

FYBA . 2 to 5  
1914118 . pages - 2

Stats - I

**Q.P. Code: 33886**

30

**DURATION: 3 HOURS**

**MARKS: 100**

- N.B.:** 1. All questions are compulsory.  
2. Use of scientific calculator is allowed.  
3. Graph paper is provided on request.

- Q.1 (a) Correct the following if necessary. 10**
- (i) Regression coefficients are affected by shift of origin. 02
  - (ii) Correlation coefficient is always positive. 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) Price relative is the ratio of prices of current year to the base year. 02
- (b) Answer in one sentence. 10**
- (i) Distinguish between direct and inverse relationship between two variables. 02
  - (ii) Which are the two forms of exponential curve? 02
  - (iii) Give two examples of trend. 02
  - (iv) Define coefficient of determination. 02
  - (v) Define Quantity Index Number. 02

- Q.2 Attempt any Two. 20**
- (a) For a set of 50 pair of values  $\bar{x} = 10, \bar{y} = 6, \sigma_x = 3, \sigma_y = 2, \rho_{xy} = 0.3$ . 10

Later a pair (10, 6) is added to the list, determine the revised value of the correlation coefficient.

- (b) (i) Derive the normal equations required to fit a straight line 04  
(ii) Fit regression lines of y on x and x on y for the following data: 06

	X	Y
Arithmetic mean	100	125
Standard deviation	25	16
Correlation coefficient	0.91	

- (c) (i) Define the lines of regression. Show that the lines are identical when the coefficient of correlation is either +1 or -1 05  
(ii) Define the regression coefficients. Express the correlation coefficient in terms of the regression coefficients, explaining the sign convention to be used. 05
- (d) Derive formula for Spearman's rank correlation coefficient. Also explain the case of repeated ranks. 10

- Q.3 Attempt any Two. 20**

- (a) (i) Define time series. Explain cyclic variations and irregular variations of time series with example. 6  
(ii) Explain briefly Additive model and Multiplicative model in time series analysis. 4
- (b) Explain estimation of seasonal component by Ratio to Moving Average method. Also state its merits and demerits. 10
- (c) Explain estimation of trend by free hand curve method and method of least square with their two merits and two demerits. 10

- (d) (i) Explain estimation of seasonal component by ratio to trend method. 05  
 (ii) Using the following data, calculate the quarterly seasonal indices by simple average method. 05

Year	1 <sup>st</sup> quarter	2 <sup>nd</sup> quarter	3 <sup>rd</sup> quarter	4 <sup>th</sup> quarter
2007	42	52	48	46
2008	46	64	62	56
2009	52	70	66	60
2010	66	88	80	74
2011	92	104	98	94

Q.4

**Attempt any Two.**

- (a) Write a short note on Splicing of an index number series. Also explain (i) Circular Test, (ii) Chain Base Index Number. 20  
 (b) Define Fisher index number. Prove that Laspeyres' and Passche's formulae do not satisfy time reversal test and factor reversal test. 10  
 (c) Write note on (i) Cost of living index number (ii) Deflating. 10  
 (d) Calculate price index numbers for 2015 by (i) Laspeyre's Method; (ii) Paasche's Method; (iii) Dorbisch and Bowley's Method; (iv) Edgeworth and Marshall Method; (v) Fisher's Method. 10

Commodity	2010		2015	
	Price	Quantity	Price	Quantity
A	2	50	15	35
B	5	12	10	2
C	1	10	5	10

Q.5

**Attempt any four.**

- (a) Explain: (i) Weighted aggregate method and (ii) Weighted average of price relative method to calculate index number. 20  
 (b) Explain method of moving averages of time series in brief. 05  
 (c) Derive normal equations for fitting equation  $y = a b^x$ . 05  
 (d) Write a short note on Spurious Correlation. 05  
 (e) The following table shows the number of lectures attended and marks obtained by 10 students. 05

Number of lectures attended	50	68	46	78	83	60	87	65	75	55
Marks obtained	61	75	54	80	85	68	90	72	75	63

Draw scatter diagram and comment on the relationship between marks obtained and number of lectures attended.

- (f) What are the different stages in the construction of index numbers? Explain in brief each stage. 05  
 (g) Prove that correlation coefficient is not affected by shift of origin and change of scale. 05

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