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FOR WEST BENGAL CLASS 12 PREPARATION

WB Class 12 Semester 3 Model Paper 2027 Statistics

EXAM	YEAR	TYPE	SUBJECT
West Bengal Class 12	2027	Sample Paper	Statistics

MODEL QUESTION PAPER - 1

Semester – III

Class—XII

Subject – Statistics (STAT)

Time: -1hour 15 minutes Full Marks: 35

This paper contains 35 questions. Students should answer all the questions according to the given instructions. Each question carries 1 mark; use of calculator is strictly prohibited.

[The symbols and notations used bear the usual significance]

Select the correct alternative for each of the following:

1. The sum $\frac{1}{1!}+\frac{4}{2!}+\frac{9}{3!}+\ldots\ldots$.is

   (A) $2e$ (B) $e-1$ (C) $3e$ (D) $2e-2$

2. $\int_{-\infty}^{\infty}\frac{3}{\sqrt{\pi}}\,e^{-9x^2}\,dx=$

   (A) $\frac{1}{\pi}$ (B) 1 (C) 0 (D) $\sqrt{\pi}$

3. If n be a positive integer and $f(p) = np(1- p)$, $0 < p < 1$, then the maximum value of $f(p)$ is

   (A) $\frac{1}{4}$ (B) $\frac{1}{4n}$ (C) $\frac{n}{4}$ (D) $\frac{n}{2}$

4. $\int_0^1 x^4\,(1-x^2)^{\frac{1}{2}}\,dx=$

   (A) $\frac{\pi}{64}$ (B) $\frac{\pi}{32}$ (C) $\frac{\sqrt{\pi}}{32}$ (D) $\frac{3\pi}{64}$

5. $\frac{1}{2.3}+\frac{1}{4.5}+\frac{1}{6.7}+\ldots\ldots$.is equal to

   (A) $1+\log_e 2$ (B) $1-\log_e 2$ (C) $\log_e 2-1$ (D) $1-2\log_e 2$

6. If X and Y are two independent random variables with standard deviations 3 and 5 respectively, then variance of (5Y-3X) is

   (A) 450 (B) 706 (C) 0 (D) 152

7. If for a random variable X, $E(X-1)^2 = 10$ and $E(X-2)^2 = 6$, then Var(X).

   (A) $\frac{7}{2}$ (B) 16 (C) $\frac{25}{2}$ (D) $\frac{15}{4}$

8. If the variances of the random variables X and Y are 4 and 9 and the correlation coefficient between the variables is 0.5, then Var(X - Y) =

   (A) 5 (B) 10 (C) 7 (D) 4

9. A random variable X takes only two values 0 and 1, where $P(X = 0) = \frac{1}{3}$. Then value of $E\{|X-E(X)|\}$ is

   (A) $\frac{2}{3}$ (B) $\frac{4}{9}$ (C) 0 (D) $\frac{2}{9}$

10. Statement A : If Cov (X, Y) = 0, then X and Y is independent.
Statement B : Two uncorrelated random variables are independent, if each of the variables assumes only two distinct values.

Select the correct option:

(A) Statement A is True but statement B is False
(B) Statement B is True but statement A is False
(C) Both the statements are False
(D) Both the statements are True

11. E $\{(|X - k|)\}$ is minimum when

(A) k < E(X) (B) k > E (X) (C) k = E(X) (D) k = Median of X

12. If F(x) be a distribution function, then for any value a of x

(A) F(a+0) = F(a) (B) F(a - 0) = F(a) (C) F(a+0) = F(a - 0) (D) F($a \pm 0$) = F(a)

13. If $f(x) = \frac{2}{3}x,\ 1 \le x \le 2,$ represents p.d.f of X ,. Then harmonic mean of X is

(A) $\frac{1}{2}$ (B) $\frac{2}{3}$ (C) 1 (D) $\frac{3}{2}$

14. Let F(x) be the cumulative distribution function of a random variable X. What is the value of $F(\mu_e)$? (μ_e = Median)

(A) 50% (B) 100% (C) 75% (D)25%

15. If $f(x) = k\ \frac{\lambda^x}{x!},$ = 1, 2, 3, …..,∞, k > 0 represents p.m.f of X, the constant k is equal to

(A) 1 (B) $e^{-\lambda}$ (C) $\frac{1}{1-e^{-\lambda}}$ (D) $\frac{e^{-\lambda}}{1-e^{-\lambda}}$

16.. The variance of 'number of success' in a set of 20 Bernoullian trials cannot exceed _____.

(A)10 (B) 5 (C) 0.25 (D) 0.125

17. The Geometric distribution is always

(A) negatively skew and platykurtic (B) positively skew and platykurtic
(C) positively skew and leptokurtic (D) positively skew and mesokurtic

18. If the mean of a binomial distribution is a positive integer, then

(A) mean > mode (B) mean < mode (C) mean = mode (D) mean = $\frac{mode}{2}$

19. If X follows a Poisson distribution with parameter 8.3 then P(X = r) is maximum when the value of r is

(A) 8.3 (B) 7 (C) 8 (D) 7 or 8

20. Two boys A and B toss a fair coin 3 times each. The probability of getting same number of heads is

(A) $\frac{1}{16}$ (B) $\frac{5}{16}$ (C) $\frac{5}{8}$ (D) $\frac{7}{16}$

21. For a bimodal binomial distribution one of the modes occur at the value 0, the coefficient of variation of the distribution will be

(A) 50% (B) 100% (C) 10% (D) 25%

22. A random variable X follows Poisson distribution with parameter 'λ', then P(X is odd) is

(A) $(1 - e^{-2\lambda})$ (B) $(1 + e^{-2\lambda})$ (C) $\frac{1}{2}(1 + e^{-2\lambda})$ (D) $\frac{1}{2}(1 - e^{-2\lambda})$

23. If X~ B(m, θ), then what will be the Var of Y= m - X?

(A) mθ (B) mθ(1 – θ) (C) m(1 – θ) (D) θ(1 – θ)

24. For a Poisson distribution 4P(X=4) – P(X=3) = 2P(X=2). Then β_2 of the distribution is

(A) $\frac{1}{\sqrt{3}}$ (B) $\frac{1}{3}$ (C) 3.5 (D) $3\frac{1}{3}$

25. In method of least squares, the principle is to minimise

(A) sum of errors (B) squares of errors (C) sum of squares of errors (D) none of these

26. In fitting an exponential curve there are 'm' normal equation, where m =

(A) 2 (B) 3 (C) 4 (D) cannot be said

27. The shape and direction of time series is provided by -

(A) Seasonal Variation (B) Secular trend
(C) Cyclical fluctuation (D) Irregular fluctuation.

28. The number of trade values remain unestimated when we use the method of moving average of period K = 6 is _____.

(A) 4 (B) 6 (C) 5 (D) 0

29. If the trend equation fitted from a given set of data of production (y, in thousand tonnes) of a fertiliser factory is 13y = 8424 + 312t considering time (t) unit 1 year, the monthly increase in production of fertiliser in thousand tonnes is :

(A) 54 (B) 24 (C) 2 (D) $\frac{1}{6}$

30. Statement A: $f(x) = ax(2 - x)$, $0 \le x \le 2$ is a p.d.f, then $a = \frac{3}{4}$

Statement B: The value of a p.d.f. may exceed 1 for some values of a random variable.

Select the correct option:

(A) Statement A is True but statement B is False
(B) Statement B is True but statement A is False
(C) Both the statements are False
(D) Both the statements are True

Read the following Assertion (A) and Reason (R) and choose the correct alternative:

31. **Assertion (A):** The binomial distribution with parameter n = 2000 and p = 0.001 can be approximated by a Poisson distribution.
Reason(R): n is sufficiently large.

(A) Both Assertion (A) and Reason (R) are true, and Reason (R) is the correct explanation of Assertion (A).
(B) Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of Assertion (A).
(C) Assertion (A) is true, but Reason (R) is false.
(D) Assertion (A) is false, but Reason (R) is true

32. **Assertion (A):** Method of mathematical curves can be used for predicting future trend values.
Reason(R): Method of mathematical curves assumes no law of change.

(A) Both Assertion (A) and Reason (R) are true, and Reason (R) is the correct explanation of Assertion (A).
(B) Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of Assertion (A).
(C) Assertion (A) is true, but Reason (R) is false.
(D) Assertion (A) is false, but Reason (R) is true

33. **Match the following with the component of time series data:**

Colum A	Colum B
1. Number of books borrowed from a library increases during the weekend.	i. Secular Trend
2. General increase in sale of computers.	ii. Seasonal Variation
3. Increase of sale of sanitizers during covid-19 situation.	iii. Cyclical Variation.
4. An era of prosperity.	iv. Irregular Variation.

(A) 1-ii, 2-iv, 3-i, 4-iii (B) 1-iii, 2-ii, 3-iv, 4-i
(C) 1-iv, 2-ii, 3-i, 4-iii (D) 1-ii, 2-i, 3-iv, 4-iii

34. **Colum Matching**

Colum A	Colum B
1. A discrete probability distribution having same mean and variance is	i. binomial distribution
2. A discrete probability distribution having variance greater than mean is	ii. uniform distribution
3. A symmetric distribution	iii. Poisson distribution
4. A discrete probability distribution having variance smaller than mean is	iv. geometric distribution

(A) 1-iii, 2-iv, 3-i, 4-ii (B) 1-iii, 2-ii, 3-iv, 4-i
(C) 1-iii, 2-ii, 3-i, 4-iv (D) 1-iii, 2-iv, 3-ii, 4-i

35. **Colum Matching**

Colum A	Colum B
1.The sequence $a_n = \frac{1}{1.2} + \frac{1}{2.3} + \frac{1}{3.4} + \ldots + \frac{1}{n.(n+1)}$ is	i. divergent
2. The series $1^3+2^3+3^3+\ldots+n^3+\ldots$ is	ii. monotonic increasing
3. The sequence $\left\{\frac{n+1}{2n+1}\right\}$ is	iii. convergent
4. The series $1+\frac{3}{2!}+\frac{5}{3!}+\frac{7}{4!}+\ldots\ldots$is	iv. monotonic decreasing

(A) 1-iv, 2-iii, 3-ii, 4-i (B) 1-iii, 2-iv, 3-ii, 4-i
(C) 1-ii, 2-i, 3-iv, 4-iii (D) 1-i, 2-ii, 3-iv, 4-iii

MODEL QUESTION PAPER - 2

Semester – III

Class—XII

Subject – Statistics (STAT)

Time: -1hour 30 minutes Full Marks: 35

This paper contains 35 questions. Students should answer all the questions according to the given instructions. Each question carries 1 mark; use of calculator is strictly prohibited.

[The symbols and notations used bear the usual significance]

Select the correct alternative for each of the following:

1. The sum $\frac{1}{2!}+\frac{1+2}{3!}+\frac{1+2+3}{4!}+$ …….is

   (A) $e/4$ (B) $2e/3$ (C) $e/2$ (D) $1/2e$

2. $\int_0^\infty x^3\ e^{-x}dx =$

   (A) 24 (B) 2 (C) 6 (D) 3

3. If f(x) = $\sqrt{\frac{2}{\pi}}e^{-2(x-3)^2}$, $-\infty < x < \infty$, then the maximum value of f (x) is

   (A) $\frac{1}{3}$ (B) $\sqrt{\frac{2}{\pi}}$ (C) 3 (D) does not exist

4. $B(\frac{3}{2},\frac{7}{2})=$

   (A) $\frac{3\pi}{64}$ (B) $\frac{5\pi}{32}$ (C) $\frac{5\pi}{128}$ (D) $\frac{\pi}{16}$

5. $\frac{1}{1.3}+\frac{1}{1.2.3.5}+\frac{1}{1.2.3.4.5.7}+$ …….is equal to

   (A) $1+ log_e 2$ (B) $1- log_e 2$ (C) $2e^{-1}$ (D) e^{-1}

6. For any random variable X, the valid relation is

   (A) $E\{|X|\} < |E(X)|$ (B) $|E(X)| \le E\{|X|\}$ (C) $|E(X)| = E\{|X|\}$ (D) $|E(X)| \ge E\{|X|\}$

7. The probability mass function of a random variable X is zero except at the points, x = 0, 1, 2. At these points it has the values $f(0) = 3c^3$, $f(1) = 4c - 10c^2$ and $f(2) = 5c - 1$, for some c > 0. The value of c is

   (A) $\frac{1}{3}$ (B) 1 (C) $\frac{1}{2}$ (D) 3

8. E(X) = 3 E{X(X - 1)} = 22 then S.D. of random variable X is -

   (A) 5 (B) 16 (C) 4 (D) 25

9. A random variable X takes only two values 0 and 1, where $P(X = 0) = \frac{1}{3}$. Then value of Var(X) is

   (A) $\frac{2}{3}$ (B) $\frac{4}{9}$ (C) 0 (D) $\frac{2}{9}$

10. **Assertion (A):** f(x) = kx, x = 1, 2, 3 ,....,n is a p.m.f, then k = $\frac{2}{n(n+1)}$

    Reason (R): f(x) ≥ 0 for all x.

    Select the correct :

    (A) A and R are both true and R is the correct explanation of A

    (B) A and R are both true but R is not the correct explanation of A

    (C) A is correct but R is incorrect

    (D) A is incorrect but R is correct

11. E $\{(X-K)^2\}$ is minimum when
(A) k < E(X) (B) k > E (X) (C) k = E(X) (D) k = Median of X

12. If F(x) be a distribution function, then which on is incorrect
(A) F(+∞) = 1 (B) F(- ∞) = 0 (C) F(x) is left continuous (D) F(x) is increasing

13. If $f(x) = cx$, $0 < x < 2$, represents p.d.f of X, where c (> 0) is constant. Then value of P(X >1) is
(A) $\frac{1}{2}$ (B) 0 (C) 1 (D) $\frac{3}{4}$

14. Let F(x) be the cumulative distribution function of a random variable X. What is the value of $F(Q_3)$?
(A) 50% (B) 100% (C) 75% (D)25%

15. If $f(x) = k\binom{n}{x}p^x(1-p)^{n-x}$, = 1, 2, 3, …..,n, k > 0 represents p.m.f of X, the constant k is equal to
(A) 1 (B) q^n (C) $\frac{1}{1-p^n}$ (D) $\frac{1}{1-q^n}$

16. For a binomial distribution with n = 15 p = ¼ which of the following is correct -
(A) The variance of the distribution is 45/4 (B) The distribution is leptokurtic
(C) The distribution is positively skewed (D) The distribution is unimodal

17. Mode of Geometric distribution with parameter p , 0 < p < 1,
(A) 0 (B) 1 (C) ∞ (D) undefined

18. For a symmetrical binomial distribution, if number of trials is an even integer, then
(A) mean > mode (B) mean < mode (C) mean = mode (D) mean = $\frac{mode}{2}$

19. In a Poisson distribution the second moment about the origin is 12, then its β_2 is
(A) $\frac{1}{\sqrt{3}}$ (B) $\frac{1}{3}$ (C) 30 (D) $3\frac{1}{3}$

20. Two boys A and B toss a fair coin n times each. The probability of getting same number of heads is
(A) $\binom{2n}{n}p^n$ (B) $\binom{2n}{n}2^n$ (C) $\binom{2n}{n}2^{-n}$ (D) $\binom{2n}{n}2^{-2n}$

21. For a bimodal Poisson distribution one of the modes occur at the value 0, the coefficient of variation of the distribution will be
(A) 50% (B) 100% (C) 10% (D) 25%

22. If ‘m’ things are distributed among ‘a’ men and ‘b’ women, show that the probability that the number of things received by men is odd, is

(A) $\frac{1}{2}\left[\frac{(b+a)^m-(b-a)^m}{(b+a)^m}\right]$ (B) $\frac{1}{2}\left[\frac{(b-a)^m-(b+a)^m}{(b+a)^m}\right]$ (C) $\frac{1}{2}\left[\frac{b^m-a^m}{(b+a)^m}\right]$ (D) $\frac{1}{2}\left[\frac{a^m-b^m}{(b+a)^m}\right]$

23. If (m – X) ~ B(m, 1- θ), then what will be the expectation of X?
(A) mθ (B) mθ(1 – θ) (C) m(1 – θ) (D) θ(1 – θ)

24. For a Poisson distribution P(X=2) =9 P(X=4) + 90P(X=6). Then μ_4 of the distribution is
(A)1 (B) $\frac{1}{4}$ (C) 30 (D) 4

25. The number of least square estimates
(A) is always 2 (B) is at most 3 (C) can exceed 2 (D) can never be 3

26. In fitting a quadratic trend by the method of least square, there are ‘m’ normal equation, where m =
(A) 2 (B) 3 (C) 4 (D) cannot be said

27. A component of time series used for short-term forecast is -
(A) Seasonal Variation (B) Secular trend (C) Cyclical fluctuation (D) Irregular fluctuation.

28. The number of trade values remain unestimated when we use the method of moving average of period K = 5 is _____.
(A) 4 (B) 6 (C) 5 (D) 0

29. If the annual trend equation is $Y_t = 60 + 12t$ (where t is the year), what is the new monthly rate of increase?
(A) 12 (B) 1 (C) 0.5 (D) 0.0833

30. **Assertion (A):** For a continuous random variable with p.d.f. $f(x) = 2x$, $0 < x < 1$ the probability P(X = 0.5) is zero.
Reason (R): The probability of a continuous random variable taking any exact single value is zero because the area under a single point is technically evaluated as an integral over a range of zero width. [1, 2]
(A) Both Assertion (A) and Reason (R) are true, and Reason (R) is the correct explanation of Assertion (A).
(B) Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of Assertion (A).
(C) Assertion (A) is true, but Reason (R) is false.
(D) Assertion (A) is false, but Reason (R) is true

31. A machine has a 0.03 probability of breaking down in any given hour. If the machine runs for 100 hours, approximately what is the probability that it breaks down at most once?

(A) $3e^{-3}$ (B) $2e^{-3}$ (C) $4e^{-3}$ (D) $5e^{-3}$

32. **Statement A:** In seasonal variations the period is more than one year.
Statement B: Trend may be down ward.
Select the correct option:
(A) Statement A is true but Statement B is false
(B) Statement B is true but Statement A is false
(C) Both the Statements are false
(D) Both the Statements are true.

33. **Match the following with the component of time series data:**

Colum A	Colum B
1. Increase of sales of garments during Durgapuja is associated with	i. Secular Trend
2. General increase in sale of smartphones.	ii. Seasonal Variation
3. Fall of production in a cement factory due to strike is associated with	iii. Cyclical Variation.
4. An era of recession.	iv. Irregular Variation.

(A) 1-ii, 2-iv, 3-i, 4-iii (B) 1-iii, 2-ii, 3-iv, 4-i
(C) 1-iv, 2-ii, 3-i, 4-iii (D) 1-ii, 2-i, 3-iv, 4-iii

34. **Colum Matching**

Colum A	Colum B
1. The number of misprints in a randomly selected page of a book follows	i. binomial distribution
2. Number of failures preceeding the first success in an indefinite series of Bernoullian trials follows	ii. uniform distribution
3. A distribution having constant p.m.f. is	iii. Poisson distribution
4. . Number of success in a finite series of Bernoullian trials follows	iv. geometric distribution

(A) 1-iii, 2-iv, 3-i, 4-ii (B) 1-iii, 2-ii, 3-iv, 4-i
(C) 1-iii, 2-ii, 3-i, 4-iv (D) 1-iii, 2-iv, 3-ii, 4-i

35. **Colum Matching**

Colum A	Colum B
1. The series $1^3+2^3+3^3+\ldots..+n^3+\ldots\ldots$ is	*i.* $\frac{e^2-1}{2e}$
2. $1+\frac{1}{3!}+\frac{1}{5!}+$ .....is	ii. convergent
3. $\sum\{\left(1-\frac{1}{n}\right)^{n^2}\}$ is	iii. $\frac{e^2+1}{2e}$
4. $1+\frac{1}{2!}+\frac{1}{4!}+\ldots\ldots$is	iv. divergent

(A) 1-ii, 2-i, 3-iv, 4-iii (B) 1-iv, 2-iii, 3-ii, 4-i
(C) 1-ii, 2-i, 3-iii, 4-iv (D) 1-iv, 2-i, 3-ii, 4-iii

Question Bank
Class—XII (Semester – III)
Subject – Statistics (STAT)

[The symbols and notations used bear the usual significance]

Unit - 1

Select the correct answer out of the option given against each question:

1. The sequence $\{(-1)^n\}$ is
   (a) unbounded (b) not bounded above
   (c) bounded below only (d) bounded
2. The upper bound of the sequence $\{2+ (-1)^n \frac{1}{n}\}$ is
   (a) 1 (b) 2 (c) 2.5 (d) 1.5
3. the greatest lower bound of the sequence $\{\frac{1}{n}\}$ is
   (a) 0 (b) $\frac{1}{2}$ (c) 1 (d) 0.5555555
4. Which of the following sequences is bounded sequence
   (a) $\{-n\}$ (b) $\{n^2\}$ (c) $\{n\}$ (d) $\{\frac{n}{n+1}\}$
5. The sequence $\frac{1}{2}, \frac{2}{3}, \frac{3}{4}, \frac{4}{5}$……is _____sequence.
   (a) unbounded (b) oscillatory (c) divergent (d) convergent
6. The sequence $\frac{1}{2}, \frac{1}{2^2}, \frac{1}{2^3}, \frac{1}{2^4}$,……, $\frac{1}{2^n}$,……converges to
   (a) 0 (b) $\frac{1}{2}$ (c) 1 (d) ∞
7. The sequence $\{-n^2\}$ is
   (a) diverges to ∞ (b) diverges to - ∞
   (c) converges to 1 (d) neither convergent not divergent
8. The sequence $\{\frac{1}{2}(1- (-1))^n\}$is
   (a) divergent (b) convergent to 1
   (c) converges to 0 (d) oscillatory
9. The sequence $\{\frac{n+1}{2n+1}\}$is
   (a) strictly monotonic increasing (b) strictly monotonic decreasing
   (c) not monotonic (d) oscillatory

10. The 12^{th} element of the sequence $\{1 + (-1)^n\}$ is

(a) 0 (b) 2 (c) 1 (d) ∞

11. Which of the following sequence is neither monotonically increasing nor monotonically increasing

(a) {-n} (b) $\{(-1)^n\}$ (c) $\{1+\frac{1}{n^n}\}$ (d) $\{\frac{1}{2^n}\}$

12. The series $\frac{1}{1^k}+\frac{1}{2^k}+\frac{1}{3^k}+\frac{1}{4^k}+\ldots\ldots+\frac{1}{n^k}+\ldots$ is convergent if

(a) k > 1 (b) k > 2 (c) k ≤ 1 (d) k > 0

13. The series $\Sigma\frac{1}{2^n}$ converges to_____

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

14. The sum $\frac{2}{1!}+\frac{3}{2!}+\frac{4}{3!}+\ldots\ldots$.is

(a) $2e$ (b) $e-1$ (c) $2e+1$ (d) $2e-1$

15. $\frac{1}{1.3}+\frac{1}{1.2.3.5}+\frac{1}{1.2.3.4.5.7}+\ldots\ldots$.is equal to

(a) $1+\log_e 2$ (b) $1-\log_e 2$ (c) $2e^{-1}$ (d) e^{-1}

16. $\frac{1}{2.3}+\frac{1}{4.5}+\frac{1}{6.7}+\ldots\ldots$.is equal to

(a) $1+\log_e 2$ (b) $\log_e 2 - 1$ (c) $1-2\log_e 2$ (d)$1-\log_e 2$

17. The series $\frac{x}{1}+\frac{x^2}{2}+\frac{x^3}{3}+\frac{x^4}{4}+\ldots.$

(a) divergent if $x \leq 1$ (b) convergent if $x < 1$

(c) convergent if $x > 1$ (d) divergent if $x < 1$

18. The series $\frac{1}{x}+\frac{1}{2x^2}+\frac{1}{3x^3}+\frac{1}{4x^4}+\ldots.$

(a) convergent if $x \geq 1$ (b) convergent if $x < 1$

(c) convergent if $x > 1$ (d) divergent if $x > 1$

19. If A = $1+\frac{3}{1!}+\frac{3^2}{2!}+\frac{3^3}{3!}+\ldots..$, then $\log_e A^3$ =

(a) 3 (b) 9 (c) e^3 (d) e^9

20. If $y = x - \frac{x^2}{2!}+\frac{x^3}{3!}-\frac{x^4}{4!}+\ldots...$, then x =

(a) $\log_e(1-y)$ (b) $\frac{1}{\log_e(1-y)}$ (c) $\log_e\frac{1}{1-y}$ (d) $\log_e(1+y)$

21. $1+\frac{4^2}{3!}+\frac{4^4}{5!}+\ldots..\infty$ =

(a) $\frac{e^4+e^{-4}}{4}$ (b) $\frac{e^4-e^{-4}}{4}$ (c) $\frac{e^4+e^{-4}}{8}$ (d) $\frac{e^4-e^{-4}}{8}$

22. Find the coefficient of x^n in the expansion of e^{a+bx} in power of x

(a) $e^a(\frac{b}{n!})$ (b) $e^a(\frac{b^n}{n!})$ (c) $e^a(\frac{b^n}{n})$ (d) $e^a(\frac{b}{n})$

23. The sum $\frac{1}{2!}+\frac{1+2}{3!}+\frac{1+2+3}{4!}+$ …….is

(a) $\frac{e}{2}$ (b) e (c) $2e$ (d) $\frac{2}{e}$

24. The sum $(1+\frac{1}{3.2^2}+\frac{1}{5.2^4}+\frac{1}{7.2^6}$ …….) is

(a) $log_e 3$ (b) $log_e 4$ (c) $log_e 5$ (d) $log_e 2$

25. $\int_0^\infty x^4\ e^{-3x}dx =$

(a) $\frac{40}{81}$ (b) $\frac{8}{27}$ (c) 120 (d) $\frac{8}{81}$

26. $\int_0^1 x^{\frac{3}{2}}(1-x)^{\frac{5}{2}}\,dx =$

(a) $\frac{3\pi}{64}$ (b) $\frac{3\pi}{32}$ (c) $\frac{15\pi}{256}$ (d) $\frac{3\pi}{256}$

27. The value $\frac{\Gamma(3)\Gamma(5)}{\Gamma(4)}$ is

(a) 2 (b) 8 (c) 15 (d) 30

28. The value of $B(\frac{4}{3},\frac{5}{3})$ is

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

29. $\Gamma(\frac{11}{2}) =$

(a) $\frac{105\sqrt{\pi}}{16}$ (b) $\frac{105\sqrt{\pi}}{32}$ (c) $\frac{945\sqrt{\pi}}{16}$ (d) $\frac{945\sqrt{\pi}}{32}$

30. The sum $1+\frac{1+a}{2!}+\frac{1+a+a^2}{3!}+\frac{1+a+a^2+a^3}{4!}+$ …….is

(a) $\frac{e^a-e}{a-1}$ (b) $\frac{e^a+e}{a+1}$ (c) $\frac{e^a+e}{a-1}$ (d) $\frac{e^a-e}{a+1}$

31. _____is the maximum value of the product of two numbers when their sum is 24

(a) 140 (b) 144 (c) 280 (d) 143

32. If n is positive integer and f(p) = np(1-p), 0 < p < 1, the maximum value of f(p) is

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

33. If $f(x) = \sqrt{\frac{2}{\pi}}e^{-2(x-3)^2}$, $-\infty < x < \infty$, then the maximum value of $f(x)$ is

(a) $\frac{1}{3}$ (b) $\sqrt{\frac{2}{\pi}}$ (c) 3 (d) does not exist

34. If $f(x,y) = x^3 - x^2y^2 + y^3$, then $\delta^2 f(x,y)/\delta x\,\delta y$ will be

(a) $4xy$ (b) $-4xy$ (c) $-4xy^2$ (d) $-4y$

35. If $f(x,y) = x^2 + 4y^3 - 3x^3y^2$, then $f'_x =$

(a) $12y^2 - 6x^3y$ (b) $2x - 6x^3y$ (c) $2x - 9x^2y^2$ (d) $12y^2 - 9x^2y^2$

36. $\int_{-\infty}^{\infty} \frac{|x|}{\sqrt{2\pi}} e^{-\frac{x^2}{2}} dx =$

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

37. $\Gamma(n+1) =$

(a) (n -1)$\Gamma(n-1)$ (b) n $\Gamma(n-1)$

(c) (n -1)$\Gamma(n)$ (d) n $\Gamma(n)$

38. Statement I : The sum $1 + \frac{1}{2!} + \frac{1}{4!} + \ldots\ldots\infty$ is $\frac{e^{-1}+e}{2}$

Statement II : The sum The sum $\frac{1}{1!} + \frac{4}{2!} + \frac{9}{3!} + \ldots\ldots$is $2e$

Choose the correct alternative:
(a) Statement A is True but statement B is False
(b)Statement B is True but statement A is False
(c) Both the statements are False
(d)Both the statements are True

39. Statement I: Given the value of (a + b), $a^2 + b^2$ is minimum when a = b

Statement II : If a+b = 18 then maximum value of ab is 81

Choose the correct alternative:
(a) Statement A is True but statement B is False
(b)Statement B is True but statement A is False
(c) Both the statements are False
(d)Both the statements are True

40.

Colum A	Colum B
1. The series $1+\frac{1}{2}+\frac{1}{3}+\frac{1}{4}+\ldots\ldots\ldots$ is	i. $5e$
2. $1\text{-}1+\frac{1}{2!}-\frac{1}{3!}+\ldots\ldots$is	ii. convergent
3. The series $1-\frac{1}{2}+\frac{1}{3}-\frac{1}{4}+\ldots\ldots\ldots$ is	iii. $\frac{1}{e}$
4. $\sum_{n=0}^{\infty}\frac{n^3}{n!}$	iv. divergent

Select the right combination:

(a) 1-ii, 2-i, 3-iv, 4-iii (b) 1-iv, 2-iii, 3-ii, 4-i

(c) 1-ii, 2-i, 3-iii, 4-iv (d) 1-iv, 2-i, 3-ii, 4-iii

Unit - 2

Select the correct answer out of the option given against each question:

1. If in a table all possible values of a random variable are given their corresponding probabilities, then this table is called as:
   (a) Probability density function (b) Distribution function
   (c) Probability distribution (d) Continuous distribution

2. 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

3. A variable which can assume finite or countably infinite number of values is known as:
   (a) Continuous (b) Discrete (c) Qualitative (d) Time series

4. 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

5. If X is A discrete random variable and f(x) is the probability of X, then the expected value of this random variable is equal to:
   (a) $\sum f(x)$ (b) $\sum[x+f(x)]$ (c) $\sum f(x)+x$ (d) $\sum xf(x)$

6. Given E(X) = 5 and E(Y) = - 2 then E(X - Y) is:
   (a) 3 (b) 5 (c) 7 (d)-2

7. Which of the following is not possible in probability distribution?
   (a) $p(x) \geq 0$ (b)$\Sigma p(x) = 1$ (c) $\Sigma xp(x) = 2$ (d) $p(x) = - 0.5$

8. If X = C is a constant (Where X is a random variable), then E(X) is:
   (a) 0 (b) 1 (c) cf(c) (d) C

9. A discrete probability distribution may be represented by:
   (a) Table (b) Graph
   (c) Mathematical function (d) All of the above

10. A listing of all the outcomes of an experiment and the probability associated with each outcome is called:
   (a) Probability distribution (b) Attributes
   (b) Probability density function (d) Distribution function

11. An expected value of a random variable is equal to its:
    (a) Variance (b) Standard deviation
    (c) Mean (d) Covariance
12. A random variable which can assume finite or countably infinite number of values is known as:
    (a) Continuous (b) Discrete
    (c) Qualitative (d) None of them
13. If C is a constant in a continuous probability distribution of X, then P(X = C) is always equal to:
    (a) Zero (b) One (c) Negative (d) Impossible

14. E[X - E(X)] is equal to:
    (a) E(X) (b) Var(X) (c) 0 (d) E(X) – X

15. Let the random variable X assume the values 1, 2, 3, ...such that $P(X = k) = 1/(2^k)$. k = 1, 2, 3 ,...., then P(X is odd) is
    (a)2/3 (b) 1/3 (c) ¼ (d) ½

16. Var(X) is equal to:
    (a) $E(X^2)$ (b) $[E(X)]^2$
    (c) $E(X^2) - [E(X)]^2$ (d) $E(X^2) + [E(X)]^2$

17. If E(X) = 3 E{X(X - 1)} = 22 then the standard deviation of the random variable X is
    (a) 5 (b) 4 (c) 16 (d) 25

18. A random variable X takes only two values 0 and 1 where P(X = 0) = 1/4 , then $E(X^2)$ is equal to
    (a) ¼ (b) 0 (c) 1 (d) ¾

19. If Var(X) = 9, then Var(45 - 3X) is
    (a) 36 (b) 18 (c) 81 (d) 27

20. If P(X < 0) = 1 then E(X) & Var(X) are respectively
    (a) positive & positive (b) zero & positive
    (c) negative & positive (d) negative & negative

21. If E(X) = 7 E(Y) = 12 then E(5X - 3Y + 1) equals
    (a) 1 (b) 2 (c)-1 (d) 0

22. $\sqrt{E(X - A)^2}$ is minimum when
    (a) A > E(X) (b) A = E(X) (c) A median of X (d) A < E(X)

23. An unbiased coin is tossed until at least one head and at least one tail appears. The expected number of tosses required is
(a) 4 (b) 6 (c) 2 (d) 3

24. E(X) = - 8, E(Y) = 9 then E(XY)
(a) 72 (b) -72 (c) 0 (d) cannot be determined

25. If X and Y are independent random variables, then Var(X±Y) =
(a) Var(X) Var(Y) (b) Var(X) + Var (Y)
(c) Var(X)-Var(Y) (d) Var(X) ± Var (Y)

26. For 2 independent random variables X and Y. Cov(X. X - Y) =
(a) Var(X) (b) Var(Y)
(c) Var(X) + Var(Y) (d) Var(X) – Cov(X,Y)

27. If Var(X) = 25 and Var(Y) = 16, ρ_{XY} = 0.5, then Var(2X + Y) is:
(a) 156 (b) $\sqrt{156}$ (c) 116 (d) 136

28. A man gets n^3 rupees for the n dots appearing on throwing an unbiased die. His expected gain (in Rs.) from a single throw is
(a) 15 (b) 87/6 (3) 95/6 (d) 73.50

29. If E(X) = 6 E(Y) = 4 and Cov(X, Y) = 9, then E(XY) =
(a) 24 (b) 33 (c) 15 (d) 42

30. A random variable X is such that P(X = -1) = P(X = 1) = 1/2 , then P($|X|$ = 1) is
(a) ¼ (b) 1/3 (c)1/2 (d) 1

31. If for a random variable X.
E$\{(X - 2)^2\}$ = 1.5 and E$\{(X - 3)^2\}$ = 4.5 then Var(X) =
(a) 0.25 (b) 0.5 (c) 1 (d) 1.5

32. If X and Y are two independent random variables such that Var(X) = 18 and Var(Y) = 7, then the standard deviation of X - Y is
(a) 11 (b) 25 (c) 5 (d) 23

33. The p.d.f of a random variable X is f(x) = 1, - ½ ≤ x ≤ ½, then P(X = 0) is
(0) ¼ (b) 0 (c) 1 (d) ½

34. Let F(x) be the distribution function of a random variable X. Then the value of 1- F(Q_1), where Q_1 is 1st quartile, is
(a) 1/10 (b) ¾ (c) ½ (d) ¼

35. A probability mass function f(x) is always:
(a) Non-negative (b) Negative (c) One (d) Zero

36. In a discrete probability distribution, the sum of all the probabilities is always equal to:
(a) Zero (b) One (c) Minimum (d) Maximum

37. A variable which can assume all values in the range of a random variable, is called:
(a) Finite (b) Infinite (c) Continuous (d) Discrete

38. Total area under the curve of a continuous probability density function is always equal to:
(a) 0 (b)1 (c) -1 (d) 2

39. The probability of a continuous random variable "X" taking any particular value, k is
(a) Negative (b) Zero (c) One (d) Cannot be determined always:

40. A random variable X takes only four values, 0, 1, 2, 3 with probabilities 0.2, 0.1, 0.6, 0.1 respectively. Then the mode is
(a) 1 (b) 3 (c) 0 (d) 2

41. If the p.d.f. f(x) is maximum at x = k then k is
(a) mean (b) mode (c) median (d) standard deviation.

42. For a random variable X, which of the following is correct?
(a) $\sqrt{E(X^2)} \leq E(X)$ (b) $\sqrt{E(X^2)} \geq E(X)$
(c) $\sqrt{E(X^2)} < E(X)$ (d) $E(X^2) < E(X)$

43. If we have $f(x) = 2x$, $0 \leq x \leq 1$, then $f(x)$ is a:
(a) Probability distribution (b) Distribution function
(c) Probability density function (d) Continuous random variable

44. If f(x) is a p.d.f. of r.v. X, then $\int_{-\infty}^{\infty} xf(x)dx$ is always equal to:
(a) Zero (b) One (c) E(X) (d) f(x) + 1

45. The probability distribution of a random variable is defined as:

X = x	1	2	3	4	5	6	7
P(X = x)	k	2k	2k	3k	k^2	$2k^2$	$7k^2+k$

Then k is equal to:
(a) Zero (b) ¼ (c) 1/10 (d) One

46. If X and Y are two independent random variables, then Cov(5X + 4, 3Y + 2) is
(a) 15 (b) 21 (c) 0 (d) 6

47. If F(x) is the distribution function of the random variable X, then which of the following is correct?
(a) $0 < F(x) < 1$ (b) $0 \leq F(x) < 1$
(c) $0 < F(x) \leq 1$ (d) $0 \leq F(x) \leq 1$

48. For a discrete random variable X taking non-negative integer values {0, 1, 2, 3,…….} with c.d.f. F(x), the E(X) can be expressed as:
(a) $\sum_0^\infty F(x)$ (b) $\sum_0^\infty x\, F(x)$
(c) $\sum_0^\infty \{1 - F(x)\}$ (d) $\sum_0^\infty \{F(x) - 1\}$

49. If the p.m.f. of a random variable X is proportional to 3^{-x}, x = 0 1,2,..., ∞, then P[X= at least 1] is-
(a) 1/3 (b) ½ (c) 2/3 (d) 1.

50. If E(X) = 3, Var(X) = 25, then $E(X^2)$ =_____
(a) 16 (b) 28 (c) 34 (d) 22

51. For a random variable X, $E\{|X|\}$ □ $\sqrt{E(X^2)}$
(a)> (b) < (c) ≥ (d) ≤

52. Variance is μ_r, where r = _____
(a) 3 (b) 4 (c) 2 (d) 1

53. For a random variable X, mean and variance are respectively μ_X and σ_X^2; then Var($\frac{X-\mu_X}{\sigma_X}$) is _____
(a) 0 (b) 1 (c) 2 (d) 4

54. If a random variable X assumes only two values 2 and 1 such that 2P(X = - 2) = P(X = l) . then Var(X) =_____
(a) 1 (b) 0 (c) 2 (d) 4

55. For a continuous random variable X, median (μ_e) is such that P(X ≥ μ_e) =_____
(a) 0.4 (b) 0.1 (c) 0.5 (d) 0.2

56. If f(x) is the p.m.f. of a discrete random variable X, then $\sum xf(x)$ =
(a) 1 (b) E(X) (c) 0 (d) Var(X)

57. Given that for two random variables X and Y, E(X) = 3, E(Y) = 4 and Cov(X, Y) = 6, then E(XY) =_____.
(a) 18 (b) 6 (c) 12 (d) 24

58. For a standardised variable Y, Var(1-5Y) =_____
(a) 6 (b) 5 (c) 25 (d) 26

59. For a random variable X, Var(X) = 25 & E(X) = 3, then E{X(X - 1)} =
(a) 37 (b) 31 (c) 34 (d) 30

60. If X and Y are independent random variables with standard deviations 2 and 3 respectively, then standard deviations of (7Y - 3X) is
(a) 165 (b) 477 (c) 405 (d) $\sqrt{477}$

61.For a continuous random variable X the probability density function f(x) is such that f(x)=$\begin{cases} a(1-x), 0 < x < 1, a > 0 \\ 0, \quad elsewhere \end{cases}$
then var (X) will be

(a) 1/6 (b) 1/9 (c) 1/12 (d) 1/18

62. Statement A: Expectation of a negative random variable is negative
Statement B: If E(X) is negative, X is not necessarily a negative random variable
Choose the correct alternative:
(a) Statement A is True but statement B is False
(b)Statement B is True but statement A is False
(c) Both the statements are False
(d)Both the statements are True

63. Statement A: If Var(X) = 0, then all values of X are equal
Statement B: If all values of X are equal, then Var(X) = 0
Choose the correct alternative:
(a) Statement A is True but statement B is False
(b)Statement B is True but statement A is False
(c) Both the statements are False
(d)Both the statements are True

64. Statement A: If X and Y are independent, then cov(X, Y) = 0
Statement B: If Cov(X, Y) = 0, then X and Y are not linearly related
Choose the correct alternative:
(a) Statement A is True but statement B is False
(b) Statement B is True but statement A is False
(c) Both the statements are False
(d)Both the statements are True

65. Statement A: If X and Y are independent random variables, then
$E(XY) = E(X).E(Y)$
Statement B: If X and Y are independent random variables, each with standard deviation 3, then standard deviation of (3X-4Y) is 15
Choose the correct alternative:
(a) Statement A is True but statement B is False
(b)Statement B is True but statement A is False
(c) Both the statements are False
(d) Both the statements are True

66. Statement A: For a random variable X, E(X) always exists
Statement B: The variance of a random variable cannot be negative
Choose the correct alternative:
(a) Statement A is True but statement B is False
(b)Statement B is True but statement A is False
(c) Both the statements are False
(d) Both the statements are True

67. Statement A: Values of a random variable are always positive numbers
Statement B: For a negative random variable X. Var(X) must be positive
Choose the correct alternative:
(a) Statement A is True but statement B is False
(b)Statement B is True but statement A is False
(c) Both the statements are False
(d) Both the statements are True

68. Statement A: The mode of a discrete random variable is its high value
Statement B: For a continuous random variable X with p.d.f. f(x), the mode is the value at which f(x) is minimum
Choose the correct alternative:
(a) Statement A is True but statement B is False
(b)Statement B is True but statement A is False
(c) Both the statements are False
(d) Both the statements are True

69. Statement A: If expectation of a random variable is zero, values of the random variable may be different
Statement B: If for a negative random variable X. $|E(X)|$ is 3, then E(X) is equal to 3
Choose the correct alternative:
(a) Statement A is True but statement B is False
(b)Statement B is True but statement A is False
(c) Both the statements are False
(d) Both the statements are True

70. Statement A: f(x)=ax(2-x),0≤ x ≤ 2 is a probability-density function for a = 4/3.
Statement B: The value of a probability-density function may exceed 1 for some real values of a random variable.
Choose the correct alternative:
(a) Statement A is True but statement B is False
(b)Statement B is True but statement A is False
(c) Both the statements are False
(d) Both the statements are True

71. Statement A: Expectation and variance of a negative random variable is always negative.
Statement B: If E(X) is negative, X is not necessarily a negative random variable.
Choose the correct alternative:
(a) Statement A is True but statement B is False
(b)Statement B is True but statement A is False
(c) Both the statements are False
(d) Both the statements are True

72.

Column A	Column B
1. Var(X)	a. 1
2. E(X)	b. P(X ≤ x)
3. The distribution function F(x) is	c. may be negative
4. For a continuous random variable X with p.d.f f(x), $\int_{-\infty}^{\infty} f(x)dx$ *is*	d. is always non-negative

Select the right combination:
(a) 1-c, 2-d, 3-b, 4-a
(b) 1-d, 2-c, 3-b, 4-a
(c) 1-d, 2-a, 3-c, 4-b
(d) 1-c, 2-d, 3-a, 4-b

73.

Column A	
1. For a continuous random variable X having p.d.f. f(x), if G is GM of X, then	a. P($a \leq X \leq b$)
2. If the p.m.f f(x) is f(x) = $\frac{x}{10}$, x = 1, 2, 3, 4 then is P(1/2 < X < 5/2)	b. MD about mean
3. Let f(x) be a p.d.f then $\int_a^b f(x)dx$ *is*	c. log G = $\int_{-\infty}^{\infty} logx.f(x)dx$
4. For a discrete random variable X with p.m.f f(x), $\sum \lvert x - E(X) \rvert$ f(x) is	d. 0.3

Select the right combination:
(a) 1-d, 2-b, 3-a, 4-c
(c) 1-b, 2-d, 3-a, 4-c
(b) 1-a, 2-d, 3-b, 4-c
(d) 1-c, 2-d, 3-a, 4-b

74. Assertion (A): f(x) = $\frac{1}{k^x}$, x = 1, 2, 3, ..., ∞ is a p.m.f., then k is 2
Reason (R): f(x) ≥ 0 for all x
Select the correct option:
(a) A and R are both True and R is the correct explanation of A
(b) A and R are both True but R is not the correct explanation of A
(c) A is correct but R is incorrect
(d) A is incorrect but R is correct

75. Assertion (A): For two independent random variables, X and Y Var(X+Y) = Var(X-Y)
Reason (R): Cov(X, Y) = 0, when X and Y are independent
Select the correct option:
(a) A and R are both True and R is the correct explanation of A
(b)A and R are both True but R is not the correct explanation of A
(c) A is correct but R is incorrect
(d) A is incorrect but R is correct

Unit - 3

Select the correct answer out of the option given against each question:

1. A coin is tossed 5 times. What is the probability of getting exactly 3 heads?
   (a) 10/32 (b) 10/64 (c) 5/32 (d) 1/32

2. In a binomial distribution, the mean is 6 and the variance is 4. What is the value of 'n'?
   (a) 10 (b) 12 (c) 15 (d) 18

3. In a Binomial distribution with n = 4, if 2 P(X=3) = 3 P (X =2), then value of p is .....
   (a) 9/13 (b) 4/13 (c) 6/13 (d) 7/13

4. Bernoulli distribution is a particular case of binomial distribution if n = ...
   (a) 4 (b) 10 (c) 2 (d)1

5. In binomial distribution probability of success in each trial remains _____.
   (a)undefine (b) constant (c) zero (d) one

6. In binomial distribution each trial results in _____ possible outcomes.
   (a) one (b) two (c) three (d) four

7. Which one is not a requirement of a binomial distribution?
   (a)There are 2 outcomes for each trial
   (b)There is a fixed number of trials
   (c)The outcomes must be dependent on each other
   (d)The probability of success must be the same for all the trials

8. For X having binomial distribution with parameters n =7 and p = $\frac{1}{3}$, P(X = r), is maximum when the value of r is
   (a) 2.67 (b) 2 (c) 3 (d) 4

9. The random variable X follows binomial distribution with parameter n and p for which the difference of the mean and the variance is 1. If 2P(X=2)=3 P(X=1) then n^2 P(X>1) is equal to
   (a) 11 (b) 12 (c) 15 (d) 16

10. Suppose the coefficient of variation of a binomial random variable X with parameters n and p is 100%. If n = 3, the variance of X will be
    (a) $\frac{7}{16}$ (b) $\frac{9}{16}$ (c) $\frac{5}{16}$ (d) $\frac{1}{2}$

11. A die is tossed twice. Getting a number greater than 4 is considered a success. Then the variance of the probability distribution of the number of successes is:
(a) 4/9 (b) 2/9 (c) 5/9 (d) 1/3

12. A man make attempts to hit the target. The probability of hitting the target is 3/5. Then the probability that A hit the target exactly 2 times in 5 attempts is:
(a)72/3125 (b)144/625 (c)216/625 (d) 32/3125

13. A multiple choice examination has ten questions; each question has four alternatives with exactly one correct answer. Suppose a student answers by guessing, then the probability of getting at least one correct answer is
(a) $(\frac{3}{4})^{10}$ (b) $(\frac{1}{4})^{10}$ (c) $1-(\frac{3}{4})^{10}$ (d) $1-(\frac{1}{4})^{10}$

14. For binomial distribution having parameters n and p, the distribution is positively skew when
(a) $p=\frac{1}{2}$ (b) $p<\frac{1}{2}$ (c) $p>\frac{1}{2}$ (d) $p=\frac{7}{9}$

15. For of a symmetrical binomial distribution, if there are even number of trials, then
(a) mean > mode (b) mean < mode (c) mean = mode (d) mean = $\frac{mode}{2}$

16. Two boys A and B toss a fair coin 3 times each. The probability of getting same number of heads is
(a) $\frac{1}{16}$ (b) $\frac{5}{16}$ (c) $\frac{5}{8}$ (d) $\frac{7}{16}$

17. For a bimodal binomial distribution one of the modes occur at the value 0, the coefficient of variation of the distribution will be
(a) 50% (b) 100% (c) 10% (d) 25%

18. Six ordinary dice are rolled. The probability that at least half of them will show at least 3 is
(a) $41\times\frac{2^4}{3^6}$ (b) $20\times\frac{2^4}{3^6}$ (c) $\frac{2^4}{3^6}$ (d) $40\times\frac{2^4}{3^6}$

19. For binomial distribution with parameters n and p, P(X = 0) =P(X = n). Then the value of p is
(a) 0.5 (b) 0.25 (c) 0.75 (d) 1

20. A binomial distribution with parameters 5 and $\frac{1}{3}$ is
(a) leptokurtic (b) platykurtic (c) mesocratic (d) none of these.

21. If X follows a symmetric binomial distribution with n= 36, value E[X(X -1)]
(a) 9 (b) 630 (c) 315 (d)18

22. If for a Binomial variable with 5 trials the sum of mean and variance is 1.8, then value of 'p' be:
(a) 0.2 (b) 0.8 (c) $0.\dot{3}$ (d) $0.\dot{6}$

23. The variance of number of successes in a set of 20 Bernoullian trials cannot exceed
(a)10 (b) 5 (c) 0.25 (d) 0.0125

24. If X has binomial distribution with mean np and variance npq, then $\frac{P(X=k)}{P(X=k-1)}$ is
(a) $\frac{n-k}{k-1}\frac{p}{q}$ (b) $\frac{n-k+1}{k}\frac{p}{q}$ (c) $\frac{n+1}{k}\frac{q}{p}$ (d) $\frac{n-k}{k-1}\frac{q}{p}$

25. The probability of a bomb hitting a bridge is ½ and two direct hits are needed to destroy it. The least number of bombs required so that the probability of the bridge being destroyed is greater than 0.9, is
(a) 8 (b) 7 (c) 6 (d) 9

26. A coin is tossed n times. The probability of getting at least 1 head is greater than or equal to 99%. The minimum number of tosses required is:
a) 5 b) 6 c) 7 d) 8

27. In a binomial distribution, the mean is 4 and the variance is 3. Its mode is:
a) 4 b) 5 c) 6 d) Cannot be determined

28. Let X be a binomially distributed random variable with parameters n and p. If the sum and the product of its mean and variance are 5 and 6 respectively, then the value of (6(n + p - q)) (where (q = 1 - p) is:
a) 50 b) 51 c) 52 d) 53

29. For a binomial distribution with n = 15, p = ¼ which of the following is correct
- (a) The variance of the distribution is 45/4
(b) The distribution is leptokurtic
(c) The distribution is positively skewed
(d) The distribution is unimodal

30 The value of

$$\sum_{x=0}^{21} x(x-1)(x-2)[\binom{21}{x}\left(\frac{2}{3}\right)^{21-x}\left(\frac{1}{3}\right)^{x}]$$

(a) 140/3 (b) 14/3 (c) 14 (d) 7.

31. For a random variable X satisfies the Poisson distribution with a mean 3, then the probability that $X \geq 2$ is

a)$1- 2e^{-3}$ b) $4e^{-3}$ c) $1+ 4e^{-3}$ d) $1- 4e^{-3}$

32. If X is a Poisson random variate with mean 3, then P ($|X- 3| < 1$) will be:

a) $\frac{9}{2}e^{-3}$ b) $1-\frac{9}{2}e^{-3}$ c) $\frac{9}{4}e^{-3}$ d) $\frac{99}{8}e^{-3}$

33. Suppose that a book of 600 pages contains 40 printing mistakes. Assume that these errors are randomly distributed throughout the book and X, the number of errors per page has a Poisson distribution. What is the probability that 10 pages selected at random will be free of errors?

a) $2\,e^{-\frac{2}{3}}$ b) $\frac{1}{3}e^{-\frac{2}{3}}$ c) $e^{-\frac{2}{3}}$ d) $\frac{1}{3}e^{-\frac{1}{3}}$

34. Consider a random variable X which follows a Poisson distribution. If, $P(X = 1) = \frac{2}{3}P(X = 2)$, then standard deviation of this distribution will be

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

35. If X∼Poisson(λ),what is P(X≠ 0)?

a) λ b) $1- e^{-\lambda}$ c) $1-\lambda$ d) $\lambda e^{-\lambda}$

36. Which of the following is true for a Poisson distribution?

a) Mean > Variance b) Mean < Variance
c) Mean = Variance d) Depends on λ

37. Which of the following is not a property of Poisson distribution?

a) It is skewed b) It has an upper bound
c) Mean = Variance d) It is discrete

38. For X∼Poisson, what is E[X(X−1)]?

a) λ^2 b) λ c) $\lambda+\lambda^2$ d) $\lambda^2-\lambda$

39. For small values of λ, the Poisson distribution is:

a) Symmetric b) Left-skewed c) Right-skewed d) Uniform

40. The γ_1 of the Poisson distribution with parameter λ is:
a) 0 b) $1/\lambda$ c) $\sqrt{\lambda}$ d) $1/\sqrt{\lambda}$

41. If X~Poisson(λ), the P(X is even) is:
a) $\frac{1}{2}(1+e^{-2\lambda})$ b) $\frac{1}{2}(1-e^{-2\lambda})$ c) $e^{-2\lambda}$ d) $1-e^{-\lambda}$

42. The Poisson distribution is a good approximation for the Binomial when:
a) n is small, p is large
b) n is large, p is small
c) n is large, p is large
d) n and p are both small

43. If X ~ Poisson(λ), then $E[e^{tX}]$ equals:
a) $e^{\lambda(e^t-1)}$ b) λe^t c) te^{λ} d) $e^{t\lambda}$

44. What is the mode of a Poisson(λ) distribution if λ is non-integer?
a) λ b) [λ] c) λ and λ-1 d) λ ± 1

45. A queue has arrivals following a Poisson (4) distribution in one hour. What is the probability of no arrivals in 15 minutes?
a) e^{-1} b) e^{-4} c) e^{-2} d) $2e^{-1}$

46. If a Poisson distribution has double mode at X = 3 and 4, then coefficient of variation of the distribution is
a) 100% b) 200% c) 50% d) 25%

47. Which of these can a Poisson random variable not take?
a) 0 b) 1 c) 2 d) -1

48. For which λ is the Poisson distribution most skewed?
a) $\lambda \to \infty$ b) $\lambda = 1$ c) $\lambda = 10$ d) $\lambda = 100$

49. A Poisson distribution has double modes 2 and 3.The μ_4 of the distribution is
a) 2 b) 3 c) 30 d) $3\frac{1}{3}$

50. If coefficient of variation of a Poisson distribution is 25%.So the mean is
a)2 b) 16 c) 4 d) 8

51. For X having Poisson distribution with parameter 7.5, P (X = r) is maximum when the value of r is
a) 7.5 b) 7 c) 8 d) 7 and 8

52. If X and Y are independent Poisson variables such that, P(X = 2)= P(X = 3) and P(Y = 4) = P(Y = 5) ,the standard deviation of (2X – Y) is

a) 17 b) 1 c) $\sqrt{11}$ d) $\sqrt{17}$

53. For a Poisson distribution with mean 1, the mean deviation about mean is

a) 2e b) 1 c) $\frac{2}{e}$ d) e^{-2}

54. If the probability that an individual suffers a bad reaction from an injection of a given serum is 0.001, then using Poisson's distribution, the probability that out of 2000 individuals, exactly 3 will suffer a bad reaction, is:

a) $\frac{9}{2}e^{-3}$ b) $\frac{9}{2}e^{-2}$ c) $\frac{4}{3}e^{-3}$ d) $\frac{4}{3}e^{-2}$

55. If $f(x) = k\frac{\lambda^x}{x!}$, = 1, 2, 3, …..,∞, k > 0 represents p.m.f of X, the constant k is equal to

(A) 1 (B) $e^{-\lambda}$ (C) $\frac{1}{1-e^{-\lambda}}$ (D) $\frac{e^{-\lambda}}{1-e^{-\lambda}}$

56. The fourth central moment of a Poisson distribution is 30, then its standard deviation is

a) 9 b) √3 c) 2 d) 3.

57. If X is a Poisson variate such that P(X = 2) = 9 P (X = 4) + 90 P(X = 6), then β_1 is

a)1 b) √3 c) 2 d) 3.

58. If X is Poisson variate, then

$$\sum_{x=0}^{\infty} x(x-1)(x-2)e - 4\frac{4^x}{x!}$$

a) 4 b) 16 c) 64 d) 2.

59. A binomial distribution requires:

a) only one trial b) two possible outcomes per trial
c) infinite outcomes d) Continuous data

60. If p = 0.5, n = 10, then mean of a binomial distribution with parameters (n, p) is:

a) 2.5 b) 5 c) 10 d) 0.5

61. Which condition is necessary for binomial distribution?

a) trials must be dependent b) probability must change
c) fixed number of trials d) Continuous variable

62. A box contain 12 items out of 4 are defective. A person selects 6 items from the box. The expected number of defective items out of his selected items is :
a) 2 b) 3 c) 3/2 d) 2/3

63. A symmetric binomial distribution will be
a) mesokurtic b) leptokurtic
c) platykurtic d) cannot be determined

64. If the mean of a binomial distribution is a positive integer, then the distribution must be
a) Unimodal b) bimodal c) Symmetric d) Positively skewed.

65. If the mean of a binomial distribution is a positive integer, then
a) mean> mode b) mean < mode c) mean = mode d) none of them.

66. Poisson distribution is used for:
a) Continuous data b) Rare events
c) Large samples only d) Equal probabilities

67. The distribution possessing the memory less property is:
a) binomial distribution b) Poisson distribution
c) discrete uniform distribution d) Bernoulli distribution

68. Mean and s.d. may be same for
a) binomial distribution b) Poisson distribution
c) Discrete uniform distribution d) geometric distribution

69. Geometric distribution deals with:
a) Number of successes b) Number of failures before first success
c) Continuous outcomes d) Number of failures

70. The mean of geometric distribution with parameter p is:
a) p b) 1/p c) 1 – p d) p^2

71. The variance of geometric distribution with parameter p is:
a) $(1 - p)/p^2$ b) p^2 c) 1/p d) $p(1 - p)$

72. The mode of Geometric distribution is:
a) 1 b) 0 c) ½ d) does not exit

73. The coefficient of kurtosis of Poisson distribution with mean m is:
a) 1/m b) - 1/m c) m d) 3 + (1/m)

74. The coefficient of variation of Poisson distribution with mean 4 is:
a) 1/4 b) 1/2 c) 4 d) 2

75. In a Poisson distribution, the second moment about origin is 12. Then its third moment about mean is
a) 4 b) 6 c) 5 d) 0

76. The mean and variance of a binomial distribution are 8 and 4 respectively, Then, P(X=1) is equal to
a) $\frac{1}{2^{12}}$ b) $\frac{1}{2^4}$ c) $\frac{1}{2^6}$ d) $\frac{1}{2^8}$

77. If for a binomial distribution b(n,p), mean = 4, variance 4/3, the probability, $P(X \geq 5)$ is equal to:
a) $\left(\frac{2}{3}\right)^6$ b) $\left(\frac{2}{3}\right)^5 \left(\frac{1}{3}\right)$ c) $\left(\frac{1}{3}\right)^6$ d) $4\left(\frac{2}{3}\right)^6$

78. An experiment succeeds twice as often as it fails. The chance that in the next six trials there shall be at least four success is:
a) 240/729 b) 489/ 729 c) 496/729 d) 498/729

79. X is a binomial distribution with parameter n and p. If n= 1, the distribution of X reduces to
a) binomial distribution b) Poisson distribution
c) discrete uniform distribution d) Bernoulli distribution

80. The uniform distribution is
a) Positively skew b) Negatively skew
c) Symmetric d) none of these.

Unit - 4

Select the correct answer out of the option given against each question:

1. In method of least squares, the principle is to minimise
   (a) sum of errors (b) squares of errors
   (c) sum of squares of errors (d) squares of sum of errors

2. Method of least squares gives
   (a) residual equations (b) exponential equations
   (c) normal equations (d) linear equations

3. In fitting parabolic curve, the number of unknown constants is
   (a) 1 (b) 2 (c) 4 (d) 3

4. In fitting an exponential curve, the equation is taken
   (a) $y= e^{(a+bx)}$ (b) $y=a+e^{bx}$ (c) $y=ab^x$ (d) $y=a+b^x$

5. In fitting linear equation, the number of unknown constants is
   (a) 1 (b) 2 (c) 4 (d) 3

6. Least square method is used in
   (a) fitting a mathematical curve (b) deriving regression equations
   (c) obtaining trend equation in a time series (d) all of these

7. Number of least square estimates
   (a) is always 2 (b) is at most 3
   (c) can exceed 2 (d) can never be 3

8. In fitting exponential curve, the number of unknown constants is
   (a) 1 (b) 2 (c) 4 (d) 3

9. After conversion of the equation $T_t= \frac{1}{ab^t}$ ($a \neq 0$, b$\neq$ 0) into a linear equation, it becomes
   (a) $\log(T_t) = a + bt$ (b) $\log(T_t) = \log(a) + t \log(b)$
   (c) $\log(T_t) = - \log(a) - t \log(b)$ (d) $\log(T_t) = - \log(a) - b \log(t)$

10. Statement A: In exponential curve, logarithmic transformation is used
    Statement B: The method of curve fitting may be used for fitting a curve other than linear or exponential
    Select the correct option:
    (a) Statement A is True but statement B is False
    (b)Statement B is True but statement A is False
    (c) Both the statements are False
    (d) Both the statements are True

11. Statement A: Two normal equations are obtained in the least square method
Statement B: Observed value minus predicted value is called the error
Select the correct option:
(a) Statement A is True but statement B is False
(b)Statement B is True but statement A is False
(c) Both the statements are False
(d)Both the statements are True

12. Least square estimates of parameter of a trend line:
a) have minimum variance b) are unbiased
c) can exactly be obtained d) all the above

Unit - 5

Select the correct answer out of the option given against each question:

1. In a time series trend means:
   a) Long term regular movement b) Short term regular movement
   c) Long term irregular movement d) Short term irregular movement

2. In a time series Depression is related with:
   a) Secular Trend b) Seasonal variation
   c) Cyclical variation d) Irregular Fluctuation

3. The method used for forecasting secular trend is:
   a) Method of mathematical curve fitting b) Ratio to moving average method
   c) Method of quarterly averages d) Ratio to trend method

4. If the trend line with 2000 as origin is y= 20.6+ 1.68x then trend line with 1995 as an origin will be:
   a) y = 12.2+ 1.68x b) y = 29.0 + 1.68x
   c) y = 20.6 + 1.68x d) y = 20.6 + 8.40 x

5. Which of the following component of the time series cannot be eliminated?
   a) Secular trend b) Irregular variation
   c) Cyclical variation d) Seasonal variation

6. General increase in sale of computer is associate with
   a) Secular Trend b) Seasonal variation
   c) Cyclical variation d) Irregular Fluctuation

7. The period of seasonal variation is
   a) Less than 2 years b) More than 1 year
   c) Not more than 1 year d) More than 1 year but less than 2 years.

8. Given the annual trend with 1981 as origin and unit of t = one year and Y_t= annual demand as $Y_t = 148.8 + 7.2t$, the monthly trend equation is:
   a) $Y_t = 12.4 + 0.05t$ b) $Y_t = 12.4 + 0.6t$
   c) $Y_t = 148.8 + 0.6t$ d) $Y_t = 148.8 + 7.2t$

9. Given the annual trend with 1981 as origin and unit of t = one year and Y_t= annual demand as $Y_t = 148.8 + 7.2t$, the quarterly trend equation is :
   a) $Y_t = 12.4 + 1.8t$ b) $Y_t = 37.2 + 0.45t$
   c) $Y_t = 37.2+ 0.2t$ d) $Y_t = 12.4 + 0.2t$

10. Increase the sales of garments during Durgapuja is associated with
    a) Secular Trend b) Seasonal variation
    c) Cyclical variation d) Irregular Fluctuation

11. Fall of production in a cement factory due to strike is associated with
    a) Secular Trend b) Seasonal variation
    c) Cyclical variation d) Irregular Fluctuation

12. Seasonal variation in a time series are caused by
    a) Lockouts and strikes b) Epidemics
    c) Floods d) climate change or human habits

13. What is a time series?
    a) Data collected at different locations b) Data collected over time intervals
    c) Random numbers d) Data without order

14. Which of the following is NOT a component of a time series?
    a) Trend b) Seasonal variation
    b) Cyclical variation d) Random sampling

15. The long-term movement in a time series is called:
    a) Seasonal variation b) Trend
    c) Irregular variation d) Cyclical variation

16. Seasonal variation refers to:
    a) Long-term increase or decrease
    b) Short-term fluctuations repeating yearly
    c) Random noise
    d) Economic cycles

17. Cyclical variations usually last for:
    a) Less than a year b) Exactly one year
    c) More than one year d) One month

18. Irregular variations are:
    a) Predictable b) Constant
    c) Random and unpredictable d) Seasonal

19. A 3-year moving average means:
    a) Average of 3 random values b) Average of 3 consecutive years
    c) Average of 3 highest values d) Average of 3 lowest values

20. In time series, multiplicative model is expressed as:
    a) $T_t + S_t + C_t + I_t$ b) $T_t \times S_t \times C_t \times I_t$
    c) $T_t - S_t - C_t - I_t$ d) $T_t \div S_t \div C_t \div I_t$

21. Additive model of time series is:
    a) $T_t \times S_t \times C_t \times I_t$ b) $T_t + S_t + C_t + I_t$
    c) $T_t \div S_t$ d) $T_t - S_t$

22. Which component reflects business cycles?
    a) Seasonal b) Trend c) Cyclical d) Irregular

23. Moving average method suffers from:
    a) the loss of information
    b) the element of subjectivity
    c) the decision about the number of years in group
    d) all the above

24. Time series analysis helps to:
    a) understand the behavior of a variable in the past
    b) predict the future behavior of a variable
    c) plan future operation
    d) all the above

25. A group of moving average consists of:
    a) 5- years period b) 3- years period
    c) a period which forms a cycle d) 3- months period

26. Moving average method of fitting trend in a time series data removes the effect of:
    a) long- term movements b) short - term movements
    c) cycle variation d) none of these.

27. Trend may be –
    (a) upward (b) downward
    (c) more or less at a constant level (d) all of these.

28. Number of models used in time series analysis is -
    (a) 4 (b) 2 (c) 3 (d) 1

29. Number of phases in "Business Cycle" is -
    (a) 2 (b) 4 (c) 3 (d) 5
30. Which of the statement is not associated with "Method of mathematical curve fitting for finding trend values –
    (a) all trend values can be estimated
    (b) satisfactory method for linear method
    (c) calculation involved is not complicated
    (d) used for prediction

31. Consider the following statements:
    Statement A: All trend values can be estimated by moving average method.
    Statement B: Moving average method cannot be used for forecasting
    (a) Statement A is true but Statement B is false
    (b) Statement B is true but statement a is false
    (c) Both Statements are false
    (d) Both Statements are true

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