UGANDA MARTYRS UNIVERSITY

FACULTY OF SCIENCE

FINAL ASSESSMENT SEMESTER II 2006 - 2007

BSc II GEN STA 2202 TIME SERIES &REGRESSION ANALYSIS

DATE: Monday, 7th May 2007 **TIME: 9:00 -12:00A.M.**

Instructions:

Attempt **ONLY FOUR** Questions

Qn 1: Suppose the time series below was observed:

T	Y_t	t	Y_t
1	8.3	13	1.9
2	8.4	14	4.0
3	8.3	15	2.3
4	6.3	16	3.0
5	4.4	17	1.7
6	6.0	18	2.5
7	5.9	19	2.2
8	6.7	20	1.1
9	8.7	21	2.4
10	4.1	22	1.0
11	5.2	23	1.8
12	3.8	24	1.2

(i) Graph the series. (4)

(ii) Does the Pearson's test for trend provide support for a horizontal model (($\alpha = 5\%$). (6)

(iii) If a trend exists based on (ii) above, fit a linear trend. (8)

(iv) What is the forecast for period 26? (2)

Qn 2: (a) What are the causes of seasonality in a time series? (5)

(b) A time series is given below.

Year	I	II	III	IV
1990	4	2	1	5
1991	6	4	4	14
1992	10	3	5	16
1993	12	9	7	22
1994	10	13	35	35

Suppose a multiple model

$Y_t = T_t x S_t x I_t$

(i) Test for seasonality. (10)

(ii) If seasonality is present estimate the seasonal factors. (5)

Qn3: The following data represent quarterly revenue of a certain firm (in million shillings)

Quarter

Year	I	II	III	IV
1996	3.02	4.53	2.14	1.97
1997	5.86	8.13	6.63	7.67
1998	12.94	16.92	17.64	21.46
1999	30.12	40.40	44.39	54.96

Suppose a multiplicative model of the form

$$Y_t = T_t \, x \, S_t \, x \, C_t \, x \, I_t$$

The trend $\hat{T}_t = 2.1504(1.24013)^t$

Base period-1996 Quarter I t-quartely

Seasonal factors are:

I	II	III	IV
112.61	119.02	85.57	83.79

(i) Detrend the series (4)
(ii) Deseasonalize the detrended series (4)
(iii) Test for the presence of cyclic component ($\alpha = 10\%$) (12)

Qn4: (a) What is the use of differencing in ARIMA models? (4)
(b) Describe the stages in Box-Jenkins modeling procedure. (6)
(c) Suppose the time series below were observed:

Year	Yt
1988	9.3
1989	8.3
1990	6.6
1991	6.0
1992	7.6
1993	8.5
1994	6.8
1995	7.8
1996	7.8
1997	6.9
1998	8.7
1999	9.5

(i) Graph the series. (3)
(ii) Does the Daniel's test ($(\alpha = 5\%)$ provide support for using a horizontal model? (7)

Qn5: The table below shows the quarterly sales of diary products by Nkozi diary farm:

	Quarter			
Year	I	II	III	IV
2002	6	9	10	8
2003	16	20	18	17
2004	15	18	24	17
2005	20	22	n.a.	n.a.

Where: n.a. – not available

Assume a multiplicative model**:** $Y_t = T_t \, x \, S_t \, x \, C_t \, x \, I_t$

The trend $\hat{T}_t = 10.81 + 1.0747t)$ with 2002 Quarter III as Base period, t quarterly.

(i) Detrend the series (6)

(ii) Using the detrended series, compute the seasonal factors. (11)

(iii) Forecast sales for 2007. (3)

Qn6: The table below shows students' IQ, number of hours studied and scores obtained in a final examination.

IQ x_1	No. of hrs studied x_2	Score y
112	5	79
126	13	97
100	3	51
114	7	65
112	11	82
121	9	93
110	8	81
103	4	38
111	6	60
124	2	86

(a) Estimate a regression line that will help predict score of students from their IQ and number of hours studied. (16)

(b) What will be the score of a student with IQ of 108 and studied 6hours for the examination? (4)

***********************************GOOD LUCK*************************************