

**B.N. Bandodkar College of Science, Thane**

**S.Y. B.Sc. First Term end Examination Oct. 2011**

**Statistics Paper II**

Duration 2 hrs

Max Marks-60

- N.B. 1) All Questions are compulsory.  
2) Figures to right indicate marks.

- Q.1) a) Explain sample survey and its advantages 3
- b) Attempt any **TWO**
- 1) Explain simple random sampling. Also explain one method of drawing simple random sample. 6
- 2) Explain stratified sampling method. Define unbiased estimator of population mean and prove that it is unbiased in usual notations. 6
- 3) Explain (i) Systematic sampling (ii) Two stage sampling. 6
- Q2) a) Show that probability of selecting given population unit in the sample at any draw is  $\frac{1}{N}$  in simple random sampling with and without replacement where  $N$  is population size. 7
- b) Attempt any **ONE**
- 1) Show that sample mean is unbiased estimator of the population mean in simple random sampling without replacement. State the expression for variance of this estimator. 8
- 2) Derive the formula for estimating sample size  $n$  from population of size  $N$  in simple random sampling without replacement when permissible error for estimation of population mean is  $d$  and confidence coefficient is  $1 - \alpha$ . 8
- Q 3) a) What is proportional allocation? Obtain formula for sample size for each stratum under this method. Also modify variance of unbiased estimator of population mean under this method of allocation. 7
- b) Attempt any **ONE**
- 1) Derive the formula for sample size for each stratum when variance of the 8

estimator is fixed and cost is minimised by taking cost function  $c = a + \sum c_i n_i$

2) In usual notations prove that 8

$$V(\bar{y}_{st})_{Prop} \leq V(\bar{y})_{SRSWOR}$$

Q.4) a) Define ratio estimator of population mean and show that it is biased estimator. 7  
Further show that it is approximately unbiased and obtain its variance.

b) Attempt any **ONE**

1) Define regression estimator of population total and obtain its variance in terms of 8  
mean squares. State estimator of this variance.

2) Show that the best value of the constant in regression estimator is given by 8  
regression coefficient of Y on X in usual notations. Also modify the expression  
for variance of estimator of population mean under this best value of constant.

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