FY BSc : Statistics : Paper I : QP Code 51575, April, 19

Q1.(a)(i) False $-1 \le r \le +1$, (ii) False, $r = \pm\sqrt{b_{xy} \cdot b_{yx}}$ should lie bet? -1 & $+1$, (iii) True, (iv) ~~False, trend~~ True, (v) True (2) each. [9 5]

(b)(i) Coeff. of determination R^2, (ii) $y = ab^x$, $\log y = \log a + x \log b$

$Y = A + xB$

Normal eqn: $\Sigma Y = nA + B\Sigma x$

$\Sigma xy = A\Sigma x + B\Sigma x^2$.

(iii) Corrln - relation bet^n variables & $-1 \le r \le +1$

Reg^n - eqns bet^n variables & need not lie bet^n -1 & $+1$.

(iv) Prosperity is rise & recovery is after decline.

(v) measures changes in prices of commodities over a period. (2) each [4 8]

Q2(a) Corrln & its properties (5), $r_{xy} = r_{uv}$. (5). [10]

(b) Dependent & indep. variables. least squares method. (2) (5)

Uses of regn analysis. (3) [10]

(c) Regn eqn of Y on X is, $y = -\frac{15}{20}x - \frac{60}{20} \Rightarrow b_{yx} = -\frac{15}{20}$ (4)

Regn eqn of X on Y is, $x = -\frac{6}{5}y - \frac{12}{5} \Rightarrow b_{xy} = -\frac{6}{5}$ (4)

$\therefore r = -\sqrt{b_{xy} \cdot b_{yx}} = -\sqrt{\frac{15}{20} \times \frac{6}{5}} = -\sqrt{0.9} = -0.9487$ // (2) [10]

(d) Objectives of curve fitting (2)

(i) $y = ae^{bx} \Rightarrow \log y = A + bx \Rightarrow \Sigma Y = An + b\Sigma x$ & $\Sigma xY = A\Sigma x + b\Sigma x^2$ (4)

(ii) $y = ax^b \Rightarrow Y = A + bX \Rightarrow \Sigma Y = nA + b\Sigma X$ & $\Sigma XY = A\Sigma X + b\Sigma X^2$ (4) [10]

Q3(a) Times series (2) & its components (6). Its two uses (2) [10]

(b) 5-yearly m.a method, its adv. & disadv. (5)

4-yearly m.a. method, its adv & disadv. (5) [10]

(c) Seasonal variation (3) Ratio to trend method. (7) [10]

(d) $y = a + bx$, $a = \frac{\Sigma y}{n}$, $b = \frac{\Sigma xy}{\Sigma x^2}$ (4)

Year	$x = 2(\text{Year} - 2017.5)$	y	xy	x^2	Trend
2013	-5	12	-60	25	40.09
2014	-3	14	-42	9	14.325
2015	-1	17	-17	1	18.56
2016	1	10	10	1	7.785
2017	3	17	51	9	-2.4
2018	5	9	45	25	-13.76
	0	79	-13	70	

$a = 13.17$, $b = -5.385$ (3)

$y = a + bx = 13.17 - 5.385x$

For, 2019, $x = 7$

$y = -24.53$ // (1)

Coreph. (2) [10]

Q4(a) Defⁿ of I.N., Steps in construction of I.N. & its two uses (2) (6) (2) [10]

(b) Chain Base I.N., Circular test (3)+(2)
Fisher's I.N. satisfies factor reversal test (5) [10]

(c) (i) Deflation, (ii) Value I.N. (3)+(3)
Simple aggregate method for price & quantity I.No. (2)
Simple avg. of price relatives for price & quantity I.No. (2) [10]

(d) $\Sigma p_0q_0 = 15300$, $\Sigma p_0q_1 = 23300$, $\Sigma p_1q_0 = 16500$, $\Sigma p_1q_1 = 25300$ (4)

(i) Fisher's price I.N. $= \sqrt{L \times P} = \sqrt{\frac{\Sigma p_1q_0}{\Sigma p_0q_0} \times \frac{\Sigma p_1q_1}{\Sigma p_0q_1}} \times 100 = \sqrt{1.078 \times 1.086} \times 100$
$= 108.199 \approx 108.2$ (2)

(ii) Marshall-Edgeworth's price I.N.
$= \frac{\Sigma p_1q_0 + \Sigma p_1q_1}{\Sigma p_0q_0 + \Sigma p_0q_1} \times 100 = \frac{16500 + 25300}{23300 + 15300} \times 100 = 108.09$ (2)

(iii) Dorbish-Bowley's price I.N. $= \frac{L+P}{2} = 108.2$ (2) [10]

Q5(a) procedure for obtaining spearman's corlⁿ coeff. in case of tie of ranks. [05]

(b) Properties of regⁿ [05]

(c) Procedure for obtaining corlⁿ & regⁿ for bivariate data [05]

(d) Use of time series in real life (any 3) [05]

(e) Method of link relatives [05]

(f) Note on cost of living I.N. [05]

(g) Real Income $= \frac{\text{Income}}{\text{Cost of living I.N.}} \times 100$ (1) [05]

Year:	2014	2015	2016	2017
Real Income:	2916.67	3750	3888.89	4285.71

(4)