3 (Sem–6) ECO M 2

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ECONOMICS

(Major)

Paper : 6.2

Full Marks : 60

Time : 3 hours

The figures in the margin indicate full marks for the questions

(For Arts Stream)

(Applied Statistics)

1. Answer as directed : 1×7=7

   (a) Price relatives used in the construction of index numbers are pure numbers.

   (Write True or False)

   (b) Why is it desirable to change the base period of a price index number from time to time?

   (c) If the origin in a trend equation is shifted backward by three years, X in the equation $Y = a + bX$ will be replaced by

   (i) $X + 3$ (ii) $X - 3$

   (iii) $\frac{1}{3} X$ (iv) None of these

   (Choose the correct answer)

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(d) What does the dx column of a life table represent?

(e) Give an example of seasonal variation in a time series.

(f) Define age-specific fertility rate.

(g) What is standard error?

2. Give brief answer to the following :   2×4=8

(a) If Laspeyre's index number is 56 and Fisher's index number is 54, then calculate Paasche's index number.

(b) Write the equation of an exponential curve and show how it can be stated as a linear equation.

(c) Mention two sources of vital statistics.

(d) What method would you prefer in collection of data when the population under study is (i) small and (ii) very large?

3. Answer any *three* from the following :   5×3=15

(a) Show that Fisher's index number satisfies both time-reversal test and factor-reversal test.

(b) Fit a trend line to the following data using graphical method and comment on the trend observed :

Year	:	2001	2002	2003	2004	2005
Sale (₹ crores)	:	102	120	115	112	118

Year	:	2006	2007	2008	2009	2010
Sale (₹ crores)	:	176	105	125	90	100

Is it possible to analyse non-linear trend by this method?   3+1+1=5

(c) Briefly explain the importance of time-series analysis in business and economics.

(d) Distinguish between crude death rate and standardised death rate. Compute age-specific death rates for the age-groups given below :   3+2=5

Age-Group	No. of Deaths	Population
0–10	25	1000
10–20	15	2000
20–30	5	3000
30–40	7	2500
40–50	18	500

(e) What is simple random sampling? Mention the names of two random number tables used to draw random samples. Write one advantage and one disadvantage of simple random sampling.   1+2+1+1=5

4. Answer any *three* from the following
questions :   10×3=30

(a) Explain the steps involved in the
construction of cost of living index
number. Compute cost of living index
number for the following data :   5+5=10

Commodity	Price (in ₹) 2003	Price (in ₹) 2014	Weight
A	5·00	8·00	30%
B	7·00	10·00	5%
C	3·50	4·00	25%
D	2·00	5·50	25%
E	10·00	12·50	15%

(b) Briefly discuss the principle of least
square method of trend fitting in a time
series. Using this principle, calculate
trend values for the following time
series :   5+5=10

Year	Production of Rice (in '000 Quintals)
2006	97
2007	105
2008	115
2009	70
2010	76
2011	95
2012	90
2013	107
2014	82

(c) What do you mean by fertility of a population cohort? Differentiate between Gross Reproduction Rate and Net Reproduction Rate. Calculate specific fertility rate, general fertility rate and total fertility rate from the data given below : 2+2+2+2+2=10

Age-group of child-bearing females	No. of Women ('000)	Total Births
15–19	16·0	260
20–24	16·4	2244
25–29	15·8	1894
30–34	15·2	1320
35–39	14·8	916
40–44	15·0	280
45–49	14·5	145

(d) What do you mean by population under an investigation? Explain how samples are selected by the method of stratified random sampling. Mention the merits and demerits of stratified random sampling. 1+4+3+2=10

(e) Write short notes on any *two* from the following : 5×2=10

   (i) Wholesale Price Index Number

   (ii) Moving Average Method of Trend Analysis

   (iii) Life Table

   (iv) Systematic Sampling

(For Science Stream)

(Econometric Methods)

1. Answer as directed : $1 \times 7 = 7$

  (a) If U_t depends on the values of the two previous periods, i.e., $U_t = f(U_{t-1}, U_{t-2})$, the form of autocorrelation is called a second-order autoregressive scheme.

  (Write True or False)

  (b) In a time series, heteroscedasticity does not occur.

  (Write True or False)

  (c) In Koyck transformation model, the disturbance term is $V_t(u_t - \lambda u_{t-1})$.

  (Write True or False)

  (d) The acceleration principle of investment theory states that investment is proportional to changes in output.

  (Write True or False)

  (e) Define the concept of multicollinearity.

  (f) What is a dummy variable trap?

  (g) Heteroscedasticity problems may be pure heteroscedasticity, multiplicative heteroscedasticity and ——.

  (Fill in the blank)

2. Answer the following :   2×4=8

(a) What do you mean by orthogonality?

(b) If the value of the standardised determinant is zero, what kind of multicollinearity will be there? Give one reason.

(c) Mention any two features of dummy variable regression models.

(d) Mention two features of Koyck transformation model.

3. Answer any *three* from the following :   5×3=15

(a) Explain briefly various reasons for the problem of multicollinearity.

(b) What are the problems faced in estimating dependent dummy variable model?

(c) What is perfect multicollinearity? State the effects of perfect multicollinearity.

(d) Distinguish between AOV and ACOV models.

(e) If $E(u_t^2) \neq \sigma_u^2$, i.e., problem of heteroscedasticity is present, then prove the consequence that the coefficient of the estimates will be statistically unbiased.

4. Answer any *three* from the following : 10×3=30

(a) Discuss the first-order autoregressive scheme. Establish the mean, variance and covariance of the autocorrelated disturbance variable.

(b) From the following information, test the autocorrelation :

X	:	1	2	3	4	5	6	7
Y	:	2	4	6	8	10	12	14

The estimated model for the above observation is $\hat{Y}_t = 1\cdot2 + 0\cdot6X_t$.

(c) Given the following observation, obtain the variance of the OLS and GLS estimators if the following values of the exogenous variable X are given as :

X : 1 2 3 4 5

Assume (i) $\lambda_i = X_i$ and (ii) $\lambda_i = X_i^2$.

(d) (i) Explain briefly any two uses of adaptive expectation model.

(ii) What is a dummy variable trap? How can we overcome it?

(e) Mention the various tests to detect the problem of heteroscedasticity. Explain, with the help of a suitable example, Spearman's rank correlation test.

(f) Briefly discuss the principle of least squares method of trend fitting in a time series. Using this principle, calculate trend values for the following time series :

Year	Production of Rice (in '000 Quintals)
2005	97
2006	105
2007	115
2008	70
2009	76
2010	95
2011	90
2012	107
2013	82

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