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2017

M.Com.

1st Semester Examination

BASIC STATISTICS

PAPER—COM-102

Subject Code—03

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 : 2×5

(a) For the regression equation of y on x, show that the value of correlation coefficient between (i) Y and e (r_{Ye}) and (ii) x and e (r_{xe}) are zero. Here, e represents for the error term. 2½+2½

(b) 10 projects of the students of MBA department are assessed by two teachers. The rankings of the projects based on the marks given by the teachers are given below.

Calculate the value of Kendall's Tau (τ).

Projects	1	2	3	4	5	6	7	8	9	10
Ranked by Teacher-1	5	7	3	1	10	3	6	3	8	9
Ranked by Teacher-2	6	7	1	2	10	3	4.5	4.5	9	8

(c) Distinguish between subjective probability and objective probability. State the limitations of Classical probability. 2+3

(d) A person has two children and two bags. The red bag contains 10 gold and 5 silver coins and the white bag contains 10 silver and 5 gold coins. The person has requested one of his children to draw one coin from any of the bags. If the girl gets the chance, she prefers to select the red bag, but if the son gets the chance, he prefers to select the white bag. The ratio that the son or the daughter gets the chance is 3 : 5. If one coin is drawn from the selected bag by any of them, then find the probability that the coin is a gold coin. 5

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

(a) (i) For a multiple regression equation of X_1 on X_2 and X_3 interpret the partial regression coefficients $b_{12.3}$ and $b_{13.2}$.

(ii) Of a random sample of 100 male students of Vidyasagar University, the following data regarding their heights are obtained. 3+7

	Students' Height (X_1)	Mothers' Height (X_2)	Fathers' Height (X_3)
Mean	67 inches	65 inches	69 inches
Variance	25 sq. inches	16 sq. inches	36 sq. inches
Correlation Coeff.	$r_{12} = 0.60$	$r_{23} = 0.30$	$r_{13} = 0.80$

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

(ii) An ice-cream factory purchased three identical machines, one new and two second hand. for running its procudtion. The second hand machines, Machine–1 and Machine–2, were respectively 2 years and 5 years old. Te company utilizes 100% capacity of the new machine but only 70% capacity of the first old machine (Machine–1) and 50% capacity of the second old machine (Machine–2). The chance of a defective production by the new machine and the first and the second old machines are respectively

2%, 5% and 8%. In one day suddenly the production manager has tasted one ice-cream from the production lot and found it to be defective. Find the chance that the ice-cream was produced in the new machine. 5+5

Unit – II

[Marks : 20]

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

(a) Identify the components of the following time series. Give reasons in support of your answer. 5×1

(i) Increase in sales of Laptop day by day ;

(ii) Increase in withdrawl of money in the first week of any month from the bank ;

(iii) Increase in Export of foodgrains from India to Afganistan due to earthquake in Afganistan ;

(iv) decrease in employment in India due to economic recess ;

(v) Increase in Sales of gold due to Dhantareaons.

(b) Show that $\frac{L(P)}{L(Q)} = \frac{P(P)}{P(P)} = V_{on}$,

Where $L(P) \Rightarrow$ Laspeyer's Price Index ;

$L(Q) \Rightarrow$ Laspeyer's Quantity Index ;

$P(P) \Rightarrow$ Paschees Price Index ;

$P(Q) \Rightarrow$ Paschees Quantity Index and

$V_{on} \Rightarrow$ Value Index.

(c) If $\gamma = \frac{1-\sqrt{x}}{1+\sqrt{x}}$

Then show that Yule's Co-efficient of association

$(Q) = \frac{2\gamma}{1+\gamma^2}$,

Where $x = \frac{(A\beta)(\alpha B)}{(AB)(\alpha\beta)}$.

(d) Show that,

$\frac{L(P)}{P(P)} = 1 - \frac{r_{xy}\delta x \delta y}{V_{on}}$; Where $x = \frac{p_{ni}}{p_{oi}}$,

$y = \frac{Q_{ni}}{Q_{oi}}$ and weight (w) = $P_{oi}\, Q_{oi}$,

Further, L(P) = Laspeyer's price index,

P(P) = Puschees Price Index

r_{xy} = Weighted correlation co-efficient of x and y.

δ_x = S.D. of x

δ_y = S.D. of y

V_{on} = Value Index.

and i = 1, 2, ..., n

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

(a) (i) Deseasonalise the following production data by the method of moving average :

Quarters	Quarterly Output ('000 tons)		
	2014	2015	2016
I	49	35	75
II	50	62	79
III	61	60	65
IV	20	25	70

(ii) There were 400 students in M.Com in Vidyasagar University under distance mode. Their results in different semesters are given below :

180 passed in 1st Semester

140 passed in 2nd Semester

180 passed in 3rd Semester

60 passed in all three Semesters

80 failed in all three Semesters

40 passed in the first and Second Semesters but failed in the third Semester ; 70 failed in the first and second Semesters but passed in the third Semester. Find out how many students passed at least two examinations. Use Assocation of Attribute concept. 6+4

(b) (i) Derive Newton's Backward Interpolation formula.

(ii) Find the value of y, when x = 17

x :	10	12	15	20
y :	25	32	35	45

5+5

[Internal Assessment — 10Marks]

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