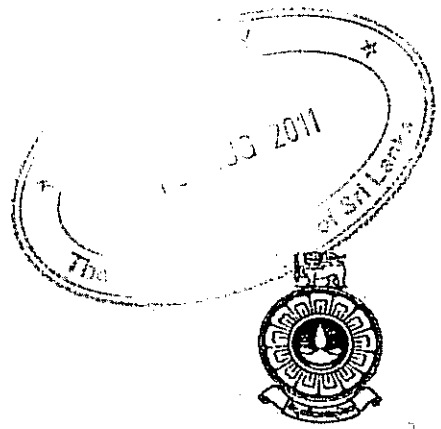


**The Open University of Sri Lanka**  
**B.Sc. Degree Programme – Level- 04**  
**Closed Book Test (CBT) – 2010/2011**

**Applied Mathematics**

**AMU 2183/AME 4183-Mathematical Modeling III**

**Duration: - One and Half Hours.**



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**Date: - 18.10.2010**

**Time: 4.00 p.m. – 5.30 p.m.**

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**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

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

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  $N(t)$ .