# Fourth Semester Bachelor of Science (C. B. S.) Examination

## STATISTICS

## Paper – II

## Applied Statistics

Time : Three Hours ] [ Max. Marks : 50

N. B. : All the **five** questions are compulsory and carry equal marks.

1. (A) Describe the following columns of a complete life table stating their inter – relationships :
$1_x, d_x, p_x, q_x, L_x, T_x$.

(B) Define

(i) Curtate expectation of life

(ii) Complete expectation of life

(iii) Force of mortality.

Show in usual notations :—

$$e_x = \left( \sum_{n=1}^{\infty} l_{x+n} \right) / l_x$$

5 + 5

**OR**

(E) Define CDR and STDR. State their relative merits and demerits. Also define infant mortality rate and cause of death rate and explain their use. 10



2. (A) Explain the concept of stable population. State the conditions under which stable population becomes stationary.

(B) Define Age – SFR. Explain why these rates are not suitable for comparing fertility situations of a particular region in two different time periods. Define the feritility rate which is suitable in this case.

(C) Define Crude rate of natural increase and Pearl's Vital Index. State their uses and limitations.

(D) Define G. R. R., N. R. R. and interpret them. Explain how N. R. R. is an improvement over G. R. R. 2.5 x 4 = 10

**OR**

(E) Discuss the following fertility rates stating the underlying assumptions. Also state their merits and demerits.

(i) Crude Birth Rate

(ii) General Fertility Rate

(iii) Age – specific Fertility Rate

(iv) Total Fertility Rate. 10

3. (A) Describe the construction of following scores stating the underlying assumptions and compare them

(i) Standard score

(ii) Normalised score

(iii) T score

(iv) Percentile score. 10

**OR**

(E) Show that mean of a set of sigma scores is always zero and its standard deviation is 1.

(F) Distinguish between standard scores and T scores.

(G) Explain the procedure for computing percentile scores for a given frequency distribution of raw scores. State the uses of percentile scores.

(H) Explain the procedure for conversion of ratings A , B , C with frequencies $f_1$ , $f_2$ , $f_3$ given by a judge to N individuals into scale values and corresponding numerical scores. 2.5 x 4 = 10

4. (A) Define validity of a test. How is it estimated ? Derive the expression for validity of a test whose length is increased k times but the criterion variable is not lengthened. Distinguish between predictive validity and concurrent validity. 10

**OR**

(E) Obtain the conditions for two tests to be parallel to each other.

(F) When is a scholastic test said to be valid ? Write a short note on content validity.

(G) Explain the split – half method of estimating test reliability stating its merits and demerits.

(H) Obtain an expression for the reliability coefficient of lengthened test whose length is increased k times. 2.5 x 4 = 10



5. Solve any **ten** of the following questions :—

(A) Define case fatality rate. What is its purpose ?

(B) What are different sources of demographic data ?

(C) Which column of the life table is called pivotal column ? Why ?

(D) Pearle's vital index is a crude measure of population growth. Why ?

(E) State any two uses of vital statistics.

(F) When will N. R. R. be equal to G. R. R. ?

(G) Define difficulty value of an item in an educational test.

(H) State the relation between Normalised score and T – score.

(I) What is the drawback of percentile score ?

(J) State one difference in the reliability and validity of a Psychological test.

(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 x 10 = 10