Note: (i) All questions are compulsory.

      (ii) Use of Calculator is allowed.

Q.1) Answer the following questions

   a) Correct the following if necessary: **(10M)**

     i. Sample is a part of universe.

     ii. Sample Mean is an unbiased estimate of population proportion.

     iii. Simple random sampling is better than systematic random sampling.

     iv. Regression estimator of population mean is a biased estimator of $\bar{Y}$.

     v. Systematic sampling require Interval for random sample.

   b) Answer in One sentence: **(10M)**

     i. Give any two advantages of Sampling.

     ii. Define parameter with example.

     iii. State the formula of $V(\bar{y}_{st})_{Prop.}$

     iv. State the mean of regression estimator for population.

     v. Write any two Applications of sampling.

Q.2) Attempt any TWO   **(20M)**

   a) Write Merits and Demerits of Sample Survey.

   b) In SRSWOR, the Sample mean square is unbiased estimator of the population mean Square (S^2).

   c) Prove that, in SRSWR the variance of sample mean is $V(\bar{y}) = \frac{N-1}{N} \times \frac{S^2}{n}$

Q.3) Attempt any TWO   **(20M)**

   a) Derive formula for sample sizes for samples to be drawn from various strata under proportional allocation.

   b) A population of size 1500 is divided into 3 strata. Their sizes and standard deviations are given below:

Stratum No.	Stratum Size (N_i)	S.D. (S_i)
I	400	5
II	600	8
III	500	12

A Stratified random sample of size 200 is to be drawn from the population.
Determine the sample sizes from these 3 stratum under: (i) Proportional allocation
(ii) Neyman's allocation.

   c) Derive formula for optimum allocation.

P.T.O

Q.4) Attempt any TWO   **(20M)**

    a) Obtain the estimator of population mean using linear regression method of estimation when β is not specified. Obtain value of β for which variance is minimum and also obtain the formula for minimum variance.

    b) In a locality there are 50 lanes. In 2005 there were 6250 persons living. Recently sample of 5 lanes showed the number of residents changing as following:

Lane Number:	1	2	3	4	5
Person living in 2005:	100	150	160	200	140
Recently:	120	160	200	170	150

Estimate the standard error of the number of persons residing in the locality using
i)   The recent sample only.
ii)   The information about 2005 as well as recent sample.

    c) Explain the systematic sampling procedure to draw the sample of size 15 from population of size 400, using starting sample as 25.

Q.5) Attempt any TWO   **(20M)**

    a) i. write difference between Parametric and non-Parametric sampling.

       ii. Difference between Population survey and sample survey.

    b) Derive confidence interval for population total.

    c) Compare between Stratified sampling and Systematic sampling.