M.Com. 1st Semester Examination, 2023

COMMERCE

(*Business Statistics*)

PAPER – COM-103

Full Marks : 50

Time : 2 hours

The figures in the right hand margin indicate marks

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

COM-103.1

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

   (*a*) For the regression equation y on x show that-
   Total Sum of Square (TSS) = Explained Sum of Squares (ESS) + Unexplained Sum of Squares (UESS). 5

(*b*) (*i*) Distinguish between multiple correlation and partial correlation.

(*ii*) The following correlations are found about the age (X_1), level of blood sugar (X_2) and lever cholesterol (X_3) of 100 elderly men of West Bengal.

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

Calculate the multiple correlation coefficient $r_{1.32}$. 3 + 2

(*c*) (*i*) If two events A and B are independent, then show that their complimentary events A^C and B^C are also independent.

(*ii*) For two events A and B if $P(A)=\frac{1}{2}$, $P(B)=\frac{1}{3}$, and $P(A \cap B)=\frac{1}{4}$ then find –

(*A*) $P(A^C \cap B^C)$

(*B*) $P\left(\frac{A}{B}\right)$ 3 + 2

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

(*a*) (*i*) State and prove Bayes' theorem.

(*ii*) There are three medicine shops adjacent to Midnapore Sadar Hospital. All the shops sometimes have problems with money changes. The chance of money change problem in Shop-1 is 20%, in Shop-2 is 40%, and in Shop-3 is 50%. Your friend purchased a medicine priced Rs. 60 from one of the shops with a Rs. 100 note in his hand and faced money changes problem with the shopkeeper. Find the probability that your friend had entered in Shop-2 ? $5 + 5$

(*b*) (*i*) Distinguish between correlation and regression.

(*ii*) Ten students of Commerce 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-X	6	4	2.5	2.5	8	1	7	5	10	9
Sir-Y	4	5	2	2	8	2	9	6	7	10

You are required to calculate the Spearman's rank correlation coefficient (r_R). 3 + 7

COM-103.2

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

(*a*) (*i*) You are given that

$$Y = 480 + 10t + .8t^2$$

(Origin 2021, t unit = 1year, Y = Annual Production of sugar in tons)
Shift the origin to year 2023.

(*ii*) Given the following equation :

$$Y = 240 + 3.8t$$

(Origin year 2020, t unit = 1 year,
Y = Annual Production of Rice)
Shift the origin to year 2022-23. 3 + 2

(*b*) 1800 candidates appeared for M.Com. Ist Semester examination. 450 were successful, 340 had attended regular offline classes and out of them 200 came out successful. Estimate the utility of offline classes. (Use Yule's Co-efficient of Association).

(*c*) From the following data calculate Cost of Living Index number using family budget method for the year 2023 with 2020 as the base year.

Commodity	Quantity in 2023 (in units)	Price per unit (in Rs.)	
		2020	2023
A	100	8.00	12.00

B	25	6.00	7.50
C	10	5.00	5.25
D	20	48.00	60.00
E	25	15.00	16.50
F	30	9.00	27.00

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

(*a*) (*i*) Fit a straight line equation from the following information and also estimate the sales for the year 2017-18 :

Year	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13
Sales (Rs. Crore)	30	38	32	36	34	40

(*ii*) Calculate the Seasonal indices by the method of Link Relatives to the following figures :

Quarterly Figures for four years

Quarters	Years			
	2018	2019	2020	2021
I	48	49	52	60
II	56	63	68	70
III	65	68	73	80
IV	56	65	72	66

5 + 5

(*b*) (*i*) Prove that Fisher's Price Index formula satisfies the Time Reversal Test and Factor Reversal Test.

(*ii*) With the help of the data given below calculate the price index numbers by

(A) Paasche's method

(B) Laspeyer's method

(C) *Marshall-Edgeworth formula*

(D) Fisher's formula

(E) Drobish-Bowley's formula.

Commodity	2020		2023	
	Price (in Rs.)	Value (in Rs.)	Price (in Rs.)	Value (in Rs.)
A	20	160	40	240
B	50	500	60	300
C	40	600	50	500
D	20	400	20	300

(3 + 2) + 5

[Internal Assessment – 10 Marks]