B. N. BANDODKAR COLLEGE OF SCIENCE, THANE – 400 601.

FIRST TERM EXAMINATION, OCT. 2010.

S.Y. B. Sc.

Time : 2Hrs

Subject : Statistics - II **Marks : 60**

N. B. : 1. All questions are compulsory.

2. Figures to the right indicate marks.

3. Use of non-programmable calculators is allowed.

Q.1 a) Explain : Sampling and non-sampling errors. Also describe one Method of drawing simple random sample [5]

b) **Attempt ANY TWO of the following :-**

i) Show that probability of drawing an element at any draw in simple random sampling without replacement is constant and independent of draw number. [5]

ii) What are advantages of stratified random sampling over simple random sampling. Explain the method of drawing stratified random sample in usual notations. [5]

iii) Explain methods : Systematic sampling, cluster sampling by giving examples. [5]

Q.2 a) In simple random sampling without replacement show that sample Mean is unbiased estimator of population mean. [7]

b) **Attempt ANY ONE of the following :**

i) In usual notations show that sample proportion is unbiased estimator of population proportion. Also obtain expression for variance of sample proportion in simple random sampling without replacement. [8]

ii) Derive the formula for sample size in simple random sample without replacement with desired margin of error. [8]

P.T.O.

Q.3 **a)** What do you understand by allocation in stratified sampling ? Derive Formula for sample sizes for samples to be drawn from various strata under proportional allocation. Obtain the formula for variance of unbiased estimator of population mean under this type of allocation.

b) Attempt ANY ONE of the following :

i) Derive the formula for sample sizes for various strata when cost function is $c = a + \sum_{i=1}^{k} c_i n_i$ notation and which minimize $V(\bar{y}_{st})$ for fixed cost .

ii) Show that in usual notations,

$V(y)_{SRSWOR} \geq V(y_{st})_{prop} \geq V(y_{st})_{opt}$

Q.4 **a)** State the ratio and regression estimators of population mean by explaining the various notations clearly. Prove that ratio estimator is biased for population mean. Also show that such bias is negligible. [7]

b) **Attempt ANY ONE of the following :** [8]

1) Obtain expression for variance of ratio estimator of population mean in terms of S_y^2, S_x^2 and S_{xy}. State estimator of this variance.

2) Obtain expression for variance of regression estimator of population mean in term of S_y^2, S_x^2 and S_{xy}. State estimator of this variane. [8]

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