

7. (a) Write a note on different errors in the measurement of Price and Quantity Index Numbers.

(b) The table gives the average wholesale prices of four groups of commodities for the year 2001 to 2005. Compute chain base index numbers.

Commodity	2001	2002	2003	2004	2005
A	20	30	40	20	70
B	30	60	90	40	30
C	40	120	200	80	160
D	50	70	180	110	220

(8,8)

(1000)

[This question paper contains 8 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 3575 I

Unique Paper Code : 2374001003

Name of the Paper : Time Series and Index Numbers

Name of the Course : GE (NEP-UGCF) offered by
Department of Statistics

Semester : I

Duration : 3 Hours

Maximum Marks : 90

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Attempt any five questions in all.
3. Question No. 1 is compulsory.
4. Select two questions from each Section.
5. Use of a non-programmable scientific calculator is allowed.

P.T.O.

1. (a) Fill in the blanks :

- (i) Increase in population in India represents the _____ component of a time series.
- (ii) A bomb blast in Delhi represents the _____ component of a time series.
- (iii) Index numbers are known as _____.
- (iv) Index numbers are expressed in _____.
- (v) The condition for the circular test to hold good with usual notation is _____.

(b) Write the correct options for the following Multiple Choice Questions :

- (i) A time series is a set of data recorded:
 - (a) Periodically
 - (b) At time or space intervals
 - (c) At successive points of time
 - (d) All of the above
- (ii) The general decline in sales of cotton clothes in Delhi is attached to the component of the time series :

Section B

- 5. (a) What is an index number? Describe briefly the problems that are involved in the construction of an index number of prices.
- (b) Explain the cost of living index number? Describe in detail how it is constructed in general. (8,8)
- 6. (a) Explain the different tests for an ideal index number.
- (b) Compute price index and quantity index numbers for the year 2005 with 2000 as base year, using
 - (i) Laspeyre's Method
 - (ii) Paasche's Method

Commodity	Quantity (units)		Expenditure (Rs.)	
	2000	2005	2000	2005
A	100	150	500	900
B	80	100	320	500
C	60	72	150	360
D	30	33	360	297

Also examine which of the indices satisfy time reversal test. (8,8)

3575

6

- (b) Calculate seasonal indices by the ratio to moving average method for the following data of the sales (Y) of a firm in lakhs of Rupees:

Year	Q1	Q2	Q3	Q4
2021	80	91	95	105
2022	65	70	77	83
2023	59	68	71	77
2024	64	85	90	98

(8,8)

4. (a) Explain the additive and multiplicative models of a time series stating clearly the assumptions and discuss their relative merits.

- (b) Given below are the figures of production (in thousand tons) of a sugar factory :

Year	1999	2000	2001	2002	2003	2004	2005
Production	77	88	94	85	91	98	90

- (i) Fit a straight line by the method of least squares and compute the trend values.

- (ii) Eliminate the trend by using additive model.

(8,8)

3575

3

- (a) Cyclic variation
(b) Secular trend
(c) Irregular variation
(d) None of the above

- (iii) Salient factors responsible for seasonal variations are :

- (a) Weather
(b) Social customs
(c) Festivals
(d) All the above

- (iv) The weights used in a quantity index are :

- (a) Quantity
(b) Values
(c) Price
(d) None of the above

(v) The equation, $y_t = \frac{\beta}{1 + \delta e^{-\epsilon t}}$; $\epsilon > 0$ stands for :

- (a) Gompertz Curve
- (b) Exponential curve
- (c) Logistic Curve
- (d) None of the above

(c) State whether True or False.

- (i) Most preferred type of average for index numbers is geometric mean.
- (ii) Index numbers are expressed in ratios.
- (iii) Base period for an index number should be a period at distant past.
- (vi) Link relatives in a time series remove the influence of the trend.
- (v) Trend in a time series means only long-term regular movement.

(d) Write the merits and demerits of the ratio to trend method.

(e) In the construction of a certain cost of living index number, the following group index numbers were found. Calculate the cost of living index number by using the weighted arithmetic mean:

Group	Food	Fuel	Clothing	House rent	Miscellaneous
Index numbers	350	200	240	160	250
Weights	25	15	18	10	20

(5,5,5,5,6)

Section A

2. (a) Define a time series. Give any two examples of the time series. Also, describe the different components of a time series. What purpose they served in analysing a time series?
- (b) Explain the fitting of exponential curve by principle of least squares. (8,8)
3. (a) What do you mean by seasonal fluctuations in time series? Give examples. Explain the method of Semi-averages for obtaining indices of seasonal variations. Discuss its relative merits and demerits.