Paper II : Applied Statistics

Section—A $1 \times 10 = 10$

1. The logistic curve is defined as :

(a) $U_t = a + bc^t$

(b) $U_t = abc^t$

(c) $U_t = \dfrac{k}{1 + e^{at + bt}}$

(d) $U_t = \dfrac{k}{1 + e^{a + bt}}$.

3. A need for increased wheat production due to a constant increase in population is mainly associated with :

(a) Long term trend

(b) Short term trend

(c) Cyclical variation

(d) Seasonal variation.

3. The serial correlation (r) is calcualted by :

(a) $\dfrac{E(U_t, U_{t+k})}{[\text{var}(U_t)\ \text{var}(U_{t+k})]^{1/2}}$

(b) $\dfrac{E(U_t)\ E(U_{t+k})}{\sqrt{\text{var}(U_t)\ \text{var}(U_{t+k})}}$

(c) $\sqrt{\dfrac{E(U_t, U_{t+k})}{\text{var}(U_t)\ \text{var}(U_{t+k})}}$

(d) $\dfrac{[E(U_t)\ E(U_{t+k})]^{1/2}}{[\text{var}(U_t)\ \text{var}(U_{t+k})]}$.

4. The formula to calculate the control limits for $\overline{X}$ chart, when standards are :

(a) $\overline{X} \pm \dfrac{\overline{R}}{d_2} \cdot \dfrac{1}{\sqrt{n}}$

(b) $\overline{X} \pm \dfrac{3\overline{R}}{d_2} \cdot \dfrac{1}{\sqrt{n}}$

(c) $\overline{X} \pm \dfrac{\overline{R}}{d_2} \cdot \dfrac{1}{n}$

(d) $\overline{X} \pm \dfrac{3\overline{R}}{d_2} \cdot \dfrac{1}{n}$.

5. The points below LCL are called :

(a) High spots (b) Middle spots (c) Low spots (d) None of above.

6. The L-P formula to calcualte Drobish-Bowley price index number is :

(a) $P_{ai}^{DB} = \dfrac{1}{2}\left[\dfrac{\Sigma p_{ij}q_{oi}}{\Sigma p_{oj}q_{oj}} \cdot \dfrac{\Sigma p_{ij}q_{ij}}{\Sigma p_{oj}q_{ij}}\right]$

(b) $P_{ai}^{DB} = \dfrac{1}{2}\left[\dfrac{\Sigma p_{ij}q_{oi}}{\Sigma p_{oj}q_{oj}} \cdot \dfrac{\Sigma p_{ij}q_{ij}}{\Sigma p_{oj}q_{ij}}\right] \times 100$

(c) $P_{ai}^{DB} = \left[\dfrac{\Sigma p_{ij}q_{oi}}{\Sigma p_{oj}q_{oj}} \cdot \dfrac{\Sigma p_{ij}q_{ij}}{\Sigma p_{oj}q_{ij}}\right]$.

(d) $P_{ai}^{DB} = = \left[\dfrac{\Sigma p_{ij}q_{oi}}{\Sigma p_{oj}q_{oj}} \cdot \dfrac{\Sigma p_{ij}q_{ij}}{\Sigma p_{oj}q_{ij}}\right] \times 100$

7. The important factors affecting the reliability of a test is :

(a) Length of the test

(b) Testing conditions

(c) Range of talent

(d) All of these.

8. The standard deviation of a set of σ scores is :

(a) -3 (b) 3 (c) 0 (d) 1.

9. General marital fertility rate is defined as :

(a) $\dfrac{\text{number of live birth in a year}}{\text{mid year femnale population in the age group 15-49 year}} \times 100$

(b) $\dfrac{\text{number of a live births in a year}}{\text{mid year married female population in the age group 15-49 year}} \times 1000$

(c) $\dfrac{\text{number of total births in a year}}{\text{mid year married female population in the age group 15-49 year}} \times 1000$

(d) $\dfrac{\text{number of total births in a year}}{\text{mid year female population in the year 15-49}} \times 1000$

10. Chid women ratio is defined as :

(a) $\dfrac{\text{number of children of age 0-4 years}}{\text{woman population in the age group 15-49 years}} \times 1000$

(b) $\dfrac{\text{number of children of age 0-4 years}}{\text{woman population in the all groups}} \times 1000$

(c) $\dfrac{\text{number of children of age 0-5 years}}{\text{womam population in the age group 15-49 year}} \times 1000$

(d) $\dfrac{\text{number of children of age 0-5 years}}{\text{woman population in all groups}} \times 1000$

Section—B
$2 \times 5 = 10$

1. Describe different components of time series.
2. Define index number.
3. Define reliability and validity of a test.
4. Define consumer's risk.
5. Define early neonatal mortality rate.
6. Define group control charts.
7. Explain ATI functions.
8. Age pyramid.
9. Write down formula for Laspeyre's index number.
10. Define scaling technique.

Section—C
$10 \times 3 = 30$

1. Explain various measures of fertility.

2. Define ratio to trend method to measure the seasonal variation. Determine the quarterly seasonal indices from the given data :

Years	I	II	III	IV
1	68	60	61	63
2	70	58	56	60
3	68	63	68	67
4	65	59	56	62
5	60	55	51	58

3. Distinguish among σ-score, standard score and T scores with their merits and demerits alongwith applications.

4. A double sampling plan is given by $N = 2000$.

$n_1 = 100$, $n_2 = 150$, $c_1 = 1$, $c_2 = 4$

The lots rejected by the plan are 100% inspected and all the defectives found are replaced by good ones. Draw the OC and A.S.N. curves for this plan.

5. Define an index number. Discuss its importance and uses. Also explain Time reversal and Factor reversal tests.