

This question paper contains 7 printed pages]

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S. No. of Question Paper : 5280

Unique Paper Code : 237551

D

Name of the Paper : Applied Statistics

Name of the Course : B.A. (Prog.) Statistics

Semester : V

Duration : 3 Hours

Maximum Marks : 75

(Write your Roll No. on the top immediately on receipt of this question paper.)

Attempt six questions in all, by selecting three from each Section.

Simple calculator can be used.

### Section I

1. (a) Describe the nature of the components of a time series. Explain the additive and multiplicative models of a time series stating clearly the assumptions and discuss their relative merits.
- (b) Given below are the annual profits (in crores rupees) in an industrial concern :

Year	Profit (Crores Rs.)
1999	80
2000	90
2001	92
2002	83
2003	94
2004	98
2005	93

P.T.O.

- (i) Find the slope of straight line trend to these figures.
- (ii) Do these figures show a rising or falling trend ?
- (iii) What does the difference between the given figures and the trend values indicate ? 5,7½

2. (a) Explain the ratio to trend method for measuring seasonal variations. Also discuss advantages and disadvantages of this method.
- (b) The quarterly seasonal indices of the sales of a popular brand of colour television of a company, in Delhi are given below :

Quarter	Seasonal Index
I	130
II	90
III	75
IV	105

It the total sales for the first quarter of 2004 is Rs. 6,50,000, estimate the worth of television to be kept in store to meet the demand in other quarters. Assume that there is no trend. 8,4½

3. (a) What is an index number ? Describe briefly the problems that are involved in the construction of an index number of prices.
- (b) Define the following Index Numbers and discuss their merits and demerits :
- (i) Laspeyre's Index Number
- (ii) Paasche's Index Number, and
- (iii) Fisher's Ideal Index Number.
- (c) Compute price index and quantity index numbers for the year 2005 with 2000 as base year, using :

Commodity	Quantity		Expenditure	
	(units)		(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

- (i) Laspeyre's method
- (ii) Paasche's method, and
- (iii) Fisher's method.

5,3,4½

4. (a) Explain :

- (i) Time Reversal Test,
- (ii) Factor Reversal Test,

in index number theory. Give examples of index number satisfying the above tests.

- (b) What are the uses and limitations of a cost living index number ? Describe in detail how it is constructed in general.

6,6½

## Section II

5. (a) Explain crude and standardised death rates. In what way is standardised death rate superior to crude death rate ? Give briefly the direct and indirect method of finding standardised death rates.

- (b) Find the standardised death rate by Direct and Indirect methods for the data given in the following table : 8,4½

Age	Standard Population		Population A	
	Population (in '000)	Specific death rate	Population (in '000)	Specific death rate
0—5	8	50	12	48
5—15	10	15	13	14
15—50	27	10	15	9
50 and above	5	60	10	59

6. (a) State the meanings of various columns of a life table and explain how a life table can be constructed from data usually available. Mention the uses of a life table. Explain the relationship between different columns.
- (b) Fill in blanks of the following table which are marked with question mark : 7½,5

Age, $x$	$l_x$	$d_x$	$q_x$	$p_x$	$L_x$	$e_x^o$
20	6,93,435	?	?	?	?	35,081,126
21	6,90,673	—	—	—	—	?

7. (a) Define process control. Describe control charts for Means.
- (b) Define the terms "Producer's Risk" and "Consumer's Risk".
- (c) The following data shows the values of samples mean  $\bar{X}$  and the range R for ten samples of size 5 each. Calculate the values for central line and control limits for mean chart and range chart :

Sample No.	Mean ( $\bar{X}$ )	Range (R)
1	11.2	7
2	11.8	4
3	10.8	8
4	11.6	5
5	11.0	7
6	9.6	4
7	10.4	8
8	9.6	4
9	10.6	7
10	10.0	9

Given for  $n = 5$ ,  $A_1 = 1.596$ ,  $A_2 = 0.577$ ,  $D_1 = 0$ ,  $D_2 = 4.918$ ,  $D_3 = 0$ ,

$D_4 = 2.115$ .

5½,3,4

8. (a) Explain the control charts for attributes and obtain their control limits. Discuss the advantages and disadvantages of control charts of variables and control charts of attributes.
- (b) Draw a suitable control chart for the following data pertaining to the number of coloured threads (considered as defects) in 15 pieces of cloth in a certain make of synthetic fibre and state your conclusions. :

7, 12, 3, 20, 21 5, 4, 3, 10, 8, 0, 9, 6, 7, 20.  $7\frac{1}{2}, 5$