2013

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 : 5×2

(a) For regression equation y on x, show that

var (e) = $S_y^2(1-r^2)$.

(b) The two regression equations for variables x and y are $3x + 2y = 25$ and $6x + y = -30$. Identify the regression equation of x on y. Find the values of $\bar{x}$, $\bar{y}$, S_x/S_y and r.

(c) Define Classical probability. State its limitation.

(d) For two possible uncertain events A_1 and A_2, given that $P(A_1 \cup A_2) = \frac{5}{6}$, $P(A_1 \cap A_2) = \frac{1}{3}$ and $P(\bar{A}_2) = \frac{1}{2}$.

Determine $P(A_1)$ and $P(A_2)$.

Examine whether A_1 and A_2 are independent.

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

(a) (i) A student has calculated Spearman's rank correlation of 15 competitors, ranked by two judges. The value has been found as 0.8. But later it was discovered that the rank differences of two competitors were wrongly counted as 4 and 7, whereas the correct values were 2 and 6 respectively.

Find the correct value of rank correlation coefficient.

(ii) For the regression equation y on x, give that the amount of variation of y explain by x is 150 and the amount which remains unexplained is 100. Find r_{xy}.

(iii) Distinguish between partial correlation and multiple correlation.

3+4+3

(b) (i) State and prove Bayes' theorem of probability.

(ii) An ice-cream production company has three identical machines, purchased in three consecutive years. The probability of defective production by three machine M_1, M_2 and M_3 are 5%, 10% and 20% respectively. In January, 2014 the company is operating at 100% capacity of new machine M_1 and at 50% capacity of each of the two older machines M_2 and M_3. From the day-end production lot, the manager of the company takes one ice-cream and finds it defective.

Calculate the probability that the ice-cream was produced from Machine M_3.

4+6

Unit—II

[Marks : 20]

3. Answer any *two* questions : 5×2

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

(i) Rise in sale of Mobile Phone.

(ii) Rise in Sale of Gold garments due to Dhanteras.

(iii) Increase in witthdrawl of money in the first week of each months.

(iv) Rise in prices of different consumer durables due to inflation.

(v) Increase in sale of Rice in West Bengal to Himachal Pradesh due to natural calamities in Himachal Pradesh.

(b) Show that the Edgeworth-Marshal Index number formula alies between Lespehers and Paaschees Price Index formula.

(c) (i) If $\delta = (AB) - (AB)_E$ then show that

$\delta = tr\{(AB)(\alpha\beta) - (A\beta)(\alpha B)\}$. Here $(AB)_E$ means expected value of (AB).

(ii) From the following examine whether the given data are consistent

(A) = 100, (b) = 150, (AB) = 140, N = 500.

(d) 300 people each of German and French nationalities were interviewed for finding their preference for music of their own language. The following facts were gathered.

(i) Out of 100 German nationals, 60 liked music of their own language; whereas 70 French nationals out of 200 liked German music.

(ii) Out of 100 French nationals, 55 liked music of their own language and 35 German nationals out of 200 Germans liked French music.

Using Co-efficient of association , state whether Germans prefer their own music in comparison with Frenchman.

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

(a) Compute the chain index number with 2008 prices as base from the following table giving the average wholesale prices of the commodities A, B and C for the years 2008-2012 :

	Average wholesale prices (Rs.)				
Commodity	*2008*	*2009*	*2010*	*2011*	*2012*
A	20	16	28	25	21
B	25	30	24	36	45
C	20	25	30	24	30

(b) (i) Convert the following monthly equation into annual form :

$y = 100 + \cdot 5t$

(Origin : 15th January, 2010;

t unit = 1 month; y = Monthly Sales)

(ii) With the help of the following series of observations verify that the 4 year centered moving average is equivalent to a 5 year weighted moving average with weights 1, 2, 2, 2, 1 respectively :

Year	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Sales (Rs.'0000)	2	6	1	5	3	7	2	6	4	8	3

2+8

[Internal Assessment : 10 Marks]

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