



Seat No. : _____

TE-102

B.Sc. Sem.-IV

May-2013

205 Statistics

Statistical Tests, Official Statistics and Sampling

Time : 3 Hours]

[Max. Marks : 70

- Instructions :** (1) All questions are compulsory.
(2) Each question carry equal marks.
(3) You can use scientific calculator.

1. (a) Define multiple correlation and multiple regression. Using Yule's notations in usual notations derive the equation of plane of regression of X_1 on X_2 and X_3 . 7

OR

Define the coefficient of multiple correlation and the coefficient of partial correlation. In usual notations prove that

$$r_{12.3} = \frac{r_{12} - r_{13} r_{23}}{\sqrt{(1 - r_{13}^2) \cdot (1 - r_{23}^2)}}.$$

- (b) Solve : (i) Show that the correlation coefficient between the residuals $X_{1.23}$ and $X_{2.13}$ is equal and opposite to that between $X_{1.3}$ and $X_{2.3}$. 7
(ii) Show that $R_{1.23}^2 = r_{12}^2 + r_{13}^2$, if $r_{23} = 0$.

OR

Solve : (i) In usual notations prove that $\sigma_{1.23}^2 = \sigma_1^2 \cdot \frac{\Delta}{\Delta_{11}}$

- (ii) Show that if $x_3 = ax_1 + bx_2$, the three partial correlations are numerically equal to unity, $r_{13.2}$ having the sign of a, $r_{23.1}$ having the sign of b and $r_{12.3}$ having the opposite sign of a/b.

2. (a) With reference to testing of hypothesis define the following terms : 7
- (i) Null Hypothesis
 - (ii) Simple and Composite Hypothesis
 - (iii) Alternative Hypothesis
 - (iv) Level of significance
 - (v) Critical region
 - (vi) Power of the test
 - (vii) Type I & Type II Errors

OR

Define and explain Z transformation and discuss various applications of it.

- (b) Solve : In a sample of 1000 people in Maharashtra, 540 are rice eaters and the rest are wheat eaters. Can we assume that both rice and wheat are equally popular in this State at 1% level of significance ? 7

OR

A sample of 900 members has a mean 3.4 cms and s.d. 261 cms. Is the sample from a large population of mean 3.25 cms and s.d. 2.61 cms ?

3. (a) Discuss in detail all the principle steps that are taken into consideration in a sample survey. 7

OR

Giving the importance of survey and census, distinguish between complete enumeration and a sample survey.

- (b) Define : (i) Probability sampling (ii) Judgement sampling and (iii) Mixed sampling. Explain each with illustration. 7

OR

Write short note on sampling and non-sampling errors.

4. (a) Explain Indian Census operations, its origin and its functions in detail. 7

OR

What is the role of Indian Census operation in planning and development processes ? Explain in detail.

- (b) Explain the meaning, origin, purpose and functions of the following : I.C.M.R., N.S.S.O. 7

OR

Explain the meaning, origin, purpose and functions of the following : I.S.I., N.S.C.

5. Write answer in brief :

14

- (i) Give any two properties of residual.
 - (ii) Give any two properties of multiple correlation coefficient.
 - (iii) Give the reason why $R_{1,23}$ is non-negative ?
 - (iv) What is IRFA ? What is its objective ?
 - (v) Name the present director general of ICMR.
 - (vi) What is the Logo and Motto of ISI ?
 - (vii) Who was the first chairperson of NSC ?
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