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6 SEM TDC STS M 2

2017

(May)

STATISTICS

(Major)

Course : 602

(Applied Statistics)

(New Course)

Full Marks : 80
Pass Marks : 24

Time : 3 hours

The figures in the margin indicate full marks for the questions

Answer *any* **four** Units

UNIT—1

(Time Series)

1. Which component of time series is applicable in the following cases? 1×2=2

(a) Fall of share prices of a particular stock

(b) An after Easter sale in a departmental store

2. Answer any *two* of the following : 3×2=6

(a) How to fit a straight line trend for a time series by the method of least square?

(b) Discuss the different mathematical models commonly used in the study of a time series.

(c) Illustrate the cyclical variation in a time series.

3. Explain the meaning of secular trend of a time series. Describe the method of moving average for determining trend. 2+4=6

4. (a) Explain the 'link relative' method of measuring seasonal variations in a time series. Discuss the merits and demerits of this method. 6

Or

(b) Derive Spencer's 15-point formula for calculating trend value of a time series.

UNIT—2

(Index Number)

5. Write true or false of the following : 1×2=2

(a) Only Fisher's formula satisfies the factor-reversal test.

(b) Quantity index numbers are helpful in studying the level of physical output in an economy.

6. Answer the following : 3×2=6

(a) Discuss the importance of index number.

(b) Explain the importance of using appropriate weights in framing an index number.

7. *(a)* Discuss the various problems in the construction of an index number. 6

Or

(b) Why is the Fisher's index number said to be an ideal index number? Explain.

8. Explain the meaning of cost of living index number. Describe one of the methods of constructing cost of living index number. 6

UNIT—3

(Mathematical Econometrics and Econometrics)

9. Fill in the blanks : 1×2=2

(a) Demand for goods having several uses is called _____ demand.

(b) Price elasticity of demand for the demand function $D = cP^{-\alpha}$; $c, \alpha > 0$ is _____.

10. Answer any *two* of the following : 3×2=6

(a) How is a Lorentz curve useful in measuring inequalities of income distribution?

(b) Write a note on utility function.

(c) Demand curve : $d = 250 - 3P^2$

Supply curve : $s = P^2 + 2P^2$

Find the equilibrium price and the quantity demanded.

11. Define elasticity of demand. Describe a method for estimating the elasticity of demand from family budget data. 2+4=6

12. Explain the important methods commonly used to graduate income distribution, pointing out their assumptions, merits and demerits. 6

UNIT—4

(Demography)

13. Choose the correct answer from the given alternative : 1×2=2

(a) If NRR is less than unity, then

(i) the population has a tendency to increase

(ii) the population has a tendency to decline

(iii) the population has a tendency to remain more or less constant

(iv) None of the above

(b) Which of the following is not a probability rate of vital events?

(i) crude death rate

(ii) crude birth rate

(iii) general reproduction rate

(iv) None of the above

14. Answer any two of the following in brief : 3×2=6

(a) Which index would you recommend for comparing mortality of the population of a country at different point of time? Justify.

(b) What are the various indices used for measuring fertility?

(c) Define general fertility rate and total fertility rate.

15. Explain the different sources of vital statistics. 6

16. Explain the purpose and procedure for standardizing death rates. 6

Or

Define a life table. Discuss about the uses of a life table.

UNIT—5

(Statistical Quality Control)

17. Answer the following as directed : 1×2=2

(a) The faults due to chance causes can be removed. (Write true or false)

(b) On which probability distribution the control charts for 'fraction defective' is based?

18. Answer any *two* of the following : 3×2=6

(a) Define process control and product control.

(b) Define the terms specification limits and control limits.

(c) Which of the control charts are used for sampling by attributes? Give practical examples where these charts can be used.

19. Explain $\bar{X}$ and R charts. What purposes do they serve? 6

20. Explain the justification for using the tree sigma limits in the control charts irrespective of the actual probability distribution of the quality characteristics. 6

UNIT—6

(Educational Statistics)

21. Answer the following : 3×3=9

(a) Write a note on test-retest method of estimating test reliability.

(b) Let x and y be scores on two parallel tests and

$$V(x-y) = 75 \cdot 00$$
$$V(x+y) = 800$$

What is the reliability of x score?

(c) Write a note on intelligent tests and IQ.

22. *(a)* What are the different procedures for scaling? Explain scaling test items in terms of difficulty. 5

Or

(b) Discuss the effect of test length on different test parameters.

23. What is meant by reliability and validity of tests? Explain the use of parallel tests in psychological studies. 3+3=6

(Old Course)

Full Marks : 80
Pass Marks : 32

Time : 3 hours

The figures in the margin indicate full marks for the questions

1. Choose the correct answer from the given alternative : 1×8=8

(a) The time series model $U_t = T_t S_t C_t R_t$ with components T_t, S_t, C_t and R_t is

(i) additive

(ii) multiplicative

(iii) mixed

(iv) None of the above

(b) The method of least squares can not be used for fitting of

(i) exponential curve

(ii) logistic curve

(iii) straight line

(iv) second degree parabola

(Turn Over)

(c) The weighted price index formula p_{oi} for ith year, $i = 1, 2, \ldots, k$ is given by

(i) $\dfrac{\sum_{j=1}^{n} w_j p_{oj}}{\sum_{j=1}^{n} w_j p_{ij}}$

(ii) $\dfrac{\sum_{j=1}^{n} w_j p_{ij}}{\sum_{j=1}^{n} w_j p_{oj}}$

(iii) $\sum_{j=1}^{n} \dfrac{w_j p_{oj}}{w_j p_{ij}}$

(iv) $\sum_{j=1}^{n} \dfrac{w_j p_{ij}}{w_j p_{oj}}$

(d) Fisher's ideal index formula does not satisfy

(i) unit test

(ii) circular test

(iii) time-reversal test

(iv) factor-reversal test

(e) If $D(P)$ and $S(P)$ are demand and supply curves of a commodity, p is the price, then equilibrium price is given by

(i) $D(p) = S(P)$

(ii) $D'(p) = 0$

(iii) $S'(p) = 0$

(iv) Either (ii) or (iii)

(f) Which one of the following life-table relations is not true?

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

(ii) $q_x = \frac{d_x}{l_x}$

(iii) $p_x = \frac{l_{x+1}}{l_x}$

(iv) $d_x = l_x - l_{x+1}$

(g) The faults due to assignable cases

(i) can be removed

(ii) cannot be removed

(iii) cannot be even detected

(iv) can be removed in some cases

(h) The 1st population census of whole India was conducted in

(i) 1881

(ii) 1872

(iii) 1901

(iv) 1871

2. (a) What are different components of a time series? Discuss them in brief. 9

Or

(b) What is trend of a time series? Discuss the merits and demerits of moving average method for trend analysis. 2+7=9

3. (a) What is cost of living index number and what are its uses? Give a formula for constructing cost of living index number. 8+1=9

Or

(b) Explain the meaning of base shifting, splicing and deflating of index number. What is factor-reversal test? 6+3=9

4. *(a)* State the law of demand and define price elasticity of demand. Discuss the type of data required for estimating elasticities of demand. 4+5=9

Or

(b) Define utility function. If $u = cx^a y^b$ is a person's utility function of two goods, show that his demand for the goods is

$$x = \frac{a}{a+b} \cdot \frac{k}{p_1}$$

$$y = \frac{b}{a+b} \cdot \frac{k}{p_2}$$

where p_1 and p_2 are fixed prices of the two goods and k the person's fixed income. 2+7=9

5. *(a)* Define crude birth rate (CBR) and mention two of its merits and two of its demerits. Discuss the importance of studying infant mortality rate (IMR) of a country. 5+4=9

Or

(b) Define a life table and give three of its uses. Define general fertility rate (GFR) and explain the meaning of the statement "The GFR of country *A* is 30 per 1000 in 2014". 5+4=9

6. *(a)* Explain $\bar{X}$ and R charts. In what situations p and np charts are used? 6+3=9

Or

(b) What is meant by statistical quality control (SQC)? Distinguish between—

(i) process control and product control;

(ii) control charts for variable and control charts for attributes. 2+3½+3½=9

7. *(a)* What are the various methods of census in India? Explain. 9

Or

(b) Write critical notes on industrial statistics and agricultural statistics in India.

8. Write short notes on any *three* of the following : 6×3=18

(a) Role of control charts in manufacturing process

(b) Uses of index number

(c) Seasonal and cyclical fluctuations of time series

(d) Sources of demographic data in India

(e) Sample registration scheme (SRS) and its functions

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