M.Sc. (MATHEMATICS WITH APPLICATIONS IN COMPUTER SCIENCE)

M.Sc. (MACS)

Term-End Practical Examination

00406

December, 2014

MMT-007(P) : DIFFERENTIAL EQUATIONS AND NUMERICAL SOLUTIONS

Time : 1$\frac{1}{2}$ hours   *Maximum Marks : 40*

*Note : There are **two** questions in this paper. Answer both the questions. 10 marks are viva-voce.*

1. Write a program in 'C' language to solve the initial value problem

   $$\frac{dy}{dx} = -2xy^2, \; y(0) = 1.$$

   in the interval [0, 2] using fourth-order Milne's Predictor – Corrector method with h = 0·2. Calculate the starting values using the fourth-order Runge – Kutta method with the same step length. Perform two corrector iterations per step.   *20*

2. Write a program in 'C' language to solve the equation

   $$\frac{\partial u}{\partial t} = \frac{\partial^2 u}{\partial x^2}, \; 0 \le x \le 4, t > 0$$

   $u(x, 0) = \frac{x}{3}(16 - x^2), \; u(0, t) = u(4, t) = 0$

   with h = 1 and $\lambda = \frac{1}{2}$ by using Crank – Nicolson method. Integrate for two time levels.   *10*