UNIIVERSITY OF CALICUT
SCHOOL OF DISTANCE EDUCATION
B.Sc MATHEMATICS
SEMESTER I
COMPLEMENTARY COURSE - STATISTICS
PROBABILITY THEORY
QUESTION BANK

PROBLEMS

1) An activity which can be repeated in more or less same condition and will have some specific outcomes is called.

   a) Sample Space b) Event c) Experiment d) None of these

2) Which of the following is a characteristic of a random experiment?

   a) Repeatable under uniform conditions
   b) Outcome of a particular trial is unpredictable
   c) Several possible outcomes
   d) All the above

3) The set of all simple outcomes of a random experiment is ______

   a) Sample point b) Event c) Trial d) Sample space

4) Which one of the following is a simple event?

   a) Getting even number while throwing a balanced die
   b) Getting odd number while throwing a balanced die
   c) Getting head while tossing a coin
   d) None of these

5) If A is a sure event, the probability of occurrence of A is equal to

   a) 0 b) 1 c) ½ d) None of these

6) The axiomatic definition of probability was introduced by

   a) Kolmogrov b) Ramanujan c) Von Mises d) None of these

7) What is the probability of getting head when we toss a coin once?

   a) ½ b) 1 c) ¼ d) 0

8) What is the probability of getting 6 when a balanced die is rolled once?

   a) $1/2$ b) $2/3$ c) $1/3$ d) $1/6$

9) What is the probability of getting two ‘six’ in rolling a die 4 times?

   a) $\frac{171}{1296}$ b) $\frac{170}{1296}$ c) $\frac{2}{1296}$ d) $\frac{179}{1296}$

10) What is the probability of getting a spade or an ace from a pack of 52 cards?

   a) $\frac{4}{52}$ b) $\frac{8}{52}$ c) $\frac{16}{52}$ d) $\frac{12}{52}$

11) What is the probability of getting seven heads in 12 tossing of a balanced coin?

   a) 0.90 b) 0.19 c) 0.39 d) 0.49

12) A card is drawn at random from the pack of playing cards. The probability of getting a face card is ____

a) $\frac{4}{13}$ b) $\frac{3}{13}$ c) 13 d) None of these

13) If a balanced coin is tossed twice, what is the probability of getting atleast one head?

a) $\frac{3}{4}$ b) $\frac{1}{4}$ c) $\frac{1}{2}$ d) $\frac{2}{3}$

14) In rolling a fair die, what is the probability of obtaining even number?

a) $\frac{1}{2}$ b) $\frac{1}{3}$ c) $\frac{1}{6}$ d) None of these

15) What is the probability of getting three heads in three random tosses of a balanced coin?

a) $\frac{1}{18}$ b) $\frac{1}{3}$ c) $\frac{1}{4}$ d) $\frac{1}{8}$

16) What is the probability that a card selected from a deck will be either an ace or a king?

a) $\frac{1}{169}$ b) $\frac{2}{13}$ c) $\frac{1}{26}$ d) $\frac{4}{13}$

17) Which of the following is not an axiom satisfied by a probability function P?

a) $P(A) \geq 0$ b) $P(S) = 1$ c) Countable additivity d) None of these

18) If $P(A) = \frac{3}{5}$ then select the value of $P(\bar{A})$ from the following options

a) $\frac{1}{5}$ b) $\frac{2}{5}$ c) $\frac{3}{5}$ d) $\frac{2}{3}$

19) The value of $P(A \cap \bar{A})$ will always be equal to

a) $\frac{1}{2}$ b) $\frac{1}{3}$ c) 1 d) 0

20) I f A and B are two events in a sample space S, then $P(A \cup B)$ is given by

a) $P(A) + P(B)$ b) $P(A) + P(B) - P(A \cap B)$

c) $P(A) + P(B) + P(A \cap B)$ d) $P(A) - P(B)$

21) For any event A, events A and ϕ are ______

a) Independent events b) Dependent events

c) (a) and (b) are true d) (a) is false, (b) is true

22) If A and B are mutually exclusive events then which of the following is true?

a) $P(A \cap B) = 1$ b) $P(A) = P(B)$

c) $P(A \cap B) = 0$ d) $P(A \cap B) = P(A) . P(B)$

23) Which of the following relation is correct?

a) $P(A \cap B) = P(A) + P(B) + P(A \cup B)$ b) $P(A \cap B) \leq 0$

c) $P(A \cap B) \leq P(A) + P(B)$ d) $P(A \cap B) \geq P(A) + P(B)$

24) If A and A^C are complementary events in a sample space S, then which of the following is true?

a) $P(A) + P(A^C) = 0$ b) $P(A) - P(A^C) = 0$

c) $P(A) + P(A^C) = 1$ d) $P(A) - P(A^C) = 1$

25) Let S be a nonempty set and F be a collection of subsets of S. Then F is called a borel field if it satisfies which of the following condition?

a) F is nonempty and elements of F are subsets of S.
b) If $A \in F$ then $A^C \in F$.
c) If $A_i \in F$ for i = 1, 2, …. Then $A_1 UA_2U\ldots \in F$.
d) All the above

26) What is the probability of getting 53 Sundays in a leap year?

a) $\frac{3}{7}$ b) $\frac{2}{7}$ c) $\frac{5}{7}$ d) $\frac{1}{7}$

27) If an unbiased coin is tossed once, then two events head and tail are

a) Mutually exclusive b) Equally likely
c) Exhaustive d) All the above

28) If A and B are two disjoint events then which of the following is true?

a) $P(A\cap B) = P(A) + P(B)$ c) both A and B
b) $P(A\cup B) = P(A) + P(B)$ d) a is true but not b

29) If A = { 1, 2, 3} and B = {1, 6, 7, 8, 9} then A – B = ____

a) {1, 2} b) {1, 2, 3} c) {2, 3} d) { 1 }

30) A box contains 8 red, 3 white and 9 blue balls. If 3 balls are drawn at random what is the probability that all the three balls are blue?

a) $\frac{7}{95}$ b) $\frac{4}{95}$ c) $\frac{23}{57}$ d) $\frac{18}{95}$

31) If three events A, B and C are mutually exclusive we have

a) $P(A\cup B\cup C) = P(A) + P(B) + P(C)$
b) $P(A\cup B\cup C) = P(A) . P(B) . P(C)$
c) $P(A\cup B\cup C) = P(A) + P(B) + P(C) + P(A\cap B\cap C)$
d) None of these

32) Two events A and B are independent if

a) $P(A/B) = P(A)$ b) $P(B/A) = P(B)$
c) $P(A\cap B) = P(A) . P(B)$ d) All the above

33) If A and B are independent events then

a) A and B^C are independent c) A^C and B^C are independent
d) A^C and B are independent d) All the above

34) If P(A) = 0.30, P(B) = 0.78, $P(A\cap B) = 0.16$ then $P(A\cap B^C)$= ______

a) 0.08 b) 0.84 c) 0.14 d) 0.25

35) If two dice are thrown, what is the probability that the sum is equal to 9?

a) $\frac{1}{9}$ b) $\frac{5}{36}$ c) $\frac{1}{6}$ d) None of these

36) If A, B, C are independent events which of the following is true?

a) $P(A\cap B\cap C) = P(A). P(B). P(C)$
b) $P(A\cap B\cap C) = P(A) + P(B) + P(C)$
c) $P(A\cap B\cap C) = P(A) + P(B) – P(A\cup B\cup C)$
d) $P(A\cap B\cap C) = P(A) + P(B) + P(A\cup B\cup C)$

37) If A and B are independent events then

a) P(A/B) = P(A) . P(B) b) P(A/B) = P(B)

c) P (A/B) = A d) P (A/B) = P(A) + P(B)

38) If P (B/A) = P(B) and P(A) $\neq$0, P(B) $\neq$ 0 then which one of the equation is correct?

a) P (A/B) = P(B) b) P (A/B) = P(A)/P(B)

c) P (A/B) = P(A) . P(B) d) P (A/B) = P(A)

39) Let A and B are two events associated with an experiment and suppose P(A) = 0.5 while P($A \cup B$) = 0.8. For what value of P(B), A and B are independent?

a) $\frac{3}{5}$ b) $\frac{2}{5}$ c) $\frac{8}{5}$ d) None of these

40) A set of events A_1, A_2…. A_n are said to be pair wise independent. Then which one of the following statement is correct?

a) $P(A_i \cap A_j) = P(A_i) + P(A_j)$ for all i and j, $i \neq j$

b) $P(A_i \cap A_j) = P(A_i) . P(A_j)$ for all i and j, $i \neq j$

c) Both (a) and (b) is correct.

d) Only a is correct

41) A purse contains 2 silver coins and 4 copper coins and a second purse contains 4 silver coins and 3 copper coins. If a coin is selected at random from one of the purses, what is the probability that it is a silver coin?

a) $\frac{9}{4}$ b) $\frac{19}{42}$ c) $\frac{1}{2}$ d) $\frac{4}{7}$

42) If A, B and C are three events in a sample space S such that P($A \cap B$) $\neq$ 0 then P($A \cap B \cap C$) equals

a) P(A) . P(B/A) . P(C/$A \cap B$) b) P(A) . P(B/C)

c) P(A) . P(A/B) . P(A/$B \cap C$) d) P(A) . P(C/B)

43) Which of the following cannot serve as the probability distribution?

a) f(x) = $\frac{1}{6}$ for x = 1, 2, 3, 4, 5, 6

b) f(x) = $\frac{1}{4}$ for x= 1, 2

c) f(x) = $\frac{1}{2}$ for x = 1, 2

d) f(x) = $\frac{1}{3}$ for x= 1, 2, 3

44) Which of the following can serve as probability distribution?

a) f(x) = $\frac{x-2}{2}$ for x = 1, 2, 3, 4

b) h(x) = $\frac{x^2}{25}$ for x = 1, 2, 3, 4

c) f(x) = $\frac{x-2}{5}$ for x = 1, 2, 3, 4

d) g(x) = $\frac{1}{4}$ for x = 1, 2, 3, 4

45) F(x) is a distribution of function of a random variable X and given statements,

1) $F(-\infty) = 0$ and $F(+\infty) = 1$
2) $F(-\infty) = 1$ and $F(+\infty) = 0$
3) $a < b \Rightarrow F(a) \leq F(b)$ for real a and b
4) $a < b \Rightarrow F(a) \geq F(b)$ for real a and b   Then,

a) (1) and (4) are true   b) (2) and (4) are true

c) (1) and (3) are true   d) (2) and (3) are true

46) Which of the following function can be represented as the probability distribution of random variable, with the given range for x = 1, 2, 3, 4?

a) $f(x) = \frac{1}{5}$ b) $f(x) = \frac{x-2}{5}$ c) $f(x) = \frac{x^2}{30}$ d) $\frac{x^2}{50}$

47) The second moment about the mean is ______

a) Mean   b) Variance   c) Standard deviation   d) Skewness

48) The first moment about the origin is ______

a) Variance   b) Mean   c) Standard Deviation   d) None of these

49) The probability distribution function satisfies the probability postulates

a) Always true   b) Always false   c) Partially true   d) Partially false

50) Which of the following moments about the mean is called a measure of asymmetry or skewness?

a) The fourth moment μ_4 b) The first moment μ_1

c) The second moment μ_2 d) The third moment μ_3

51) Stochastic variable is another name of _____

a) Continuous variable   b) Discrete variable

c) Random variable   d) None of these

52) Which of the following is a discrete random variable

a) Number of road accidents occurs in a day in a city
b) Life time of a mobile phone
c) Height of a randomly selected student from a college
d) All of the above

53) X is a random variable. Then which of the following is a random variable?

a) aX + b, where a and b constants   b) X^2 c) X^3 d) All the above

54) Values taken by a random variable will always be a _____

a) Positive integer   b) Positive real number

c) Real number   d) Odd number

55) f(x) = P (x = x) denotes ____ of a random variable X.

a) Probability mass function   b) Probability density function

c) Distribution function   d) None of these

56) Two events are said to be mutually exclusive if_____

a) They cannot occur together
b) Both of them can occur together
c) Their occurrence is not certain
d) None of the above

57) A coin is tossed. Event {H}, {T} are ____

a) Mutually exclusive b) Independent events

c) Dependent events d) (a) and (c) both

58) A problem in statistics is given to three students A, B, and C whose chances of solving it are $\frac{1}{2}, \frac{3}{4}$ and $\frac{1}{4}$ respectively. What is the probability that the problem will be solved?

a) $\frac{3}{32}$ b) $\frac{29}{32}$ c) $\frac{20}{32}$ d) $\frac{27}{32}$

59) A random variable X has the following probability function.

x	– 2	–1	0	1	2	3
P(x)	0.1	k	0.2	2k	0.3	k

What is the value of k?

a) 0.4 b) 3 c) 0.1 d) 2

60) The event E_1 and E_2 have probabilities 0.25 and 0.50 respectively. The probability that both E_1 an E_2 occur simultaneously is 0.14. The probability that neither E_1 nor E_2 occurs is

a) 0.39 b) 0.25 c) 0.11 d) 0.42

61) Let $P_1 = P(A)$, $P_2 = P(B)$, $P_3 = P(A \cap B)$ then P(A/B) is given by

a) $\frac{P_2}{P_3}$ b) $\frac{P_3}{P_2}$ c) $P_3\ P_2$ d) $P_1\ P_2$

62) Which one of the following statements are true?

a) Maximum value of F(x) is 1
b) Maximum value of f(x) is 1
c) Both (a) and (b)
d) None of these

63) The probability density function for the random variable whose probability distribution is given by

$$F(x) = \begin{cases} x, & 0 \le x \le 1 \\ 0 & \text{otherwise} \end{cases}$$

a) $f(x) = \begin{cases} 1 & 0 \le x \le 1 \\ 0 & \text{otherwise} \end{cases}$ b) $f(x) = \begin{cases} x^2 & 0 \le x \le 1 \\ 0 & \text{otherwise} \end{cases}$

c) $f(x) = \begin{cases} x & 0 \le x \le 1 \\ 0 & \text{otherwise} \end{cases}$ d) None of these

64) For the random variable X which has the probability function $f(x) = \frac{k}{x!}$ (x = 0, 1, 2, ………..) the distribution function is given by

a) $\frac{k}{e}$ b) e c) ke d) k

65) Let the probability distribution function be f(x) = $\begin{cases} 0 & x < o \\ 1-e^{-x} & x > 0 \end{cases}$. Find the probability density function.

a) $f(x) = 1 - e^{-x}$ b) $f(x) = \begin{cases} 0 & x < 0 \\ e^{-x} & x > 0 \end{cases}$

c) $f(x) = \begin{cases} 0 & x < 0 \\ e^{x} & x > 0 \end{cases}$ d) $f(x) = -\bar{e}e^{x}$

66) Let the probability function f(x) = $\begin{cases} kx^2, & 0 \le x \le 2 \\ 0, & \text{otherwise} \end{cases}$ the value of k is

a) $\frac{1}{8}$ b) $\frac{2}{5}$ c) $\frac{3}{8}$ d) $\frac{3}{5}$

67) For any real constants a and b with a≤ b and F(x) the probability distribution function of random variable X, the following is true.

a) $P(a \le x \le b) = F(a)$ b) $P(a \le x \le b) = F(a) - F(b)$

c) $P(a \le x \le b) = F(b) - F(a)$ d) $P(a \le x \le b) = F(b)$

68) For any real numbers a and b, a ≤ b, the probability density function of a continuous random variable X is given by

a) $P(a \le x \le b) = \int_a^b f(x)dx$ b) $P(a \le x \le b) = \int_b^a f(x)dx$

c) $P(a \le x \le b) = 1 - \int_a^b f(x)dx$ d) All the above

69) If f(x) is a probability density function of a continuous random variable. Then

a) $\int_{-\infty}^{\infty} f(x)dx = 1$ b) $\int_{-\infty}^{\infty} f(x)dx = 0$

c) $\int_{-\infty}^{\infty} f(x)dx > 1$ d) $\int_{-\infty}^{\infty} f(x)dx < 0$

70) The minimum value of distribution function F(x) of a random variable X is

a) 1 b) 0 c) - ∞ d) None of these

71) If the distribution function F(x) is given to be

$$F(x) = \begin{cases} \frac{2x^2}{5} & 0 < x \le 1 \\ \frac{-3}{5} + \frac{2\left(3x - \frac{x^2}{2}\right)}{5}, & 1 < x \le 2 \\ 1 & x > 2 \end{cases}$$

Then the density function is

a) $f(x) = \begin{cases} \frac{2x}{5} & 0 < x \le 1 \\ \frac{2}{5}(3 - x^2) & 1 < x \le 2 \\ 0 & \text{Otherwise} \end{cases}$ b) $\begin{cases} \frac{4x}{5} & 0 < x \le 1 \\ \frac{2}{5}(3 - x^2) & 1 < x \le 2 \\ 1 & \text{Otherwise} \end{cases}$

c) $f(x) = \begin{cases} \frac{2x}{5} & 0 < x \le 1 \\ \frac{2}{5}(3 - x) & 1 < x \le 2 \\ 1 & \text{Otherwise} \end{cases}$ d) $f(x) = \begin{cases} \frac{4x}{5} & 0 < x \le 1 \\ \frac{2}{5}(3 - x) & 1 < x \le 2 \\ 0 & \text{Otherwise} \end{cases}$

72) Which of the following is not a property of distribution function $F_X(x)$ of a random variable?
   a) Defined for all real values of the random variable
   b) Minimum value is 0 and maximum 1
   c) Decreasing
   d) If the random variable is continuous, $P(a \le x \le b)$ gives the area under the curve.

73) Suppose the life in weeks of a certain kind of computers has the pdf

$$f(x) = \begin{array}{ll} \frac{100}{x^2} & \text{When } x \ge 100 \\ 0 & \text{When } x < 100 \end{array}$$

What is the probability that none of three such computers will have to be replaced during the first 150 weeks of operation?

a) $\frac{1}{27}$ b) $\frac{1}{3}$ c) $\frac{1}{9}$ d) $\frac{1}{16}$

74) Find the value of k so that f(x) = kx (1-x) for $0 \le x \le 1$ is a pdf of a continuous random variable.

a) 5 b) $\frac{1}{6}$ c) 6 d) $\frac{1}{5}$

75) Let $f(x) = \frac{1}{\pi l}$, $0 \le x \le \pi l$ be a probability density function. The probability distribution function F(x) is given by

a) $\frac{\pi l}{x}$ b) $x \pi l$ c) $\frac{1}{\pi l}$ d) $\frac{x}{\pi l}$

76) Let x has the probability density function

$$f(x) = \begin{array}{ll} 0.75(1 - x^2) & x \in [-1, 1] \\ 0 & \text{Otherwise} \end{array}$$

what is the probability $P\left(-\frac{1}{2} \le x \le \frac{1}{2}\right)$?

a) 0.60 b) 0.65 c) 0.66 d) 0.68

77) Given $P(A_i) = (\frac{1}{2})^i$ and $\bigcup_{i=1}^{\infty} A_i = S$, the sample space where A_i are mutually exclusive events, then P(s) is equal to

a) ∞ b) 0 c) 1 d) None of these

78) What is the probability to get two access in succession from an ordinary deck of 52 cards without replacement?

a) $\frac{2}{221}$ b) $\frac{3}{221}$ c) $\frac{4}{221}$ d) $\frac{1}{221}$

79) Two players are tossing a balanced coin. If it shows heads four times in a row, What is the probability that a head will occur in the fifth toss too?

a) 0.25 b) 0.50 c) 0.75 d) None of these

80) If A is an event of a sample space S, then choose the correct statement

a) $P(A) \leq P(s)$ b) $P(A) > P(S)$ c) $P(A) > 1$ d) $P(A) < 0$

81) The second moment about the origin is μ^2 and mean is μ, then the variance is given by

a) $\sigma^2 = \mu_2^1 + \mu^2$ b) $\sigma^2 = \mu_2^1 - \mu^2$

c) $\sigma^2 = \frac{\mu_2^1}{\mu_2}$ d) None of these

82) The expected value of a constant 'b' is ____

a) b b) 0 c) 1 d) $\frac{1}{b}$

83) For constants C_1 and C_2 the expected value of $c_1 X + c_2$ is equal to

a) $E(c_1x + c_2) = c_1x$ b) $E(c_1x + c_2) = c_2$

c) $E(c_1x + c_2) = c_1 E(X) + c_2$ d) $E(c_1x+c_2) = c_1x + E(c_2)$

84) If a and b are two constants, then which one of the following statements is incorrect?

a) $E[aX+b] = aE(x)+b$ b) $E[aX+bX] = aE(X)+bE(X)$

c) $E[aX+b] = a+b$ d) $E[(a+b)X] = (a+b)E(X)$

85) If $f(x) = \begin{cases} 30x^4(1-x), & 0 \leq x < 1 \\ 0 & \text{, otherwise} \end{cases}$ is the pdf of a random variable x

a) $\frac{5}{7}$ b) $\frac{7}{5}$ c) $\frac{3}{7}$ d) None of these

86) Expectation is defined as _____

a) $\sum_{j=1}^{n} \frac{x_j}{p_j}$ b) $\sum_{j=1}^{n} (x_j + p_j)$ c) $\sum_{j=1}^{n} x_j p_j$ d) $\sum_{j=1}^{n} (x_j - p_j)$

87) The diameter on an electric cable X is assumed to be continuous variable with probability density function $f(x) = y_0x(1-x)$, $0 \leq x \leq 1$, y_0 being a constant. Then the arithmetic mean is given by

a) $\frac{1}{2}$ b) $\frac{1}{12}$ c) 12 d) 2

88) Find the expectation of the number on a die when thrown.

a) $\frac{1}{6}$ b) $\frac{7}{2}$ c) $\frac{7}{12}$ d) None of these

89) In terms of moments the mean can be expressed as _____

a) μ_3^1 b) μ_2^1 c) μ_1^1 d) μ_0^1

90) Which of the following is not correct for expected value?

a) E(c)= c for a constant c

b) E[cg(x)] = cE[g(x)] for a constant c

c) $E[c_1g_1(x) + c_2g_2(x)] = c_1e[g_1(x)] + c_2 E[g_2(x)]$

d) $E[g_1(x)] \leq E[g_2(x)]$ if $g_1(x) \geq g_2(x)$ for all x

91) Which of the following is Cauchy-Schwartz inequality related to expectation.

a) $[E(xy)]^2 \geq E(x^2).\ E(y^2)$ b) $[E(xy)]^2 \leq E(x^2).\ E(y^2)$

c) both a and b d) None of these

92) IF random variables X and Y have expected values 32 and 28 respectively then E(x-y) will be equal to

a) 60 b) 4 c) 16 d) None of these

93) If X is a random variable variance of X, $Var[X] = E[X-E(x)]^2 = E(x^2) - [E(x)]^2$ provided

a) $E(x^2)$ exists b) $E(x^2)$ does not exist

c) Existence or non-existence of $E(x^2)$ cannot be proved d) None of these

94) If X is a random variable the r^{th} moment of X usually denoted by μ_r^1 is defined as ______

a) $\mu_r^1 = rE(x)$ b) $\mu_r^1 = E[r(x)]$ c) $\mu_r^1 = r+E(x)$ d) $\mu_r^1 = E(x^r)$

95) The relationship between mean μ, variance σ^2 and second moment about the origin μ_2^1 is given by

a) $\sigma^2 = \mu + \mu_2^1$ b) $\sigma^2 = \mu - \mu_2^1$ c) $\sigma^2 = \mu_2^1 + \mu$ d) $\sigma^2 = \mu_2^1 - \mu$

96) A moment generating function is that____

a) Which gives a representation of all the moments

b) $m(t) = E(e^{tx}) = \int_{-\infty}^{\infty} e^{tx} f(x)dx$ if X is continuous

c) The expected value of e^{tx} exists for every value of t in some interval $-h < t < h,\ h > 0$

d) All the above

97) $m(t) = E(e^{tx}) = \sum_x e^{tx} f(x)dx$ is for ____

a) X is continuous b) X is discrete

c) both a and b d) None of these

98) If X is a random variable, the r^{th} central moment of X about A is defined as __

a) $E[(X-A)^r]$ b) $E[(A+x)^r]$ c) $E[(x^r-A^r)]$ d) $E[(Ax)^r]$

99) If X is a continuous random variable, we can define median of X as _____

a) $\int_{-\infty}^{md} f(x)dx = \frac{1}{2}$ b) $\int_{md}^{\infty} f(x)dx = \frac{1}{2}$

c) both and b c) None of the above

100) If X is a random variable with pdf

$$F(x) = \begin{cases} \frac{x}{6} & \text{When } x = 1,2,3 \\ 0 & \text{Otherwise} \end{cases}$$ then $E(X+2)^2$ is

a) $\frac{58}{6}$ b) $\frac{58}{5}$ c) $\frac{58}{3}$ d) None of these

101) The r^{th} raw moment μ_r^1 is the coefficient of ___ in moment generating function $M_x(t)$ of the random variable X.

a) $\left(\frac{t}{r!}\right)^2$ b) $\frac{t^r}{r!}$ c) $\frac{t}{r!}$ d) None of these

102) The characteristic function ϕ_x (t) of a continuous random variable X is given by

a) $\int_{-\infty}^{\infty} e^{tx} f(x) dx$ b) $\int_{-\infty}^{\infty} e^{!tx} f(x) dx$ c) $\sum_{-\infty}^{\infty} e^{tx} f(x)$ d) $\sum_{-\infty}^{\infty} e^{itx} f(x)$

103) If X is a random variable with pdf

$$f(x) \begin{cases} \frac{x+1}{2} & - \le x < 1, \\ 0 & \text{Otherwise} \end{cases}$$

then variance of X, V(X) is given by

a) $\frac{9}{2}$ b) $\frac{2}{9}$ c) $\frac{1}{3}$ d) $\frac{2}{3}$

104) Three urns contains respectively 3 green and 2 white balls, 5 green and 6 white balls and 2 green and 4 white balls. One ball is drawn from each urn. Find the expected number of white balls drawn.

a) 1.16 b) 2.16 c) 1.61 d) 2.61

105) If X is a random variable having the pdf

$F(x) = q^{x-1} P$, x = 1, 2, 3, …. P+q = 1. Find moment generating function.

a) $\frac{Pe^t}{1-qe^t}$ b) $\frac{qe^t}{1-pe^t}$ c) $\frac{e^t}{p-qe^t}$ d) $\frac{e^t}{q-pe^t}$

106) The random variable X has pdf f(x)= $\begin{cases} \frac{3}{4}x(2-x), 0 \le x \le 2 \\ 0 \quad \text{Otherwise} \end{cases}$ The coefficient of skewness is equal to ______

a) $\frac{15}{7}$ b) $\frac{6}{35}$ c) 0 d) 1

107) The coefficient of kurtosis β_2 of a random variable X is given by

a) $\frac{\mu_2^2}{\mu_4}$ b) $\frac{\mu_4}{\mu_2^2}$ c) $\frac{\mu_2}{\mu_4}$ d) None of these

108) Given probability density function of a random variable X, f(x) = $\begin{cases} \frac{4}{x(1+x^2)}, 0 < x < 1 \\ 0 \quad \text{Otherwise} \end{cases}$ The second moment about the origin of a random variable X is equal to

a) $\frac{4}{\pi}-1$ b) $\frac{\pi}{4}-1$ c) 4π d) $\frac{4}{\pi}$

109) If the random variable X take on three values –1, 0 and 1 with probabilities $\frac{11}{32}$, $\frac{16}{32}$ and $\frac{5}{32}$ respectively, what is P(1) if we transform X taking Y = 2x+1

a) $\frac{11}{32}$ b) $\frac{16}{32}$ c) $\frac{5}{32}$ d) None of these

110) A continuous random variable X has the pdf

$$f(x) = \begin{cases} 2x, 0 < x < 1 \\ 0 \quad \text{elsewhere} \end{cases}$$

What is the pdf of Y = 3x + 1

a) $g(y) \begin{cases} (y-1),\ 0 < y < 1 \\ 0 \qquad \text{elsewhere} \end{cases}$ b) $g(y) \begin{cases} 2(y-1), 1 < y < 4 \\ 0 \qquad \text{elsewhere} \end{cases}$

c) $g(y) \begin{cases} \frac{2}{9}(y-1), 1 < y < 4 \\ 0 \qquad \text{elsewhere} \end{cases}$ d) $g(y) \begin{cases} \frac{2}{9}(y-1), 0 < y < 1 \\ 0 \qquad \text{elsewhere} \end{cases}$

111) If the cumulative distribution function of X is F(x), then the cumulative distribution function of $Y = x^3$ is given by

a) $P(x \leq x)$ b) $P(x^3 \leq x^{\frac{1}{3}})$ c) $P(x^{\frac{1}{3}} \leq x)$ d) $P(X \leq x^{\frac{1}{3}})$

112) Suppose that the time in minutes that a person has to wait at a certain station for a train is a random phenomenon. The distribution function is given by

$F(x) = 0 \qquad x \leq 0$

$= \frac{1}{2}x \qquad 0 \leq x \leq 1$

$= \frac{1}{2} = \qquad 1 \leq x \leq 2$

$= \frac{1}{4}x \qquad 2 \leq x \leq 4$

$1 \qquad x \geq 4$

What is the probability that a person will have to wait more than 3 minutes?

a) $\frac{3}{4}$ b) $\frac{1}{2}$ c) $\frac{1}{4}$ d) None of these

113) A point is chosen at random on the line segment [0, 2]. What is the probability that the chosen point lies between 1 and $\frac{3}{2}$?

a) $\frac{1}{2}$ b) $\frac{1}{4}$ c) $\frac{3}{2}$ d) $\frac{3}{4}$

114) If $f(x) = e^{-x}$, $x \geq 0$ find the pdf of $y = x^{\frac{1}{2}}$.

a) $ye^{-y^2}, y \geq 0$ b) $2ye^{y^2}, y \geq 0$ c) $2ye^{-y^2}, y \geq 0$ d) $\frac{1}{2}ye^{y^2}, y \geq 0$

115) If $\phi_x(t)$ is the characteristic function of X, what is the value of $\phi(0)$?

a) 1 b) 0 c) ϕ d) None of these

116) If $f(x) = \frac{1}{2} e^{-|x|}$, $-\infty < x < \infty$ is the p.d.f of random variable X what is the standard deviation of X?

a) 2 b) $\frac{1}{2}$ c) $\sqrt{2}$ d) $\frac{1}{\sqrt{2}}$

117) Given probability density function of a random variable X.

$$f(x) = \begin{cases} \frac{4}{x(1+x^2)} & 0 < x < 1 \\ 0 & \text{Otherwise} \end{cases}$$

The second moment about the origin of the random variable X is equal to

a) $\frac{\pi}{4} - 1$ b) 4π c) $\frac{4}{4\pi} - 1$ d) $\frac{4}{\pi}$

118) For a given probability distribution $f(x) = \frac{1}{8}\binom{3}{x}$, x =0, 1, 2, 3 for random variables X, the moment generating function is ____

a) e^t b) $\frac{1}{8}(1+e^t)^3$ c) $(1+e^t)^2$ d) $\frac{1}{4}e^t$

119) The expectations of the powers of the random variable which has the given distribution is known as

a) Moments b) Mean c) Variance d) Skewness

120) If some one draws a card random from a deck and then without replacing the second card, draws a second card, What is the probability that both cards will be aces?

a) $\frac{1}{221}$ b) $\frac{3}{221}$ c) $\frac{3}{51}$ d) $\frac{2}{51}$

121) What is the probability that the total of two dices will be greater than 8 given that the first dice comes to a 6?

a) $\frac{3}{2}$ b) $\frac{2}{3}$ c) $\frac{1}{6}$ d) None of these

122) A committee of four has to be formed among 3 economists, 4 engineers, 2 statisticians and 1 Doctor. What is the probability that each of the four professions is represented on the committee?

a) $\frac{32}{105}$ b) $\frac{24}{13}$ c) $\frac{4}{35}$ d) $\frac{41}{10}$

123) From a bag containing 4 white and 6 red balls, three balls are drawn at random. Find the expected number of white balls drawn.

a) $\frac{6}{5}$ b) $\frac{1}{6}$ c) $\frac{1}{9}$ d) $\frac{4}{9}$

124) Two digits are selected at random from the digits 1 through 9. What is the probability that their sum is even?

a) $\frac{2}{9}$ b) $\frac{4}{9}$ c) $\frac{5}{8}$ d) None of these

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

a) $\frac{15}{69}$ b) $\frac{13}{69}$ c) $\frac{28}{69}$ d) $\frac{25}{69}$

126. The total number of possible outcomes in any trial is known as ……………….
(a) mutually exclusive
(b) equally likely event
(c) Exhaustive event
(d) none

127. In throwing of two dice, the number of cases favourable to getting the sum 5 is....
(a) 2
(b) 4
(c) 36
(d) 5

128. In throwing an unbiased die all the 6 faces are .....event
(a) equally likely
(b) mutually exclusive
(c) all of the above
(d) none

129. In throwing of n dice the exhaustive number of cases is .....
(a) 36
(b) 6n
(c) 2^n
(d) 6^n

130. The number of outcomes which entail the happening of an event
(a) independent event
(b) favourable event
(c) exhaustive event
(d) none

131. If an E is impossible event, then P(E) is .....
(a) 1
(b) 0
(c) ∞
(d) not define

132. Probability of having a king and queen when two cards are drawn from a pack of 52 cards
(a) 14/663
(b) 8/663
(c) 2/663
(d) 1/663

133. If n people are seated at a round table, What is the chance that two named individuals will be next to each other?
(a) 2/(n-1)
(b) (n-1)!
(c) (n-1)!/(n-2)!
(d) None

134. Probability of the impossible event is .....
(a) 1
(b) 0
(c) ∞
(d) 1/2

135. If P and Q are two events which have no point in common, the event P and Q are
   (a) Complimentary to each other
   (b) Independent
   (c) Mutually exclusive
   (d) Dependent

136. Each outcome of a random experiment is called
   (a) primary event
   (b) compound event
   (c) derived event
   (d) all the above

137. If E and F are two events,the probability of occurance of either E or F is given by
   (a) P(E)+P(F)
   (b) P(EUF)
   (c) P(E F)
   (d) P(E)P(F)

138. The definition of statistical probability was originally given by
   (a) De Moivre
   (b) Laplaces
   (c) Von Mises
   (d) Pascal

139. The probability of intersection of two disjoint events is always
   (a) Infinity
   (b) Zero
   (c) One
   (d) None of the above

140. If two events A and B are such that $A \subset B$ and $B \subset A$ the relation between P(A) and P(B) is
   (a) $P(A) \leq P(B)$
   (b) $P(A) \geq P(B)$
   (c) P(A)=P(B)
   (d) None of the above

141. If $A \subset B$, the probability P(A/B) is equal to
   (a) Zero
   (b) One
   (c) P(A)/P(B)
   (d) P(B)/P(A)

142. The idea of postiriori probabilities was introduced by
   (a) Pascal
   (b) Peter and Paul
   (c) Thomas Bayes
   (d) M Loeve

143. The probability of two persons being borned on the same day (ignoring date) is
   (a) 1/49
   (b) 1/365
   (c) 1/7
   (d) None of the above

144. Three dice are rolled simultaneously the probability of obtaining 12 spots is
   (a) 1/8
   (b) 25/216
   (c) 1/12
   (d) 1/2

145. One of the two events must happen, given that the chances of one is one-fourth of the other. The odd in favour of the other is
(a) 1:3
(b) 1:4
(c) 1:5
(d) None of the above

146. If P(A/B) = 1/4 , P(B/A)=1/3 then P(A)/P(B)
(a) 3/4
(b) 7/12
(c) 4/3
(d) 1/12

147. A fair coin is tossed repeatedly unless a head is obtained. The probability that the coin has to be tossed at least four times is
(a) 1/2
(b) 1/4
(c) 1/6
(d) 1/8

148. If four whole numbers are taken at random and multiplied, the chance that the first digit is their product is 0,3,6 or 9 is
(a) $(2/5)^3$
(b) $(1/4)^3$
(c) $(2/5)^4$
(d) $(1/4)^4$

149. If A is an event, the conditional probability of A given A
(a) 0
(b) 1
(c)
(d) indeterminate quantity

150. Classical definition of probability was given by.....
(a) Pascal
(b) Peter and Paul
(c) Thomas Bayes
(d) Laplace

151. An event consisting only one point is called
(a) binary
(b) composite
(c) Elementary
(d) None of these

152. Mathematical probability cannot be calculated if the outcomes are
(a) Equallylikely
(b) Not equallylikely
(c) Both a and b
(d) None of these

153. An event which cannot occur is known as.........
(a) Possible event
(b) Impossible event
(c) Composite event
(d) None of these

154. The probability of the sample space is .....
    (a) 0
    (b) 1
    (c) Both a and b
    (d) None of these

155. The outcome of tossing a coin is a
    (a) Simple
    (b) Mutually exclusive event
    (c) Complimentary event
    (d) Compound event

156. Classical probability is measured in terms of
    (a) An absolute value
    (b) A ratio
    (c) Both a and b
    (d) None of the above

157. Probability can take values
    (a) $-\infty$ to ∞
    (b) $-\infty$ to 1
    (c) -1 to 1
    (d) 0 to 1

158. Probability is expressed as
    (a) Ratio
    (b) Proportion
    (c) Percentage
    (d) All the event

159. Two events are said to be independent if
    (a) Each outcome has equal chance of occurrence
    (b) There is no common point in between them
    (c) One doesn't a ect the occurrence of the other
    (d) Both the events have only one point

160. If A and B are two events which have no point in common, the events A and B are:
    (a) Complementary to each other
    (b) Independent
    (c) Mutually Exclusive
    (d) Dependent

161. Classical probability is also known as
    (a) Laplace's probability
    (b) Mathematical probability
    (c) A priori probability
    (d) All the above

162. Each outcome of a random experiment is called
    (a) Primary event
    (b) Compound event
    (c) Derived event
    (d) All the above

163. If A and B are two events, the probability of occurrence of either A or B is given as
(a) P(A)+P(B)
(b) $P(A\cup B)$
(c) $P(A \cap B)$
(d) P(A) P(B)

164. If A and B are two events, the probability of occurrence of A & B simultaneously is given as
(a) P(A)+P(B)
(b) $P(A \cup B)$
(c) $P(A \cap B)$
(d) P(A) P(B)

165. The limiting relative frequency approach of probability is known as
(a) Statistical Probability
(b) Classical Probability
(c) Mathematical Probability
(d) All the above

166. The definition of a priori probability was originally given by
(a) De Moivre
(b) Laplace
(c) Von Mises
(d) Feller

167. If it is known that an event A has occurred, the probability of an event E given A is called
(a) Emperical probability
(b) A priori Probability
(c) Posteriori Probability
(d) Conditional Probability

168. Probability by classical approach has
(a) No lecunae
(b) Only one lecunae
(c) Only two lacunae
(d) Many lacunae

169. Classical Probability is possible in case of
(a) unequilikely outcomes
(b) equilikely outcomes
(c) either A or B
(d) All the above

170. An event consisting of those elements which are not in A is called
(a) Primary event
(b) Derived event
(c) Simple event
(d) Complimentary event

171. The probability of all possible outcomes of a random experiment is always equal to
(a) infinity
(b) Zero
(c) One
(d) None of the above

172. The probability of the intersection of two mutually exclusive events is always
(a) infinity
(b) Zero
(c) One
(d) None of the above

173. The individual probabilities of occurence of two events A and B are known, the probability of occurence of both the events togather will be
(a) increased
(b) decreased
(c) One
(d) Zero

174. If $E_1, E_2, \ldots, E_n$ is a countable sequence of events such that $E_i \supset E_{i+1}$ for $i = 1,2,$ ….., then
(a) $lim_{n\to\infty} P(E_n) = 0$
(b) $lim_{n\to\infty} P(E_n) = \infty$
(c) $lim_{n\to\infty} P(E_n) = 1$
(d) $lim_{n\to\infty} P(E_n) =$ impossible value

175. If A_1, A_2 and A_3 are three mutually exclusive events, the probability of their union is equal to
(a) $P(A_1)P(A_2)P(A_3)$
(b) $P(A_1)+P(A_2)+P(A_3) - P(A_1A_2A_3)$
(c) $P(A_1)+P(A_2)+P(A_3)$
(d) $P(A_1)P(A_2)+P(A_1)P(A_3)+P(A_2)P(A_3)$

176. If A_1, A_2 and A_3 are three independent events, the probability of their joint occurrence is equal to
(a) $P(A_1)P(A_2)P(A_3)$
(b) $1/P(A_1)P(A_2)P(A_3)$
(c) $P(A_1)+P(A_2)+P(A_3)$
(d) $P(A_1 \cap A_2)+P(A_1 \cap A_3)+P(A_2 \cap A_3)$

177. If two events A and B are such that A and B , the relation between P(A) and P(B) is
(a) $P(A) \leq P(B)$
(b) $P(A) \geq P(B)$
(c) $P(A) = P(B)$
(d) None of the above

178. If A is an event , the conditional probability of A given A is equal to
(a) Zero
(b) One
(c) ∞
(d) Indeterminate quantity

179. If $A \subset B$, the probability, P(A/B) is equal to
(a) Zero
(b) One
(c) P(A)/P(B)
(d) P(B)/P(A)

180. If $B \subset A$, the probability P(A/B) is equal to
(a) Zero
(b) One
(c) P(A)/P(B)
(d) P(B)/P(A)

181. If two events A and B are such that A the relation between the conditional probabilities P(A/C) and P(B/C) is
(a) P(A/C) = P(B/C)
(b) P(A/C) > P(B/C)
(c) P(A/C) < P(B/C)
(d) All the above

182. For any two events A and B, P(A-B) is equal to
(a) P(A) -P(B)
(b) P(B)-P(A)
(c) P(B)-P(AB)
(d) P(A)-P(AB)

183. If an event B has occurred and it is known that P(B)=1, the conditional probability P(A/B) is equal to
(a) P(A)
(b) P(B)
(c) One
(d) Zero

184. If A and B are two independent events, then P($\bar{A} \cap \bar{B}$) is equal to
(a) P($\bar{A}$) P($\bar{B}$)
(b) 1-P(A ∪ B)
(c) [1- P (A)][1- P (B)]
(d) All the above

185. If E_1, E_2 , ..., E_n are n mutually exclusive events such that P(E_j)$\neq 0$ for j = 1,2,...,n and A is an arbitrary event contained in $\bigcup E_j$ with P(A)>0 and has been observed , the probability of a particular event E_j given A is given by the formula
(a) P (E_j/A) = $\frac{P(E_j)P(A/E_j)}{\sum_j P(E_j)}$
(b) P (E_j/A) = $\frac{P(E_j)P(A/E_j)}{\sum_j P(E_j)P(A/E_j)}$
(c) P (E_j/A) = $\frac{P(A/E_j)}{\sum_j P(A/E_j)}$
(d) None of the above

186. If A and B are two events such that AB and A$\bar{B}$ are two mutually exclusive and exhaustive events in which the event A can occur, then
(a) P(A) = 1
(b) P(A) = P(AB) + P(A $\bar{B}$)
(c) P(A) = P($\bar{A}$)+P(A$\bar{B}$)
(d) P(A) = P($\bar{A}$B)+P(A$\bar{B}$)

187. In a city 60 per cent read newspaper A, 40 per cent read news paper B and 30% read newspaper C, 20 percent read A and B, 30 percent read A and C , 10 percent read B and C. The percentage of people who do not read any of these newspaper is
(a) 65 per cent
(b) 15 per cent
(c) 45 per cent
(d) none of the above

188. If a bag contains 4 white and 3 black balls. Two draws of 2 balls are successively made, the probability of getting 2 white balls at first draw and 2 black balls at second draw when the balls drawn at first draw were replaced is

(a) 3/7
(b) 1/7
(c) 19/49
(d) 2/49

189. In tossing three coins at a time, the probability of getting at most one head is
(a) 3/8
(b) 7/8
(c) 1/2
(d) 1/8

190. There is 80 per cent chance that a problem will be solved by a statistics student and 60 per cent chance is there that the same problem will be solved by the mathematics student. The probability that at least the problem will be solved is
(a) 0.48
(b) 0.92
(c) 0.10
(d) 0.75

191. An urn contains 5 red, 4 white and 3 black balls. The probability of three balls being of different colours when the ball is replaced after each draw is equal to
(a) 3/144
(b) 4/144
(c) 5/144
(d) 1

192. In question 77, the probability of three balls being drawn in the order red, white and black when the balls are not replaced after each drawn, is equal to
(a) 1/22
(b) 5/144
(c) 60/144
(d) None of the above

193. An urn A contains 5 white and 3 black balls and B contains 4 white and 4 black balls. An urn is selected and a ball is drawn from it, the probability, that the ball is white, is
(a) 9/8
(b) 9/16
(c) 5/32
(d) 5/16

194. From a pack of 52 cards, two cards are drawn at random. The probability that one is an ace and the other is a king is
(a) 2/13
(b) 1/169
(c) 16/169
(d) 8/663

195. Two dice are rolled by two players A and B. A throws 10, the probability that B throws more than A is
(a) 1/12
(c) 1/18
(b) 1/6
(d) None of the above

196. There are two groups of students consisting of 4 boys and 2 girls; 3 boys and 1 girl. One student is selected from both the groups. The probability of one boy and one girl being selected is
(a) 1/9
(b) 5/12
(c) 1
(d) None of the above

197. In a shooting competition, Mr.X can shoot at the bulls eye 4 times out of 5 shots and Mr.Y, 5 times out of six and Mr.Z, 3 times out of 4 shots. The probability that the target will be hit at least twice is
    (a) 107/120
    (b) 47/120
    (c) 1/2
    (d) None of the above
198. There are two bags. One bag contains 4 red and 5 black balls and the other 5 red and 4 black balls. One ball is to be drawn from either of the two bags, the probability of drawing a black ball is
    (a) 1
    (b) 16/81
    (c) 1/2
    (d) 10/81
199. Three dice are rolled simultaneously. The probability of getting 12 spots is
    (a) 1/8
    (b) 25/216
    (c) 1/12
    (d) none of the above
200. Given that P (A) = $\frac{1}{3}$, P(B)= $\frac{1}{4}$, P(A/B)= $\frac{1}{6}$, the probability P(B/A) is equal to
    (a) 1/4
    (b) 3/4
    (c) 1/8
    (d) none of the above
201. From the probabilities given in question 86, the probability, P (B /$\bar{A}$)is equal to
    (a) 1/16
    (b) 15/24
    (c) 15/16
    (d) 5/16

202. A bag contains 3 white and 5 red balls. Three balls are drawn after shaking the bag. The odds against these balls being red is
    (a) 5/28
    (b) 5/8
    (c) 15/64
    (d) 3/5
203. A bag contains 3 white, 1 black and 3 red balls. Two balls are drawn from the well shaked bag. The probability of both the balls being black is

    (a) 1
    (b) zero
    (c) 1/7
    (d) none of the above

204. The chance of winning the race of the horse A in Durby is 1/5 and that of horse B is 1/6 . The probability that the race will be won by A or B is
    (a) 1/30
    (b) 1/3
    (c) 11/30
    (d) none of the above

205. Four cards are drawn from a pack of 52 cards. The probability that out of 4 cards being 2 red and 2 black is
    (a) 325/833
    (b) 46/833
    (c) 234/574
    (d) none of the above
206. The probability of Mr.R living 20 years more is 1/5 and that of Mr.S is 1/7. The probability that at least one of them will survive 20 years hence is
    (a) 12/35
    (b) 1/35
    (c) 13/35
    (d) 11/35
207. For a 60 year old person living up to the age of 70, it is 7:5 against him and for another 70 year old person surviving up to the age of 80 , it is 5:2 against him. The probability that one of them will survive for 10 years more is
    (a) 5/42
    (b) 49/84
    (c) 59/84
    (d) none of the above
208. If 7:6 is in favour of A to survive 5 years more and 5:3 in favour of B to survive 5 years more, the probability that at least one of them will survive for 5 years more is
    (a) 35/104
    (b) 12/26
    (c) 21/26
    (d) 43/52
209. The chance of Appu to stand first in the class is 1/3 and that of Abduis 1/5. The probability that either of the two will stand first in the class is
    (a) 1/15
    (b) 8/15
    (c) 7/15
    (d) none of the above
210. The probability of throwing an odd sum with two fair dice is
    (a) 1/4
    (b) 1/16
    (c) 1
    (d) 1/2
211. The probabilities of Mr.J and Mr.M not living for one more year are 1/9 1nd 1/7 respectively. The probability of living one more year of either one or both is
    (a) 20/21
    (b) 62/63
    (c) 14/63
    (d) 5/21
212. A group consists of 4 men, 3 women and 2 boys. Three persons are selected at random. The probability that two men are selected is
    (a) 3/28
    (b) 7/28
    (c) 5/28
    (d) 5/14

213. With a pair of dice thrown at a time, the probability of getting a sum more than that of 9 is
(a) 5/18
(b) 7/36
(c) 5/6
(d) None of the above

214. If the chance of A hitting a target is 3 times out of 4 and of B 4times out of 5 and of C 5 times out of 6. The probability that the target will be hit in two hits is
(a) 19/24
(b) 23/30
(c) 47/120
(d) None of the above

215. The chance that doctor A will diagnose a disease X correctly is 60 percent. The chance that a patient will die by his treatment after correct diagnosis is 40 percent, and the chance of death by wrong diagnosis is 70 %. A patient of doctor A, who had disease X, died. The probability that his disease was diagnosed correctly is
(a) 6/25
(b) 7/25
(c) 6/7
(d) 6/13

216. An urn contains four tickets marked with numbers 112,121,211,222 and one ticket is drawn at random. Let $A_i (i = 1,2,3)$ be the event that i^{th} digit of the number of the ticket drawn is 1. Are the events A_1, A_2 and A_3
(a) mutually exclusive
(b) dependent
(c) independent
(d) pairwise independent

217. An urn contains 5 yellow, 4 black and 3 white balls. Three balls are drawn at random. The probability that no black ball is selected is
(a) 1/66
(b) 7/55
(c) 2/9
(d) None of the above

218. A bag contains 3 white and 5 red balls. A game is played such that a ball is drawn, its colour is noted and replaced with two additional balls of the same colour. The selection is made three times, the probability that a white ball is selected at each trial is
(a) 7/64
(b) 21/44
(c) 105/512
(d) 9/320

219. Given that P(A)=1/3, P(B)=3/4 and P (A∪B) = 11/12, then P(B/A) is
(a) 1/6
(b) 4/9
(c) 1/2
(d) None of the above

220. If A,B and C are three events such that P(A)=0.3, P(B)=0.4, P(C)=0.5 and $P(AB')$=0.2, P(BC)=0.3,$P(A' B' C') = 0.3$, $P(AB/C') = 0.1$, the probability, P(B) is equal to

(a) 3/5
(b) 4/5
(c) 1/5
(d) None of the above

221. Given the probabilities in question 107, the probability P(A/B) is equal to
(a) 1/4
(b) 1/2
(c) 1/3
(d) None of the above

222. In four whole numbers are taken at random and multiplied, the chance that the first digit in their product is 0,3,6 or 9 is
(a) $(2/5)^3$
(b) $(1/4)^3$
(c) $(2/5)^4$
(d) $(1/4)^4$

223. There are 4 coins in a bag. One of the coins has head on both sides. A coin is drawn at random and tossed five times and fell always with head upward. The probability that it is the coin with two head is
(a) 3/128
(b) 1/4
(c) 32/35
(d) None of the above

224. One of the two events is certain to happen. The chance one event is one-fifth of the other. The o dds in favour of the other is
(a) 1:6
(b) 6:1
(c) 5:1
(d) 1:5

225. One of the two events must happen; given that the chance of one is one forth of the other. The odd in favour of the other is
(a) 1:3
(b) 1:4
(c) 1:5
(d) None of the above

226. A coin is tossed six times. The probability of obtaining heads and tails alternately is
(a) 1/64
(b) 1/2
(c) 1/32
(d) None of the above

227. The oddsin favour of certain event are 5:4, and odds against another event are 4:3. The chance that at least one of them will happen is
(a) 15/63
(b) 51/63
(c) 47/63
(d) None of the above

228. Three houses were available in a locality for allotment. Three persons applied for a house . The probability that all the three persons applied for the same house is

(a) 1/3
(b) 1/9
(c) 1/27
(d) 1

229. If A tells truth 4 times out of 5 and B tells truth 3 times out of 4. The probability that both expressing the same fact contradict each other is
(a) 1/20
(b) 3/20
(c) 1/5
(d) None of the above

230. The probability of drawing a white ball in the first draw and again a white ball in the second draw with replacement from a bag containing 6 white & 4 blue balls is
(a) 2/10
(b) 6/10
(c) 36/100
(d) 1/3

231. A fair coin is tossed repeatedly unless a head is obtained. The probability that the coin has to be tossed at least four times is
(a) 1/2
(b) 1/4
(c) 1/6
(d) 1/8

232. Out of 20 employees in a company, five are graduates. Three employees are selected at random. The probability of all the three being graduates is
(a) 1/64
(b) 1/125
(c) 1/114
(d) None of the above

233. A card is drawn from a well shuffled pack of 52 cards. A gambler bets that it is either a heart or an ace. What are odds against his winning this bet?
(a) 9:4
(b) 4:9
(c) 35:52
(d) 1:3

234. The outcomes of tossing a coin three time are a variable of the type
(a) Continuous r.v
(b) Discrete r.v.
(c) Neither discrete nor continuous
(d) Discrete as well as continuous

235. The height of students in a school is a r.v. of the type
(a) Discrete
(b) Continuous
(c) Neither a nor b
(d) Both a and b

236. A discrete r.v has probability mass function $p(x) = kq^x p$, $p+q=1$, $x=2,3,4,...$The value of k should be equal to

(a) $1/q^2$
(b) 1/p
(c) 1/q
(d) 1/pq

237. Let x be a continuous r.v. with pdf $f(x) = kx$, $0 \leq x \leq 1 = k$, $1 \leq x \leq 2 = 0$, otherwise The value of k is equal to
(a) 1/4
(b) 2/3
(c) 2/5
(d) 3/4

238. For the distribution function of a r.v. X , F(4)-F(2) is equal to
(a) $P(2 < x < 4)$
(b) $P(2 \leq x < 4)$
(c) $P(2 \leq x \leq 4)$
(d) $P(2 < x \leq 4)$

239. If X is a r.v. with the mean μ, the expression $E(x - \mu)^2$ represents
(a) Variance of X
(b) Second central moment
(c) Both a and b
(d) None of a and b

240. If X is a r.v. $E(e^{tx})$ is known as
(a) Characteristic function
(b) Moment generating function
(c) Probability generating function
(d) All the above

241. If X is a r.v. with the mean μ, the expression E (x μ) is called
(a) Variance of X
(b) raw moment
(c) central moment
(d) None of the above

242. If X is a r.v. hich can takes only non negative values then
(a) $E(X^2) = [E(X)]^2$
(b) $E(X^2) \geq [E(X)]^2$
(c) $E(X^2) \leq [E(X)]^2$
(d) None of the above

243. If X is a r.v. having the pdf $f(x)$, then E(X) is called
(a) arithmetic mean
(b) geometric mean
(c) harmonic mean
(d) first quartile

244. If X is a r.v. having the pdf $f(x)$, then E(1/x) is used to find
(a) arithmetic mean
(b) geometric mean
(c) harmonic mean
(d) first quartile

245. If X is a r.v. having the pdf $f(x)$, then E(log X) represents

(a) arithmetic mean
(b) geometric mean
(c) harmonic mean
(d) logarithmic mean

246. If X is a continuous r.v. being the pdf $f(x)$= 1/3, -1≤ x ≤ 0 = 2/3, 0 ≤ x ≤ 1, then E(X^2) is equal to
(a) 1/9
(b) 2/3
(c) 5/12
(d) 1/3

247. If a r.v. X has mean 3 and standard deviation 4 the variance of the variable Y=2X+5 is
(a) 16
(b) 64
(c) 32
(d) 6

248. The mgf of a r.v. X is $M_x^{(t)} = \frac{2}{5} + \frac{1}{3}e^{2t} + \frac{4}{15}\ e^{3t}$. The expected value of X is
(a) 22/15
(b) 9/5
(c) 17/15
(d) 11/15

249. If X is a r.v. with distribution function F(x), then P ($X^2 \leq y$) is
(a) P ($-\sqrt{y} \leq X \leq \sqrt{y}$
(b) P ($X \leq \sqrt{y}$) - P ($X \leq -\sqrt{y}$)
(c) F ($\sqrt{y}$) - F ($-\sqrt{y}$)
(d) All the above

250. If X and Y are two random variables such that their expectations exist and P(x≤ y) = 1, then
(a) E(X) ≤ E(Y)
(b) E(X) ≥ E(Y)
(c) E(X) = E(Y)
(d) None of the above

251. If x is a r.v with v(x)=3, then v(3x+4) = ...
(a) 13
(b) 9
(c) 27
(d) 31

Answer Key

1. (c) Experiment
2. (d) All the above
3. (d) Sample space
4. (c) Getting head while tossing a coin
5. (b) 1
6. (a) Kolmogrov
7. (a) ½
8. (d) $1/6$
9. (a) $\frac{171}{1296}$
10. (c) $\frac{16}{52}$
11. (b) 0.19
12. (b) $\frac{3}{13}$
13. (a) $\frac{3}{4}$
14. (a) $\frac{1}{2}$
15. (d) $\frac{1}{8}$
16. (b) $\frac{2}{13}$
17. (d) None of these
18. (b) $\frac{2}{5}$
19. (d) 0
20.(b)$P(A)+P(B)-P(A\cap B)$
21.(a) Independent events
22.(c)$P(A\cap B)=0$
23.(c)$P(A\cap B)\leq P(A)+P(B)$
24. (c) $P(A) + P(A^C) = 1$
25. (d) All the above
26. (b) $\frac{2}{7}$
27. (d) All the above
28. (b) $P(A\cup B) = P(A) + P(B)$
29. (c) {2 3}
30. (a) $\frac{7}{95}$
31. (a) $P(A\cup B\cup C) = P(A) + P(B) + P(C)$
32. (d) All the above
33.(d)All the above
34.(c)0.14
35. (a) $\frac{1}{9}$
36.(a) $P(A\cap B\cap C)=P(A).P(B).P(C)$
37. (c) P (A/B) = A
38. (d) P (A/B) = P(A)
39. (a) $\frac{3}{5}$
40. (b) $P(A_i\cap A_j) = P(A_i) . P(A_j)$ for all i and j $i \neq j$
41. (b) $\frac{19}{42}$
42. (a)P(A). P(B/A). P(C/A$\cap$B)
43. (b) $f(x) = \frac{1}{4}$ for x= 1, 2
44. (d) $g(x) = \frac{1}{4}$ for x = 1, 2, 3, 4
45. (c) (1) and (3) are true
46. (c) $f(x) = \frac{x^2}{30}$
47. (b) Variance
48. (b) Mean
49. (a) Always true
50. (d) The third moment μ_3
51. (c) Random variable
52. (a) Number of road accidents occurs in a day in a city
53. (d) All the above
54. (c) Real number
55. (a) Probability mass function
56. (a They cannot occurs together
57.(d) (a) and (c) both
58. (b) $\frac{29}{32}$
59. (c) 0.1
60. (a) 0.39

61. (b) $\frac{P_3}{P_2}$ 62.(c) Both (a) and (b) 63. (a) f(x)= $\begin{cases} 1, & 0 \le x \le 1 \\ 0 & \text{otherwise} \end{cases}$

64.(c) ke 65. (b) f(x) = $\begin{cases} 0 & x < 0 \\ e^{-x} & x > 0 \end{cases}$ 66. (c) $\frac{3}{8}$

66. (c) $\frac{3}{8}$ 67. (c) P(a $\le$ x $\le$ b) = F(b) – F(a) 68. (a) P(a $\le$ x $\le$ b) = $\int_a^b f(x)dx$

69. (a) $\int_{-\infty}^{\infty} f(x)dx = 1$ 70. (b) 0 71. (d) f(x) = $\begin{cases} \frac{4x}{5} & 0 < x \le 1 \\ \frac{2}{5}(3-x) & 1 < x \le 2 \\ 0 & \text{Otherwise} \end{cases}$

72. (c) Decreasing 73. (a) $\frac{1}{27}$ 74. (c) 6 75. (d) $\frac{x}{\pi l}$

76. (d) 0.68. 77. (c) 1 78. (d) $\frac{1}{221}$ 79. (b) 0.50

80. (a) P(A) $\le$ P(s) 81. (b) $\sigma^2 = \mu_2^1 - \mu^2$ 82. (a) b

83. (c) E $(c_1x + c_2) = c_1$ E(X) + c_2 84. (c) E[aX+b] = a+b 85. (a) $\frac{5}{7}$

86. (c) $\sum_{j=1}^{n} x_j p_j$ 87.(a) $\frac{1}{2}$ 88.(b) $\frac{7}{2}$ 89.(c) μ_1^1

90.(d) E[g_1(x)] $\le$ E [g_2(x)] if g_1 (x) $\ge$ g_2 (x) for all x 91.(b) $[E(xy)]^2 \le E(x^2).\ E(y^2)$

92.(b) 4 93.(a) E(x^2) exists 94.(d) $\mu_r^1 = E(x^r)$ 95.(d) $\sigma^2 = \mu_2^1 - \mu$

96.(c) The expected value of e^{tx} exists for every value of t in some interval –h < t<h h>0

97.(b) X is discrete 98. (a) E [$(X-A)^r$] 99. (c) both and b 100.(c) $\frac{58}{3}$

101.(b) $\frac{t^r}{r!}$ 102. (b) $\int_{-\infty}^{\infty} e^{itx} f(x)\,dx$ 103.(b) $\frac{2}{9}$ 104. (c) 1.61

105. (a) $\frac{Pe^t}{1-qe^t}$ 106.(c) 0 107. (b) $\frac{\mu_4}{\mu_2^{\ 2}}$ 108. (a) $\frac{4}{\pi} - 1$

109. (b) $\frac{16}{32}$ 110. (c) g(y) $\begin{cases} \frac{2}{9}(y-1), 1 < y < 4 \\ 0 \quad \text{elsewhere} \end{cases}$ 111.(d) P(X$\le$ $x^{\frac{1}{3}}$)

112.(c) $\frac{1}{4}$ 113.(a) $\frac{1}{2}$ 114. (c) $2ye^{-y^2}, y \ge 0$ 115.(a) 1

116.(c) $\sqrt{2}$ 117. (c) $\frac{4}{4\pi}-1$ 118.(b) $\frac{1}{8}(1+e^t)^3$ 119. (a) Moments

120. (a) $\frac{1}{221}$ 121. (b) $\frac{2}{3}$ 122.(c) $\frac{4}{35}$ 123.(b) $\frac{6}{5}$

124. (b) $\frac{4}{9}$ 125. (d) $\frac{25}{69}$

126. c	152. b	178. b	204. c	230. c
127. b	153. b	179. c	205. a	231. b
128. c	154. b	180. b	206. d	232. c
129. d	155. a	181. c	207. b	233. a
130. b	156. b	182. d	208. d	234. b
131. b	157. d	183. a	209. b	235. b
132. b	158. d	184. d	210. d	236. a
133. a	159. c	185. b	211. b	237. b
134. b	160. c	186. b	212. d	238. c
135. c	161. d	187. b	213. d	239. c
136. a	162. a	188. d	214. c	240. b
137. b	163. b	189. c	215. d	241. c
138. c	164. c	190. b	216. d	242 b
139 b	165. a	191. c	217. b	243. a
140. c	166. b	192. a	218. a	244. c
141. b	167. d	193. d	219. c	245. b
142. c	168. d	194. d	220. b	246. d
143. c	169. b	195. a	221. a	247. a
144. d	170. d	196. b	222. c	248. a
145. d	171. c	197. a	223. c	249. d
146. a	172. b	198. c	224. d	250. a
147. b	173. b	199. b	225. b	251. c
148: c	174. a	200. c	226. c	
149. b	175. c	201. d	227. c	
150. d	176. a	202. a	228. b	
151. c	177. c	203. b	229 d	