

2014

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 of the following questions : 5×2
- (a) State the assumptions of linear regression. 5
- (b) Briefly explain the 'Relative frequency approach' of probability. Write down its limitations. 2+3
- (c) (i) What do you understand by conditional and unconditional probability ?

(Turn Over)

- (ii) The following table gives the joint probability distribution of x and y :

$x \backslash y$	2	3	4
1	0.1	0.25	0.05
3	0.3	0.15	0.15

- (A) Find the marginal distribution of x and of y .
 (B) Find the conditional distribution of y when $x = 3$.
 (C) Examine whether x and y are independent. 2+3
- (d) Eight salesmen of a medicine company are ranked according to the amount of sales they have made and their skills on understanding psychology.

<i>Salesmen :</i>	<i>A</i>	<i>B</i>	<i>C</i>	<i>D</i>	<i>E</i>	<i>F</i>	<i>G</i>	<i>H</i>
Rank on sell :	3	5.5	1	2	5.5	4	8	7
Rank on Psychology :	2	4	3	1	5	6	7.5	7.5

Find the association between amount of sales and understanding psychology, applying Kendalls tau(τ).

5

2. Answer any *one* of the following questions : 10×1

- (a) (i) Write down the implication of coefficient of determination, r^2 .

- (ii) For regression equation y on x , show that the coefficient of determination —

$$r^2 = \frac{\text{Explained variation}}{\text{Total variation}}$$

- (iii) For a trivariate data

$$\bar{x}_1 = 40 \quad \bar{x}_2 = 70 \quad \bar{x}_3 = 90$$

$$S_1 = 3 \quad S_2 = 6 \quad S_3 = 7$$

$$r_{12} = 0.4 \quad r_{23} = 0.5 \quad r_{13} = 0.6$$

Estimate the value of x_3 when $x_1 = 30$ and $x_2 = 45$.
2+3+5

- (b) (i) Define Sample space, Mutually exclusive events and equally likely events.
- (ii) Give the expression of total probability of n events when they are mutually exclusive and not mutually exclusive.
- (iii) There are two urns. Urn-I contains 4 red and 6 white balls and Urn-II contains 5 white and 6 black balls. A child is instructed to draw one ball from Urn-I and put the ball in the same urn if it is red but to transfer the ball to Urn-II if it is white. Finally, if you draw one ball from Urn-II, then what is the probability that your chosen ball is black?

3+2+5

Unit—II*[Marks : 20]*

3. Answer any *two* of the following : 5×2

(a) If $\gamma = \frac{1 - \sqrt{x}}{1 + \sqrt{x}}$, where $x = \frac{(A\beta)(\alpha B)}{(AB)(\alpha\beta)}$, then show that

$$Q = \frac{2\gamma}{1 + \gamma^2}, \text{ where } \gamma = \text{co-efficient of colligation and}$$

Q = Yules co-efficient of association.

- (b) A price index number series was started in 2003 as base. By 2007 it rose by 20%. The link relative for 2008 was 90. In this year a new series was started. This new series rose by 25 points by next year. In 2010 it rose by 2% than 2009. In 2011 and 2012 it further rose by 5% and 8% in respect of year 2010 and 2011 respectively. Splice both the series.
- (c) How would you fit the trend equation $y = ab^x$ to a time series by the method of least square.
- (d) There were 400 students in B.Com. (Hons.) examination in 2013. Their results in various terminal examinations are given below :

180	passed	in	first	terminal
140	"	"	second	"
180	"	"	third	"
60	"	"	all	"
80	failed	"	"	"

40 passed in the first and second terminals but failed in the third terminal, 70 failed in the first and second terminals but passed in the third terminals.

Find out how many students passed at least two terminal examination.

4. Answer any one of the following : 10×1

(a) (i) Write the essential features of the cyclical component in time series.

(ii) Fit a quadratic trend to the following data :

Year	2009	2010	2011	2012	2013	2014
Production : ('000 tons)	37	38	37	40	41	45

Estimate the production for the year 2016.

2+(6×2)

(b) (i) In calculating of a certain cost of living index number, the following weights were used :

Food 15, Clothing 3, Rent 4, Fuel and Lighting 2, Miscellaneous 1.

Calculate the cost of Living Index for the period when the average percentage increase in Prices of items in the various groups over the base period were 32, 54, 47, 78 and 58 respectively.

Suppose a salaried person was earning Rs. 3,00,000 in the base period, what should be his earning in the current period if his standard for living is to remain the same,

- (ii) Examine whether Laspeyers Price Index formula satisfies both time reversal and factor reversal tests.

5+5

[Internal Assessment : 10 Marks]
