

Seat No.	
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M.Phil / Ph.D. Entrance Examination, September - 2019
STATISTICS

Day and Date : Wednesday, 18 - 09 - 2019

Total Marks : 100

Time : 10.00 a.m. to 12.00 noon

- Instructions :**
- 1) All questions are compulsory.
 - 2) Each question carries 2 marks.
 - 3) Answers should be marked in the given OMR answer sheet by darkening the appropriate option.
 - 4) Use black ball point pen only for marking the circles. Do not make any stray mark on the OMR Answer Sheet.
 - 5) Follow the instructions given on OMR Sheet.
 - 6) Rough work shall be done on the sheet provided at the end of question paper.
 - 7) Only non-programmable calculators are allowed.

- 1) Formulation of Research Hypothesis means:
 - A) Creating a legal basis for research
 - B) Enunciation of postulates
 - C) Enumeration of basic principles
 - D) Formation of tentative generalization

- 2) Pilot study is done to
 - A) Identify problems
 - B) Test the tools
 - C) Draw sample
 - D) Create hypothesis

- 3) Facts or information are analyzed and critical evaluation is made in
 - A) Survey
 - B) Historical research
 - C) Analytical research
 - D) Pilot study

P.T.O.

- 27) Identify the odd member of the set
 A) Measurement error
 B) Failure to measure a unit
 C) Editing and coding errors
 D) Error due to selecting only a few units as sample
- 28) $\sum_{i=1}^n (X_i - \bar{X})^2$ can be expressed as
 A) X^TAX where $A = I_n - \frac{1}{n}E_{nn}$
 B) X^TAX where $A = I_n + \frac{1}{n}E_{nn}$
 C) X^TAX where $A = I_n$
 D) None of these
- 29) A basis for R^2 is _____.
 A) (1, 1), (1, 1)
 B) (1, -1), (-1, 1)
 C) (1, 0), (2, 0)
 D) (1, 1), (0, 1)
- 30) The power of the MP test of size α for testing $H_0: \theta = 1$ against $H_1: \theta = 0$ based on a single observation from the distribution with pdf $f(x, \theta) = (2x\theta + 1 - \theta)$, $0 < x < 1$, is
 A) $\sqrt{\alpha}$
 B) α
 C) $\frac{\alpha}{2}$
 D) 2α
- 31) Size of the test is
 A) Always greater than or equal to the level of significance
 B) Always less than or equal to the level of significance
 C) Always equal to the level of significance
 D) Some times greater than the level of significance
- 32) Which of the following statement (s) is (are) true?
 I) A statistic S that is independent of every ancillary statistic is complete.
 II) If a family of distributions is complete, its sub family is also complete.
 A) Only I
 B) Only II
 C) Both I and II
 D) Neither I nor II

37) Which of the following two statement(s) is (are) true?

- I) Hotelling's T^2 is invariant under non singular linear transformation
- II) Fisher best discriminant is invariant under non singular linear transformation

- A) Only I
- B) Only II
- C) Both I and II
- D) Neither I nor II

38) The number of linearly independent eigen vectors of $\begin{bmatrix} 1 & 1 & 0 & 0 \\ 2 & 2 & 0 & 0 \\ 0 & 0 & 3 & 3 \\ 0 & 0 & 5 & 5 \end{bmatrix}$ is

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

39) The partial derivative of the function $f(x, y, z) = e^{1-x\cos(y)} + ze^{-\frac{1}{(1+y^2)}}$ with respect to x at the point (1, 0, π) is

- A) 0
- B) $\frac{-1}{e}$
- C) -1
- D) π

40) The next iterative value of the root of $x^2 - 4 = 0$ using the Newton-Raphson method with initial guess 3 is

- A) 1.5
- B) 2.067
- C) 2.167
- D) 3.000

41) Which of the following is correct for a sequence $\{A_n\}$ of sets?

- A) If $A_n \rightarrow A$ then $A_n^c \uparrow A^c$.
- B) If $A_n \downarrow A$ then $A_n^c \downarrow A^c$.
- C) If $A_n \uparrow A$ then $A_n^c \uparrow A^c$.
- D) If $\{A_n\}$ does not converge then $\{A_n^c\}$ does not converge to any limit

- 42) The Basic purpose of Response Surface Methodology is
- A) To explore the functional form of the relationship of response variable with input factors
 - B) To examine for existence of interactions across the factors influencing the response
 - C) To identify the region in the factor space where optimal response is expected
 - D) To examine whether current operating conditions of a process are optimal.
- 43) In a general linear model $y = X\beta + \epsilon$, _____.
- A) any estimable linear parametric function is a linear combination of the functions $X\beta$.
 - B) if S^- is a g-inverse of $S = X'X$ then $S^- y$ is a least square estimator of β .
 - C) the coefficient vector of any function belonging to the error space is orthogonal to the rows of X .
 - D) a least square estimator of β is unbiased for β .
- 44) Post optimal analysis is a technique to _____.
- A) determine how the optimum solution of an LPP changes in response to problem inputs.
 - B) allocate resources optimally.
 - C) minimize cost operations.
 - D) spell out the relationship between dual and its primal.
- 45) The zero-one programming problem requires that _____.
- A) the coefficients of the decision variables are between 0 and 1.
 - B) the values of decision variables are in $(0, 1)$.
 - C) the values of decision variables are either 0 or 1.
 - D) the coefficients of the decision variables are in $(0, 1)$.

Rough Work

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