Exercise 6.3

Choose the correct Answer

1. Value which is obtained by multiplying possible values of random variable with probability of occurrence and is equal to weighted average is called

    (a) Discrete value   (b) Weighted value

    (c) Expected value   (d) Cumulative value

2. Demand of products per day for three days are 21, 19, 22 units and their respective probabilities are 0·29, 0·40, 0·35. Pofit per unit is 0·50 paisa then expected profits for three days are

    (a) 21, 19, 22   (b) 21.5, 19.5, 22.5 (c) 0.29, 0.40, 0.35   (d) 3.045, 3.8, 3.85

3. Probability which explains x is equal to or less than particular value is classified as

    (a) discrete probability   (b) cumulative probability

    (c) marginal probability   (d) continuous probability

4. Given $E(X) = 5$ and $E(Y) = -2$, then $E(X - Y)$ is

    (a) 3   (b) 5   (c) 7   (d) –2

5. A variable that can assume any possible value between two points is called

    (a) discrete random variable   (b) continuous random variable

    (c) discrete sample space   (d) random variable

6. A formula or equation used to represent the probability distribution of a continuous random variable is called

    (a) probability distribution   (b) distribution function

    (c) probability density function   (d) mathematical expectation

7. If X is a discrete random variable and $p(x)$ is the probability of X, then the expected value of this random variable is equal to

    (a) $\sum f(x)$ (b) $\sum \left[x + f(x) \right]$ (c) $\sum f(x) + x$ (d) $\sum x p(x)$

[1]

8. Which of the following is not possible in probability distribution?

   (a) $\sum p(x) \geq 0$ (b) $\sum p(x) = 1$ (c) $\sum x \, p(x) = 2$ (d) $p(x) = -0.5$

9. If c is a constant, then $E(c)$ is

   (a) 0   (b) 1   (c) $c \, f(c)$ (d) c

10. A discrete probability distribution may be represented by

   (a) table   (b) graph

   (c) mathematical equation   (d) all of these

11. A probability density function may be represented by:

   (a) table   (b) graph

   (c) mathematical equation   (d) both (b) and (c)

12. If c is a constant in a continuous probability distribution, then $p(x = c)$ is always equal to

   (a) zero   (b) one   (c) negative   (d) does not exist

13. $E\big[X - E(X)\big]$ is equal to

   (a) $E(X)$ (b) $V(X)$ (c) 0   (d) $E(X) - X$

14. $E\big[X - E(X)\big]^2$ is

   (a) $E(X)$ (b) $E(X^2)$ (c) $V(X)$ (d) $S.D(X)$

15. If the random variable takes negative values, then the negative values will have

   (a) positive probabilities   (b) negative probabilities

   (c) constant probabilities   (d) difficult to tell

16. If we have $f(x) = 2x, 0 \leq x \leq 1$, then $f(x)$ is a

   (a) probability distribution   (b) probability density function

   (c) distribution function   (d) continuous random variable

[2]

17. $\int\limits_{-\infty}^{\infty} f(x)dx$ is always equal to

   (a) zero   (b) one   (c) $E(X)$ (d) $f(x)+1$

18. A listing of all the outcomes of an experiment and the probability associated with each outcome is called

   (a) probability distribution   (b) probability density function

   (c) attributes   (d) distribution function

19. Which one is not an example of random experiment?

   (a) A coin is tossed and the outcome is either a head or a tail

   (b) A six-sided die is rolled

   (c) Some number of persons will be admitted to a hospital emergency room during any hour.

   (d) All medical insurance claims received by a company in a given year.

20. A set of numerical values assigned to a sample space is called

   (a) random sample   (b) random variable

   (c) random numbers   (d) random experiment

21. A variable which can assume finite or countably infinite number of values is known as

   (a) continuous   (b) discrete   (c) qualitative   (d) none of them

22. The probability function of a random variable is defined as

$X= x$	-1	-2	0	1	2
$P(x)$	k	2k	3k	4k	5k

Then k is equal to

   (a) zero   (b) $\dfrac{1}{4}$ (c) $\dfrac{1}{15}$ (d) one

23. If $p(x)=\dfrac{1}{10}$, $x = 10$, then $E(X)$ is

   (a) zero   (b) $\dfrac{6}{8}$ (c) 1   (d) –1

[3]

24. A discrete probability function $p(x)$ is always

    (a) non-negative   (b) negative   (c) one   (d) zero

25. In a discrete probability distribution the sum of all the probabilities is always equal to

    (a) zero   (b) one   (c) minimum   (d) maximum

26. An expected value of a random variable is equal to it's

    (a) variance   (b) standard deviation   (c) mean   (d) covariance

27. A discrete probability function $p(x)$ is always non-negative and always lies between

    (a) 0 and ∞ (b) 0 and 1   (c) –1 and +1   (d) $-\infty$ and $+\infty$

28. The probability density function $p(x)$ cannot exceed

    (a) zero   (b) one   (c) mean   (d) infinity

29. The height of persons in a country is a random variable of the type

    (a) discrete random variable   (b) continuous random variable

    (c) both (a) and (b)   (d) neither (a) nor (b)

30. The distribution function $F(x)$ is equal to

    (a) $P(X=x)$ (b) $P(X\leq x)$ (c) $P(X\geq x)$ (d) all of these

[4]

Exercise 7.4

Choose the correct Answer

1. Normal distribution was invented by

   (a) Laplace   (b) De-Moivre   (c) Gauss   (d) all the above

2. If $X \sim N(9,81)$ the standard normal variate Z will be

   (a) $Z = \dfrac{X-81}{9}$ (b) $Z = \dfrac{X-9}{81}$ (c) $Z = \dfrac{X-9}{9}$ (d) $Z = \dfrac{9-X}{9}$

3. If Z is a standard normal variate, the proportion of items lying between $Z = -0.5$ and $Z = -3.0$ is

   (a) 0.4987   (b) 0.1915   (c) 0.3072   (d) 0.3098

4. If $X \sim N(\mu, \sigma^2)$, the maximum probability at the point of inflexion of normal distribution is

   (a) $\left(\dfrac{1}{\sqrt{2\pi}}\right)e^{\frac{1}{2}}$ (b) $\left(\dfrac{1}{\sqrt{2\pi}}\right)e^{\left(-\frac{1}{2}\right)}$ (c) $\left(\dfrac{1}{\sigma\sqrt{2\pi}}\right)e^{\left(-\frac{1}{2}\right)}$ (d) $\left(\dfrac{1}{\sqrt{2\pi}}\right)$

5. In a parametric distribution the mean is equal to variance is :

   (a) binomial   (b) normal   (c) poisson   (d) all the above

6. In turning out certain toys in a manufacturing company, the average number of defectives is 1%. The probability that the sample of 100 toys there will be 3 defectives is

   (a) 0.0613   (b) 0.613   (c) 0.00613   (d) 0.3913

7. The parameters of the normal distribution $f(x) = \left(\dfrac{1}{\sqrt{72\pi}}\right)\dfrac{e^{-(x-10)^2}}{72}$ $-\infty < x < \infty$

   (a) (10,6)   (b) (10,36)   (c) (6,10)   (d) (36,10)

8. A manufacturer produces switches and experiences that 2 per cent switches are defective. The probability that in a box of 50 switches, there are atmost two defective is :

   (a) $2.5 \, e^{-1}$ (b) e^{-1} (c) $2 \, e^{-1}$ (d) none of the above

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

   (a) 240/729   (b) 489/729   (c) 496/729   (d) 251/729

10. If for a binomial distribution b(n,p) mean = 4 and variance = 4/3, the probability, $P(X \geq 5)$ is equal to :

    (a) $(2/3)^6$ (b) $(2/3)^5(1/3)$ (c) $(1/3)^6$ (d) $4(2/3)^6$

[5]

11. The average percentage of failure in a certain examination is 40. The probability that out of a group of 6 candidates atleast 4 passed in the examination are :

    (a) 0.5443   (b) 0.4543   (c) 0.5543   (d) 0.4573

12. Forty percent of the passengers who fly on a certain route do not check in any luggage. The planes on this route seat 15 passengers. For a full flight, what is the mean of the number of passengers who do not check in any luggage?

    (a). 6.00   (b.) 6.45   (c). 7.20   (d.) 7.50

13. Which of the following statements is/are true regarding the normal distribution curve?

    (a) it is symmetrical and bell shaped curve

    (b) it is asymptotic in that each end approaches the horizontal axis but never reaches it

    (c) its mean, median and mode are located at the same point

    (d) all of the above statements are true.

14. Which of the following cannot generate a Poisson distribution?

    (a) The number of telephone calls received in a ten-minute interval

    (b) The number of customers arriving at a petrol station

    (c) The number of bacteria found in a cubic feet of soil

    (d) The number of misprints per page

15. The random variable X is normally distributed with a mean of 70 and a standard deviation of 10. What is the probability that X is between 72 and 84?

    (a) 0.683   (b) 0.954   (c) 0.271   (d) 0.340

16. The starting annual salaries of newly qualified chartered accountants (CA's) in South Africa follow a normal distribution with a mean of ₹ 180,000 and a standard deviation of ₹ 10,000. What is the probability that a randomly selected newly qualified CA will earn between ₹ 165,000 and ₹ 175,000 per annum?

    (a) 0.819   (b) 0.242   (c) 0.286   (d) 0.533

17. In a large statistics class the heights of the students are normally distributed with a mean of 172cm and a variance of 25cm. What proportion of students are between 165cm and 181cm in height?

    (a) 0.954   (b) 0.601   (c) 0.718   (d) 0.883

18. A statistical analysis of long-distance telephone calls indicates that the length of these calls is normally distributed with a mean of 240 seconds and a standard deviation of 40 seconds. What proportion of calls lasts less than 180 seconds?

    (a) 0.214   (b) 0.094   (c) 0933   (d) 0.067

19. Cape town is estimated to have 21% of homes whose owners subscribe to the satelite service, DSTV. If a random sample of your home in taken, what is the probability that all four home subscribe to DSTV?

    (a) 0.2100   (b) 0.5000   (c) 0.8791   (d) 0.0019

20. Using the standard normal table, the sum of the probabilities to the right of $z = 2.18$ and to the left of $z = -1.75$ is:

    (a) 0.4854   (b) 0.4599   (c) 0.0146   (d) 0.0547

21. The time until first failure of a brand of inkjet printers is normally distributed with a mean of 1,500 hours and a standard deviation of 200 hours. What proportion of printers fails before 1000 hours?

    (a) 0.0062   (b) 0.0668   (c) 0.8413   (d) 0.0228

22. The weights of newborn human babies are normally distributed with a mean of 3.2kg and a standard deviation of 1.1kg. What is the probability that a randomly selected newborn baby weighs less than 2.0kg?

    (a) 0.138   (b) 0.428   (c) 0.766   (d) 0.262

23. Monthly expenditure on their credit cards, by credit card holders from a certain bank, follows a normal distribution with a mean of ₹ 1,295.00 and a standard deviation of ₹ 750.00. What proportion of credit card holders spend more than ₹ 1,500.00 on their credit cards per month?

    (a) 0.487   (b) 0.392   (c) 0.500   (d) 0.791

24. Let z be a standard normal variable. If the area to the right of z is 0.8413, then the value of z must be:

    (a) 1.00   (b) –1.00   (c) 0.00   (d) –0.41

25. If the area to the left of a value of z (z has a standard normal distribution) is 0.0793, what is the value of z?

    (a) -1.41   (b) 1.41   (c) –2.25   (d) 2.25

26. If $P(Z > z) = 0.8508$ what is the value of z (z has a standard normal distribution)?

    (a) –0.48   (b) 0.48   (c) –1.04   (d) 1.04

27. If $P(Z > z) = 0.5832$ what is the value of z (z has a standard normal distribution)?

    (a) –0.48   (b) 0.48   (c) 1.04   (d) –0.21

28. In a binomial distribution, the probability of success is twice as that of failure. Then out of 4 trials, the probability of no success is

    (a) 16/81   (b) 1/16   (c) 2/27   (d) 1/81

[7]

Exercise 8.3

Choose the correct Answer

1. A …………. may be finite or infinite according as the number of observations or items in it is finite or infinite.

   (a) Population   (b) census   (c) parameter   (d) none of these

2. A ……… of statistical individuals in a population is called a sample.

   (a) Infinite set   (b) finite subset   (c) finite set   (d) entire set

3. A finite subset of statistical individuals in a population is called …………

   (a) a sample   (b) a population   (c) universe   (d) census

4. Any statistical measure computed from sample data is known as …………...

   (a) parameter   (b) statistic   (c) infinite measure   (d) uncountable measure

5. A…………..is one where each item in the universe has an equal chance of known opportunity of being selected.

   (a) Parameter   (b) random sample   (c) statistic   (d) entire data

6. A random sample is a sample selected in such a way that every item in the population has an equal chance of being included

   (a) Harper   (b) Fisher   (c) Karl Pearson   (d) Dr. Yates

7. Which one of the following is probability sampling

   (a) purposive sampling   (b) judgment sampling

   (c) simple random sampling   (d) Convenience sampling

8. In simple random sampling from a population of units, the probability of drawing any unit at the first draw is

   (a) $\dfrac{n}{N}$ (b) $\dfrac{1}{N}$ (c) $\dfrac{N}{n}$ (d) 1

9. In …………….. the heterogeneous groups are divided into homogeneous groups.

   (a) Non-probability sample   (b) a simple random sample

   (c) a stratified random sample   (d) systematic random sample

10. Errors in sampling are of

    (a) Two types   (b) three types   (c) four types   (d) five types

[8]

11. The method of obtaining the most likely value of the population parameter using statistic is called ……………………

    (a) estimation   (b) estimator   (c) biased estimate   (d) standard error.

12. An estimator is a sample statistic used to estimate a
    (a) population parameter   (b) biased estimate
    (c) sample size   (d) census

13. …………..is a relative property, which states that one estimator is efficient relative to another.

    (a) efficiency   (b) sufficiency   (c) unbiased   (d) consistency

14. If probability $P[|\breve{\theta} - \theta| < \varepsilon] \to 1\mu$ as $n \to \infty'$, for any positive ε then $\breve{\theta}$ is said to …………..estimator of θ.

    (a) efficient   (b) sufficient   (c) unbiased   (d) consistent

15. An estimator is said to be …………. if it contains all the information in the data about the parameter it estimates.

    (a) efficient   (b) sufficient   (c) unbiased   (d) consistent

16. An estimate of a population parameter given by two numbers between which the parameter would be expected to lie is called an……………..interval estimate of the parameter.

    (a)point estimate   (b) interval estimation (c) standard error (d) confidence

17. A _____ is a statement or an assertion about the population parameter.

    (a) hypothesis   (b) statistic   (c) sample   (d) census

18. Type I error is

    (a) Accept H_0 when it is true   (b) Accept H_0 when it is false

    (c) Reject H_0 when it is true   (d) Reject H_0 when it is false.

19. Type II error is

    (a) Accept H_0 when it is wrong   (b) Accept H_0 when it is true

    (c) Reject H_0 when it is true   (d) Reject H_0 when it is false

20. The standard error of sample mean is

    (a) $\dfrac{\sigma}{\sqrt{2n}}$ (b) $\dfrac{\sigma}{n}$ (c) $\dfrac{\sigma}{\sqrt{n}}$ (d) $\dfrac{\sigma^2}{\sqrt{n}}$

[9]

Exercise 9.4

Choose the correct Answer

1. A time series is a set of data recorded

   (a) Periodically   (b) Weekly

   (c) successive points of time   (d) all the above

2. A time series consists of

   (a) Five components   (b) Four components

   (c) Three components   (d) Two components

3. The components of a time series which is attached to short term fluctuation is

   (a) Secular trend   (b) Seasonal variations

   (c) Cyclic variation   (d) Irregular variation

4. Factors responsible for seasonal variations are

   (a) Weather   (b) Festivals

   (c) Social customs   (d) All the above

5. The additive model of the time series with the components T, S, C and I is

   (a) $y=T+S+C\times I$ (b) $y=T+S\times C\times I$ (c) $y=T+S+C+I$ (d) $y=T+S\times C+I$

6. Least square method of fitting a trend is

   (a) Most exact   (b) Least exact

   (c) Full of subjectivity   (d) Mathematically unsolved

7. The value of 'b' in the trend line y=a+bx is

   (a) Always positive   (b) Always negative

   (c) Either positive or negative   (d) Zero

8. The component of a time series attached to long term variation is trended as

   (a) Cyclic variation   (b) Secular variations

   (c) Irregular variation   (d) Seasonal variations

9. The seasonal variation means the variations occurring with in

   (a) A number of years   (b) within a year

   (c) within a month   (d) within a week

10. Another name of consumer's price index number is:

    (a) Whole-sale price index number   (b) Cost of living index

    (c) Sensitive   (d) Composite

11. Cost of living at two different cities can be compared with the help of

    (a) Consumer price index   (b) Value index

    (c) Volume index   (d) Un-weighted index

12. Laspeyre's index = 110, Paasche's index = 108, then Fisher's Ideal index is equal to:

    (a) 110   (b) 108   (c) 100   (d) 109

13. Most commonly used index number is:

    (a) Volume index number   (b) Value index number

    (c) Price index number   (d) Simple index number

14. Consumer price index are obtained by:

    (a) Paasche's formula   (b) Fisher's ideal formula

    (c) Marshall Edgeworth formula   (d) Family budget method formula

15. Which of the following Index number satisfy the time reversal test?

    (a)Laspeyre's Index number   (b) Paasche's Index number

    (c) Fisher Index number   (d) All of them.

16. While computing a weighted index, the current period quantities are used in the:

    (a) Laspeyre's method   (b) Paasche's method

    (c) Marshall Edgeworth method   (d) Fisher's ideal method

17. The quantities that can be numerically measured can be plotted on a

    (a) p - chart   (b) c – chart   (c) x bar chart   (d) np – chart

18. How many causes of variation will affect the quality of a product?

    (a) 4   (b) 3   (c) 2   (d) 1

19. Variations due to natural disorder is known as

    (a) random cause   (b) non-random cause

    (c) human cause   (d) all of them

20. The assignable causes can occur due to

    (a) poor raw materials   (b) unskilled labour

    (c) faulty machines   (d) all of them

21. A typical control charts consists of

    (a) CL, UCL   (b) CL, LCL   (c) CL, LCL, UCL (d) UCL, LCL

22. $\overline{X}$ chart is a

   (a) attribute control chart   (b) variable control chart

   (c) neither Attribute nor variable control chart

   (d) both Attribute and variable control chart

23. R is calculated using

   (a) $x_{max} - x_{min}$ (b) $x_{min} - x_{max}$ (c) $\overline{x}_{max} - \overline{x}_{min}$ (d) $\overline{\overline{x}}_{max} - \overline{\overline{x}}_{min}$

24. The upper control limit for $\overline{X}$ chart is given by

   (a) $\overline{X} + A_2 \overline{R}$ (b) $\overline{\overline{X}} + A_2 R$ (c) $\overline{\overline{X}} + A_2 \overline{R}$ (d) $\overline{\overline{X}} + A_2 \overline{\overline{R}}$

25. The LCL for R chart is given by

   (a) $D_2 \overline{R}$ (b) $D_2 \overline{\overline{R}}$ (c) $D_3 \overline{\overline{R}}$ (d) $D_3 \overline{R}$

Choose the correct Answer

1. The transportation problem is said to be unbalanced if _____

   a) Total supply ≠ Total demand   (b) Total supply = Total demand

   (c) $m = n$ (d) $m+n-1$

2. In a non – degenerate solution number of allocations is

   (a) Equal to $m+n-1$ (b) Equal to $m+n+1$

   (c) Not equal to $m+n-1$ (d) Not equal to $m+n+1$

3. In a degenerate solution number of allocations is

   (a) equal to $m+n-1$ (b) not equal to $m+n-1$

   (c) less than $m+n-1$ (d) greather than $m+n-1$

4. The Penalty in VAM represents difference between the first _____

   (a) Two largest costs   (b) Largest and Smallest costs

   (c) Smallest two costs   (d) None of these

5. Number of basic allocation in any row or column in an assignment problem can be

   (a) Exactly one   (b) at least one   (c) at most one   (d) none of these

6. North-West Corner refers to _____

   a) top left corner   (b) top right corner

   (c) bottom right corner   (d) bottom left corner

7. Solution for transportation problem using _____ method is nearer to an optimal solution.

   a)NWCM   (b) LCM   (c) VAM   (d) Row Minima

8. In an assignment problem the value of decision variable x_{ij} is _____.

   (a) 1   (b) 0   c) 1 or 0   (d) none of them

9. If number of sources is not equal to number of destinations, the assignment problem is called_____

   (a) balanced   (b) unsymmetric   (c) symmetric   (d) unbalanced

10. The purpose of a dummy row or column in an assignment problem is to

    (a) prevent a solution from becoming degenerate

    (b) balance between total activities and total resources

    (c) provide a means of representing a dummy problem

    (d) none of the above

11. The solution for an assignment problem is optimal if

    (a) each row and each column has no assignment

    (b) each row and each column has atleast one assignment

    (c) each row and each column has atmost one assignment

    (d) each row and each column has exactly one assignment

12. In an assignment problem involving four workers and three jobs, total number of assignments possible are

    (a) 4　　　　　　　(b) 3　　　　　　　(c) 7　　　　　　　(d) 12

13. Decision theory is concerned with

    (a) analysis of information that is available

    (b) decision making under certainty

    (c) selecting optimal decisions in sequential problem

    (d) All of the above

14. A type of decision –making environment is

    (a) certainty　　　(b) uncertainty　　　(c) risk　　　(d) all of the above

[14]