

**M.A. (PREVIOUS) EXAMINATION 2017 HELD IN 2018**  
**ECONOMICS (PAPER III)**  
**ADVANCE ECONOMIC STATISTICS**

Time: 3 hours

Max Marks: 100

**Instructions:**

- (i) Attempt any FOUR questions in all. Question no. 1 is COMPULSORY.
- (ii) The usual convention of denoting deviations by lower case letters applies.

Q1 The following table shows the distribution of salaries of employees at a certain organization:

Income Bracket (in '000s)	No. of Workers
-0.50 – 20.50	180
19.50 – 40.50	200
39.50 – 80.50	70
79.50 – 120.50	30
119.50 – 380.50	15
379.50 – 620.50	5

- (a) Using the above data construct a histogram and draw the frequency polygon. Also draw the two ogives and determine the median graphically.
- (b) Calculate the arithmetic and geometric means, median, mode and mean absolute deviation around median.
- (c) Calculate the first four raw moments around 40.
- (d) Use the Romans to calculate the true moments and the coefficients of skewness and kurtosis. What do the results in part (c) and (d) imply about the distribution of income? How many employees and incomes (i) below 12,000 (ii) above 220,000?

Q2 (a) The following data shows prices and quantities of 2000, 2004 and 2009.

	2000		2004		2009	
	Price	Qty	Price	Qty	Price	Qty
<b>A</b>	77	50	125	48	198	55
<b>B</b>	185	26	236	24	298	20
<b>C</b>	88	102	165	110	198	130
<b>D</b>	146	30	155	32	175	40
<b>E</b>	158	40	166	40	170	41
<b>F</b>	44	12	45	10	47.5	12

Compute the Laspayre's, Paasche's and Fisher's price and quantity indices 2000 as the base year. Also calculate the average annual rate of inflation between 2000 and 2004, and between 2000 and 2009 using each of the indices.

(b) Given the two index number series with base 1987 and base 1999 splice the two price index series and shift the base of the consolidated series to 1995.

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
P <sub>1987</sub>	135	153	166.5	180	198	211.5	252	279					
P <sub>1999</sub>								100	108	120	135	145	152

- Q3 (a) The following table shows the country's employed labour Force for some selected years. Interpolate the value of employed labour force in the year 1986.

Year	1980	1984	1988	1992	1996
Labour Force (in millions)	23.5	41.2	48.5	52.5	60.0

- (b) Use the data in the table below to calculate the rank correlation between the grades assigned to 15 job candidates by 2 panelist.

Panelist 1	20	25	27	27	30	30	32	33	35	36	37	38	38	38	39
Panelist 2	36	45	34	30	32	35	36	31	25	28	26	39	28	28	30

- Q4 (a) Let Y represent the weight of the person and X represent his height (measured as relevant class mid points). Then given the following bivariate frequency distribution resulting from a small sample study.

Classes	Weight (lbs)				
	60-62	63-65	66-68	69-71	72-74
100-104	5	0	0	0	0
105-109	5	10	2	1	0
110-114	0	4	6	1	0
115-119	0	1	7	6	2

- (i) Calculate the coefficient of correlation between X and Y.  
(ii) Construct the conditional distribution of Y and X and obtain the conditional mean of Y on X.  
(iii) Let Z represent the data series you have constructed in part B. Fit the straight line  $Z: rz+13-X$  on this data and interpret the results.
- (b) A box contains 5 red balls 7 green balls and 3 white balls. A ball is drawn and then a second ball is drawn without replacement. What is the probability of (i) of a white chip on the first draw and a red on the second (ii) two green chips being drawn (iii) a red chip on the second, given that a white ship was drawn on the first.
- Q5 (a) A farm house has an average daily sales of oranges equal to 4700 with standard deviation of 500 oranges. Sales follow a normal distribution. Determine (i) the probability that sales will be more than 5500 (ii) the sales will be less than 4300, and (iii) the probability that sales will be between 4900 and 5100.

- (b) A soft drink machine at a steakhouse is regulated so that the amount of drink dispensed is approximately normally distributed with a mean of 200 ml and a standard deviation of 15 ml. The machine is checked periodically by sample of 9 drinks and computing the average content. If the sample mean falls in the range 191-209, the machine is thought to be operating

satisfactorily; otherwise, that it is 200ml. Test the hypothesis at  $Z = 200$  ml and  $t = 215$  ml at the 5% level of significance. Also determine probability of type-1 error in each case.

Q6 Determine that trend seasonal and irregular components of the following time series data:

Y	Q1	Q2	Q3	Q4
1995	41.655	41.314	42.331	43.229
1996	45.209	44.199	45.094	45.591
1997	47.96	46.1	46.6	47.56
1998	51.16	52.04	54.72	55.872
1999	57.89	57.16	58.31	59.565