

00930

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

Term-End Practical Examination

June, 2013

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

Time : 1½ hours

Maximum Marks : 40

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*Note : There are two questions in this paper totalling 30 marks.  
Answer both of them. Remaining 10 marks are for the  
viva-voce.*

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1. Write a program in 'C' language to solve the initial value problem 15

$$\frac{dy}{dx} = y^2 \sin x, y(0) = 1$$

in the interval  $[0, 2]$  using fourth order Milne's predictor corrector method with  $h=0.4$ . Calculate the starting values using the fourth-order Runge-Kutta method with the same step length. Perform two corrector iterations per steps.

2. Write a 'C' program to solve the initial boundary value problem 15

$$\frac{\partial u}{\partial t} = \frac{\partial^2 u}{\partial x^2}$$

$$u(x, 0) = \cos \frac{\pi x}{2}, \quad -1 \leq x \leq 1, \quad t=0$$

$$u(-1, t) = u(1, t) = 0, \quad t > 0$$

with  $h = \frac{1}{3}$  and  $\lambda = \frac{1}{3}$  by using Crank-Nicolson method.

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