TDC (CBCS) Odd Semester Exam., 2022

STATISTICS

(5th Semester)

Course No. : STSDSE-501T

Full Marks : 50
Pass Marks : 20

Time : 3 hours

The figures in the margin indicate full marks for the questions

Honours Students will answer from Option—A and Pass Students will answer from Option—B

OPTION—A

(For Honours Students)

Course No. : STSDSE-501T(A)

(Time Series Analysis)

UNIT—I

1. Fill in the blanks (any *three*) : 1×3=3

(a) A time series consists of at the most _____ components.

(b) The method of ascertaining secular trend which involves no calculation is _____ method.

(c) Mathematical equation of the Gompertz curve is _____.

(d) The method which determines secular trend with the help of two points only is known as _____ method.

2. Answer any *one* of the following questions : 2

(a) Briefly explain the measurement of trend by freehand method.

(b) Give the names of different methods of measuring trend. Give examples of irregular variations in time series.

3. Answer either *(a)* or *(b)* : 5

(a) (i) Explain semi-average method of determining trend. What are the merits and demerits of the semi-average method? 3

(ii) Write the merits and demerits of the least square method of finding the trend. 2

(b) (i) How to fit a straight-line trend by least square method? 2½

(ii) Briefly explain the multiplicative model of time series. 2½

UNIT—II

4. Answer any *three* of the following as directed : 1×3=3

(a) Moving averages remove _____ and _____ variations.

(Fill in the blanks)

(b) Seasonal index by the simple average method is the ratio of _____ to _____.

(Fill in the blanks)

(c) For fitting a second-degree parabola, how many normal equations are required?

(d) Write one limitation of ratio to trend method.

5. Answer any *one* of the following questions : 2

(a) What is detrending of time series data? Briefly explain.

(b) Briefly explain the method of simple averages for measuring seasonal fluctuation.

6. Answer either *(a)* or *(b)* : 5

(a) Explain in detail the ratio to trend method for measuring seasonal variation in time series data.

(b) Describe the method of moving averages for measuring trend.

UNIT—III

7. Fill in the blanks (any *three*) : 1×3=3

(a) Link relative method for measuring seasonal indices was expounded by _____.

(b) Residual method of measuring cyclic variations means removal of _____ and _____ from the series.

(c) Link relative means the ratio of a value to its _____ value.

(d) In case of pronounced cyclical swings, ratio to trend method is _____ than ratio to moving average method.

8. Answer any *one* of the following questions : 2

(a) Briefly explain deseasonalization of data.

(b) What is residual approach? Explain briefly.

9. Answer either *(a)* or *(b)* : 5

(a) Describe link relative method with its merits and demerits for estimating seasonal indices.

(b) Describe the method of periodogram analysis for determining the hidden periodicities in a time series.

UNIT—IV

10. Answer any *three* of the following questions : 1×3=3

(a) Write the model for autoregressive process of order k.

(b) What is the form of the complementary function of autoregressive process of order one?

(c) Name one growth curve associated with time series data.

(d) For autoregressive process of order one, what is the value of $E(\varepsilon_t)$?

11. Answer any *one* of the following questions : 2

(a) What is autoregressive process?

(b) Name different types of stochastic time series models.

12. Answer either *(a)* or *(b)* : 5

(a) Describe the method of 'partial sum' for fitting modified exponential curve.

(b) Explain the fitting of 'logistic curve' by the method of 'three selected points'.

UNIT—V

13. Answer any *three* of the following questions : 1×3=3

(a) Define white noise process.

(b) Write the formula for autocorrelation function.

(c) Define covariance function $C(s, t)$.

(d) When is a stochastic process said to be weakly stationary?

14. Answer any *one* of the following questions : 2

(a) State the properties of covariance and correlation function.

(b) What is exponential smoothing method?

15. Answer either *(a)* or *(b)* : 5

(a) Describe in detail the variate difference method.

(b) Explain exponential smoothing method.

OPTION—B

(For Pass Students)

Course No. : STSDSE-501T(B)

(Vital Statistics)

UNIT—I

1. Answer any *three* of the following questions : 1×3=3

(a) What is meant by coverage error in demographic data?

(b) What is meant by content error in demographic data?

(c) Define vital statistics.

(d) What is meant by non-response error in demographic survey?

2. Answer any *one* of the following questions : 2

(a) Explain, with example, dependency ratio in demography.

(b) How are errors detected in vital statistics registration?

3. *(a)* Explain population balance equation in demographic analysis. Discuss the utility of population balance equations. 5

Or

(b) What are the vital events in life? Discuss the uses of vital statistics in human activity. 5

UNIT—II

4. Answer any *three* of the following questions : 1×3=3

(a) Define sex ratio in relation to demography.

(b) Mention the different measures of mortality in demography.

(c) Define infant mortality rate.

(d) Define specific death rate.

5. Answer any *one* of the following questions : 2

(a) Explain the merits and demerits of crude death rate.

(b) Discuss the shortcomings of registration method in obtaining vital statistics.

6. (a) What do you mean by standardized death rate? Explain briefly the direct and indirect methods of finding standardized death rate. 5

Or

(b) Describe the nature and methods of collection of vital statistics. 5

UNIT—III

7. Answer any *three* of the following questions : 1×3=3

(a) Define life table.

(b) Define stable population.

(c) Define force of mortality.

(d) Define stationary population.

8. Answer any *one* of the following questions : 2

(a) What is expectation of life?

(b) In the usual notations, prove that

$$L_x = \frac{1}{2}(l_x + l_{x+1})$$

9. (a) State the meaning of various columns of a life table and explain how a life table can be constructed from data usually available. 5

Or

(b) Define central mortality rate. Show that the following with usual notations : 1+2+2=5

(i) $m_x = \frac{2q_x}{2-q_x}$

(ii) $e_x^0 = \frac{T_x}{l_x}$

UNIT—IV

10. Answer any *three* of the following questions : 1×3=3

(a) What do you mean by the fertility of a population?

(b) Define general fertility rate.

(c) State the demerits of general fertility rate.

(d) Explain specific fertility rate.

11. Answer any *one* of the following questions : 2

(a) Explain the merits and demerits of crude birthrate.

(b) Discuss the merits and demerits of specific fertility rate.

12. (a) What is meant by total fertility rate? Discuss its relative merits and demerits as a measure of fertility. 5

Or

(b) What is meant by crude birthrate? Why is it called as crude? Discuss its relative merits and demerits as a measure of fertility. 5

UNIT—V

13. Answer any *three* of the following questions : 1×3=3

(a) What are the different measures of population growth?

(b) Define crude rate of natural increase.

(c) Explain Pearl's vital index.

(d) What is the upper limit of GRR?

14. Answer any *one* of the following questions : 2

(a) Establish the relationship between GRR and NRR.

(b) Discuss the limitations of GRR.

15. *(a)* Explain NRR. Discuss its merits and demerits. 5

Or

(b) What are the various coefficients used for measuring fertility? Discuss their merits. 5

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