This question paper contains **4** printed pages]

Roll No.

S. No. of Question Paper : **7746**

Unique Paper Code : **32375902**   **HC**

Name of the Paper : **Applied Statistics**

Name of the Course : **Generic Elective : Statistics**

Semester : **IV**

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.

Question No. **1** is compulsory.

Select *two* questions from Section A and *three* from Section B.

Use of simple calculators is allowed.

1.   (*a*)   Define Time Series and mention its various components.

     (*b*)   Explain Time reversal test and Factor reversal test and name the index numbers which satisfy the above tests.

     (*c*)   Define the terms :   3×5=15

         (*i*)   Control Limits

   (*ii*)   Specification Limits

   (*iii*)   Tolerance Limits

Section A

2.   (*a*)   Explain the fitting of a straight line trend : $Y_t = a + bt$ by principle of least squares and discuss the relative merits and demerits.

   (*b*)   Use ratio to trend method for obtaining indices of Seasonal Variations for the following data :   6,6

Year	Spring	Summer	Autumn	Winter
1999	86	95	96	99
2000	96	102	104	110
2001	103	108	106	107

3.   (*a*)   Define an index number and describe the basic problems involved in the construction of an index number.

   (*b*)   On a certain date the Minister of Labour retail price index was 204.6. Percentage increases in price over some based period were : Rent and rates 65, clothing 220, fuel and light 110, miscellaneous 125. What was the percentage increase in the food group ? Given that the weights of the different items in the group were as follows :

Food 60, Rent and rates 16, Clothing 12, Fuel and light 8, Miscellaneous 4.   6,6

4. (a) Define the additive model and multiplicative model of a time series. State the underlying assumptions.

(b) What do you understand by cost of living index ? Describe *one* method for its construction. 6,6

Section B

5. (a) In order to determine whether or not a production of bronze casting is in control, 20 sub-groups of size 6 are taken. It is found that $\overline{\overline{X}}$ = 3.126 gm and $\overline{R}$ = 0.009 gm. Assuming that the process is in control, find upper and lower limits for the sub-group means and sub-group ranges.

(n = 6; A_2 = 0.483, D_3 = 0, D_4 = 2.004)

(b) What do you mean by statistical quality control ? Explain causes of variations in statistical quality control. 6,6

6. (a) Define Process and Product control. Give justification for using 3σ limits in control charts.

(b) Distinguish between a defect and a defective. Derive control limits for the construction of c-chart when (*i*) standards are specified, (*ii*) standards are not specified. Also explain application of c-chart. 6,6

7. (a) Explain the term Vital Statistics. Explain the uses and methods of obtaining vital statistics.

(b) Calculate the crude and standardized death rates for the local population from the following data :

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

6,6

8. (a) Fill in the blanks, marked with a query in the following life table :

Age x	l_x	d_x	p_x	q_x	L_x	T_x	e_x^o
30	762227	?	?	?	?	27296632	?
31	758580	—	—	—	—	?	—

where the symbols have their usual meanings.

(b) Explain the following terms :

(i) Crude Death Rate

(ii) Specific Death Rate

(iii) Total Fertility Rate

(iv) General Fertility Rate

6,6

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