 PG/IS/COM/103.1 & 103.2/24

M.Com. 1st Semester Examination, 2024

COMMERCE

(*Business Statistics*)

PAPER – COM-103.1 & 103.2

Full Marks : 50

Time : 2 hours

Answer **all** questions

The figures in the right hand margin indicate marks

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

PAPER – COM 103.1

[*Marks* : 20]

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

(*a*) Three friends Amaan , Ayaan and Ehan are trying to hit a target by teir respective guns G1, G2, and G3. The probability

that Amaan will hit the target is $P(G_1) = \frac{1}{2}$, Ayaan will hit the target is $P(G_2) = \frac{1}{3}$ and Ehan will hit the target is $P(G_3) = \frac{1}{4}$. If they try to hit the target independently, then find the probability that

(*i*) Exactly one hit will register the target.

(*ii*) At least one hit will register the target. $2\frac{1}{2} + 2\frac{1}{2}$

(*b*) (*i*) For a regression equation Y on X show that the covariance between y_i and the error term (e_i) is zero. [Cov $(y_i, e_i) = 0$]

(*ii*) For the above regression, if the explained variation is found to be 168 and the unexplained variation is 244, then find the value of correlation coefficient between X and Y. $3 + 2$

(*Continued*)

(*c*) For a random sample of 50 male students of V.U., the following calculations regarding their weight (y-in inches) and height (x-in kgs) are made : $\bar{x} = 66$ inches, $\bar{y} = 58$ kgs, $b_{xy} = 0.8$, $r_{xy} = 0.5$.
Estimate the weight of a student, if his height is 70 inches. 5

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

(*a*) (*i*) For the three variables, Academic achievement (A), Anxiety (B) and Intelligence (C), the following values of correlation coefficients are obtained :

$$\gamma_{AB} = -0.346,\ \gamma_{AC} = 0.826,\ \gamma_{BC} = -0.225$$

Calculate the partial correlation coefficient $\gamma_{AC\,B}$ and the multiple correlation coefficient of $\gamma_{A.CB}$.

(*ii*) In a dance competition 8 candidates are ranked by two judges in the following way :

Candidate	A	B	C	D	E	F	G	H
Judge-I	3	5	3	6	3	1	8	7
Judge-II	1	3	6	4	2	5	7	8

Calculate Spearman's coefficient of rank correlation. (2 + 2) + 6

(*b*) (*i*) Write brief notes on :

(*I*) Mutually exclusive events

(*II*) Sample space.

(*ii*) In a box there are 15 pendrives, out of which 4 are blank (without any data). If you are in search of the blank pen drives and examine one after another without replacement, then find the probability that you find the last blank pen drive in 11th examination. (2 + 2) + 6

PAPER – COM 103.2

[*Marks* : 20]

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

(*a*) (*i*) Identify the components name of the following items in Time Series and justify your answer :

(*I*) Increase in sales of Gold during Dhanteras

(*II*) Increase in sales of Laptop day by day

(*ii*) Given the following trend equation : $Y = 240 + 3.8t$ (Origin 2016, t unit = 1 year, Y unit = annual production of Cement) Shift the origin to 2018-19.

(*iii*) A company estimates its sales for a particular year to be Rs. 36,00,000. The seasonal indices for the month of February and May are 80 and 137 respectively.

Calculate the estimated sales of February and May respectively. 2 + 1 + 2

(*b*) In an examination in which 500 candidates appeared, the number of boys exceed girls by 12% of all candidates. Number of passed candidates exceeded the number of failed candidates by 200. The number of girls failing in the examination is 80. Calculate the Yule's co-efficient of association between boys and success in the examination.

(*c*) Do you find any inconsistency in the data given below ?

$N = 100$, $(A\beta) = 483$, $(A\delta) = 378$, $(B\delta) = 226$, $(A) = 525$, $(B) = 312$, $(C) = 470$ and $(ABC) = 25$.

(*Continued*)

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

(*a*) (*i*) Prove that Paasche's Price Index is the weighted harmonic mean of price Relative ; where weight is the current year's value.

(*ii*) Group index number for 2023 and 2015 as base year and group weights of an average working class family's budget are given below :

Group :	Food	Fuel and Light	Clothing	Rent	Misc.
Index No. :	250	227	231	171	191
Weight :	48	10	14	12	16

If a worker was getting Rs. 5000 per month in 2015 and Rs. 9500 per month in 2023, how much extra allowance the worker ought to have received in 2023 to maintain standard of living of the year 2015 ?

(*iii*) An index number series was started in 1018. It dropped by 5% in 2019 over 2018, and the link relative in 2020 was 108, in 2021 index number rose by 10% over 2020. In 2021 another series was started with base 100. It rose by 15 points in 2022 over 2021 and the link relative in 2023 was 102. Splice both the incomplete series. 3 + 4 + 3

(*b*) (*i*) Fit a straight line equation from the following information :

Year	2018-19	2019-20	2020-21	2021-22	2022-23
Sales (Rs. Crore)	35	38	42	40	45

(*ii*) Construct indices of seasonal variations from the following time series data on consumption of cold drinks, which contains only seasonal and irregular variations. 6 + 4

Consumption of Cold Drinks
('000 bottles)

Year\Quarters	I	II	III	IV
2019	90	75	87	70
2020	75	80	78	75
2021	80	75	75	72
2022	85	82	80	81

[Internal Assessment — 10 Marks]