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Acc. No.
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Nagaon Assam

2026

STATISTICS

(Major)

Paper : STA0600104

(Applied Statistics)

Full Marks : 60

Time : 2½ hours

The figures in the margin indicate full marks for the questions.

1. Answer the following questions as directed : 1×8=8

(a) Fisher's ideal index number is the _____ of Laspeyres' and Paasche's index numbers.

(Fill in the blank)

(b) Linear trend of a time series indicates towards

(i) variable rate of growth

(ii) change in geometric progression

(iii) constant rate of growth

(iv) All of the above

(Choose the correct option)

(c) The control chart for fraction defective is called *np*-chart.

(Write True or False)

(d) What is meant by the statement—"NRR of a country is 1·65"?

(e) SQC takes care of the variation due to _____ causes.

(Fill in the blank)

(f) Define price relative.

(g) Mention two demerits of moving average method.

(h) In statistical quality control (SQC), when is *c*-chart used?

2. Answer any *six* questions from the following : 2×6=12

(a) Distinguish between additive model and multiplicative model in the analysis of time series.

(b) Define wholesale price index number.

(c) What do you understand by sampling inspection plans?

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(d) Compare GRR and NRR as a measure of population growth.

(e) What do you understand by abridged life table?

(f) What are the important sources of demographic data?

(g) Distinguish between tolerance limit and specification limit.

(h) What do you mean by process control and product control?

(i) Define coefficient of determination (R^2).

(j) State few limitations of index numbers.

3. Answer any *four* questions from the following : 5×4=20

(a) What is a time series? Describe various methods of measuring trend. 2+3=5

(b) Prove that Marshall-Edgeworth index number lies between Laspeyres' and Paasche's index numbers. 5

(c) What is meant by SQC? State clearly the theoretical assumption behind the control chart technique. Give the reason of using 3σ limits in control chart. 1+2+2=5

(d) State the assumptions regarding the population under which a life table is constructed. Also mention the uses of a life table. 3+2=5

(e) Prove the following : 2+3=5

(i) $l_x = \sum_{i=x}^{\omega-1} d_i$ if $l_\omega = 0$

(ii) $T_x = \frac{1}{2} l_x + \sum_{t=1}^{\infty} l_{x+t}$

(f) Describe the multiple linear regression model for k variables mentioning the basic assumptions. 5

(g) Discuss the organization and functions of the central statistical organization (CSO). 5

(h) If $\bar{\bar{X}} = 0 \cdot 8768$, $\bar{R} = 0 \cdot 0026$ and given that $A_2 = 0 \cdot 58$, $D_3 = 0$ and $D_4 = 2 \cdot 115$, compute LCL and UCL for $\bar{X}$ and R-charts. 5

4. Answer any *two* questions from the following : 10×2=20

(a) Explain the least square method of measuring trend. Write down the normal equations for linear and quadratic trend equations.

Fit a straight line trend by the method of least squares to the following data : 5+5=10

Year	:	1966	1967	1968	1969
Production (in '000 tons)	:	20	30	40	20
Year	:	1970	1971	1972	
Production (in '000 tons)	:	50	60	80	

(b) What is cost of living index number? Describe briefly the important steps involved in its construction.

From the data given below, construct the cost of living index number : 5+5=10

Group	*Price relative*	*Weight*
Food	250	45
Rent	150	15
Clothing	320	20
Fuel and lighting	190	5
Misc.	300	15

(c) Distinguish between attributes and variables in the context of SQC. Discuss different types of attribute control charts. 10

(d) Discuss different fertility rates comparing their advantages and disadvantages. 10

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(e) Estimate the coefficients of the relation

$$Y = a_1 + a_2 X_2 + a_3 X_3 + U$$

subject to the restriction $\hat{a}_2 = \hat{a}_3$, where data from 23 observations in deviation form yield

$$x'x = \begin{bmatrix} 20 & 0 \\ 0 & 40 \end{bmatrix}, \quad x'y = \begin{bmatrix} 15 \\ 25 \end{bmatrix}$$

Also, obtain a_2 and a_3 without any restriction. 10

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