

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

Term-End Practical Examination

00366

June, 2018

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

Time : $1\frac{1}{2}$ Hours

Maximum Marks : 40

Note : (i) *There are two questions in this paper, totalling 30 marks. Answer **both** of them.*

(ii) *Remaining 10 marks are for viva-voce.*

1. Write a 'C' program to solve the boundary value problem

$$y'' = y - 4xe^x, 0 < x < 1$$

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

using the shooting method. Use third order Taylor series method with $h = 0.2$ 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 : Square $0 \leq x \leq 1, 0 \leq y \leq 1$

$u(x, y) = \frac{x^4 + y^4}{12}$ on the boundary of the square. Take the step length $h = \frac{1}{3}$. 15