

Government Degree College Ganderbal

Department of Statistics

Some Important Instructions

Before writing and preparing your assignments, candidates are required to read the instructions given below carefully. It is mandatory for candidates to strictly adhere to every point so that your assignments will be approved for evaluation without any issue.

- 1) Students are required to write down their Roll No, Name, Registration No, Semester and page numbering, on top of each page.
- 2) The assignments must be hand written on A4 size ruled paper with not more than 10 pages.
- 3) Students are required to convert their hand written assignment into a single pdf file by using a user friendly camscanner app.
- 4) Students are required to scan your hand written assignments clearly, so that the submitted assignments are readable for concerned evaluator
- 5) Students are required to submit their scanned copy of assignment through Email: statistics.assignmentsem4@gmail.com
- 6) Do not waste your precious time by simply copying from other students, instead you must use your IQ to prepare your assignments for best results
- 7) Students are advised to keep a hard copy of their assignments with them
- 8) The last date for the submission of assignments is 26/06/20.
- 9) Students must put their signatures on top of each page.
- 10) The first page of assignment must only contain the following information
 - i) Name of candidate.....
 - ii) Roll No.....
 - iii) Batch.....
 - iv) Category: Fresh/Backlog.....
 - v) Regn. No:.....
 - vi) Subject.....
 - vii) Semester.....
 - viii) Contact No.....
 - ix) Email address.....
 - x) Date of Submission.....
 - xi) Signature of Candidate.....
- 11) Last but not least students must cross check whether they have followed all the points given in the instructions carefully before the submitting their assignments.

Assignment Paper for 4th semester, June 2020

Subject: Statistics

Max. Marks: 60

Class: B.A/B.Sc. Regular Batch 2018 and Backlog Students of Batch 2016/2017

Note: Attempt any two (02) questions and each question carries equal marks.

- Q1 (i) What is sampling. Distinguish between sample and population and hence list some advantages and disadvantages of sampling.
- (ii) What are the advantages of sampling over Census
- (iii) Differentiate between sampling and non-sampling errors

- Q2 (i) What do you understand by simple random sampling (SRS) with replacement and without replacement. For a population of size $N=5$ with values 2,4,6,8,10 draw all possible samples of size, $n=2$ by simple random sampling with replacement method

(ii) In SRSWOR show that

$$E(\bar{y}) = \bar{Y} \text{ and } V(\bar{y}) = \left(\frac{N-n}{nN} \right) S^2 \text{ where the terms have their usual meaning.}$$

(iii) In SRSWR, show that sample mean square is unbiased estimate of population variance, i.e. $E(s^2) = \sigma^2$

- Q3 (i) What is stratified sampling. What are the principal reasons for stratification?

(ii) For stratified sampling without replacement, if in every stratum, $E(\bar{y}_i) = \bar{Y}$ and samples are drawn independently in different strata, then show that variance of

$$\bar{y}_{st} = \sum_{i=1}^k W_i \bar{y}_i \text{ is given by } V(\bar{y}_{st}) = \sum_{i=1}^k \left(\frac{1}{n_i} - \frac{1}{N_i} \right) W_i^2 S_i^2$$

(iii) What are the advantages of stratified sampling over SRS?

- Q4 (i) Show that in systematic sampling with interval k , sample mean is an unbiased estimator of population mean and its variance is given by

$$V(\bar{y}_{sy}) = \frac{N-1}{N} S^2 - \frac{k(n-1)}{N} S_{wsy}^2 = \frac{N-1}{N} S^2 - \frac{n-1}{n} S_{wsy}^2$$

Where $S_{wsy}^2 = \frac{1}{k(n-1)} \sum_{i=1}^k \sum_{j=1}^n (y_{ij} - \bar{y}_i)^2$ is the mean square among the units which lies within the same systematic sample

(ii) Show that mean of Systematic sample is more precise than the mean of SRS if and only if $S_{wsy}^2 > S^2$

(iii) What are the merits and demerits of systematic sampling?