M.Sc. Semester-II Examination 2017
Statistics (Old)
Course : MSC-23
(Sample Survey and Statistical Computing)

Time : 3 Hours **Full Marks : 40**

Questions are of value as indicated in the margin

Answer **any three** from Group – A and any one from Group – B

Group – A (Sample Survey)

1. (a) Show that a necessary and sufficient condition for the existence of an unbiased estimator of population total is that the inclusion probability of each unit of the population is strictly positive.

   (b) Define Horvitz – Thompson's estimator. Find its variance and express it in the form of Sen, Yates and Grundy. 5+5=10

2. Define regression estimator for double sampling. Find approximate expressions of its bias and mean square error. 2+8=10

3. (a) Explain the rationale behind randomized response technique.

   (b) Describe the method of unrelated questions in this regard. 5+5=10

4. Find the expressions of the first and second order inclusion probabilities in SRSWR(n). Also find the expected value and variance of the effective sample size. (you should derive the necessary results). 10

5. (a) Define Hansen-hurwitz's estimator for population total.

   (b) Find its variance and two different unbiased estimators of its variance. 2+(2+6)=10

Group – B (Statistical Computing)

6. Write down the outputs of the following R-codes. 2×5=10

   (a) y = rep(1:3, c(2,3,4))

   Mean(y)

   (b) x = c(5, 3, 1, 10, 12, 16, 20, 1, 12)

   x[x>7]

   x>7

   © A = matrix (c(1, 0, 2, -1, 0, -1, 3, 4, 0, 0, 2, 1), nrow =3 bycol=T)

   B = apply (A, 2, mean)

   x = mean (A)

   (d) y = gnorm (0.975, 2, 1)

   z = pnorm (19, 10, 3)

   y

   z

P.T.O.

(e) y= rnorm (10, 5, 1)

m = mean (y)

s = sd (y)

z = y-m)/s

Var(z)

7. (a) Describe the procedure of loading a data file in R, which is in CSV format.

(b) How does the functions work?

(i) Wilcox test

(ii) var test

(iii) t. Test $4+(3\times2)=10$
