2021

Time : 3 hours

Full Marks : 50

Candidates are required to give their answers in their own words as far as practicable.

The figures in the margin indicate full marks.

*Answer from **all** the Sections as directed.*

Section – A

(Objective Type Questions)

1. [A] Fill in the blanks : 1×5 = 5

(a) According to Prof. R. A. Fisher, there are 4 criteria of a good estimate.

(b) The sum of squares of n independent standard normal variates is a chi-square variate with ___n___ degrees of freedom.

(c) For testing Ho:$\mu = \mu_0$, the suitable test-statistic is $H_0 : \mu_1 = \mu_2$

(d) For $\upsilon = 1$ the student's t distribution becomes _____

(e) There are ___3___ basic designs.

[B] Four options are given for each, select the suitable one : $1 \times 5 = 5$

(i) The arithmetic mean of the simple random sample is _____ estimate of the population mean.

(I) Unbiased

(II) Maximum likelihood

(III) Both (I) and (II)

(IV) None of these

(ii) For large n $\sqrt{2x^2}$ is normally distributed with :

(I) Mean $\sqrt{2n}$; variance 0

(II) Mean $\sqrt{2n}$; variance 1

(III) Mean $\sqrt{2n-1}$; variance 0

(IV) None of these

(iii) The suitable test – statistic for testing Ho : $\sigma^2 = \sigma_0^2$ is :

(I) $\frac{nS^2}{\sigma_0^2}$

(II) $\frac{\sum(x_i - \bar{x})^2}{\sigma_0^2}$

(III) Both (I) and (II)

(IV) None of these

(iv) The probability of committing type I error is :

(I) α

(II) β

(III) $1 - \alpha$

(IV) $1 - \beta$

(v) For C. R. D., the experimental units must be :

(I) Homogeneous

(II) Heterogeneous

(III) Both (I) and (II)

(IV) None of these

Section – B

(Short-answer Type Questions)

Answer any **four** questions : $3 \times 4 = 12$

(i) What are the criteria of a good estimate. Explain any one.

(ii) Obtain the maximum likelihood estimate of the parameter of the Poisson distribution.

(iii) Describe χ^2 as a test of indipendence.

(iv) Obtain m. g. f. of χ^2.

(v) Why do prefer R. B. D. over C. R. D.

(vi) Define Latin square design.

Section – C

3. Answer any **four** questions of the following : $7 \times 4 = 28$

(i) What is maximum likelihood estimate ? Obtain m. l. e. of the Parameters of normal distribution.

(ii) Define student's t. Show that for this distribution

with v degrees of freedom

$$\mu_{2r} = \frac{1.3.5.....(2r-1)}{(v-2)(v-4).....(v-2r)} \cdot u^r.$$

(iii) Define simple hypothesis, composite hypothesis, null hypothesis and alternative hypothesis, two kinds of error.

(iv) Name the test-statistic for testing

(a) Ho : $\mu = \mu_0$ (b) Ho : $\mu_1 = \mu_2$

Also describe the procedures for testing.

(v) What is analysis of variance technique ? Give the assumptions involves in it.

$$\sum_{i=1}^{k}\sum_{j=1}^{r_i} (y_{ij} - \bar{y})^2 = \sum_{i=1}^{k}\sum_{j=1}^{r_i} (y_{ij} - \bar{y}_i)^2 + \sum_{i=1}^{k} r_i(\bar{y}_i - \bar{y})^2$$

(vi) Give the analysis of Latin square design.

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