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COMBINED COMPETITIVE (PRELIMINARY) EXAMINATION, 2013

Serial No.

STATISTICS
Code No. 21

A

Time Allowed : Two Hours ***Maximum Marks : 300***

INSTRUCTIONS

1. IMMEDIATELY AFTER THE COMMENCEMENT OF THE EXAMINATION, YOU SHOULD CHECK THAT THIS TEST BOOKLET DOES NOT HAVE ANY UNPRINTED OR TORN OR MISSING PAGES OR ITEMS, ETC. IF SO, GET IT REPLACED BY A COMPLETE TEST BOOKLET.
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4. This Booklet contains 100 items (questions). Each item comprises *four* responses (answers). You will select *one* response which you want to mark on the Response Sheet. In case you feel that there is more than one correct response, mark the response which you consider the best. In any case, choose ONLY ONE response for each item.
5. In case you find any discrepancy in this test booklet in any question(s) or the Responses, a written representation explaining the details of such alleged discrepancy, be submitted within three days, indicating the Question No(s) and the Test Booklet Series, in which the discrepancy is alleged. Representation not received within time shall not be entertained at all.
6. You have to mark all your responses ONLY on the separate Response Sheet provided. *See directions in the Response Sheet.*
7. All items carry equal marks. Attempt ALL items. Your total marks will depend only on the number of correct responses marked by you in the Response Sheet.
8. Before you proceed to mark in the Response Sheet the response to various items in the Test Booklet, you have to fill in some particulars in the Response Sheet as per instructions sent to you with your Admit Card and Instructions.
9. While writing Centre, Subject and Roll No. on the top of the Response Sheet in appropriate boxes use **"ONLY BALL POINT PEN".**
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ROUGH WORK

1. Given $P(A) = 0.3$, $P(B) = p$ and $P(A \cup B) = 0.58$ then events A and B will be independent if p is :
   - (A) 0.4
   - (B) 0.3
   - (C) 0
   - (D) none of these

2. A problem in Statistics is given to 3 students whose chances of solving it independently are $\frac{1}{2}, \frac{1}{3}$ and $\frac{1}{4}$ respectively, then the probability that the problem will be solved is :
   - (A) $\frac{1}{4}$
   - (B) $\frac{2}{3}$
   - (C) $\frac{3}{4}$
   - (D) 1

3. If 3 letters are to be put in 3 addressed envelopes, the probability that none of the letters are in the correct envelope is :
   - (A) 0
   - (B) $\frac{1}{6}$
   - (C) $\frac{1}{3}$
   - (D) $\frac{1}{2}$

4. If x_i, $i = 1, 2, 3$ are independently distributed as Uniform U(0, 1), then the probability that exactly 2 of the 3 variables exceed $\frac{1}{3}$ is :

$P(AB) \le P(A) + P(B)$

   - (A) $\frac{1}{3}$
   - (B) $\frac{2}{3}$
   - (C) $\frac{2}{9}$
   - (D) $\frac{4}{9}$

5. For 2 events A and B, it is given that :
   - (i) $P(AB) \ge 1 - P(\bar{A}) - P(\bar{B})$
   - (ii) $P(AB) \ge P(A) + P(B) - 1$
   - (iii)

   Out of these :
   - (A) Only (i) is correct
   - (B) Only (ii) is correct
   - (C) Only (iii) is correct
   - (D) All the three are correct

6. In a binomial distribution B(n, p)

    mean – variance = 1

    $(\text{mean})^2 - (\text{variance})^2 = 11$

    then p is :

    (A)

    (B) $\frac{5}{6}$

    (C) $\frac{1}{3}$

    (D) $\frac{2}{3}$

7. Let X has continuous distribution with cumulative distribution function (cdf) F(x), then the distribution of Y = F(X) is :

    (A) Exponential

    (B) Uniform

    (C) Normal

    (D) None of these

8. The mean and variance of a random variable X are same then the distribution of X is :

    (A) Binomial

    (B) Poisson

    (C) Geometric

    (D) Normal

9. Let X has Poisson P(λ) distribution, with

    P(x = 1) = P(x = 2)

    then the variance of x is :

    (A) 1

    (B) 2

    (C) 3

    (D) None of these

10. Let E(x) = 3 and $E(x^2) = 13$, then the Chebyshev's lower bound for $P[-2 < x < 8]$ is :

    (A) 1

    (B) $\frac{4}{25}$

    (C) $\frac{21}{25}$

    (D) None of these

11. The probability that a non-leap year will have 53 Sundays is :

    (A) $\frac{1}{7}$

    (B) $\frac{2}{7}$

    (C) $\frac{5}{7}$

    (D) $\frac{6}{7}$

12. If X and Y have the joint probability mass function :

$$f(x, y) = c\left(\frac{1}{2}\right)^x\left(\frac{1}{3}\right)^y, \ x, y = 0, 1, 2...$$

then the value of c is :

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

(C) 2 (D) 3

13. Let X has normal $N(\mu, \sigma^2)$ distribution. If $P[x \le 15] = \frac{1}{2}$, then μ is :

(A) 10 (B) 15

(C) 20 (D) None of these

14. Let the probability mass function of X be :

$$P(X = x) = \binom{3}{x}\left(\frac{1}{8}\right), \ x = 0, 1, 2, 3$$

with (i) moment generating function (mgf) $= \frac{1}{8}(1+e^t)^3$

(ii) mean $= 3/2$

Out of these :

(A) Only (i) is correct (B) Only (ii) is correct

(C) Both (i) and (ii) are correct (D) None is correct

15. If the moment generating function (mgf) of X be $M(t) = \frac{\lfloor e^t - 1 \rfloor}{t}$ then the variance of X is :

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

(C) $\frac{1}{12}$ (D) None of these

16. If the joint pdf of (X, Y) be

$f(x, y) = 2, \ 0 < y < x < 1$

then the conditional expectation

$E[Y \mid X = x]$ is :

(A) $\frac{x}{2}$ (B) $\frac{x^2}{2}$

(C) $\frac{1}{x}$ (D) None of these

17. Which one of the following distributions has memory less property ?
(A) Normal
(B) Binomial
(C) Exponential
(D) Uniform

18. A box contains 'a' white and 'b' black balls. 'c' balls are drawn without replacement. Then the expected number of white balls drawn is :
(A) $\frac{ac}{a+b}$
(B) $\frac{bc}{a+b}$
(C) $\frac{a}{a+b}$
(D) None of these

19. For a negative binomial NB(r, p) distribution :
(A) mean > variance
(B) mean < variance
(C) mean = variance
(D) not definite

20. Let X and Y are independent Poisson variates then the conditional distribution of X given (X +Y) is :
(A) Poisson
(B) Binomial
(C) Geometric
(D) None of these

21. Let x_1 and x_2 be independently binomially distributed as $B(n_1, p)$ and $B(n_2, 1-p)$ respectively then $B(n_1 + n_2, p)$ will be distribution of :
(A) $x_1 + x_2$
(B) $x_1 + n_2 - x_2$
(C) $x_2 + n_1 - x_1$
(D) None of these

22. Let (X, Y) has bivariate normal BN(4, 2, 16, 25, 3/5) then the conditional mean of Y given X = 8 is :
(A) 5
(B) 4
(C) 2
(D) $\frac{98}{25}$

23. If x has exponential distribution with mean 2, then P[x < 2] is :
(A) e^{-1}
(B) $1- e^{-1}$
(C) e^{-2}
(D) None of these

24. Let $\{X_K\}$ be a sequence of independent random variables with

$$P(X_K = \pm K^{\alpha}) = \frac{1}{2}$$

then Weak Law of Large Numbers (WLLN) holds if :
(A) $\alpha < \frac{1}{2}$
(B) $\frac{1}{2} < \alpha < 1$
(C) $\alpha > 1$
(D) None of these

25. If the pdf of normal $N(\mu, \sigma^2)$ distribution be

$$f(x) = ce^{-\frac{x^2}{4}+\frac{3}{2}x}$$

then (μ, σ^2) are :

(A) (2, 3) (B) (3, 2)

(C) (3, 1) (D) None of these

26. The mean of first n natural numbers is :

(A) $\frac{n(n+1)}{2}$ (B)

(C) (D) None of these

27. The mean weight of boys in a class is 60 kg and that of girls is 40 kg. If the average weight of the class be 46 kg, then the percentage of boys and girls in the class is :

(A) (60, 40) (B) (40, 60)

(C) (30, 70) (D) (70, 30)

28. The sum of absolute deviations is least when measured from :

(A) mean (B) median

(C) mode (D) geometric mean

$\frac{n+1}{2\ 2}$

29. A student pedals from his home to the college at the speed of 10 km/hour and back at the speed of 15 km/hour. Then his average speed in km/hour is :

(A) 12 (B) 12.2

(C) 12.5 (D) None of these

30. The harmonic mean (H) of two numbers is 4 and their arithmetic mean (A) and geometric mean (G) satisfy $2A + G^2 = 27$, then the numbers are :

(A) (1, 3) (B) (6, 3)

(C) (9, 5) (D) (12, 7)

31. In a moderately asymmetric distribution the median and mean are respectively 42 and 40, then the mode is :

(A) 40 (B) 42

(C) 44 (D) 46

32. The relation between arithmetic mean (A), geometric mean (G) and harmonic mean (H) is :

(A) $A > H > G$ (B) $A > G > H$

(C) $G > A > H$ (D) $H > G > A$

33. Let X be a random variable with mean μ and median m then $E(x-b)^2$ is least if :

(A) $b = 0$
(B) $b = m$
(C) $b = \mu$
(D) None of these

34. A discrete random variable takes values –1 and 1 with respective probability p and q. If $E(x) = \frac{3}{5}$, then the standard deviation of X is :

(A) $\frac{4}{5}$
(B) $\frac{16}{25}$
(C) $-\frac{4}{5}$
(D) None of these

35. The first 4 moments about a number '4' are 1, 4, 10, 45, then the mean and variance are :

(A) (1, 4)
(B) (5, 3)
(C) (5, 4)
(D) None of these

36. If the possible values of X are 1, 2, 3.... then E(X) is :

(A) $P(X \geq n)$
(B) $P(X < n)$
(C) $\sum_{n=1}^{\infty} P(X \geq n)$
(D) $\sum_{n=1}^{\infty} P(X < n)$

37. If two regression lines be :

$3x + 5y = 8$
$2x + 5y = 7$

then the correlation coefficient between (X, Y) is :

(A) $2/3$
(B) $\sqrt{2/3}$
(C) $-\sqrt{2/3}$
(D) 0

38. The means and variances of two independent random variables X and Y are same, then the correlation between (X, X – Y) is :

(A) 0
(B) $\frac{1}{\sqrt{2}}$
(C) $-\frac{1}{\sqrt{2}}$
(D) 1

39. If b_{xy} and b_{yx} be two regression coefficients and if $b_{xy} > 1$, then :

(A) $b_{yx} > 1$
(B) $0 < b_{yx} < 1$
(C) $b_{yx} < 0$
(D) not definite

40. If correlation between (X, Y) be 0.4, then correlation between $(-2X+1, 3Y+2)$ will be :

(A) 0.4 (B) – 0.4

(C) 0.0 (D) 1.0

41. For a χ^2-distribution :

(A) mean = variance (B) 2 mean = variance

(C) mean = 2 variance (D) none of these

42. If X has uniform U(0, 1) distribution, then the pdf of the r^{th} order statistic is :

(A) Exponential (B) Beta

(C) Uniform (D) None of these

43. In a frequency distribution, the fourth central moment is double of the $[\text{variance}]^2$ then the distribution is :

(A) Leptokurtic (B) Platykurtic

(C) Mesokurtic (D) All of these

44. Let x has F(m, n) distribution, then the distribution of $\frac{1}{x}$ will be :

(A) F(m, n) (B) F(n, m)

(C) χ^2 (D) t

45. Let x has t-distribution with n degrees of freedom. If $n = 1$, then the distribution of t reduces to :

(A) Normal (B) Cauchy

(C) F (D) None of these

46. The pdf of the first order statistic in $f(x, \theta) = \frac{1}{\theta} e^{-\frac{x}{\theta}}, x > 0$ is :

(A) Exponential (B) Uniform

(C) Beta (D) None of these

47. The mean of first order statistic in Uniform U(0, 1)

$f(x) = 1 \quad 0 < x < 1$

is :

(A) $\frac{1}{n}$ (B) $\frac{1}{n+1}$

(C) $\frac{1}{n-1}$ (D) $\frac{n}{n^2-1}$

48. If for two attributes A and B $\frac{(AB)}{(B)} = \frac{(A\beta)}{\beta}$, then A and B are :

(A) independent
(B) positively associated
(C) negatively associated
(D) no conclusion

49. If the regression line of Y on X be
$y = ax + b$
then a is :

(A) $\rho \frac{\sigma_y}{\sigma_x}$
(B) $\rho \frac{\sigma_x}{\sigma_y}$
(C) ρ
(D) None of these

where

50. If range of correlation coefficient be (0, 1) then the correlation is :
(A) Partial
(B) Multiple
(C) Rank
(D) Simple

51. An unbiased estimator of θ in $f(x, \theta) = \frac{1}{\theta}, \quad 0 < x < \theta$ is :

(A) Sample mean
(B) Sample median
(C) Largest observation
(D) Double of the sample mean

52. Sufficient statistic of θ in $f(x, \theta) = e^{-(x-\theta)}, \quad x \geq \theta$ is :
(A) $\min(x_1, ..., x_n)$
(B) $\max(x_1, ..., x_n)$
(C) sample mean
(D) sample median

53. The minimum variance unbiased estimator (mvue) of θ^2 in normal $N(\theta, 1)$ distribution is :

(A) $\bar{x}^2 - \frac{1}{n}$
(B) $\bar{x}^2 + \frac{1}{n}$
(C) $\bar{x}^2$
(D) None of these

54. Maximum likelihood estimator (mle) of σ^2 in normal $N(\mu, \sigma^2)$ distribution when μ is unknown is :

(A)
(B) $\frac{1}{n-1}\sum_1^n (x_i - \bar{x})^2$
(C) $\frac{1}{n}\sum_1^n x_i^2$
(D) $\frac{1}{n}\sum_1^n (x_i - \mu)^2$

55. If x_1, x_2 and x_3 are independently distributed with mean θ, then

$$T = x_1 + 2x_2 + \lambda x_3$$

is unbiased estimator of θ if λ is :

(A) 1 (B) –1

(C) 0 (D) –2

56. Cramer-Rao Lower Bound (CRLB) for the variance of an unbiased estimator θ from Poisson $P(\theta)$ is :

(A) $\frac{\theta}{n}$ (B) $\frac{\theta^2}{n}$

(C) θ (D) θ^2

57. Maximum likelihood estimator (mle) of θ in

$$f(x, \theta) = \frac{1}{2} e^{-|x-\theta|}, \quad -\infty < x < \infty$$

is :

(A) Sample mean (B) Max $(x_1, ..., x_n)$

(C) Min $((x_1, ..., x_n)$ (D) Sample median

58. Confidence interval for σ^2 in normal $N(\mu, \sigma^2)$ distribution is based on the distribution :

(A) t (B) normal

(C) χ^2 (D) F

59. Let X has Poisson $P(\theta)$ distribution, then mle of $\bar{e}^{\theta}$ is :

(A) $\bar{e}^{\bar{x}}$ (B) $\bar{x}$

$\bar{e}^{n\bar{x}}$ $X_{(n)}$

(C) (D) None of these

60. The mvue of θ in

$$f(x, \theta) = \frac{1}{\theta}, \quad 0 < x < \theta$$

is :

(A) $2\bar{X}$ (B)

(C) $\frac{n+1}{n} X_{(n)}$ (D) $\frac{n}{n+1} X_{(n)}$

where $X_{(n)} = \max(X_1, ..., X_n)$

61. Which of the following statements is *not* true ?

(A) consistency does not imply unbiasedness

(B) unbiasedness does not imply consistency

(C) mle is function of sufficient statistic

(D) mle is unbiased

62. The moment estimator of σ^2 in normal $N(\mu, \sigma^2)$ distribution, when μ is unknown is :

(A) $\frac{1}{n}\sum_{1}^{n}(x_i - \bar{x})^2$

(B) $\frac{1}{n-1}\sum_{1}^{n}(x_i - \bar{x})^2$

(C) $\frac{1}{n}\sum_{1}^{n}x_i^{\,2}$

(D) none of these

63. For the pdf

$$f(x, \theta) = \frac{1}{\theta}, \quad 0 < x < \theta$$

the moment estimator of θ is :

(A) $\bar{x}$

(B)

(C)

(D) none of these

64. Let x_1, x_2 be a random sample of size 2 from the distribution

$$f(x, \theta) = \theta\, x^{\theta - 1}, 0 < x < 1$$

then sufficient statistic for θ is :

(A) $x_1 x_2$

(B) $x_1 + x_2$

(C) $x_1 - x_2$

(D) $\frac{x_1}{x_2}$

65. MLE are always :

(A) unbiased

(B) unique

(C) consistent

(D) none of these

66. Neyman–Pearson lemma is used for finding Most Powerful (MP) test for :

(A) Simple Vs simple hypotheses

(B) Simple Vs composite hypotheses

(C) Composite Vs simple hypotheses

(D) Composite Vs composite hypotheses

67. For an exponential distribution

$$f(x, \theta) = \frac{1}{\theta}e^{-x/\theta}, x > 0, \theta > 0$$

the hypothesis to be tested is

$H_0 : \theta = 1 \quad H_1 : \theta = 2$

If on the basis of a single observation critical region be $x \geq 4$ then the size of the test is :

(A) $1 - \bar{e}^{2}$

(B) $1 - \bar{e}^{4}$

(C) $\bar{e}^{2}$

(D) $\bar{e}^{4}$

68. If n is the sample size, μ is the population mean and σ^2 is the population variance, then the standard error of sample mean is :

(A) σ (B) σ/n

(C) $\sigma/\sqrt{n}$ (D) $\sigma/2n$

69. Let X has normal $N(\mu, \sigma^2)$ distribution where both μ and σ^2 are unknown. Then the simple hypothesis is :

(A) $H_0 : \sigma = 5$ (B) $H_0 : \mu = 10$

(C) $H_0 : \mu = 5, \sigma = 1$ (D) $H_0 : \mu \neq 5, \sigma = 1$

70. Which of the following is not related to probability of Type I error ?

(A) α (B) β

(C) level of significance (D) size of the test

71. The number of runs in XYY X Y X X is :

(A) 2 (B) 3

(C) 4 (D) 5

72. The expected value of the runs in Question 71 is :

(A) 3.1 (B) 4

(C) 4.4 (D) 5.2

73. Let

X : 10, 12, 7

Y : 5, 13, 9, 15

then the value of Wilcoxon-Mann-Whitney (WMW) statistic is :

(A) 1 (B) 2

(C) 3 (D) 5

74. The distribution of statistic used in sign test is :

(A) Binomial (B) Poisson

(C) χ^2 (D) t

75. The distribution of the statistic used in median test is :

(A) χ^2 (B) t

(C) F (D) Binomial

76. In a simple random sampling without replacement (SRSWOR), the probability of a sample of size n drawn from N units is :

(A) $\frac{1}{N}$ (B) $\frac{n}{N}$

(C) $\frac{1}{n}$ (D) $\frac{1}{\binom{N}{n}}$

77. In SRSWOR, the variance of the sampling mean $\bar{y}$, Var($\bar{y}$), in usual notation is :

(A) $\left(\frac{1-f}{N}\right)S^2$

(B) $\left(\frac{1}{n}+\frac{1}{N}\right)S^2$

(C) $\left(\frac{N-n}{N}\right)S^2$

(D) $\left(\frac{1-f}{n}\right)S^2$

78. The relation between variances (V) in usual notation is :

(A) $V_{opt} \geq V_{prop} \geq V_{SRS}$

(B) $V_{opt} \geq V_{SRS} \geq V_{prop}$

(C) $V_{prop} \geq V_{opt} \geq V_{SRS}$

(D) $V_{SRS} \geq V_{prop} \geq V_{opt}$

79. A population consisting of 100 units is divided into two strata, such that $N_1 = 60$, $N_2 = 40$, $S_1 = 2$ and $S_2 = 3$. If by Neyman allocation $n_1 = 12$, then the sample size n will be :

(A) 24

(B) 12

(C) 6

(D) none of these

80. The coefficient of variation (CV) in a large population is 10%. In order that the CV of the sample mean be 2% the size of the simple random sample be :

(A) 5

(B) 10

(C) 25

(D) 250

81. In a SRSWOR, if $\bar{y} = 50$, $n = 100$, $N = 500$ then the estimated population total is :

(A) 250

(B) 500

(C) 2500

(D) 25000

82. In simple random sampling (SRS), the relation between sampling fraction (f) and finite population correction (fpc) is :

(A) fpc = f

(B) fpc = 1 – f

(C) fpc =

(D) None of these

83. If the variance of sample mean in SRS with and without replacement be V_{WR} and V_{WOR} respectively and e is

$e = \frac{V_{WOR}}{V_{WR}}$ then the value of e is :

(A) $\frac{N-n}{N-1}$

(B)

(C)

(D) $\frac{N}{N-n}$

84. In a SRSWR from a population of 400 units, the finite population correction (fpc) is 0.75, then the sample size is :

(A) 100 (B) 75

(C) 60 (D) 50

85. If a population consists of a linear trend, then which of the following is correct ?

(A) $Var(\bar{y}_{st}) \le Var(\bar{y}_{sys}) \le Var(\bar{y}_R)$ (B)

(C) (D)

where st = Stratified, sys = Systematic and R = simple random sampling.

86. Under SRSWOR, n units are drawn from N units. If the ratio estimator of the population mean

$\bar{Y}$ be

then is :

(A) $\bar{Y} - cov\left(\frac{\bar{y}}{\bar{x}}, \bar{x}\right)$ (B) $\bar{Y} - cov(\bar{y}, \bar{x})$

(C) $cov\left(\frac{\bar{y}}{\bar{x}}, \bar{x}\right)$ (D) $cov\left(\frac{\bar{y}}{\bar{x}}, \bar{y}\right)$

$Var(\bar{y}_{sys}) \le Var(\bar{y}_R) \le Var(\bar{y}_{st})$ $\bar{X}$ $E\left(\right)$ y_R y_R $\bar{x}$

87. The variance of the stratified sample mean $(\bar{y}_{st})$ is :

(A) $\sum_{h=1}^{L}\left(\frac{1}{N_h} - \frac{1}{n_h}\right) W_h^2 S_n^2$ (B) $\sum_{h=1}^{L}\left(\frac{1}{n_h} - \frac{1}{N_h}\right) W_h^2 S_n^2$

(C) $\sum_{h=1}^{L}\left(\frac{1}{n_h} - \frac{1}{N_h}\right) W_h S_n^2$ (D) None of these

where $N = \sum_{1}^{L} n_h$, $n = \sum_{1}^{L} n_i$, $W_h = \frac{N_h}{N}$.

88. Basic principle of an experimental design is :

(i) Replication

(ii) Randomization

(iii) Local control

Out of these

(A) Only (i) is true (B) Only (i) and (ii) are true

(C) Only (ii) and (iii) are true (D) All (i), (ii) and (iii) are true

89. In a m^2 – LSD, the degree of freedom of error is :
(A) $m^2 - 1$
(B) $(m - 1)^2$
(C) $(m - 1)(m - 2)$
(D) None of these

90. In a RBD with 5 treatments and 4 blocks, one observation is missing, therefore in ANOVA table, degree of freedom for error will be :
(A) 12
(B) 11
(C) 10
(D) None of these

91. In a m^2 – LSD, if the degree of freedom of treatment and error are same, then the value of m is :
(A) 7
(B) 5
(C) 4
(D) 3

92. The estimate of the missing value (X) in the following RBD :

Treat.	**Block** 1	2	3	4	**Total**
1	6	5	7	8	26
2	7	X	4	5	16 + X
3	8	6	5	9	28
Total	21	11+X	16	22	70 + X

is :
(A) 3.6
(B) 4.1
(C) 5.5
(D) 7.8

93. In a LSD, relation between no. of replicates (r) and no. of treatments (t) is :
(A) r = t
(B) r > t
(C) r < t
(D) all of these

94. In a RBD, local control is used in K directions, where K is :
(A) 0
(B) 1
(C) 2
(D) 3

95. The interaction effect in a 2-way design can not be studied if the number of observations per cell is :
(A) 1
(B) 2
(C) 3
(D) 4

96. A 2^3-experimental design is arranged in 2 blocks. If the principal block contains treatment combinations

(1), c, ab, abc

then the confounded interaction is :
(A) AB
(B) AC
(C) BC
(D) ABC

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97. The number of confounded interactions in a 2^n-experimental design arranged in 2^k blocks is :

(A) 2^{n-k}
(B) $2^{n-k} - 3$
(C) $2^k - 1$
(D) none of these

98. A two-way classification with m observations per cell has r rows and c columns. The degree of freedom for interaction in ANOVA table is :

(A) $m - 1$
(B) $(m - 1)(r - 1)$
(C) $(m - 1)(c - 1)$
(D) $(r - 1)(c - 1)$

99. Local control is completely absent in :

(A) CRD
(B) RBD
(C) LSD
(D) none of these

100. A m^2–LSD is based on incomplete 3-way experimental design because the no. of experimental units are :

(A) m
(B) m^2
(C) m^3
(D) m^4

ROUGH WORK

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