



PMM/KS/15/5848

Bachelor of Science (B.Sc.) Fourth Semester

Examination

STATISTICS

Paper—II

(Applied Statistics)

Time : Three Hours]

[Maximum Marks : 50

Note :— (1) All the **FIVE** questions are compulsory and carry equal marks.

(a) Explain the following mortality rates by giving definition, formula for computation and relative merits and demerits :

(i) C.D.R.

(ii) S.D.R. and Age-S.D.R.

(iii) S.T.D.R. (By direct and indirect method)

(iv) Cause-of-death rate. 10

OR

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(Contd.)



(e) In usual notations, prove the following expressions :

$$(i) M_x = \mu_x + \frac{1}{2}$$

$$(ii) T_x = \frac{1}{2}(l_x) + l_{x+1} + l_{x+2} + \dots$$

$$(iii) n^q_x = \frac{d_{x+n-1}}{l_x}$$

$$(iv) n^p_x = p_x \cdot p_{x+1} \cdot p_{x+2} \dots p_{x+n-1}$$

10

2. (a) Write a short note on stable and stationary population .
- (b) Define crude rate of natural increase and Pearl Vital Index. State their uses and limitations.
- (c) Distinguish between GFR and TFR.
- (d) Define Age SFR. Explain why the fertility situation of two areas cannot be compared on the basis of Age SFR. Suggest the measure used for such comparison.

$$2.5 \times 4 = 10$$

OR

(e) Discuss the construction of Age-S.F.R. and explain how it is an improvement over C.B.R. and G.F.R. Explain T.F.R., stating the assumptions in its construction.

(f) Define G.R.R. and N.R.R. Explain how N.R.R. is an improvement over GRR by comparing the underlying assumptions in the construction of these two rates. 5+5

3. (a) Define a percentile score. State the procedure for computation of percentile scores for a given frequency distribution of raw scores. Explain the advantages and disadvantages of percentile score.

Explain the procedure of converting ranks :

1, 2, 3, ..., N assigned by a Judge 'A' in a 'Personality Contest', into the corresponding percentile scores. Define Normalized score and T-Score and state the uses of T-Scores. 10

OR

(e) Distinguish between standard scores and T-Score.



- (f) Show that the mean of a set of 6-scores is always Zero and its standard deviation is 1.
- (g) Explain the procedure of scaling of individual test items in terms of difficulty.
- (h) If a grade is given for the range (x_1, x_2) of the trait under consideration, assuming that the trait distribution is normal, derive the formula for scale value corresponding to the grade.

$$2.5 \times 4 = 10$$

4. (a) Show that the means and the variances of the raw scores on two parallel tests are equal.
- (b) Distinguish between predictive and concurrent validity.
- (c) Obtain an expression for the reliability coefficient of the lengthened test which is increased K times.
- (d) Explain the split-half method of estimating test reliability stating its merits and limitations.

$$2.5 \times 4 = 10$$

OR



(e) Discuss the method of rational equivalence for estimating the test reliability. Derive Kuder Richardson, 'Formula 20' and 'Formula 21', stating the underlying assumptions.

(f) Describe the test retest method and the parallel forms method of estimating test reliability. Give their relative merits and demerits. 5+5

5. Solve any **ten** questions from the following set of questions :

(a) What is meant by case fatality rate ? What is its purpose ?

(b) Define the complete expectation of life.

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

(d) Why is Pearle's Vital Index considered a crude measure of population growth ?

(e) C B R is a probability rate. State true or false. Justify the answer.

(f) Show that, $N.R.R. \leq G.R.R.$

(g) Define validity of a test.



- (h) State the linear model of test theory explaining the assumptions.
- (i) Define I.Q. ; interpret it.
- (j) Is the Psychological scale a ratio scale or an interval scale.
- (k) What is the objective of scaling scores on a test ?
- (l) If the percentile score corresponding to a raw score is 50, find the corresponding normalized score.

$$1 \times 10 = 10$$