UNIVERSITY OF THE PUNJAB

Roll No. in Fig. ....

B.S. 4 Years Program / Sixth Semester – 2019

Roll No. in Words. ....

Paper: Advanced Sampling Techniques (Theory)
Course Code: STAT-312 Part – I (Compulsory) Time: 15 Min. Marks: 10

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Signature of Supdt.:

ATTEMPT THIS PAPER ON THIS QUESTION SHEET ONLY.
Division of marks is given in front of each question.
This Paper will be collected back after expiry of time limit mentioned above.

Q.1. Encircle the correct option. (10x1=10)

1. The classical ratio estimators are generally -------------------
   A. Unbiased B. Biased
   C. Zero D. None of the above
2. People who are available, volunteer, or can be easily recruited are used in the sampling method called ---------------.
   A. Area B. Probability proportional to size
   C. Multi-stage D. Convenience
3. The correlation co-efficient between elements in the same ------------- is called Intracluster correlation.
   A. cluster B. stratum
   C. sample D. None of the above
4. The list of all units in the population is called ------------.
   A. Parameter B. Statistic
   C. Sampling Frame D. Bias
5. Like the ratio estimate, the linear regression estimate is designed to increase ---------------- by the use of an auxiliary variate x_i that is correlated with y_i.
   A. Precision B. Sample size
   C. Variability D. Confidence width
6. --------- estimator is unbiased when sample size is large.
   A. BLUE B. Regression C. Ratio D. None of above
7. In the regression method of estimation, the quantity $\left|\frac{b_0}{B}\right|$ must be close to '1' if ρ is _______
   A. Low B. High
   C. Zero D. Negative
8. All of the following are true about cluster sampling except
   A. Samples are similar to those in simple random sampling
   B. Is a rapid and simple method
   C. The sample size may vary according to study design
   D. It is a type of probability sample
9. The ------------- estimate is more precise than the ratio estimate unless $B = R$
   A. Regression B. Unbiased
   C. Robust D. None of the above
10. In -------------- number of units at each stage are different.
    A. Simple random sampling B. Stratified random sampling
    C. Systematic sampling D. Multistage sampling

UNIVERSITY OF THE PUNJAB

B.S. 4 Years Program / Sixth Semester – 2019

Roll No. ....

Paper: Advanced Sampling Techniques (Theory)
Course Code: STAT-312 Part – II

Time: 2 Hrs. 45 Min. Marks: 50

ATTEMPT THIS (SUBJECTIVE) ON THE SEPARATE ANSWER SHEET PROVIDED

Q. No. 2. Write a short note on the following: **(5 each)**

i. Application of Ratio Estimator
ii. Non-response Error
iii. Double Sampling
iv. Cluster Sampling

Q. No. 3. Compare combined and separate regression estimates. Under what condition they are equally good. **(08)**

Q. No. 4. Show that the value of b_0 that minimizes $V(\bar{y}_{lr})$ is $B = \frac{S_{yx}}{S_x^2}$. **(07)**

Q. No. 5. If a simple random sample of n clusters, each containing M elements, is drawn from N clusters in the population, show that the sample mean per element $\bar{\bar{y}}$ is an unbiased estimate of $\bar{\bar{Y}}$ with variance: **(08)**

$$V(\bar{\bar{y}}) = \frac{1-f}{n}\frac{(NM-1)}{M^2(N-1)}S^2[1+(M-1)\rho]$$

Q. No. 6. If a sample of n units are drawn with probability proportional to z_i and with replacement, show that an unbiased estimate of $V(\hat{Y}_{PPZ})$ is **(07)**

$$v(\hat{Y}_{PPz}) = \frac{1}{n(n-1)}\sum_{i=1}^{n}\left(\frac{y_i}{z_i} - \hat{Y}_{PPZ}\right)^2$$