

BACHELOR OF ARTS EXAMINATION, 2018

(1st Year, 2nd Semester)

SUBJECTS : ECONOMICS**PAPER : STATISTICAL METHODS FOR ECONOMICS**

Time : Two hours

Full Marks : 30

Answer any two question

- 1) a) Let x be a variable assuming the values $1, 2, 3, \dots, n$ and let F_1, F_2, \dots, F_n be the corresponding more than type cumulative frequencies. Show that

$$\bar{x} = \frac{\sum_{i=1}^n F_i}{F_1}$$

- b) Show that $NS^2 = n_1S_1^2 + n_2S_2^2 + \frac{n_1n_2}{N}(\bar{x}_1 - \bar{x}_2)^2$, where $n_1+n_2=N$; \bar{x}_1 and s_1^2 and \bar{x}_2 and s_2^2 are mean and variance respectively of the two subsets of observations.
- c) Let x and y be two independent variables with variances σ_x^2 and σ_y^2 , respectively. Show that the correlation coefficient between x and $x \pm y$ is $\frac{\sigma_x}{\sqrt{\sigma_x^2 + \sigma_y^2}}$.
- d) Using graphical method, calculate mode from the following set of observations.

Monthly Expenditure (Rs)	Frequency
Less than 1000	14
1000-1250	29
1250-1500	41
1500-1750	59
1750-2000	72
2000-2250	57
2250-2500	28
2500-2750	24
2750-3000	18
More than 3000	12

4+3+4+4

- 2) a) Prove that arithmetic mean of price relatives has an upward bias while the harmonic mean shows a downward bias.
- b) Prove that time reversal test is satisfied by the method of simple average of price relatives when median or mode is taken as a measure of average.

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- c) Establish the relationship between m_r' and m_r when r is negative.
- d) In a group of 500 wage earners the daily wages of 49% were under Rs. 32.50. The median and the quartile wages were Rs. 42.75 and Rs. 60.50. The 4th and 6th decile wages were Rs. 42.75 and Rs. 60.50 respectively. Put the above information in the form of a frequency distribution and calculate 1st, 2nd, 3rd, and 7th, deciles.

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3. a) Fit an exponential trend to the sales data given below.

year	2005	2006	2007	2008	2009	2010
Sales (qtl.)	97	113	129	202	195	193

- b) Prove that the correlation coefficient between $x+y$ and $x-y$ is zero when x and y have the same variance.
- c) If $b_{yx} = - (3/2)$ and $b_{xy} = - (1/5)$, find $\text{var}(y)$ and $\text{var}(x)$.
- d) Group index numbers for 1991 with 1981 as base year for the average working class family's budget are given below.

Group	Food	Fuel and Light	Clothing	Rent
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c) In a bi-variate regression, if d_i is the difference between the actual and the estimated y expressed in standard units, show that r^2 measures the goodness of fit.

d) Show that $r^2 = \frac{\sum_i (y'_i - \bar{y})^2}{\sum_i (y_i - \bar{y})^2}$, where $y'_i = a + bx_i$. 3+(1+3)+4+4