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Sr. No. of Question Paper : 215

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Your Roll No.....

Unique Paper Code : 237551

Name of the Paper : Applied Statistics

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

Semester : V

Duration : 3 Hours

Maximum Marks : 75

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Attempt **SIX** questions in all, by selecting **Three** from each section.
3. Simple calculator can be used.

Section – I

1. (a) Define time series. Mention its important components. Describe method of least squares for measuring a trend line.
(b) Name the characteristic movement of time series with which you will mainly associate the following :
 - (i) A fire in factory that delays the factory's production for two weeks.
 - (ii) A fall in death rate due to scientific advancement.
 - (iii) Increase in demand for gift items during festivals.
 - (iv) New launches and phase out of gadgets from market. (8½,4)
2. (a) Explain additive and multiplicative models of time series.
(b) Explain Ratio - to - moving average method for measuring seasonal variations. Using this method calculate seasonal index for the following data :

P.T.O.

Year \ Quarter	2001	2002	2003	2004
Q1	75	86	90	100
Q2	60	65	72	78
Q3	54	63	66	72
Q4	69	80	85	93

(4,8½)

3. (a) What is an index number ? Discuss its importance and uses. Explain :

(i) Time reversal test and

(ii) Factor reversal test, as applied to index numbers.

Show that Fisher's ideal number formula satisfies both these tests.

(b) Prepare price and quantity index numbers for 2005 with 1995 as base year from the following data (table) by using

(i) Laspeyre's method

(ii) Paasche's method and

(iii) Fisher's method

Commodities	1995		2005	
	Price	Quantity	Price	Quantity
A	20	8	40	6
B	50	10	60	5
C	40	15	50	15
D	20	20	20	25

With reference to the above, verify that, the 'Factor Reversal Test' and 'Time Reversal Test' are satisfied by fisher's formula. (6,6½)

4. (a) What is meant by cost of living index number ? Mention at least three of its uses.

- (b) An enquiry into the budgets of middle class families in a family gave the following information.

Expenses on	Food 30%	Rent 15%	Clothing 20%	Fuel 10%	Others 25%
Price (in Rs.) In 2001	100	20	70	20	40
Price (in Rs.) In 2004	90	20	60	15	55

What are the changes in the cost of living figures of 2004 as compared with those of 2001 ? (6,6½)

SECTION – II

5. (a) Define the term 'Vital Statistics'. Describe their nature and the methods of collection of vital statistics.
- (b) Explain the difference between crude death rate and standardized death rate.
- (c) Calculate the crude and standardized death rates for the local population from the following data and compare them with crude death rate of the standard population.

Age-group	Standard population	Deaths	Local population	Deaths
0-10	600	18	400	16
10-20	1000	5	1500	6
20-60	3000	24	2400	24
60-100	400	20	700	21

(5,4,3½)

6. (a) Describe the various components of a life table.
- (b) Fill in the blanks in a portion of Life table given below :

Age (in years)	l_x	d_x	p_x	q_x	L_x	T_x	e_x^0
4	95,000	500	?	?	?	4,850,300	?
5	?	400	?	?	?	9	?

Define the following :

- (i) Total Fertility Rate
- (ii) Gross Reproduction Rate
- (iii) Net Reproduction Rate (4,4,4½)

7. (a) What is meant by process control in industrial statistics ?
- (b) Explain how a control chart helps to control the quality of a manufactured product. Describe the basis of a control chart. Discuss major parts of control charts.
- (c) Stating, clearly, the assumptions explain the basis and working of control charts for mean and range.

In order to determine whether or not a production of bronze casting is in control, 20 sub-groups of size six are taken. The quality characteristics of interest is the weight of the castings and it is found that \bar{X} is 3.126 gm., and $\bar{R} = 0.009$ gm.

- (i) Assuming that the process is in control, find upper and lower control limits for the sub group means,
 - (ii) Assuming that the process is in control, find upper and lower control limits for the sub-group ranges,
- given for $n = 6$, $A_1 = 1.410$, $A_2 = 0.483$, $D_3 = 0$, $D_4 = 2.004$. (2,4,6½)
8. (a) Distinguish between defect and defective. Give some examples of defects for which the c-chart is applicable. How do you calculate control limits for a c-chart ? Discuss the assumptions and approximations involved in the calculations.
- (b) What do understand by control chart for a fraction defective ? Explain its construction. Give the theoretical distribution on which the control limits are based. (6,6½)