3. Graph paper is provided on request.

Stats/FY·BA/XY9DCI Date 13/03/2020

Q.1. (a) Correct the following if necessary **(10)**

(i) Correlation coefficient is always positive. **(02)**

(ii) Regression coefficients are affected by shift of origin. **(02)**

(iii) In least square method, summation of squares of errors is maximized. **(02)**

(iv) Sale of umbrella in rainy season is an example of trend. **(02)**

(v) Index numbers are unit less. **(02)**

(b) Answer in one sentence **(10)**

(i) Define Spearman's rank correlation coefficient. **(02)**

(ii) What is the point of intersection of two regression lines? **(02)**

(iii) Which are the two forms of exponential curve? **(02)**

(iv) Mention one merit and one demerit of method of moving averages.. **(02)**

(v) Define price relative. **(02)**

Q.2. Attempt ANY TWO

(a) (i) Define with example: (i) Correlation (ii) Regression. **(05)**

(ii) Using the principle of least squares, fit a power curve of the type $y = ax^b$ **(05)**

(b) Derive the formula for Spearman's rank correlation coefficient. Also, explain the case of repeated ranks. **(10)**

(c) (i) Write down the two regression equations. Show that they are identical when $r = -1$ or $r = +1$. **(05)**

(ii) Define the regression coefficients. Express the relationship between b_{yx}, b_{xy} and r. **(05)**

(d) (i) Write a note on Spurious correlation. **(04)**

(ii) The data for 25 years on sales (Y) and advertisement expenditure (X) of a particular product yielded the following values (in Rs. Lakhs). **(06)**

$\sum x = 125$, $\sum y = 100$, $\sum x^2 = 650$, $\sum y^2 = 460$ and $\sum xy = 508$.

Find –(i) Regression equation of Y on X

(ii) Regression equation of X on Y.

Q.3. Attempt ANY TWO

(a) Define time series. Explain various components of time series in detail. **(10)**

(b) Explain briefly Additive model and multiplicative model in time series analysis. State the uses of time series in detail. **(10)**

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(c) Explain estimation of trend by free hand curve method and method of least square with their two merits and two demerits. **(10)**

(d) Explain estimation of seasonal component by simple average method. Using the following data, calculate the quarterly seasonal indices by simple average method. **(10)**

Year	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
2011	68	62	61	63
2012	65	58	66	61
2013	68	63	63	67

Q.4. Attempt ANY TWO

(a) Explain different stages in the construction of index numbers. **(10)**

(b) (i) Explain base shifting with respect to an index number series. **(05)**

(ii) Write a note on 'Cost of living index number. **(05)**

(c) Show that Fisher's index number satisfies- **(10)**
(i) Time reversal test (ii) factor reversal test

(d) For the following data calculate price index numbers using- **(10)**
(i) Laspeyre's method (ii) Paasche's method (iii) Fisher's method
(iv) Dorbisch Bowley's method (v) Marshall-Edgeworths method

Commodity	Base Year		Current Year	
	Price	Quantity	Price	Quantity
A	8	10	10	11
B	10	9	12	9
C	16	16	20	17

Q.5. Attempt ANY FOUR

(a) Write a note on scatter diagram. **(05)**
(b) Obtain limits within which coefficient of correlation lies. **(05)**
(c) Show that correlation coefficient is not affected due to shift of origin and change of scale. **(05)**
(d) Explain the method of semi averages for measurement of trend. **(05)**
(e) Explain the term 'Real income'. Also explain how to calculate it. **(05)**
(f) Discuss the uses of index numbers. **(05)**
(g) Prove that Fisher's index number lies between Laspeyre's index number and Paasche's index number. **(05)**