

2021
STATISTICS
[GENERAL]
Paper : IV

Full Marks : 60

Time : 3 Hours

*The figures in the right-hand margin indicate marks.**Candidates are required to give their answers in their own words as far as practicable.*

1. Answer any **six** questions: 1×6=6
- i) Write down one advantage of stratified random sampling.
 - ii) What is the range of multiple correlation coefficient?
 - iii) What is a treatment contrast?
 - iv) Give two examples of assignable cause of variation.
 - v) Name two measures of fertility.
 - vi) Explain the case that $r = -1$, where r is the simple correlation coefficient.
 - vii) What do you mean by vital events?
 - viii) Define 'LTPD' in connection with SQC.

[Turn over]

2. Answer any **seven** questions: 2×7=14
- i) Distinguish between "stable population" and "stationary population".
 - ii) How does N.R.R. indicate the growth of population?
 - iii) Explain the terms "main effects" and "interaction effect" in factorial experiment.
 - iv) What is a contingency table? State the hypothesis you test using the chi-square statistic in a contingency table.
 - v) Show that if $r_{12} = r_{13} = 0$, then $r_{1.23} = 0$. What is the significance of this result in regard to the multiple regression equation of X_1 and X_2 and X_3 ?
 - vi) Define partial correlation coefficient and interpret the result:

$$r_{12.3} = 0.85$$
 - vii) Distinguish between "Consumer's risk" and "Producer's risk".
 - viii) Write down the control limits of c-chart when standard is not given.
 - ix) What are the different methods of allocating a sample in stratified sampling?

3. Answer any **five** questions: $6 \times 5 = 30$

- i) Obtain the simplified form of the test-statistic for testing independence of two attributes (in large sample procedure) when each attribute has only two categories.
- ii) Prove that $1 - r_{1.23}^2 = (1 - r_{12}^2)(1 - r_{13.2}^2)$. Hence show that $r_{1.23}^2 = r_{12}^2 + r_{13}^2$ if $r_{23} = 0$.
- iii) How do you construct a control chart for number of defectives?
- iv) Define ASFR, TFR, GRR.
- v) What is a life table? Describe the different columns of a complete life table.
- vi) Explain how \bar{X} -chart is drawn in practice. How would you interpret the points falling outside the control limits on this chart?
- vii) Give the expressions for the total-effect, the main-effect and S.S. due to an effect for a 2^3 -experiment.
- viii) With a cost function $C = a + \sum_n C_n r_n$, prove that the variance of the estimated mean \bar{y}_{st} is minimum when n_n is proportional to $N_n S_n / \sqrt{C_n}$ in case of stratified random sampling.

- ix) Define General Fertility Rate. Discuss its relative merits and demerits as a measure of fertility.

4. Answer any **one** question: $10 \times 1 = 10$

- i) Describe a single sampling inspection plan. Give a general outline of methods for determining the constant involved in single sampling plan.
- ii) Give the process of analysis of the data obtained from 2^3 -factorial experiment conducted in a randomised block design.