2016

M.Com. 1st Semester Examination

BASIC STATISTICS

PAPER—COM-102

Full Marks : 50

Time : 2 Hours

The figures in the 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) Write a brief note on 'relative frequency' approach of probability. 5

(b) State the assumptions of Pearson's measure of product-moment correlation. What do you understand by 'spurious correlation'? 2+3

(c) In a consignment of 20 CDs, 3 CDs are defective. If you examine the CDs at random one by one (without replacement), then find the probability that your 15th examination will detect the last defective.

(d) Write down the implication of coefficient of determination (R^2) in case of linear regression ? Show that :

Coefficient of determination $\left(R^2\right)$ =

$$\frac{\text{Explained Variation}}{\text{Total Variation}}$$

2+3

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

(a) (i) For three variables X_1, X_2 and X_3, given that

$$r_{12} = 0.65,\ r_{23} = 0.70,\ r_{13} = 0.40$$

Calculate the values of partial correlation coefficient $r_{23.1}$ and multiple correlation coefficient $r_{2.31}$.

(ii) For a regression equation of y on x, the explained sum of square (ESS) is found to be as 22.35 and the unexplained sum of square (UESS) as 30.55. Calculate the value of correlation coefficient (r) between x and y.

(iii) With the help of the first normal equation generated by OLS method, show that the mean value of errors $(\bar{e})$ is zero.

(iv) Write down the Kendall's formulae for computing rank correlation coefficient. How would you modify the formulae in presence of the among the ranks ?

(2+2)+2+2+2

(b) (i) What do you understand by independent event ? Write the concepts of pair-wise independence and mutual independence of 'n' events ?

(ii) Mr. Lucky is on the hot sit of KBC. He will win Rs. 1 crore if he can answer correctly all 12 questions. Each question has four alternative answers, out of which one is correct. He can enjoy three help lines, *viz.*, phone a friend, audience poling and 50-50. It is estimated that the chance of getting a correct answer from his friend is 70% and that chance from the audience is 92%. If it is assumed that unfortunately the answers of all the questions are unknown to Mt. Lucky and he gives the answers by his guesswork and using help lines, then find the probability that he will become a 'crorepati'.

4+6

Unit – II

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

(a) Show that Edgeworth-Marshall Price Index formula lies between Laspeyers and Paschees Price Index formula.

(b) In a class-test in which 135 candidates were examined for proficiency in English and Economics, it was discovered that 75 students failed in English, 80 failed in Economics and 50 failed in both. Find if there is any association between failing in English and Economics and also state the magnitude of association.

(c) A company estimates its sales for a particular year to be ₹ 30,00,000. The seasonal indices for sales are as follows :

Month	Seasonal Index	Month	Seasonal Index
January	75	July	102
February	80	August	104
March	98	September	100
April	128	October	102
May	137	November	82
June	119	December	73

Using this information, calculate estimates of monthly sales of the company. (Assume that there is no trend).

(d) A price index number series was started in 2005 as base. By 2009 it rose by 25%. The link relative for 2010 was 95. In this year a new series was started. This new series rose by 15 points by next year.

But during next four years the rise was not rapid. During 2015 the price level was only 5% higher than 2013 and in 2013 they were 8% higher than 2011. Splice the two series and calculate the index numbers for the various years by shifting the base to 2011.

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

(a) (i) Derive Newton's Forward Interpolation formula.

(ii) From the following data, obtain the value of y when x = 9 by using Newton's forward Interpolation formula :

x :	3	7	11	15	19
y :	42	43	47	53	60

5+5

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

Food 8.5, Rent 2, Clothing 3.5, Fuel and Light 1, and Miscellaneous 2.

Calculate the index number in case of data where the percentage increase in the prices of the various

items in 2015 over 2011 were 40, 75, 60, 35 and 80 respectively.

(ii) Fit a parabolic equation from the following data :

Year :	2011	2012	2013	2014	2015
Sales : (₹ '000)	40	42	80	60	70

5+5

[Internal Assessment — 10]