

M.Sc. (Ag.) Examination, 2016
Semester-I
Agricultural Economics and Statistics (ES)
Course: STAT-550
(Statistical Methods for Applied Sciences)

Time: Three Hours

Full Mark-50

Questions are of value as indicated in the margin
Answer any five questions

1. (a) Define probability density function of a normal distribution with parameters μ and σ^2 . Draw a normal probability curve. State chief characteristics of normal probability curve.
(b) The mean yield for one-acre plot is 662 kilos with a standard deviation of 32 kilos. Assuming Normal distribution, how many one-acre plots in a batch of 1000 plots would you expect to have yield (i) over 700 kilos and (ii) below 650 kilos. Given that $P(0 \leq Z \leq 1.19) = 0.3830$ and $P(0 \leq Z \leq 0.38) = 0.1430$, where $Z \sim N(0,1)$ 5+5=10
2. (a) What do you mean by standard normal variate? If $X \sim N(\mu, \sigma^2)$, write down its standard normal form.
(b) State the approximate values of the probability $P(-1 \leq Z \leq 1)$ and $P(-2 \leq Z \leq 2)$, where Z is a standard normal variate.
(c) In final B.A. examination 10% of the candidates scored 60 or more marks and 30% scored 40 or less marks. Find the mean and standard deviation of marks, assuming marks are normally distributed. Given: $P(Z > 1.280) = 0.10$ and $P(Z < -0.525) = 0.30$, where $Z \sim N(0,1)$ 3+2+5=10
3. (a) Define linear regression. What are the two regression lines?
(b) Show that the coefficient of correlation is the geometric mean of two regression coefficients.
(c) Explain the method of least square as applied to fit a linear regression equation $y = a + bx$. 3+2+5=10
4. (a) Explain partial correlation. State the formula for partial correlation coefficient $r_{23.1}$
(b) if $r_{12} = r_{23} = r_{31} = p \neq 1$ then show that $r_{12.3} = r_{23.1} = r_{31.2} = \frac{p}{1+p}$
(c) Data relating to yield (x_1), rainfall (x_2) and temperature (x_3) give the following simple correlations: $r_{12} = 0.77$, $r_{13} = 0.72$ and $r_{23} = 0.52$. Find the partial correlation coefficient $r_{12.3}$ and multiple correlation coefficient $R_{1.23}$ 3+2+5=10
5. (a) Define sample. Give an example of sample drawn from a population.
(b) Define simple random sampling. Explain one method of drawing a simple random sample. Point out disadvantages of the simple random sampling. 3+7=10
6. (a) Discuss the advantages of the sample survey over the complete enumeration.
(b) Propose an unbiased estimator of population mean $\bar{Y}$ both under SRSWOR and SRSWR. Write down the variance of the proposed estimator for SRSWOR and SRSWR. 4+6=10
7. (a) Explain the procedure of stratified random sampling.
(b) State how non-sampling errors differ from sampling errors. Explain how sampling errors can be rectified in a sample.
(c) Describe Neyman and proportional allocation in a stratified random sampling. Propose an unbiased estimator for the population mean by a stratified sample. 2+3+5=10
8. Write short notes on **any two** of the following: 5+5=10
 - (a) Cluster Sampling
 - (b) Multiple linear regression
 - (c) Sampling frame and sampling unit.
 - (d) Properties of simple linear regression coefficients.