

LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034



M.Sc. DEGREE EXAMINATION – DATA SCIENCE

FOURTH SEMESTER – APRIL 2022

PDS 4602 – TIME SERIES AND SAMPLING THEORY

Date: 17-06-2022

Dept. No.

Max. : 100 Marks

Time: 01:00 PM - 04:00 PM

PART – A

Q. No Answer ALL Questions

(10x 2 = 20 Marks)

- 1 Define Timeseries with example.
- 2 State the multiplicative model of Time series.
- 3 Define cyclical variation in time series.
- 4 List the methods of measuring secular trend.
- 5 Differentiate SRSWR and SRSWOR.
- 6 State any two limitations of Simple random sampling.
- 7 Define Stratified random sampling.
- 8 Write the formula of the mean of the h^{th} stratum in stratified random sampling.
- 9 Define Circular Systematic sampling.
- 10 State any two advantages and disadvantage of systematic sampling.

PART – B

Answer any ALL Questions

(5 x 8 = 40 Marks)

- 11 a. State and explain the various components of Timeseries.

(OR)

- b. Fit a trend line by free hand method.

Year	2001	2002	2003	2004	2005	2006	2007	2008
Sales(in thousands)	9	12	10	14	20	18	20	19

- 12 a. Calculate Seasonal index using link relative method.

Year	Quarters			
	I	II	III	IV
2002	74	76	74	80
2003	82	68	50	62
2004	70	74	70	82

(OR)

- b. Write the procedure of measuring seasonal variation by the ratio to moving average method.

- 13 a. Explain in detail the following methods of drawing samples (i) Lottery method (ii) Random number table method.

(OR)

- b. Derive the sample mean and variance of simple random sampling without replacement.
- 14 a. Compare Stratified sampling and systematic sampling with examples.

(OR)

- b. Write any four applications of stratified random sampling.
- 15 a. Write the procedure drawing 'n' samples out of 'N' population using systematic sampling.

(OR)

- b. Compare systematic sampling and Circular systematic sampling with examples.

PART – C

Answer any TWO Questions

(2x 20 = 40 Marks)

- 16 a. Estimate the profit for the year 2006 by the method of least squares.

Year	2000	2001	2002	2003	2004	2005
Sales ('000s)	18	29	29	38	39	49

- b. Calculate Seasonal index by eliminating Trend using additive model.

	Quarters			
Year	I	II	III	IV
2000	30	81	62	91
2001	33	104	86	71
2002	42	99	100	221

- 17a. Distinguish between sampling and Non sampling errors.

- b. Derive the sample mean and variance of stratified random sampling.

- 18a. In a population of size $N=5$ values of the population characteristics are 1,3,5,7, and 9. A sample of size $n=2$ is drawn randomly without replacement. Verify that the sample mean is unbiased estimator of the population mean. Also find the sample variance.

- b. Prove that the sample mean is unbiased estimator population mean in a systematic sampling. Also give any two situations where systematic sampling is used.

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