

2015

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

GROUP – A

1. Answer any *one* question : 15 × 1

(a) Prove that for a set of p variables, if all the simple correlation coefficients are negative, then all the partial correlation coefficients of all orders are also negative. Define

multiple correlation coefficient of X_1 on X_2, \dots, X_p . Show that it is the maximum correlation coefficient between X_1 and any linear combination of X_2, \dots, X_p .

- (b) Define multivariate data. Give an example of it. Explain the concept of partial regression coefficient of x_1 and x_2 for fixed x_3, x_4, \dots, x_p . Let the partial regression coefficient of x_i on x_j ($i < j$) for fixed $x_1, x_2, \dots, x_{i-1}, x_{i+1}, \dots, x_{j-1}, x_{j+1}, \dots, x_p$ be denoted by $b_{ij.12\dots(i-1)(i+1)\dots(j-1)(j+1)\dots p}$. Show that

$$b_{12.34\dots(p-1)} = \frac{b_{12.34\dots p} + b_{1p.23\dots(p-1)} b_{p2.13\dots(p-1)}}{1 - b_{1p.23\dots(p-1)} b_{p1.23\dots(p-1)}}$$

2. Answer any *one* question :

8 × 1

- (a) How do 'ordinal' data differ from 'nominal' data? Explain with one example of each kind. Interpret the cases for a 2×2 contingency table (i) odds-ratio less than 1 and (ii) odds-ratio greater than 1.

(b) Consider a variable y which is related to x as :

$$y = 1 - \frac{1}{1 + \exp(a + bx)}$$

where ' a ' and ' b ' are two unknown constants. Apply a suitable transformation and derive the least square estimates of ' a ' and ' b ' on the basis of ' n ' pairs of observations on (x, y) with y as the dependent variable.

GROUP – B

3. Answer any *two* of the following : 6 × 2
- (a) Discuss the different sources of error in census data and registration data.
- (b) What is population growth ? What is meant by saying that NRR for a country is 1.5 ? Show that for any community $NRR < GRR$.
- (c) Distinguish among population estimation, projection and forecasting. Describe AP or GP method for population estimation.

4. Answer any *one* :

4 × 1

(a) Derive the following relationship among various life table functions.

$$q_x = \frac{1}{l_x} \int_0^1 \mu_{x+t} l_{x+t} dt, \text{ where } \mu_x = -\frac{d(\log_e l_x)}{dx}$$

(b) Briefly describe the component method of population projection.

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

(i) Role of TFR and IMR in the context of development

(ii) Measures of population growth

(iii) Fisher's method of fitting a Logistic curve.

[*Internal Assessment* : 5 marks]

NEW**Part II 3-Tier****2015****STATISTICS****(Honours)****PAPER—IVC****(PRACTICAL)**

Full Marks : 50

Time : 4 Hours

The figures in the margin indicate full Marks.

Answer all questions.

1. (a) Calculate measures of skewness and kurtosis, both being based on moments for the following daily income (Rs.) distribution of 50 rickshawpullers and comment on the results obtained :

Daily income :	70 - 90	90 - 110	110 - 130
(Rs.)			

Frequency :	8	11	18
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Daily income :	130 - 150	150 - 170	Total
(Rs.)			

Frequency :	9	4	50
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(Turn Over)

- (b) If Sheppard's corrections are applied to the results of part (a), how would the values of coefficients of skewness and kurtosis change? 7+5

2. The birth weights (in gm) of babies born to four mothers in a nursing home are given below. Calculate the intra-class correlation coefficient : 7

Mother			
I	II	III	IV
2722	2551	2630	2978
2805	2830	3458	2900
2949	2800		2912
2835			2865

3. The following is the distribution of marks of 8 students in pre-test, test and final examinations in a certain course :

	← Marks →							
Pre-test	43	38	27	28	35	21	19	13
Test	22	29	23	33	20	8	17	19
Final	66	38	55	63	25	17	33	18

- (a) Obtain the linear regression equation of final examination marks (x_1) on pre-test marks (x_2) and test marks (x_3).
- (b) Calculate multiple correlation coefficient $r_{1.23}$ and the partial correlation coefficients $r_{12.3}$ and $r_{13.2}$.

8+6

4. The following table show the number of women classified with respect to their level of literacy and their practice of family planning (FP) :

	Illiterate	Literate
Not practising FP	3000	100
Practising FP	1000	300

Fit a logistic regression equation to the above data.

7

5. Practical Note Book

5

6. Viva-voce.

5