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UNIVERSITY EXAMINATIONS 2023/2024

FOURTH YEAR, SECOND SEMESTER EXAMINATION FOR THE DEGREE OF BACHELOR OF SCIENCE IN STATISTICS

SMS 3452: ECONOMETRICS

DATE: APRIL 2024 **TIME: 2 HOURS**

INSTRUCTIONS: Answer Question ONE and any other TWO questions.

QUESTION ONE (30 MARKS)

a) State three basic functions of econometrics. (3 Marks)

b) Give three most useful transformations into linear functions. (3 Marks)

c) Differentiate between the following concepts

i. Exactly identified and over/under identified simultaneous equations. (4 Marks)

ii. Laspeyres and paasche price index. (4 Marks)

iii. Indirect least squares and two stage least squares. (4 Marks)

d) Given the following data with two variables.

x_i	2	3	5	4	3	5	7	6	7	8
y_i	20	28	40	45	37	52	54	43	65	56

If there is a linear relationship between the two variables such that $\hat{y}_i = b_0 + b_1 X_i$

i. Find b_0 and b_1 (4 Marks)

ii. Test at 5% level of significance if b_1 is significant given that $t = 2.306$ at degrees of freedom. (3 Marks)

e) Give two difficulties of estimating the distributed lag model. (2 Marks)

f) Give three ways one can overcome or reduce the problem resulting from Mulricollinearity.

(3 Marks)

QUESTION TWO (20 MARKS)

To compare the cost of family food buying over the years, a food basket that consists of five items is used. The following data was collected.

	2010		2015		2020	
Item	Price	Quantity	Price	Quantity	Price	Quantity
Sugar (kg)	80	52	100	60	120	80
Maize Flour (kg)	35	104	50	155	60	200
Rice(kg)	40	45	50	60	60	80
Beans (kg)	30	50	40	80	70	70
Wheat flour (kg)	50	26	60	30	80	40

a) Calculate the Simple Price Index for 2015 and 2020 taking 2010 as the base year.

(2 Marks)

b) Calculate the unweighted aggregate price index for 2010 and 2020 taking 2015 as the base year. (4 Marks)

c) Compute the Laspeyres price index for 2015 and 2020 using 2010 as the base year.

(7 Marks)

d) Compute the Paasche Price index for 2010 and 2015 using 2020 as the base year.

(7 Marks)

QUESTION THREE (20 MARKS)

The following data gives 50 kg bags of maize (y),per acre resulting from the application of various amounts of foliar fertilizer (litres) denoted X_1 and pesticides in litre denote by X_2 between 2012 and 2021

Year	2012	13	14	15	16	17	18	19	20	21
y_1	40	44	46	48	52	58	60	68	74	80
x_1	6	10	12	14	16	18	22	24	26	32
x_2	4	4	5	7	9	12	14	20	21	24

i. If $Y = b_0 + b_1X_1 + b_2X_2$, find b_0, b_1 and b_2. (12 Marks)

ii. Using the t- test statistic, find out whether b_1 and b_2 are significant a 5% level of significance assume $t = 2.179$ (6 Marks)

iii. Find the estirriated yield for 2024 $if\ X_1 = 33$ and $X_2 = 28$. (2 Marks)

QUESTION FOUR (20 MARKS)

a) i. State two shortcomings of using indirect least squares. (2 Marks)

ii. Give two advantages of using two stage least squared method over indirect least squares method. (2 Marks)

b) given the following data.

t	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
y_t	34	33	40	43	37	36	39	38	36	38	48	41	41	44	44	48

Test for autocorrelation using Durbin-Watson test statistic. Use a two failed test at 1% level of significance taking $d_L = 1.10$ and $d_\mu = 1.37$ for $n = 16$ and $K = 1$. (16 Marks)

QUESTION FIVE (20 MARKS)

a) the following data gives average wages (y) per hour and the number of workers employed $(X)$by 16 Firms

Average wages per hour				worker employed
84	84	86	87	100
89	90	91	93	200
94	96	98	99	300
103	103	105	106	400

Using the first 5 observations and the last 5 observations, test for heteroscedasticity at 5% level of significance (Assume $F = 2.97$). (10 Marks)

b) The following two structured equations represent a simple demand – supply model.
Demand: $Q_t = a_0 + a_1 p_t + a_2 y_t + \mu_{11}, a_1, < 0, a_2 > 0$
Supply:$Q_t = b_0 + b_1 p_t + \mu 2_t, b_1 > 0$
Where Q is quantity, $p$is price and y is consomers income. Find the reduced – form equations corresponding to the structured equations. (10 Marks)