RAJARATA UNIVERSITY OF SRI LANKA
FACULTY OF APPLIED SCIENCES

B.Sc. Degree in Industrial Mathematics
Fourth Year Semester II Examination – September/ October 2013

MAT 4302 – Financial Mathematics

Time: 3 hours

Answer all questions.
Calculators & Graph Papers will be provided.

1. Your uncle has an **investment annuity.** The value of the annuity increases each month by an automatic deposit of 2% of interest of previous month's balance. Your uncle withdraws 1000$ at the beginning of each month for his living expenses. Currently he has 70,000 $ in the annuity. Model the investment annuity and find the **fixed-point** of the dynamical system. Predict the financial outcome of the model in the long-run and interpret your results graphically.

2. Write **brief** accounts on each of the following:

   (i) Merchant's rule in Partial Payments;

   (ii) Cobweb-model in Theory of Finance;

   (iii) Binomial theorem and CCI-Model;

   (iv) Arbitrage Portfolios

3. Determine the **equilibrium point** of the **static** market model

$$E_d = 0,$$
$$Q_d = -4P^3 + 13P \quad \textit{and}$$
$$Q_s = 6P^2 + 3;$$

given in the usual notation.

Write down the demand and supply sets; and interpret your results graphically.

4. A merchant buys a used car priced at 13,000 $. He pays 5000 $ down and wishes to pay the remainder in 16 equal monthly installments, the first due in one month. If the dealer charges 6% **compounded monthly**, find the monthly installment of the deal .

5. A merchant decides to invest his money in three different assets L-B-S and three possible states can occur. If the Return-matrix $\underline{R} = (r_{ij})_{3:3}$,where $r_{11} = r_{21} = r_{22} = r_{23} = r_{32} = 1.05$; $r_{12} = 1.20$, $r_{13} = 1.10$, $r_{31} = r_{12} - 0.30$ and $r_{33} = r_{31} + 0.05$, show that there is no *state-price vector* and find *an arbitrage portfolio.*