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UG/1st Sem/STAT(H)/T/19

2019

B.Sc.

1st Semester Examination
STATISTICS (Honours)

Paper - C 1-T

(Descriptive Statistics)

Full Marks : 40

Time : 2 Hours

*The figures in the margin indicate full marks.
Candidates are required to give their answers
in their own words as far as practicable.*

1. Answer any five questions : 5×2=10
- (a) How should an average change when all values of the variable are increased in the same proportion ? 2
- (b) State different uses of index numbers. 2
- (c) Describe a Box plot. 2

[Turn Over]

(d) If $y = a+bx$ and μ_0 is the mode of x , then show that the mode of y must be $a + b\mu_0$. 2

(e) What is odds ratio ? 2

(f) Define coefficient variation and explain its uses. 2

(g) For the case of two attributes, define independence and association. 2

(h) What is Fisher's ideal index number ? 2

2. Answer any *four* questions : 4×5=20

(a) Consider any symmetrical frequency distribution for a discrete variable. Show that its central moments of odd orders must all be zero. 5

(b) Show that Spearman's rank correlation lies between -1 and $+1$. Interpret the marginal cases. 5

(c) Let s and R be, respectively, the standard deviation and range of a set of n values of x .

Show that $\frac{R^2}{2n} \leq s^2 \leq \frac{R^2}{4}$. 5

(d) Show that the factor reversal test and the time reversal test are not satisfied by Laspyres' and paasche's index number, but are satisfied by Fisher's ideal index number. 5

(e) Using Cauchy-Schwarz inequality, or otherwise, prove that

(i) $b_2 \geq 1$ and

(ii) $b_2 - b_1 - 1 \geq 0$

Where b_1 and b_2 have their usual meaning. 5

(f) Let x be a variable assuming positive values only. Show that the arithmetic mean of the square-root of x cannot be greater than the square-root of its arithmetic mean. 5

3. Answer any *one* question : 1×10=10

(a) Show that the angles between the two regression lines (of y on x and of x on y) are

[Turn Over]

$$\tan^{-1} \left(\pm \frac{1-r^2}{r} \times \frac{s_x \cdot s_y}{s_x^2 + s_y^2} \right) \text{ and interpret the}$$

cases where $r = 0$ and $r = \pm 1$, where s_x , s_y and r have their usual standard meaning. 10

- (b) What is a rank correlation coefficient ? Deduce Spearman's formula for rank correlation coefficient. How should the formula be modified for tied ranks ? 10
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