M.Sc. Semester-II Examination 2017
Statistics (New)
Course : MSC-23
(Sample Survey)

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

Questions are of value as indicated in the margin

Answer **any four** questions

1. (a) Clearly distinguish between stratified, cluster and two stage sampling schemes with examples. Also discuss their relative merits and demerits.

   (b) Briefly explain the role of auxilliary information in sample survey. (4+3)+3=10

2. (a) If you wish to estimate the proportion of alcohol addicted college students in a city by usual simple random sampling technique, what kind of difficulty will you face?

   (b) In this situation, what do you suggest and what will be your estimate? 4+6=10

3. (a) Distinguish between informative and non-informative design.

   (b) For a binary variable Y, show that $p\left[\bar{y}-\frac{3}{4n}\le\bar{Y}\le\bar{y}+\frac{3}{4n}\right]\ge\frac{8}{9}$, where symbols have their usual meanings. 2+8=10

4. Given an unbiased estimator t of the population total Y, based on a sample s drawn according to a design p, describe a procedure to construct an estimator having variance smaller than that of t. 10

5. (a) Define Desh Raj's estimator for population total. Show that is unbiased.

   (b) Find the expression of its variance & estimate the variance unbiasedly. (1+2)+(3+4)=10

6. Instead of applying PPSWR directly to draw samples from a population, if we classify the observations through SRSWOR and then select one unit from each group by PPSWR; there will be a gain in efficiency' – justify. 10

7. Show that the variance (V) of the unbiased estimator of population mean under double sampling for stratification, satisfies the relationship

$$n'\left(V+\frac{S^2}{N}\right)=\left(S^2-\sum_{h=1}^{k}W_hS_h^2\right)+\sum_{h=1}^{k}\frac{W_hS_h^2}{v_h}$$

   Where the symbols have their usual meanings. In this context, describe the process of obtaining the optimal sample sizes for a specified cost. 10
