B. A. Economics (Honours) Examination 2018

1st Year, 1st Semester

Paper: Statistics 1

Answer any two questions **Time: Two Hours** **Total marks: 30**

All questions carry equal marks

1. (a) Consider any symmetric distribution for a discrete variable. Prove that all odd order central moments of this distribution are zero.

(b) Two variables x and y take the values:

x	-7	-5	-3	-2	2	3	5	7
y	49	25	9	4	4	9	25	49

Find out the correlation coefficient r_{xy}. Are the variables x and y dependent? Justify your answer.

(c)Let there be two sets of values of x with the size of the two sets being n_1 and n_2, the respective means being $\bar{x}_1$ and $\bar{x}_2$ and the standard deviations being s_1 and s_2. Show that the pooled variance is given by

$s^2 = (n_1 s_1^2 + n_2 s_2^2)/(n_1+n_2) + [n_1 n_2/(n_1+n_2)^2] (\bar{x}_1 - \bar{x}_2)^2$

(d) (i) Define skewness.

(ii) The first two moments of distribution about the value 5 are 3 and 25 respectively. If the mode is 6, obtain the Perason's measure of skewness.

(e)For a standardized unit, what is the population moment of r^{th} order (α_r)? Is the r^{th} order moment affected by change in unit? Justify. 2+(2+2)+4+(1+2)+2

2. a) Derive the relation between m_4 and m_4'.

b) Prove that arithmetic mean of squares of variable values is greater than equal to square of arithmetic mean of variable values.

c) Find the values of Q_1, Q_3 and P_{35} from the following observations:

Height (cm)	141-145	146-150	151-155	156-160	161-165	166-170	171-175
Number of persons	9	10	18	25	23	9	6

d) Calculate the Fisher's price index from the following table onprice and quantity of individual commodities:

Commodity	p_0	p_n	q_0	q_n
Rice	3.3	6.9	185	152
Flour	2.25	3.31	192	191
Fish	17.4	55.7	10.5	10.9
Oil	26.8	61.4	3.4	3.3
Sugar	18.6	30.1	7.4	5.9
Potato	6.4	9.7	94.7	98.1
Other Vegetables	34.5	65.0	3.7	6.8

3+3+6+3

3. a) For a set of 25 observations the arithmetic mean and standard deviation were calculated as 14 and 2.5 respectively. It was later found on scrutiny that the last observation of the data set should be 18 instead of 10. Calculate the correct arithmetic mean and standard deviation.

b) In case of k-statistic, what is k_4 when the sample size is large?

c) (i) Does Marshall-Edgeworth price index satisty both "time reversal" and "factor reversal" tests? Justify.

(ii) What is the weight for each commodity in geometric mean quantity index?

d) The following values relate to bivariate data on (x, y):

$\sum x_i = 120, \sum y_i = 90, \sum x_i y_i = 414, \sum x_i^2 = 600, \sum y_i^2 = 300, n=30$

Obtain the estimate of y when x = 16. Also find out the correlation coefficient between x and y.

4+2+(2+1)+(3+3)