

**M.Sc. (MATHEMATICS WITH APPLICATIONS IN COMPUTER SCIENCE)****M.Sc. (MACS)****Term-End Practical Examination****June, 2015**

000003

**MMT-007(P) : DIFFERENTIAL EQUATIONS AND NUMERICAL SOLUTIONS**Time :  $1\frac{1}{2}$  hours

Maximum Marks : 40

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- Note :** (i) There are **two** questions in this paper totalling 30 marks.  
(ii) Answer **both** the questions.  
(iii) Remaining 10 marks are for the viva-voce.
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1. Write a program in 'C' language to solve the boundary value problem

$$y'' - 3y' + 2y = 0, \quad 0 < x < 1$$

$$2y(0) - y'(0) = 1, \quad y(1) + y'(1) = 2e + 3e^2$$

using the shooting method. Use the Taylor series method of order 2 with  $h = 0.25$  to solve the resulting initial value problem. 15

2. Write a program in 'C' language to find the solution of  $\nabla^2 u = x^2 + y^2$  in R, subject to the given R and boundary conditions using the five-point difference formula

$$R : \text{Square } 0 \leq x \leq 1, \quad 0 \leq y \leq 1$$

$$u(x, y) = \frac{x^4 + y^4}{12} \quad \text{on } x = 1, y = 0, y = 1$$

$$12u + \frac{\partial u}{\partial x} = x^4 + y^4 + \frac{1}{3}x^3 \quad \text{on } x = 0.$$

Use central difference approximation in the boundary conditions and take the step length  $h = \frac{1}{2}$ . 15

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