



SOUTH EASTERN KENYA UNIVERSITY

UNIVERSITY EXAMINATIONS 2017/2018

SECOND SEMESTER EXAMINATION FOR THE DEGREE OF COMMERCE (OPERATIONS MANAGEMENT OPTION)

DMS 308: BUSINESS STATISTICS II

DATE: 12TH APRIL 2018

TIME: 4.00-6.00PM

INSTRUCTIONS: ATTEMPT QUESTIONS ONE AND ANY OTHER TWO QUESTIONS

QUESTION ONE (30 MARKS)

a) Briefly explain five problems or aspects that have to be put into consideration before starting the actual construction of index numbers. (5 marks)

b) Draw the connectivity graph for the block design with field plan,

Bl₁ 1, 2, 5 Bl₂ 3, 4, 6 Bl₃ 1, 3 Bl₄ 2, 4 Bl₅ 1, 4 Bl₆ 2, 3
Bl₇ 5, 6, 7 and state whether the design is connected or not. (4 marks)

c) A time series can be viewed as being made up of a number of components. Using clear diagrams, explain. (5 marks)

d) Calculate three-month moving averages for the data below

Jan	Feb	March	April	May	June	July	Aug	Sep	Oct
470	460	480	430	360	380	390	400	450	470

(5 marks)

- e) Consider the randomized block design shown below with the observations belonging to the 3rd treatment in block 2 missing. Estimate the missing observation.

	Trt 1	Trt 2	Trt 3	Trt 4
Block 1	16.1	17.2	15.7	12.6
Block 2	19.0	19.1	-----	23.4
Block 3	19.7	14.5	18.5	16.5
Block 4	17.0	16.1	17.3	18.5

(4 marks)

- f) The following contingent table refers to economic study to check whether there is an independence between purchase decision and income class.

		Middle	Upper	Total
Purchase decision	Lower	494	201	695
	Upper	26	4	30
	Total	520	205	725

Test at 0.05 level of significance whether the hypothesis is true.

(7 marks)

QUESTION TWO (20 MARKS)

- a) The following data is based on the number of households in a region and the sales volume of electronics within the region in a specific store.

Store	1	2	3	4	5	6	7	8	9	10	11	12
No. of households	161	99	135	120	164	221	179	204	214	101	231	206
Sales volume	157. 27	93. 28	136. 81	123. 79	153. 51	241. 74	201. 54	206. 71	229. 78	135. 22	224. 71	195. 29

Compute the spearman rank correlation coefficient and test at 0.05 level of significance whether there is a positive relationship between the number of households and the sales volume.

(10 marks)

b) The table below shows the test results for 9 students in both Mathematics and Economics.

Maths	65	45	40	55	60	50	80	30	70
Economics	60	60	55	70	80	40	85	50	70

- i) Compute the Pearson product moment correlation coefficient r_{xy} between the two subjects. (7 marks)
- ii) Interpret your calculated value of r_{xy} . (1 mark)
- iii) State a major difference between Pearson and Spearman rank correlation coefficients. (2 marks)

QUESTION THREE (20 MARKS)

a) Briefly describe;

- i) the steps involved in the construction of the cost of a living index. (5 marks)
- ii) the four main approaches used in measuring trend in a time series. (4 marks)

b) Use the table below to calculate

Commodities	Base Year		Current Year	
	Price (P_0)	Quantity (Q_0)	Price (P_1)	Quantity (Q_1)
A	5	4	7	3
B	6	5	1	5
C	8	3	10	3
D	3	4	2	6

- i) Laspeyre's index. (5 marks)
- ii) Paasche's index. (3 marks)
- iii) Fisher's Ideal index. (3 marks).

QUESTION FOUR (20 MARKS)

- a) Using a clear diagram discuss four assumptions in linear regression model. (4 marks)
- b) A random sample of eight auto drivers insured with a company and having similar auto insurance policies was selected. The following table lists their driving experience (in years) and the monthly auto insurance premium (in KShs 00's) paid by them

Driving Experience – X	5	2	12	9	15	6	25	16
Monthly Premium (00's) –Y	64	87	50	71	44	56	42	60

- i) Present the data in a scatter plot (3 marks)
- ii) Given that $\sum X = 90$, $\sum Y = 47400$, compute the regression line (9 marks)
- iii) Comment on the coefficients obtained in (ii) above. (2 marks)
- iv) Determine the coefficient of determination. (2 marks)

QUESTION FIVE (20 MARKS)

- a) i) Explain the meaning of a randomized block design. (2 marks)
- ii) State three advantages of a randomized block design. (3 marks)
- b) In an agricultural trial, a variety of wheat was grown for 3 years in succession on 9 plots in each of the 3 geographical areas and the yields per plot were measured each year. Different randomly selected plots in each area were used each year. The yields per plot in Kg are given in the table below.

Treatments

	Area 1	Area 2	Area 3
Year 1	$\begin{pmatrix} 16.2 \\ 16.4 \\ 19.5 \\ 16.0 \end{pmatrix} 68.1$	$\begin{pmatrix} 15.6 \\ 18.3 \\ 21.2 \\ 27.4 \end{pmatrix} \text{---}$	$\begin{pmatrix} 17.0 \\ 18.3 \\ 18.6 \\ 16.3 \end{pmatrix} \text{---}$
Year 2	$\begin{pmatrix} 16.9 \\ 17.8 \\ 17.9 \\ 19.6 \end{pmatrix} \text{---}$	$\begin{pmatrix} 19.1 \\ 16.4 \\ 15.9 \\ 15.1 \end{pmatrix} 66.5$	$\begin{pmatrix} 14.2 \\ 16.4 \\ 18.9 \\ 15.5 \end{pmatrix} 65.0$
Year 3	$\begin{pmatrix} 16.8 \\ 14.2 \\ 13.9 \\ 17.3 \end{pmatrix} \text{---}$	$\begin{pmatrix} 15.0 \\ 16.7 \\ 16.5 \\ 14.9 \end{pmatrix} 63.1$	$\begin{pmatrix} 19.8 \\ 20.1 \\ 18.2 \\ 17.3 \end{pmatrix} \text{---}$

N/B $\sum_{i=1}^3 \sum_{j=1}^3 \sum_{k=1}^4 y_{ijk}^2 = 11\ 072.42$ and $G = 625.2$.

- i) Prepare an ANOVA table for the data
 - ii) Test H_0 : All effects due to treatment are equivalent Vs. H_1 : Anything different(H_0)
 - iii) Test H_0 : All effects due to year are equivalent Vs. H_1 : Anything different from H_0
- Test H_0 : All effects due to interaction of treatment and year are equivalent Vs. H_1 : Anything different from H_0 . (15 marks)