RAJARATA UNIVERSITY OF SRI LANKA
FACULTY OF APPLIED SCIENCES MIHINTALE

B.Sc. (General) Degree in Applied Sciences

Third Year Semester I Examination- October/November 2015

MAT 3208-Time Series

Answer All Questions **Time: Two hours**

1.

a) Define the term *time series*.

b)

i. What are the components of time series?

ii. Briefly explain above components with one example.

c) Explain the following terminology used in time series analysis.

i. IID Noise

ii. White Noise

iii. Moving Average model

2.

a) State four methods which can be used to measure the trend.

b) Briefly explain moving average method and give one advantage and one disadvantage.

c) Calculate 5- points moving average of number of students studying in commerce collage (see Table 1).

year	Number of students
1981	332
1982	317
1983	357
1984	392
1985	402
1986	405
1987	410
1988	427
1989	405
1990	438

d) Given below are the Table of production of a TV factory.

Year	Production of TV sets('000)
1986	17
1987	20
1988	19
1989	26
1990	24
1991	40
1992	35
1993	55
1994	50
1995	74
1996	69

i. Fit a straight line trend to these figures.
ii. Plot the given data showing also the trend line.
iii. Estimate the production for the year 2001.

3.

a) Write down the process for the following terms.

i. Moving Average Process of order q, denoted by MA(q)

ii. Auto Regressive Process of order p, denoted by AR(p)

iii. Auto Regressive Moving Average Process, denoted by ARMA (p,q)

b)

i. Define the stationarity of a time series.

ii. Write down properties of Auto covariance function.

c) Find the auto covariance function of the moving average process,

$V_t = \frac{1}{3}\left(w_{t-1} + w_t + w_{t+1}\right)$

; Where $w_t \approx WN\left(0, \sigma^2\right)$ and w_t is an uncorrelated process. Check stationarity of the series.

4.

a) Define the two terms invertibility and causality.

b) Test for the stationarity and invertibility for the following models (Hint: Use back-shift notation).

i. $X_t = Z_t + 0.7Z_{t-1} - 0.2Z_{t-2}$

ii. $X_t + 0.1X_{t-1} = Z_t - 0.5Z_{t-1}$

iii. $X_t - 0.5X_{t-1} + 1.2X_{t-2} = Z_t + 0.7Z_{t-1}$

Where $z_t \approx WN\left(0, \sigma^2\right)$.

c)

i. Briefly explain three main categories of forecasting procedure.

ii. What are the facts that need to be considered when forecasting?

**********End of the paper**********