

**Bachelor of Science (B.Sc.) Semester—IV Examination**

**STATISTICS (Applied Statistics)**

**Optional Paper—II**

Time : Three Hours]

[Maximum Marks : 50

**N.B. :— ALL** questions are compulsory and carry equal marks.

1. (a) Define C.D.R. and S.T.D.R. Explain how STDR is an improvement over C.D.R. Describe the direct and indirect methods of standardization of death rates.
- (b) Define case fatality rate and infant mortality rate. State their advantages and limitations. Is IMR a probability rate ? Justify. 5+5

**OR**

- (e) Describe the following columns of a complete life table, stating their interrelationships :  $l_x, d_x, p_x, q_x, L_x$  and  $T_x$ .

(f) Define :

- (1) Curtate expectation of life
- (2) Complete expectation of life at the age x.

Show that in usual notation :

(1)  ${}_n p_x = p_x \cdot p_{x+1} \cdot \dots \cdot p_{x+n-1}$ .

(2)  $e_x = \frac{\left( \sum_{n=1}^{\infty} l_{x+n} \right)}{l_x}$ . 5+5

2. (a) Define Age—S.F.R. with its merits and demerits. Explain the concept of stable population. State the conditions under which stable population becomes stationary.
- (b) Define :
  - (1) Crude rate of natural increase
  - (2) Pearle’s vital index.
 State their uses and limitations.  
 Define G.R.R. and N.R.R. Explain how N.R.R. is an improvement over G.R.R. 5+5

**OR**

- (e) Discuss the following fertility rates stating their merits and demerits :
  - (i) Crude Birth Rate (C.B.R.)
  - (ii) General Fertility Rate (G.F.R.)
  - (iii) Age Specific Fertility Rate (Age—S.F.R.)
  - (iv) Total Fertility Rate (T.F.R.). 10

3. (a) Describe the construction of following scores stating the underlying assumptions and compare them :
- (i) Standard Score
  - (ii) Normalized Score
  - (iii) T-Score
  - (iv) Percentile Score. 10

**OR**

- (e) Explain the following scaling procedures stating their objectives and underlying assumptions :
- (i) Scaling individual test items in terms of difficulty.
  - (ii) Scaling of ratings in terms of normal density curve. 10
4. (a) Discuss the following three methods of estimating test reliability stating their relative merits and demerits :
- (i) Test—Retest method
  - (ii) Split—Half method
  - (iii) Kuder—Richardson method. 10

**OR**

- (e) Define validity of a test. How is it estimated ? Explain the following concepts of validity :
- (i) Predictive validity
  - (ii) Concurrent validity
  - (iii) Content validity
  - (iv) Construct validity. 10
5. Solve any **ten** questions from the following questions :
- (a) Define cause of death rate.
  - (b) State any two uses of vital statistics.
  - (c) What is the main difference in C.D.R. and Age—S.D.R. ?
  - (d) Why is Pearle’s vital index a crude measure of population growth ?
  - (e) When will N.R.R. be equal to G.R.R. ?
  - (f) State the drawbacks of G.R.R.
  - (g) Define the difficulty value of an item in an educational test.
  - (h) State the relation between Z-score and standard score.
  - (i) What is the drawback of percentile score ?
  - (j) Define parallel tests.
  - (k) Show that index of reliability is always greater than reliability coefficient.
  - (l) Define the term ‘Mental Ratio’ and interpret the cases :
    - (i)  $M.R. > 1$
    - (ii)  $M.R. < 1$
    - (iii)  $M.R. = 1$ .

1×10=10