The Open University of Sri Lanka
B.Sc. Degree Programme – Level- 04
Closed Book Test (CBT) – 2010/2011
Applied Mathematics
AMU 2183/AME 4183-Mathematical Modeling III
Duration: - One and Half Hours.

Date: - 18.10.2010 **Time: 4.00 p.m. – 5.30 p.m.**

Answer All Questions.

1. A person is interested in depositing money in the bank so that at the end of 5 years he will have 500,000 rupees in the bank. They offered him two schemes to make this scenario a possibility.

   (i) A monthly installment of p rupees which will accumulate at a compound interest rate of 1.2% per month.

   (ii) A yearly installment of q rupees which will accumulate at a compound interest rate of 13% per year.

   Find the values of p and q such that under scheme (i) and (ii) the person's account will have 500,000 rupees at the end of 5 years.

2. A uniform beam of length $2l$ and weighting w per length is placed horizontally with two smooth supports at its ends. If the flexural rigidity of the beam is k. Show that the beam will rest along a curve whose equation with respect to a (x, y) co-ordinate system is

$$y = \frac{wx}{24k}(2l - x)\left[4l^2 + x(2l - x)\right].$$

3. Let $N(t)$ be the number of infected persons in a hospital. The rate at which the numbers of infected persons increase is proportional to the product of the number of infected persons and those not infected in the hospital. Let R be the total number of persons in the hospital.
   Given that $N(0)=25$ and $N(5)=160$, find $N(t)$.