Test Paper : **II**

Test Subject : **MATHEMATICAL SCIENCE**

Test Subject Code : **K-2616**

Test Booklet Serial No. : _____

OMR Sheet No. : _____

Roll No. | | | | | | | | |

(Figures as per admission card)

Name & Signature of Invigilator/s

Signature : _____

Name : _____

Paper : II

Subject : MATHEMATICAL SCIENCE

Time : 1 Hour 15 Minutes | Maximum Marks : 100

Number of Pages in this Booklet : **8** | Number of Questions in this Booklet : **50**

ಅಭ್ಯರ್ಥಿಗಳಿಗೆ ಸೂಚನೆಗಳು

1. ಈ ಪುಟದ ಮೇಲ್ತುದಿಯಲ್ಲಿ ಒದಗಿಸಿದ ಸ್ಥಳದಲ್ಲಿ ನಿಮ್ಮ ರೋಲ್ ನಂಬರನ್ನು ಬರೆಯಿರಿ.
2. ಈ ಪತ್ರಿಕೆಯು ಬಹು ಆಯ್ಕೆ ವಿಧದ ಐವತ್ತು ಪ್ರಶ್ನೆಗಳನ್ನು ಒಳಗೊಂಡಿದೆ.
3. ಪರೀಕ್ಷೆಯ ಪ್ರಾರಂಭದಲ್ಲಿ, ಪ್ರಶ್ನೆಪುಸ್ತಿಕೆಯನ್ನು ನಿಮಗೆ ನೀಡಲಾಗುವುದು. ಮೊದಲ 5 ನಿಮಿಷಗಳಲ್ಲಿ ನೀವು ಪುಸ್ತಿಕೆಯನ್ನು ತೆರೆಯಲು ಮತ್ತು ಕೆಳಗಿನಂತೆ ಕಡ್ಡಾಯವಾಗಿ ಪರೀಕ್ಷಿಸಲು ಕೋರಲಾಗಿದೆ.
   (i) ಪ್ರಶ್ನೆ ಪುಸ್ತಿಕೆಗೆ ಪ್ರವೇಶಾವಕಾಶ ಪಡೆಯಲು, ಈ ಹೊದಿಕೆ ಪುಟದ ಅಂಚಿನ ಮೇಲಿರುವ ಪೇಪರ್ ಸೀಲನ್ನು ಹರಿಯಿರಿ. ಸ್ಟಿಕ್ಕರ್ ಸೀಲ್ ಇಲ್ಲದ ಅಥವಾ ತೆರೆದ ಪುಸ್ತಿಕೆಯನ್ನು ಸ್ವೀಕರಿಸಬೇಡಿ.
   (ii) **ಪುಸ್ತಿಕೆಯಲ್ಲಿನ ಪ್ರಶ್ನೆಗಳ ಸಂಖ್ಯೆ ಮತ್ತು ಪುಟಗಳ ಸಂಖ್ಯೆಯನ್ನು ಮುಖಪುಟದ ಮೇಲೆ ಮುದ್ರಿಸಿದ ಮಾಹಿತಿಯೊಂದಿಗೆ ತಾಳೆ ನೋಡಿರಿ. ಪುಟಗಳು/ಪ್ರಶ್ನೆಗಳು ಕಾಣೆಯಾದ, ಅಥವಾ ದ್ವಿಪ್ರತಿ ಅಥವಾ ಅನುಕ್ರಮವಾಗಿಲ್ಲದ ಅಥವಾ ಇತರ ಯಾವುದೇ ವ್ಯತ್ಯಾಸದ ದೋಷಪೂರಿತ ಪುಸ್ತಿಕೆಯನ್ನು ಕೂಡಲೆ 5 ನಿಮಿಷದ ಅವಧಿ ಒಳಗೆ, ಸಂವೀಕ್ಷಕರಿಂದ ಸರಿ ಇರುವ ಪುಸ್ತಿಕೆಗೆ ಬದಲಾಯಿಸಿಕೊಳ್ಳಬೇಕು. ಆ ಬಳಿಕ ಪ್ರಶ್ನೆ ಪತ್ರಿಕೆಯನ್ನು ಬದಲಾಯಿಸಲಾಗುವುದಿಲ್ಲ, ಯಾವುದೇ ಹೆಚ್ಚು ಸಮಯವನ್ನೂ ಕೊಡಲಾಗುವುದಿಲ್ಲ.**
4. ಪ್ರತಿಯೊಂದು ಪ್ರಶ್ನೆಗೂ (A), (B), (C) ಮತ್ತು (D) ಎಂದು ಗುರುತಿಸಿದ ನಾಲ್ಕು ಪರ್ಯಾಯ ಉತ್ತರಗಳಿವೆ. ನೀವು ಪ್ರಶ್ನೆಯ ಎದುರು ಸರಿಯಾದ ಉತ್ತರದ ಮೇಲೆ, ಕೆಳಗೆ ಕಾಣಿಸಿದಂತೆ ಅಂಡಾಕೃತಿಯನ್ನು ಕಪ್ಪಾಗಿಸಬೇಕು.
   ಉದಾಹರಣೆ: (A) (B) ● (D)
   (C) ಸರಿಯಾದ ಉತ್ತರವಾಗಿದ್ದಾಗ.
5. ಪ್ರಶ್ನೆ ಪತ್ರಿಕೆ I ರಲ್ಲಿ **ಕೊಟ್ಟಿರುವ OMR ಉತ್ತರ ಹಾಳೆಯಲ್ಲಿ, ಪ್ರಶ್ನೆ ಪತ್ರಿಕೆ I ಮತ್ತು ಪ್ರಶ್ನೆ ಪತ್ರಿಕೆ II ರಲ್ಲಿ ಇರುವ ಪ್ರಶ್ನೆಗಳಿಗೆ ನಿಮ್ಮ ಉತ್ತರಗಳನ್ನು ಸೂಚಿಸತಕ್ಕದ್ದು.** OMR ಹಾಳೆಯಲ್ಲಿ ಅಂಡಾಕೃತಿಯಲ್ಲದೆ ಬೇರೆ ಯಾವುದೇ ಸ್ಥಳದಲ್ಲಿ ಉತ್ತರವನ್ನು ಗುರುತಿಸಿದರೆ, ಅದರ ಮೌಲ್ಯಮಾಪನ ಮಾಡಲಾಗುವುದಿಲ್ಲ.
6. OMR ಉತ್ತರ ಹಾಳೆಯಲ್ಲಿ ಕೊಟ್ಟ ಸೂಚನೆಗಳನ್ನು ಜಾಗರೂಕತೆಯಿಂದ ಓದಿರಿ.
7. ಎಲ್ಲಾ ಕರಡು ಕೆಲಸವನ್ನು ಪುಸ್ತಿಕೆಯ ಕೊನೆಯಲ್ಲಿ ಮಾಡತಕ್ಕದ್ದು.
8. ನಿಮ್ಮ ಗುರುತನ್ನು ಬಹಿರಂಗಪಡಿಸಬಹುದಾದ ನಿಮ್ಮ ಹೆಸರು ಅಥವಾ ಯಾವುದೇ ಚಿಹ್ನೆಯನ್ನು, ಸಂಗತವಾದ ಸ್ಥಳ ಹೊರತು ಪಡಿಸಿ, OMR ಉತ್ತರ ಹಾಳೆಯ ಯಾವುದೇ ಭಾಗದಲ್ಲಿ ಬರೆದರೆ, ನೀವು ಅನರ್ಹತೆಗೆ ಬಾಧ್ಯರಾಗಿರುತ್ತೀರಿ.
9. ಪರೀಕ್ಷೆಯು ಮುಗಿದನಂತರ, ಕಡ್ಡಾಯವಾಗಿ OMR ಉತ್ತರ ಹಾಳೆಯನ್ನು ಸಂವೀಕ್ಷಕರಿಗೆ ನೀವು ಹಿಂತಿರುಗಿಸಬೇಕು ಮತ್ತು ಪರೀಕ್ಷಾ ಕೊಠಡಿಯ ಹೊರಗೆ OMR ನ್ನು ನಿಮ್ಮೊಂದಿಗೆ ಕೊಂಡೊಯ್ಯಕೂಡದು.
10. ಪರೀಕ್ಷೆಯ ನಂತರ, ಪರೀಕ್ಷಾ ಪ್ರಶ್ನೆ ಪತ್ರಿಕೆಯನ್ನು ಮತ್ತು ನಕಲು OMR ಉತ್ತರ ಹಾಳೆಯನ್ನು ನಿಮ್ಮೊಂದಿಗೆ ತೆಗೆದುಕೊಂಡು ಹೋಗಬಹುದು.
11. **ನೀಲಿ/ಕಪ್ಪು ಬಾಲ್‌ಪಾಯಿಂಟ್ ಪೆನ್ ಮಾತ್ರವೇ ಉಪಯೋಗಿಸಿರಿ.**
12. **ಕ್ಯಾಲ್ಕುಲೇಟರ್, ವಿದ್ಯುನ್ಮಾನ ಉಪಕರಣ ಅಥವಾ ಲಾಗ್ ಟೇಬಲ್ ಇತ್ಯಾದಿಯ ಉಪಯೋಗವನ್ನು ನಿಷೇಧಿಸಲಾಗಿದೆ.**
13. **ಸರಿ ಅಲ್ಲದ ಉತ್ತರಗಳಿಗೆ ಋಣ ಅಂಕ ಇರುವುದಿಲ್ಲ.**
14. **ಕನ್ನಡ ಮತ್ತು ಇಂಗ್ಲೀಷ್ ಆವೃತ್ತಿಗಳ ಪ್ರಶ್ನೆ ಪತ್ರಿಕೆಗಳಲ್ಲಿ ಯಾವುದೇ ರೀತಿಯ ವ್ಯತ್ಯಾಸಗಳು ಕಂಡುಬಂದಲ್ಲಿ, ಇಂಗ್ಲೀಷ್ ಆವೃತ್ತಿಗಳಲ್ಲಿರುವುದೇ ಅಂತಿಮವೆಂದು ಪರಿಗಣಿಸಬೇಕು.**

Instructions for the Candidates

1. Write your roll number in the space provided on the top of this page.
2. This paper consists of fifty multiple-choice type of questions.
3. At the commencement of examination, the question booklet will be given to you. In the first 5 minutes, you are requested to open the booklet and compulsorily examine it as below :
   (i) To have access to the Question Booklet, tear off the paper seal on the edge of the cover page. Do not accept a booklet without sticker seal or open booklet.
   (ii) **Tally the number of pages and number of questions in the booklet with the information printed on the cover page. Faulty booklets due to pages/questions missing or duplicate or not in serial order or any other discrepancy should be got replaced immediately by a correct booklet from the invigilator within the period of 5 minutes. Afterwards, neither the Question Booklet will be replaced nor any extra time will be given.**
4. Each item has four alternative responses marked (A), (B), (C) and (D). You have to darken the circle as indicated below on the correct response against each item.
   Example : (A) (B) ● (D)
   where (C) is the correct response.
5. Your responses to the questions are to be indicated in the **OMR Sheet kept inside the Paper I Booklet only**. If you mark at any place other than in the circles in the OMR Sheet, it will not be evaluated.
6. Read the instructions given in OMR carefully.
7. Rough Work is to be done in the end of this booklet.
8. If you write your name or put any mark on any part of the OMR Answer Sheet, except for the space allotted for the relevant entries, which may disclose your identity, you will render yourself liable to disqualification.
9. You have to return the test OMR Answer Sheet to the invigilators at the end of the examination compulsorily and must NOT carry it with you outside the Examination Hall.
10. You can take away question booklet and carbon copy of OMR Answer Sheet after the examination.
11. **Use only Blue/Black Ball point pen.**
12. **Use of any calculator, Electronic gadgets or log table etc., is prohibited.**
13. **There is no negative marks for incorrect answers.**
14. **In case of any discrepancy found in the Kannada translation of a question booklet the question in English version shall be taken as final.**

MATHEMATICS
Paper – II

Note : This paper contains **fifty (50)** objective type questions. **Each** question carries **two (2)** marks. **All** questions are **compulsory**.

1. Let $a_n = (-1)^n \frac{\log(n^4+1)}{n^2+1}$. Then the sequence $\{a_n\}$

(A) is not convergent
(B) converges to 0
(C) converges to a non-zero limit
(D) oscillates between $-\infty$ and ∞

2. If f, g are real-valued functions, then max.(f, g) =

(A) $\frac{f+g-|f-g|}{2}$

(B) $\frac{|f-g|-|f+g|}{2}$

(C) $\frac{f+g+|f-g|}{2}$

(D) $\frac{|f-g|+|f-g|}{2}$

3. Let $f : [a, b] \to \mathbb{R}$ take the value 1 at rational points and –1 at irrational points. Then the upper and the lower Riemann integrals are respectively

(A) b – a and –(b – a)
(B) b – a and 0
(C) 1 and –1
(D) 1 and 0

4. Which one of the following has positive Lebesgue measure in $\mathbb{R}$?

(A) The cantor set
(B) Z
(C) Q
(D) (a, b) – Q, where a < b

5. The closed unit ball of a normed linear space X is norm compact if and only if

(A) X is finite dimensional
(B) X is reflexive
(C) X is a Hilbert space
(D) X is a Banach space

6. Suppose the matrix

$$A = \begin{bmatrix} 3 & x+2i & yi \\ 3-2i & 0 & 1+zi \\ yi & 1-xi & -1 \end{bmatrix}$$ is Hermitian.

Then (x, y, z) must be

(A) (0, 3, 3) (B) (3, 0, 3)
(C) (3, 3, 0) (D) (0, 0, 3)

7. The 2-dimensional subspaces of $\mathbb{R}^3$ can be geometrically described as

(A) All planes
(B) All planes passing through the origin
(C) All lines passing through the origin
(D) The only planes x = 0, y = 0, z = 0

8. Let $A = \begin{bmatrix} 1 & 1 & 2 \\ 0 & 2 & 3 \\ 0 & 0 & 3 \end{bmatrix}$. The characteristic polynomial of A is given by

(A) $\pm(\lambda+1)(\lambda-2)(\lambda-3)$
(B) $\pm(\lambda-1)(\lambda+2)(\lambda-3)$
(C) $\pm(\lambda-1)(\lambda-2)(\lambda+3)$
(D) $\pm(\lambda-1)(\lambda-2)(\lambda-3)$

9. Let M be the set of all 2×2 matrices with real entries and let $f : M \to \mathbb{R}$ be the determinant map

Then

(A) f is one-one and onto
(B) f is neither one-one nor onto
(C) f is one-one but not onto
(D) f is onto but not one-one

10. The dimension of the vector space $M = \left\{ [a_{ij}]_{m \times n} : a_{ij} \in \mathbb{C} \right\}$ over the field $\mathbb{R}$ of real numbers is

(A) m + n (B) 2mn
(C) 2(m + n) (D) mn

11. The radius of convergence of the power series $\sum 2^n z^n$ is

(A) 1 (B) 0
(C) 2 (D) $1/2$

12. Let f be an analytic function in $\mathbb{C}$. A sufficient condition for f to be constant is

(A) $f\left(\frac{1}{n}\right) = 0$ for n = 1, 2, 3 .....
(B) f(n) = 0 for n = 0, ± 1, ± 2, ...
(C) f(0) = 0
(D) f(z) = 0 for z = 0, ± 1, $\pm i$

13. If 1, ω, ω^2 are the cube roots of unity, then the value of $(\omega + \omega^2)^3$ is

(A) 0 (B) 1
(C) –1 (D) 3

14. The modulus of the complex number e^z for any complex number z is

(A) $e^{|z|}$ (B) e^{Rez}
(C) e^{Imz} (D) $e^{|z|}$

15. The locus of $|z+1| = |z-1|$ in the complex plane is

(A) A straight line
(B) A circle
(C) An ellipse
(D) A parabola

16. If x is a positive integer satisfying $x \equiv 3 \bmod 7$ and $x \equiv -3 \bmod 11$, then

(A) x = 3
(B) No such x exists
(C) Exactly one such x exists
(D) There are infinitely many such x

17. The number of primitive 11^{th} roots of unity is

(A) 1 (B) 2
(C) 10 (D) 5

18. The number of subgroups of a cyclic group of order 20 is

(A) 6 (B) 2
(C) 10 (D) 1

19. For which prime P in the following, both – 1 and 2 are quadratic residues modulo P ?

(A) 7 (B) 17
(C) 11 (D) 13

20. Let P be prime and let F be a field with P^2 number of elements. Then the number of ideals in F is

(A) 1 (B) P^2
(C) 2 (D) $P^2 - 1$

21. In X = [0, 1] with the topology given by the metric $d(x, y) = |x - y|$, $\left[0, 1/2\right)$ is

(A) Closed
(B) Open
(C) Both open and closed
(D) Neither open nor closed

22. In $X = [0, 2] \cup \{3\}$ with the topology given by $d(x, y) = |x - y|$,
Int. $([1, 2] \cup \{3\}) =$
(A) $(1, 2)$ (B) $(1, 2) \cup \{3\}$
(C) $(1, 2] \cup \{3\}$ (D) $[1, 2] \cup \{3\}$

23. The only compact subsets of the real line $\mathbb{R}$ with the usual distance metric are
(A) ϕ and $\mathbb{R}$
(B) Closed intervals
(C) Finite union of closed intervals
(D) Closed and bounded sets

24. The number of linearly independent solutions of the form $y = x^r$ of the differential equation

$x^3 \frac{d^3y}{dx^3} - 6x \frac{dy}{dx} + 12y = 0$ is
(A) 0
(B) 1
(C) 2
(D) 3

25. The partial differential equation

$x^2 \frac{\partial^2 z}{\partial x^2} - (y^2 - 1)x \frac{\partial^2 z}{\partial x \partial y} + y(y-1)^2 \frac{\partial^2 z}{\partial y^2} +$

$x \frac{\partial z}{\partial x} + y \frac{\partial z}{\partial y} = 0$ is hyperbolic in a region in the xy – plane if
(A) $x \neq 0$ and $y = 1$
(B) $x = 0$ and $y \neq 1$
(C) $x \neq 0$, $y \neq 1$ and $y \neq 2$
(D) $x = 0$ and $y = 1$

26. The partial differential equation of the set of all right circular cones whose axes coincide with z-axis is
(A) $x \frac{\partial z}{\partial x} = y \frac{\partial z}{\partial y}$
(B) $y \frac{\partial z}{\partial x} = x \frac{\partial z}{\partial y}$
(C) $x^2 \frac{\partial^2 z}{\partial x^2} = y^2 \frac{\partial^2 z}{\partial y^2}$
(D) $y^2 \frac{\partial^2 z}{\partial x^2} = x^2 \frac{\partial^2 z}{\partial y^2}$

27. In the motion of a two particle system, if two particles are connected by a rigid weightless rod of constant length, then the number of degrees of freedom of the system is
(A) 5
(B) 2
(C) 3
(D) 6

28. Extremal for the variational problem

$I[y(x)] = \int_{x_0}^{x_1} \frac{dy}{dx}\left(1 + x^2 \frac{dy}{dx}\right) dx$ is a solution of the differential equation
(A) $x^2 \frac{dy}{dx} + \frac{dy}{dx} = 0$
(B) $\frac{d^2y}{dx^2} + 2\frac{dy}{dx} = 0$
(C) $x \frac{d^2y}{dx^2} + 2\frac{dy}{dx} = 0$
(D) $\frac{d^2y}{dx^2} + 2x\frac{dy}{dx} = 0$

29. In the solution of the following system of linear equations by Gauss elimination use partial pivoting $5x + y + 2z = 34$; $4y - 3z = 12$; $10x - 2y + z = -4$. The pivots for elimination of x and y are

(A) 10, 4 (B) 10, 2

(C) 5, 4 (D) 5, – 4

30. Which of the following matrix admits a Cholesky decomposition ?

(A) $\begin{bmatrix} 1 & i \\ i & 1 \end{bmatrix}$ (B) $\begin{bmatrix} 1 & 2i \\ -2i & 1 \end{bmatrix}$

(C) $\begin{bmatrix} 1 & -2 \\ -2 & 5 \end{bmatrix}$ (D) $\begin{bmatrix} 1 & 1 \\ 2 & 2 \end{bmatrix}$

31. For a negatively skewed distribution, the relationship among mean, median and mode is

(A) Mode > Mean > Median

(B) Mean > Median > Mode

(C) Mode > Median > Mean

(D) Mode = Mean = Median

32. Let Ω be a sample space, A and B are events such that $P(A) = 1$, $P(B) = 0$. Then one of the following is necessarily TRUE

(A) $P(A \cup B) < 1$ and $P(A \cap B) = 0$

(B) $P(A \cup B) = 1$ and $P(A \cap B) = 0$

(C) $A = \Omega$ and $B = \phi$

(D) $B^C = A$

33. A random variable X with mean 5 and variance 4, then mean and standard deviation of $4x + 5$ are

(A) 21, 16 (B) 25, 64

(C) 25, 16 (D) 25, 8

34. Let X be a two point distribution taking values 0 and 2 with equal probability. Then its characteristic function is

(A) $\frac{1}{2}\left(1+e^{2t}\right)$ (B) $\frac{1}{2}+e^{i2t}$

(C) $\frac{1}{2}\left(1+e^{i2t}\right)$ (D) $1+\frac{1}{2}e^{i2t}$

35. $\phi(t)$ is a characteristic function of a random variable. Then one of the following NEED NOT be satisfied

(A) $|\phi(t)| \le 1$

(B) $\phi(t)$ is continuous

(C) $\phi(t)$ always exists

(D) $\phi(t) = \phi(-t)$

36. A necessary condition for WLLN for a sequence of iid random variable $\{X_n\}$ is

(A) EX_1 exists and finite

(B) $n P\left[|X_1| > n\right] \to 0$ as $n \to \infty$

(C) $V(X_1)$ is finite

(D) X_1 is symmetric about 0

37. Let $\{X_n\}$ be a Markov chain with state space {1, 2, 3} and transition probability matrix

$$P = \begin{bmatrix} 1/3 & 1/3 & 1/3 \\ 1/2 & 0 & 1/2 \\ 0 & 0 & 1 \end{bmatrix}.$$

State 3 is

(A) Absorbing and transient

(B) Absorbing and persistent

(C) Communicating with all the states

(D) Has period 2

38. Chapman-Kolmogorov equation in a Markov-chain is used to compute

(A) Communicating states

(B) Absorbing states

(C) Higher order transition probabilities

(D) One state transition probability

39. $N_1(t)$ and $N_2(t)$ are independent Poisson processes, then for any fixed t, $N_1(t) \mid [N_1(t) + N_2(t) = n]$ follows

(A) Poisson distribution

(B) Gaussian distribution

(C) Negative binomial distribution

(D) Binomial distribution

40. Queuing process is a

(A) Poisson process

(B) Pure birth process

(C) Erlang process

(D) Birth-death process

41. Based on two independent random samples from continuous distributions $F_x(x)$ and $G_y(x)$ with sample sizes 4 and 5 respectively, the value of the Wilcoxon rank-sum statistic, that is, sum of ranks of Y observations is 20. Then the value of Mann-Whitney statistic is

(A) 6

(B) 7

(C) 5

(D) 8

42. The consistency of the test statistic for testing $H_0 : \theta \in (H)_0$ against $H_1 : \theta \in (H)_1$ implies that

(A) Size of that test goes to zero as $n \to \infty$

(B) Power of the test is larger than the size of the test

(C) Power of the test statistic approaches 1 as $n \to \infty$

(D) Size of the test is less than power of the test

43. Let $\{X_1, X_2, ..., X_n\}$ be a random sample from a continuous distribution function F and let F_n be the corresponding empirical distribution function.

Let

$$D_n^+ = \sup_x [F_n(x) - F(x)]$$

$$D_n^- = \sup_x [F(x) - F_n(x)]$$

$$D_n = \text{Max.}(D_n^+, D_n^-)$$

Which of the following is TRUE ?

(A) D_n^+, D_n^- and D_n are distribution-free over the class of all discrete distributions

(B) D_n^+, D_n^- and D_n distribution-free over all continuous distributions

(C) D_n is distribution-free but not D_n^+ and D_n^-

(D) D_n^+ and D_n^- are distribution-free but not D_n

44. Let $\{X_i\}_{i=1}^{n}$ be i.i.d. $N(\theta_1, \theta_2)$ r.v.'s, then, the consistent estimator of $\theta_1^2 + \theta_2$ is

(A) $\frac{1}{n}\sum_{i=1}^{n} X_i^2$ (B) $\bar{X}^2$

(C) $\frac{1}{n}\sum_{i=1}^{n}\left|X_i - \bar{X}\right|^2$ (D) $\left(\frac{1}{n-1}\sum X_i\right)^2$

45. Canonical Correlation Analysis is used to

(A) Quantify the association between two sets of multivariate data

(B) Reduce the dimension of exogenous variables

(C) Extract best linear combination from one set of data

(D) Identify the prominent components in one set of variables

46. In a 2^3 factorial experiment with three factors A, B, C at two levels a_0, b_0, c_0 and a, b, c. Then the contrast for the interaction AB can be obtained from the product

(A) $(a_1 - a_0)(b_1 - b_0)(c_1 - c_0)$

(B) $(a_1 - a_0)(b_1 - b_0)(c_1 + c_0)$

(C) $(a_1 + a_0)(b_1 + b_0)(c_1 - c_0)$

(D) $(a_1 - a_0)(b_1 + b_0)(c_1 + c_0)$

47. The null hypothesis in the ANOVA of a linear regression model is

(A) Means of explanatory variables are equal

(B) Response variable is linearly related to the regressors

(C) Response variable is not depending on any of the regressors

(D) Variance of the response variable is a constant

48. The best linear unbiased predictor of mean response in a regression model for a specified new observation on the regressor is obtained by

(A) Replacing the model parameters with their unbiased estimators

(B) Replacing the model parameters with their best linear unbiased estimators

(C) Replacing the regression coefficients with generalised least squares estimators

(D) Replacing the regression coefficients with their consistent estimators

49. In SRSWOR of size n, the bias in the ratio estimator $\hat{R}$ is

(A) Less than or equal to $\frac{SE(\hat{R})SE(\bar{x})}{\bar{X}}$

(B) Greater than or equal to $\frac{SE(\hat{R})}{\bar{X}}$

(C) Less than or equal to $\frac{SE(\bar{x})}{\bar{X}}$

(D) Greater than $\frac{SE(\hat{R}).SE(\bar{x})}{\bar{X}}$

50. Stratified sampling is more efficient than simple random sampling because

(A) Population is divided into strata in such a way that the units within the strata are homogeneous and units between strata are heterogenous, leading to minimal internal variation

(B) Population is subdivided into mutually exclusive and exhaustive subpopulations

(C) Strata are small and hence sampling variation is small

(D) Samples are selected from few strata

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Space for Rough Work