UG/II/STAT/H/IV/16(Old)

2016

STATISTICS

[Honours]

PAPER – IV (Gr. 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*) Define multiple correlation and partial correlation and indicate how they differ from simple correlation.

Prove that

$$1-r^2_{1\cdot23\ldots p}=\left(1-r^2_{12}\right)\left(1-r^2_{13\cdot2}\right)\cdots\left(1-r^2_{1p\cdot23\ldots(p-1)}\right)$$

Use this relation to show that the multiple correlation coefficient is numerically greater than or equal to any of the total or partial correlation coefficients of x_1 with the other variables. 5 + 8

(*b*) Show that r_{12}, r_{13} and r_{23} must satisfy

$$r_{12}^2 + r_{13}^2 + r_{23}^2 - 2r_{12}\, r_{13}\, r_{23} \leq 1$$

show that, if $r_{ii}=0 \ \forall i=2,3,\ldots p$ then $r_{1\cdot23\ldots p}=0$ and conversely. What is the significance of this result in regard to multiple regression equation of x_1 on $x_2, x_3 \ldots x_p$? 5 + 8

2. Answer any *one* question : 10 × 1

(*a*) For the case of two attributes, define independence and association (positive

and negative). What are the different measures of association and what are their properties ? 10

(*b*) What is partial association ? Define Tschuprow's T measures for a $k \times l$ table. Discuss the significance of $T = 0$ and $T = 1$. 10

GROUP – B

3. Answer any *two* questions : 6×2

(*a*) Define rates and radios of vital events. Describe, with examples, how registration and census data can be used to compute such measures. 6

(*b*) Define specific death rate (SDR). Formulate a good measure of mortality, with the help of SDRs, which can be used for comparison purpose. 6

(*c*) "For a complete life table q_x column is called the pivotal column of the table" – Justify. Find the probability that a person of age

30 will survive upto age 80. Where it is given that

$$l_x = \left(\frac{100-x}{190}\right); 5 \le x \le 100. \qquad 6$$

4. Answer any *one* question : 4×1

(*a*) Define infant mortality rate (IMR) and discuss its drawback. 4

(*b*) What is life table stationary population ? Show that for a life table stationary population, crude death rate (CDR) without multiplier 1000 equals to $\frac{1}{e_0^0}$. (Notations have their usual meanings). 4

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

(*i*) Population estimation, projection and forecasting

(*ii*) Properties of logistic curve

(*iii*) Use of life table.

[*Internal Assessment* : 5 Marks]

OLD

Part II 3-Tier

2016

STATISTICS

(Honours)

PAPER—IVC

(PRACTICAL)

Full Marks : 50

Time : 4 Hours

The figures in the margin indicate full Marks.

Answer *all* questions.

1. For each of ten families, the weights in kgs. of three brothers belonging to it are recorded below. Obtain the strength of association between the brothers with respect to weights using some suitable measure.

Family	Weights of brothers		
1	59·5	60·6	62·3
2	51·2	50·8	52
3	45·6	47·2	46·7
4	52·2	53·6	53·5
5	38	40·5	40·5
6	54·4	54·2	54·6
7	33·2	32·1	32·4
8	67·1	68·2	70·2
9	52	54	51
10	48·2	50·1	47·5

8

2. The following data shows the survival time (in days) of patients with advanced cancer of the Stomach, Bronchus and Colon treated with a certain drug. Compare the survival time using boxplot and give your comments :

Stomach	Bronchus	Colon
80	126	245
455	45	277
18	25	289
246	40	1743
450	410	190
166	55	5347
63	1110	529
64	46	465
155	105	
859	875	
151	146	
340	166	
396	37	
	223	
	138	
	72	

7

3. 50 workers in a factory are graded by two supervisors with respect to their work. The frequency distributions of grades are given below :

Garde	*Supervisor 1*	*Supervisor 2*
I	3	10
II	15	12
III	25	13
IV	5	8
V	2	7

Compare the performances of two workers using some suitable scaling methods whose grades are as follows :

	Grade Obtained from	
Worker	*Supervisor 1*	*Supervisor 2*
1	I	III
2	III	I

8

4. The following table shows the results of vaccination against small pox in a survey :

	Vaccinated	*Not Vaccinated*
Attacked with small pos	30	330
Not attacked with small pox	310	805

Can vaccination be regarded as a preventive measure of small pox from the above data ? 5

5. The following information are obtained from the three variables x_1, x_2 and x_3 :

$$m_1 = 55{\cdot}9,\ s_1 = 2{\cdot}26,\ r_{12} = {\cdot}578.$$

$$m_2 = 51{\cdot}5,\ s_2 = 4{\cdot}39,\ r_{12} = {\cdot}581.$$

$$m_3 = 56{\cdot}03,\ s_1 = 4{\cdot}41,\ r_{12} = {\cdot}974$$

Where m_i and s_i be the mean and s.d. of x_i and r_{ij} be the correlation coefficient between x_i and x_i.

(a) Obtain linear regression equation of x_3 on x_1 and x_2 and multiple correlation coefficient $r_{3\cdot12}$.

(b) Obtain partial correlation coefficients $r_{23\cdot1}$ and $r_{13\cdot2}$. 12

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