the elements of A and another subset B of X is chosen at random. The probability that $A\cap B$ contains exactly 10 elements is

1. $\frac{1}{10}$ 2. ${}^{100}c_{10}\left(\frac{1}{2}\right)^{100}$

3. ${}^{100}c_{10}\left(\frac{1}{4}\right)^{100}$ 4. ${}^{100}c_{10}\frac{3^{90}}{4^{100}}$

40. A number denoted by X is chosen at random from the set {1, 2, 3, 4}. A second number denoted by Y is chosen at random from the set {1.....X}, the probability that Y = 1 is

1. $\frac{1}{4}$ 2. $\frac{1}{2}$ 3. $\frac{25}{48}$ 4. $\frac{23}{48}$

41. A coin is tossed (m + n) times (m < n). The probability for getting atleast 'n' consecutive heads is

1. $\frac{m+2}{2^{n+1}}$ 2. $\frac{n+2}{2^{m+1}}$ 3. $\frac{m}{2^{n+1}}$ 4. $\frac{n}{2^{m+1}}$

42. Square matrices of order 3 are considered. If a sub matrix is chosen at random, the probability that it is 1×3 matrix is

1. $\frac{3}{49}$ 2. $\frac{2}{49}$ 3. $\frac{1}{49}$ 4. $\frac{1}{7}$

43. The probability of forming a five digit number using the digits of the decimal system which reads alike from left to right and right to left is

1. 0.02 2. 0.01 3. 0.03 4. 0.2

44. By using the digits 1, 2, 3, 4, 5, 6 four digited numbers are formed. If a number is selected from them then the chance that the number reads alike from left to right and right to left is

1. $\frac{1}{36}$ 2. $\frac{1}{6}$ 3. $\frac{1}{1296}$ 4. $\frac{1}{216}$

45. In a multiple choice question, there are four alternative answers, of which one or more are correct. A candidate decides to tick the answers at random. If he is allowed up to 3 chances to answer the question, the probability that he will get marks in the question is

1. $\frac{1}{15}$ 2. $\frac{621}{3375}$ 3. $\frac{1}{5}$ 4. $\frac{4}{15}$

46. If four whole numbers taken at random are multiplied together, then the probability that the last digit in the product is 1, 3, 7 or 9 is

1. $\frac{16}{625}$ 2. $\frac{32}{625}$ 3. $\frac{64}{625}$ 4. $\frac{256}{675}$

47. In a test, an examinee either guesses or copies or knows the answer to a multiple choice question with four choices. The probability that he makes a guess is $\frac{1}{3}$, the probability that he copies the answer is $\frac{1}{6}$ and the probability of his answer is correct given that he copied it is $\frac{1}{8}$. The probability that he knows the answer to the question given that he correctly answered it is

1. $\frac{23}{24}$ 2. $\frac{24}{29}$ 3. $\frac{23}{49}$ 4. $\frac{11}{24}$

48. If three dice are thrown, then the probability that they show the numbers in A.P. is

1. $\frac{1}{36}$ 2. $\frac{1}{18}$ 3. $\frac{2}{9}$ 4. $\frac{5}{18}$

49. A has 3 tickets of a lottery containing 3 prizes and 9 blanks. B has two tickets of another lottery containing 2 prizes and 6 blanks. The ratio of their chances of success is

1. $\frac{32}{55}:\frac{15}{28}$ 2. $\frac{32}{55}:\frac{13}{28}$ 3. $\frac{34}{55}:\frac{13}{28}$ 4. $\frac{34}{55}:\frac{15}{28}$

50. A coin is so biased that the probability of falling head when tossed is $\frac{1}{4}$. If the coin is tossed 5 times the probability of obtaining 2 heads and 3 tails, with heads occurring in succession is

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

51. S = {1, 2, 3, ... 11} if 3 numbers are chosen at random from S, the probability for they are in G.P.

1. $\frac{7}{{}^{11}c_3}$ 2. $\frac{9}{{}^{11}c_3}$ 3. $\frac{5}{{}^{11}c_3}$ 4. $\frac{4}{{}^{11}c_3}$

52. A coin is tossed 3 times. If E denotes the event in which two heads appear atleast and F denotes an event in which first head comes then $P\left(\frac{E}{F}\right)=$

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

53. A three figure number is formed by the digits 4, 5, 6, 7, 8 (no digit being repeated in any number). The probability that the number formed is divisible by 9 is

1. $\frac{1}{5}$ 2. $\frac{1}{10}$ 3. $\frac{1}{15}$ 4. $\frac{1}{6}$

54. Out of (2n+1) tickets consecutively numbered, three are drawn at random. The chance that the numbers on them are in A.P. is

1. $\frac{n}{n^2-1}$ 2. $\frac{3n}{n^2-1}$ 3. $\frac{3n}{4n^2-1}$ 4. $\frac{3n}{4n^2+2n-1}$

55. A box contains 24 identical balls of which 12 are white and 12 are black. The balls are drawn at random from the box one at a time with replacement. The probability that a white ball is drawn for the 4th time on the 7th draw is

1. $\frac{5}{64}$ 2. $\frac{27}{32}$ 3. $\frac{5}{32}$ 4. $\frac{1}{2}$

56. The probability of India winning a test match against West Indies is $\frac{1}{2}$. Assuming independence from match to match, the probability that in a 5 match series. India's second win occurs at third test is

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

57. Out of 3n consecutive integers, three are selected at random, then the chance that their sum is divisible by 3 is

1. $\frac{3n^2-3n+2}{(3n-1)(3n-2)}$ 2. $\frac{1}{(3n-1)(3n-2)}$

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

58. A positive integer n not exceeding 100 is chosen in such a way that if $n \le 50$, then the probability of choosing n is p, and if n>50, then the probability of choosing n is 3p. The probability that a perfect square is chosen is

1. 0.05 2. 0.065 3. 0.08 4. 0.1

59. 3 white balls and 5 black balls are placed in a bag and three men draw a ball in succession (the balls drawn not being replaced), until a white ball is drawn, the ratio of their respective chances is

1. 27:18:11 2. 11:18:27
3. 18:11:27 4. 18:27:11

60. Urn A contains 6 red and 4 black balls and urn B contains 4 red and 6 black balls. One ball is drawn at random from A and placed in B. Then one ball is drawn at random from B and placed in A. If one ball is now drawn from A then the probability that it is found to be red is

1. $\frac{32}{55}$ 2. $\frac{33}{55}$ 3. $\frac{32}{63}$ 4. $\frac{25}{66}$

61. A letter is known to have come form TATANAGAR or CALCUTTA. On the envelope just two consecutive letters TA are visible. The probability that the letter has come from CALCUTTA is

1. $\frac{4}{11}$ 2. $\frac{7}{11}$ 3. $\frac{1}{22}$ 4. $\frac{21}{22}$

62. A man is known to speak the truth 2 out of 3 times. He throws a die and reports that it is a six. Then the probability that it is actually a six is

1. $\frac{2}{7}$ 2. $\frac{6}{7}$ 3. $\frac{5}{7}$ 4. $\frac{1}{7}$

63. If $\frac{1-3p}{2}, \frac{(1+4p)}{3}, \frac{1+p}{6}$ are the probabilities of three mutually exclusive and exhaustive events, then the set of all values of p is

1. $(0,1)$ 2. $\left[-\frac{1}{4},\frac{1}{3}\right]$ 3. $\left[0,\frac{1}{3}\right]$ 4. $(0,\infty)$

64. A bag contains n white, n black balls. Pair of balls are drawn without replacement until the bag is empty. Then the probability that each pair consists of one white and one black ball is

1. $\frac{n!}{(2n!)}$ 2. $\frac{(n!)^2}{(2n)!}$ 3. $\frac{n!.2^2}{(2n)!}$ 4. $\frac{(n!)^2.2^n}{(2n)!}$

65. A car is parked by an owner amongst 25 cars in a row, not at either end. On his return he finds that exactly 15 places are still occupied. The probability that both neighbouring places are empty is

1. $\frac{91}{276}$ 2. $\frac{15}{184}$ 3. $\frac{15}{92}$ 4. $\frac{1}{25}$

66. A sum of money rounded off to the nearest rupee. The probability that the error occured in rounding off at lesat 15 paise is

1. $\frac{29}{100}$ 2. $\frac{30}{100}$ 3. $\frac{70}{100}$ 4. $\frac{71}{100}$

KEY

1. 3	2. 3	3. 3	4. 2	5. 3
6. 2	7. 1	8. 1	9. 2	10. 3
11. 1	12. 3	13. 3	14. 3	15. 2
16. 3	17. 2	18. 3	19. 3	20. 2
21. 2	22. 2	23. 3	24. 2	25. 3
26. 3	27. 4	28. 1	29. 4	30. 1
31. 3	32. 2	33. 4	34. 2	35. 2
36. 1	37. 3	38. 2	39. 4	40. 3
41. 1	42. 1	43. 2	44. 1	45. 3
46. 1	47. 2	48. 2	49. 3	50. 3
51. 4	52. 1	53. 1	54. 3	55. 3
56. 2	57. 1	58. 3	59. 1	60. 1
61. 1	62. 1	63. 3	64. 4	65.3

HINTS

1. Always $P(A\cup B\cup C)\le 1$, given

$P(A\cup B\cup C)\ge 0.75 \Rightarrow P(B\cap C)\in[0.19, 0.44]$

5. Both the squares selected must lie in the same diagonal and must lie consecutively.

6. Both the squares selected must lie either in a row or column.

11. $n(S)=n^n, n(E)={}^nP_n=n!$

$P(E)=\frac{n!}{n^n}$

13. $n(S)={}^{2^n}C_1.{}^{2^n}C_1=2^{2n}$

$n(E)=C_0.C_0+C_1.C_1+C_2.C_2+...+C_n.C_n={}^{2n}C_n$

$P(E)=\frac{{}^{2n}C_n}{2^{2n}}$

19. $52\begin{cases}4K\\(1K)\\48\bar{K}\end{cases}=51\begin{cases}3K\\ \Rightarrow P(K)=\frac{3}{51}=\frac{1}{17}\\48\bar{K}\end{cases}$

24. Probability that there will be no pair

$=\frac{16}{16}.\frac{14}{15}.\frac{12}{14}.\frac{10}{13}$

Probability that there will be atleast one pair

$=1-\frac{8}{13}=\frac{5}{13}$

26. $n(s)=7^4, n(A)=3^4-2^4$

27. B_1 = having 2 defective,

B_2 = having 3 defective.

$P\left(\frac{A}{B_1}\right)$ = p(one defective and 10 good in 11 draws and 2nd in 12th testing).

$P\left(\frac{A}{B_2}\right)$ = p(2 defective and 9 good in 11 draws and 3rd in the 12th testing)

$P(E)=P(B_1).P\left(\frac{A}{B_1}\right)+P(B_2).P\left(\frac{A}{B_2}\right)$

28. A, B, C are pair-wise independent. A, B C are not mutually independent

29. No. of ways W, W, B; W, B, B, B, W, B; B, B, B

30. No. of relations from $A\to B=2^{mn}$,

no. of functions from $A\to B=n^m$

31.

$X=x_i$	0	1	2
$P(X=x_i)$	p	qp	q^2p

$E(x)=\frac{q}{p}=\frac{1-p}{p}$

32. $n(S)=(n+7)_{C_5}$

$n(A)=2_{C_2}.5_{C_2}.n_{C_1}+2_{C_2}.5_{C_3}+2_{C_1}.5_{C_4}$

$n(\overline{A})=10(n+2)$

33. Required probability = $\frac{3}{10}\times\frac{2}{10}+\frac{7}{10}\times\frac{4}{10}$

34. $n(s)=5^n, \quad n(\overline{A})=3^n$

35. Required probability =

$\frac{P(T)}{P(T)+P(F)}, = \frac{xy}{xy+(1-x)(1-y)}$

37. $P(A)=\frac{{}^9C_9}{{}^{10}C_9}.\frac{{}^{19}C_9}{{}^{19}C_9}+\frac{{}^9C_8{}^1C_1}{{}^{10}C_9}.\frac{{}^1C_1{}^{18}C_8}{{}^{19}C_9}$

38. Put n = 1, $n(s) = {}^3C_2 = 3$, only $1^3 + 2^3$ is divisible by 3. Required probability $= \frac{1}{3}$

39. $n(S) = 4^{10}$

$n(A) = 100_{C_{10}}.(1)^{10}$

40. x = 1 or 2 or 3 or 4, required probability = $\frac{1}{4}.\left[1+\frac{1}{2}+\frac{1}{3}+\frac{1}{4}\right] = \frac{50}{96}$

41. $n(s) = 2^{m+n}, n(A) = \left(\frac{1}{2}\right)^n + \left(\frac{1}{2}\right)^{n+1}.m$

42. $n(s) = 49,\ n(A) = {}^3C_1.{}^3C_3$'

$1\times1, 1\times2, 1\times3, 2\times1, 2\times2, 2\times3, 3\times1, 3\times2, 3\times3$

9+9+3+9+9+3+3+3+1=49

43. $n(S) = 9\times10^4$

$n(E) = 9\times10^2$

$P(E) = \frac{9\times10^2}{9\times10^4} = \frac{1}{100} = 0.01$

44. $n(S) = 6^4$

$n(E) = 6^2;\quad P(E) = \frac{1}{36}$

45. $P(E) = 1 - \frac{{}^{14}C_3}{{}^{15}C_3}$

46. $n(s) = 10^4,\ n(A) = 4^4$

47. $P\left(\frac{B_3}{A}\right) =$

$= \dfrac{P(B_3).P\left(\frac{A}{B_3}\right)}{P(B_1).P\left(\frac{A}{B_1}\right) + P(B_2)P\left(\frac{A}{B_2}\right) + P(B_3)P\left(\frac{A}{B_3}\right)}$

48. (1, 2, 3) : (2, 3, 4): (3, 4, 5): (4, 5, 6): (1, 3, 5): (2, 4, 6), Required probability

$= \frac{12}{6^3}\quad n(A) = 6+6, n(s) = 6^3$

49. Success means getting atleast one prize.

$p(A) = 1 - \frac{{}^9C_3}{{}^{12}C_3} : p(B) = 1 - \frac{{}^6C_2}{{}^8C_2}$

50. $p(H) = \frac{1}{4},\quad P(T) = \frac{3}{4}\quad HHTTT : THHTT, TTHHT, TTTHH$

Required probability = $4\left(\frac{1}{4}\right)^2\left(\frac{3}{4}\right)^3$

51. Favourable cases (1,2,4), (2,4,8), (1,3,9), (4,6,9)

Required probability = $\frac{4}{11_{C_3}}$

52. $n(A) = 4,\ n(A \cap B) = 3,\ HHT, HTH$, THH, HHH

53. No. is divisible by 9, if the sum of the digits is divisible by 9, $\{(4\ 6\ 8)(5\ 7\ 6)\}$

54. $n(s) = {}^{(2n+1)}C_3$' $n(E) = n^2$

55. First 6 drawings must contain 3 white balls and 7th draw must be a white ball ${}^6C_3\left(\frac{1}{2}\right)^3.\left(\frac{1}{2}\right)^3.\frac{1}{2}$

56. W L W $\frac{W}{L}\frac{W}{L}$ or $LWW\frac{W}{L}\ \frac{W}{L}$

$= \frac{1}{2}\times\frac{1}{2}\times\frac{1}{2}+\frac{1}{2}+\frac{1}{2}+\frac{1}{2}$

57. $P(E) = \frac{3({}^nC_3) + ({}^nC_1)^3}{{}^{3n}C_3}$

58. $\frac{7P+9P}{200P} = \frac{16P}{200P}$ = 0.08 n(S)=50p+50.3p

n(E)=7p+9p

59. $P(A) = \frac{3}{8} + \frac{5}{8}.\frac{4}{7}.\frac{3}{6}.\frac{3}{5}$, By verification

60. Required probability =

$\frac{6}{10.}.\frac{5}{11}.\frac{6}{10} + \frac{4}{10}.\frac{7}{11}.\frac{6}{10.} + \frac{6}{10}.\frac{6}{11}.\frac{5}{10} + \frac{4}{10}.\frac{4}{11}.\frac{7}{10}$

61. $P(E)=\dfrac{\frac{1}{2}.\frac{1}{7}}{\frac{1}{2}.\frac{1}{7}+\frac{1}{2}.\frac{1}{8}+\frac{1}{2}.\frac{1}{8}}$

62. $P(E)=\dfrac{\frac{2}{3}.\frac{1}{6}}{\frac{2}{3}.\frac{1}{6}+\frac{1}{3}.\frac{5}{6}}$

63. For any event E, $0 \le P(E) \le 1$

64. $n(s) = {}^{2n}C_2.{}^{(2n-2)}C_2......{}^{2}C_2,$

$n(A) = ({}^{n}c_1.{}^{n}c_1)^{(n-1)}c_1{}^{(n-1)}c_1.....{}^{1}c_1.{}^{1}c_1$

$P(A)=\dfrac{2^n.n!}{(2n)!}$

LELVEL-IV

1. Two dice are thrown p = the probability of getting a number always greater than 4 on the second die; q = the probability of getting a sum 10 on the two dice and r = the probability of getting a sum which is a perfect square. Arrange the probabilities in increasing order of magnitude

1. p, q, r 2. q, r, p 3. r, p, q 4. r, q, p

2. A box contains 2 red, 3 blue and 4 black balls, 3 balls are drawn at random from the box. p = the probability for the balls to be of different colours; q = the probability for 2 balls of the same colour and the third of different colour; r = the probability for all the 3 balls to be of the same colour. Arrange them in the decreasing order of magnitude

1. p, q, r 2. q, r, p 3. q, p, r 4. r, q, p

3. p = probability for a leap year to have 52 mondays and 52 wednesdays; q = probability for a non-leap year to have 53 sundays; r = probability of the month February in a leap year to have 5 sundays or 5 saturdays. Then

1. p < q < r 2. q < r < p
3. r < q < p 4. q < p < r

4. Two events A and B have probabilities 0.25 and 0.50 respectively. The probability that both A and B occur simultaneously is 0.14. p = the probability that exactly one of A and B occurs; q = the probability that neither A or B occurs; r = the probability that A occurs and B does not occur. Which of the following is true

1. 2q < 5r < p 2. p < 5r < q
3. 4r < p < q 4. p < 5r < 2q

5. A husband and wife appear in interview for the same post. The probability of husband's selection is 1/7 and that of wife's selection is 1/5. Let a = prob. that both of them will be selected; b = Prob. that none of them will be selected and c = Prob. that only one of them will be selected. Then we have

1. a < c < b 2. a < b < c
3. b < a < c 4. c < a < b

6. By rolling a die the following events are considered. E_1 = {5, 3, 1}, E_2 = {3, 2,},
E_3 = {5, 4, 3, 2}
The arrangement of the following probabilities

$A: P(E_1/E_2)$ $B: P(E_1 \cup E_3)$

$C: P(E_1 \cap E_3)$

$D: P(E_2 \cap E_1)$ in the descending order is

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

7. A bag X contains 4 white and 2 black balls. Another bag Y contains 3 white and 4 black balls. A bag is selected at random and a ball is drawn at random from it.

I. the probability that the ball drawn is white is 17/42

II. The probability that the ball drawn is black is 19/42

Which of the above statements is correct

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

8. An urn A contains 2 white and 3 black balls. Another urn B contains 3 white and 4 black balls. Out of these two urns, one is selected at random and a ball is drawn from it. If the ball drawn is black, then the probability

I. that it is from urn A is 21/40

II. that is from urn B is 20/41

Which of the following statements is correct

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