2018

M.Com. 1st Semester Examination

BASIC STATISTICS

PAPER—COM-102

Full Marks : 50

Time : 2 Hours

The figures in the right-hand margin indicate full marks.

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

Illustrate the answers wherever necessary.

Unit–I

[Marks : 20]

1. Answer any *two* questions : 2×2

(a) State the limitations of relative frequency approach of probability.

(b) What do you understand by mutual independency of n events ?

(c) What is spurious correlation ?

(d) What do you understand by the term 'coefficient of determination (r^2)' ?

2. Answer any *two* questions : 2×4

(a) A box contains 6 red, 4 white and 10 black balls. If you draw 4 balls from the box at random then what is the probability that there will be at least one ball of each color ?

(b) If two events A and B are independent then show that their complimentary events A^1 and B^1 are also independent.

(c) The following correlation coefficients are associated with the age (X_1), level of blood sugar (X_2) and lever cholesterol (X_3) of 100 elderly men of West Bengal :

$$r_{12} = 0.4 \qquad r_{13} = 0.2 \qquad r_{23} = 0.5$$

Calculate the partial correlation coefficient $r_{13.2}$ and the multiple correlation coefficient $r_{1.32}$.

(d) For the regression equation y or x show that total sum of squares (TSS) = Explained Sum of Squares (ESS) + Unexplained Sum of Squares (UESS).

3. Answer any *one* question : 1×8

(a) (i) Ten students of MBA department of Vidyasagar University are ranked by their two teachers in an event of group discussion on a specific topic. Their ranks are given below :

Students	1	2	3	4	5	6	7	8	9	10
Sir A	6	4	2.5	2.5	8	1	7	5	10	9
Sir B	4	5	2	2	8	2	9	6	7	10

You are required to calculate Spearman's rank correlation coefficient (r_R).

(ii) With the help of the first normal equation generated by OLS method, show that the mean value of error in regression ($\bar{e}$) is zero. 6+2

(b) (i) There are two urns. The first urn contains 6 red and 9 white balls and the second urn contains 5 red and 5 white balls. One ball is selected from the first urn randomly and without looking on its color it is placed in the second urn and then a ball is drawn from the second urn. Find the probability that the ball drawn from the second urn is white.

(ii) Define sample space.

(iii) For 'n' number of elementary events which are not mutually exclusive A_1, A_2, A_3 ..... A_n give the expression of their total probability (union event of A_i). 6+1+1

Unit–II

[Marks : 20]

4. Answer any *two* questions : 2×2

(a) Identify the components name of the following in time series analysis and justify your answer :

(i) Increase in withdrawl of money from bank in the first week of any month.

(ii) Decrease in employment due to economic recession.

(b) You are given the following index number series. Splice both the series

Year	Index No. (Base 2012)	Index No. (Base 2014)
2011	98	—
2012	100	—
2013	105	—

Year	Index No. (Base 2012)	Index No. (Base 2014)
2014	108	100
2015	—	110
2016	—	112
2017	—	115

(c) State the differences between correlation and association of attributes.

(d) Define extrapolation and inverse interpolation.

5. Answer any *two* questions : 2×4

(a) (i) Convert the following into annual trend equation

$y = 120 + 4.8t$

(origin : January, 2017, t unit = 1 month and y unit = monthly production in thousands)

(ii) Given the equation

$y = 56\ (2.5)^t$

(origin : 2016, t unit = 1 year)

Shift the origin backward by 2 years. 2+2

(b) Show that Edgewarth-Marshal Price Index formula lies *between Laspeyer's* and Paschees Price Index formulae.

(c) According to a survey the following results were obtained :

	Boys	Girls
No. of candidates appeared at all examination	800	200
Married	150	50
Married and successful	70	20
Unmarried and successful	550	110

Find the association between marital status and the success in the examination both for boys and girls.

(d) (i) Establish relationship between E operator and Δ (Delta) operator in interporlation.

(ii) Find the missing term :

x :	0	1	2	3	4	
f(x) :	1	3	9	?	81	2+2

6. Answer any *one* question : 1×8

(a) (i) An equiry into the budgets of middle class families in a certain city gave the following information :

Group	% increase in expenditure in 2017 compared with 2012	Weight
Food	65	—
Clothing	90	12
Fuel	20	18
Miscellaneous	70	10
Rent	150	20

Determine the relative importance of food group, given that the cost of living index number for 2017 with 2012 as base is 175.

(ii) Construct chain base index numbers from the following data relating to production of electricity :

Year	Production ('000 kwt)
2012	27
2013	30
2014	28
2015	35
2016	36
2017	38
2018	32

4+4

(b) (i) Fit a linear trend equation to the following series on production :

Year :	2012	2013	2014	2015	2016	2017
Production (tons)	21	37	48	56	62	69

(ii) The values of a function f(x) are given for certain values of x :

x :	4	5	6	8
f(x) :	3.11	2.96	2.85	2.70

Obtain the best approximation of f(7). 4+4

Internal Assessment — 10