

5362/1

FACULTY OF SCIENCE
B.Sc. (V Semester) Examination
STATISTICS
Paper V (NEW)
(Applied Statistics - I)

Time : 3 Hours]

[Max. Marks : 80

Section A – (Marks: $8 \times 4 = 32$)

(Short Answer Questions)

Answer any **eight** questions.

1. Explain about Census versus Sample Surveys.
2. Explain various methods of drawing random samples with and without replacement.
3. Explain sampling and non-sampling errors.
4. Explain proportional and Neyman allocation in stratified random sampling.
5. What is stratified random sampling? Show that \bar{y}_{st} is an unbiased estimate of the population mean \bar{Y}_N .
6. Explain about systematic sampling. Also mention its advantages and disadvantages.
7. What is meant by a time series? Indicate its importance in business and economics.
8. Below are given the figures of production (in thousand quintals) of a sugar factory:

Year	2013	2014	2015	2016	2017	2018	2019
Production	77	88	94	85	91	98	90

- (i) Fit a straight line by the method of least squares and tabulate the trend values.
 - (ii) What is the monthly increase in the production of sugar?
9. What is the meaning of seasonal indices? Explain the link relative method for measuring seasonal indices.
 10. What do you understand by statistical quality control? Discuss briefly its need and utility in industry.
 11. The following are the figures of defectives in 22 lots each containing 2,000 rubber belts:
425, 430, 216, 341, 225, 322, 280, 306, 337, 305, 356, 402, 216, 264
126, 409, 193, 326, 280 389, 451, 420.

Draw control chart for fraction defective and comment on the state of control of the process.

12. Explain the construction procedure of C-Chart.

[P.T.O.

Section B – (Marks: 4 × 12 = 48)*(Essay Type Questions)**Answer all questions.*

13. (a) Explain the principal steps in Sample Surveys. Also mention the limitations of Sampling.

Or

- (b) Prove that in SRSWOR the variance of the Sample mean: $V(\bar{y}_n) = \frac{N-n}{N} \cdot \frac{S^2}{n}$.

14. (a) With usual notations, prove that $V(\bar{y}_n)_R \geq V(\bar{y}_{st})_P \geq V(\bar{y}_{st})_N$.

Or

- (b) Prove that in Systematic Sampling, the variance of the estimated mean:

$$V(\bar{y}_{sys}) = \frac{N-1}{N} S^2 - \frac{(n-1)K}{N} \cdot S_{wsy}^2.$$

15. (a) Explain the various components of time series with an example.

Or

- (b) Explain:

- (i) Ratio to trend method
(ii) Ratio to Moving Average Method.

16. (a) What is Control Chart? Explain the basic principles underlying the control charts. Also derive the three sigma limits.

Or

- (b) Explain in detail for construction procedure of \bar{X} and R charts.