

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

00478

Term-End Practical Examination**December, 2015****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** of them.
(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

$$y'' = 2y - y'$$

$$y'(0) = 3, y'(1) = e + \frac{2}{e}$$

using the shooting method. Use the Taylor series method

$$y_{i+1} = y_i + hy'_i + \frac{h^2}{2} y''_i + \frac{h^3}{6} y'''_i$$

$$y'_{i+1} = y'_i + hy''_i + \frac{h^2}{2} y'''_i$$

with $h = 0.25$ to solve the resulting initial value problems.

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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 : a triangle $0 \leq x \leq 1, 0 \leq y \leq 1, 0 \leq x + y \leq 1$. $u(x, y) = x - y$ on the boundary of the triangle. Assume the step length $h = \frac{1}{3}$.

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