UG/II/STAT/H/IV/17(Old)

2017

STATISTICS

[Honours]

PAPER – IV(A & B)

Full Marks : 50

Time : 2 hours

The figures in the right hand margin indicate marks

Candidates are required to give their answers in their own words as far as practicable

Illustrate the answers wherever necessary

[OLD SYLLABUS]

GROUP – A

1. Answer any *one* question :   13 × 1

    (*a*) (*i*) Define multivariate data. Give an example of it.

    (*ii*) Explain the concept of multiple regression with an example.

(*iii*) With usual notations prove that

$$r_{1.23\,...p} \geq r_{1.23\,...\overline{p-1}} \qquad 4+4+5$$

(*b*) (*i*) Define multiple correlation coefficient of X_1 on $X_2, X_3,..., X_p$. Show that it is the maximum correlation coefficient between X_1 and any linear combination of $X_2, ..., X_p$.

(*ii*) Let the partial regression coefficient of X_1 on X_j for fixed $X_1, ... X_{i-1}, X_{i+1}, ...,$ $X_{j-1}, X_{j+1}, ... , X_p$ be denoted by $b_{ij\cdot 12...(i-1)(i+1)..(j-1)(j+1)...p}$. $(i < j)$. Show that

$$b_{12\cdot34...(p-1)} = \frac{b_{12\cdot34\cdots p} + b_{1p\cdot23\cdots(p-1)} b_{p2\cdot13...(p-1)}}{1 - b_{1p\cdot23\cdots(p-1)} b_{p1\cdot23\cdots(p-1)}}$$

$$6+7$$

2. Answer any *one* question : $\qquad 10 \times 1$

(*a*) Define odd's ratio as a measure of association between two attributes. Define multiple association and partial association based on Pearson's measure. Also explain the case of independent attributes. $\quad 3+5+2$

(b) Describe the concept of logistic regression with an appropriate example. How would you fit such a model to a given set of data ? 5 + 5

GROUP – B

3. Answer any *two* questions : 6×2

(a) Starting from Crude birth rate, derive step-by-step improved formulae for comparing fertility levels over two or more different situations. 6

(b) Define gross reproduction rate and net reproduction rate (GRR and NRR). Show that NRR ≤ GRR. Explain the case of equality appropriately and discuss the situation. 2 + 1 + 3

(c) Define e_x° function of a complete life table. Prove that, under trapezoidal approximation for area under the curve of l_x,

$$e_x^{\circ} = 1 - \frac{1}{2} q_x + \frac{1}{l_x} \sum_{i=1}^{\infty} l_{x+i} - \frac{1}{2l_x} \sum_{i=1}^{\infty} l_{x+i} \, q_{x+i} \quad 2 + 4$$

4. Answer any *one* question :　　　　　4 × 1

　　(*a*) Discuss the major sources of data for vital
　　　　statistics.　　　　　　　　　　　4

　　(*b*) Discuss the fitting of logistic curve by
　　　　Fisher's method.　　　　　　　　4

5. Write notes on any *two* of the following :　　3 × 2

　　(*i*) Morbidity prevalence rate

　　(*ii*) GP method for population estimates

　　(*iii*)Maternal mortality rate.

[*Internal Assessment* — 5 marks]

OLD

Part II   3-Tier

2017

STATISTICS

(Honours)

PAPER—IVC

(PRACTICAL)

Full Marks : 50

Time : 4 Hours

The figures in the margin indicate full Marks.

Answer *all* questions.

1. Ranks of six boys and six girls on the basis of their performance in a certain test are given below :

Six	B	B	G	B	B	G	G	G	B	G	B	G
Rank	2	2	2	4	5	6.5	6.5	8	9.5	11	9.5	12

[B = boy, G = girl]

(Turn Over)

Do you find any association between six performance with respect to Spearman's and Kendoll's formulae for rank correlation, assuming that in ranking with respect to sex, boys are considered superior to girls ?   10

2. From the following bivariate frequency distribution of variables x and y, compute (a) the product moment correlation coefficient, (b) correlation ratio of x and y and (c) correlation ratio of y on x, Hence comment on the obtained measures.

x \ y	15 – 25	25 – 35	35 – 45	45 – 55	55 – 65
15 – 30	15	5	3	–	–
30 – 45	8	20	2	5	3
45 – 60	2	18	25	6	4
60 – 65	–	2	5	10	6

12

3. 1072 school boys were classified according to intelligence, and at the same time their economic conditions wre recorded. The results are shown in the following table.

Economic condition	Intelligence			
	Excellence	Good	Mediocre	Dull
Good	48	199	181	82
Not Good	81	185	190	106

Judge whether there is any association between intelligence and economic condition.   5

4. The following values were obtained from scores of two tests x_1 and x_2 and also the efficiency index x_3 of 25 workers in a factory.

$\bar{x}_1 = 55.95$ $s_1 = 2.26$ $r_{12} = 0.578$

$\bar{x}_2 = 51.70$ $s_2 = 4.39$ $r_{13} = 0.581$

$\bar{x}_3 = 56.03$ $x_3 = 4.41$ $r_{23} = -0.974$

Obtain a linear prediction formula for the efficiency index in terms of the scores on the two tests and give a measure of usefulness of the prediction formula.   8+5

5. Practical note book and Viva-voce.   5+5

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