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S. No. of Question Paper : 3124

Unique Paper Code : 32375902

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Name of the Paper : Applied Statistics

Name of the Course : Statistics : G.E. for Honours

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.

Q. 1 is compulsory, further select *two* questions from

Section I and *three* from Section II.

Use of simple calculator is allowed.

1. (a) Name the characteristic movement of time series with which you will mainly associate the following :

(i) Fall in production of rice due to flood

(ii) An era of recession

(iii) Increase in literacy rate in a developing country

P.T.O.

(b) Fill in the blanks :

(i) When the time series data is found to be increasing/decreasing by equal absolute percentage the ..... method can be used to measure trend.

(ii) Periodic Changes in time series data may be classified as ..... and ..... variations.

(c) Describe assignable causes of variation in Statistical Quality Control.

(d) Name the different test to be satisfied by a good index number ? Which is an ideal index number ?

(e) How do you decide on the type of control chart to control process variability ?

(f) What is CDR ? Discuss its advantages.

(g) What is process control and product control ?

## Section I

2 (a) Describe the different components of a time series. Give suitable examples for each.

(b) Name different methods for measuring trend in a time series. Fit a straight line to the following series. Estimate production of steel for 2012 : 6,6

Year	Production of steel (m. tons)
2001	60
2002	72
2003	75
2004	65
2005	80
2006	85
2007	95

3. (a) Define seasonal fluctuations of a time series. Describe Ratio to trend method for measuring the seasonal variations, stating clearly the assumptions made.

(b) Define the following :

(i) Marshall-Edgeworth price index number

(ii) Value index number

(iii) Fisher's quantity index number. 6,6

4. (a) What is a consumer index number ? Describe aggregate expenditure method to construct consumer index number. Give any *two* uses of consumer index number.

(b) Compute price index numbers for the year 2005 with 2000 as base year, using : 6,6

(i) Laspeyre's method

(ii) Paasche's method and

(iii) Fisher's method.

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Further, show that Fisher's index number satisfies Time reversal test.

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

## Section II

5. (a) What do you understand by SQC ? Discuss briefly its need and utility in industry.
- (b) The torque reading of a bearing used in a wing-flap actuator assembly is a critical quality characteristic to be maintained. It is known from the past experience that when the process is in control, bearing torque has a normal distribution with mean  $\mu = 80$  inch-pounds and standard deviation  $s = 10$  inch-pounds where samples of size  $n = 10$  were used. Deduce the central line and control limits for controlling process average. 6,6



6. (a) Explain with examples when variable control charts are not suitable. Name different attribute control charts. Discuss the construction of control chart for proportion of defectives.
- (b) Discuss the criteria for detecting lack of control in  $\bar{X}$  ? and R-charts. 6,6
7. (a) Define the term "Vital Statistics". Describe the methods of collection of vital statistics data.
- (b) Compute the crude and standardized death rates of the two populations A and B from the following data taking population of town A as standard population : 6,6

Age group (Years)	A		B	
	Population	Deaths	Population	Deaths
Below 5	15,000	360	40,000	1,000
5-30	20,000	400	52,000	1,040
Above 30	10,000	280	8,000	240
Total	45,000	1,040	1,00,000	2,280

8. (a) What do various columns of a complete life table represent ? Fill in the blanks of the following skeleton life table which are marked with questions marks, where the symbols have their usual meanings.

Age	$l_x$	$d_x$	$q_x$	$p_x$	$L_x$	$T_x$	$e_x^0$
9	93832	1293	?	?	?	3699301	30.42
10	?	1210	—	—	—	—	—

- (b) Discuss the following measures. :

(i) Age-SDR

(ii) IMR

(iii) GFR

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