

M.Sc.(Ag.) Semester – I Examination, 2014

6

Agricultural Extension

Course : STAT-550

(Statistical Methods for Applied Sciences)

Time: 3 Hours

Full Marks: 50

Questions are of value as indicated in the margin.

Answer **any five** questions.

1. (i) If $p(z \leq -1) = 0.1587$, then find $p(z \leq 1)$, where $Z \sim N(0,1)$.

- (ii) The distribution of a random variable X is given by

$$f(x) = \text{constant } e^{-\frac{1}{2}\left(\frac{x-100}{5}\right)^2}, -\infty < x < \infty$$

Write down the values of the following:

- (a) the constant, (b) the mean, (c) the mode, (d) the variance.

4+6=10

2. (i) Show that the normal distribution is a symmetric distribution.

- (ii) The mean length (in cm.) of ear head in a population of ear heads of a variety of wheat is 9.978 cm. and standard deviation is 1.441 cm. Assuming the normal distribution of ear head lengths find the probability that

- (a) an ear head will have a length of 12.128 cm or more.
(b) an ear head will have a length of 6.536 cm or less.

[given $P(Z \leq 1.49) = 0.9319$, $P(Z \leq 2.39) = 0.9916$, where $Z \sim N(0,1)$]

5+5=10

3. (i) In a normal distribution, 31% items are under 45 and 8% are over 64. Find the mean and standard deviation of distribution.

Given $\Phi(0.5) = 0.69$ and $\Phi(1.4) = 0.92$, where

$$\Phi(t) = P(z \leq t) = \int_{-\infty}^t \frac{1}{\sqrt{2\pi}} e^{-\frac{1}{2}z^2} dz$$

- (ii) State four properties of a $N(\mu, \sigma^2)$ distribution

6+4=10

4. (i) Discuss the advantage of stratified random sampling over simple random sampling.

- (ii) State when stratified sampling technique will be useful for drawing a good sample.

- (iii) Write down the expression for the variance of the unbiased estimator of population mean when sampling is done by stratified random sampling under without replacement and proportional allocation rules.

4+2+4=10

P.T.O.

(2)

5. (i) State the basic principles of sample survey.
(ii) Propose an unbiased estimator of population mean μ in case of an SRSWR of size n and a population of size N .
(iii) Write down the variance of the estimator of the population mean μ you proposed in (ii), when the population variance is σ^2 . 3+3+4=10
6. (i) Find the regression equation of x_1 on x_2 and x_3 , when the following values are given
 $\bar{x}_1 = 100$, $\bar{x}_2 = 75$, $\bar{x}_3 = 30$ and
 $r_{12} = 0.3$, $r_{23} = 0.5$, $r_{13} = 0.5$
 $s_1 = 2.7$, $s_2 = 2.4$, $s_3 = 2.7$
(Notation bear their usual meaning).
(ii) Predict the value of x_1 when $x_2=40$ and $x_3=20$. 7+3=10
7. Define multiple correlation coefficient. State reasons why it lies between 0 and 1. Calculate the value of multiple correlation coefficient $R_{1.23}$ when (a) $r_{12} = r_{13} = 0$,
(b) $r_{23} = 0$, (c) $r_{12} = r_{13} = r_{23} = r$. 2+2+6=10
8. Write short notes on **any two** of the following: 5+5=10
(i) Sources of non sampling errors in sampling or in complete enumeration.
(ii) Partial correlation and its uses.
(iii) Allocation problem in stratified sampling.
(iv) Normal distribution and its use in agriculture.
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