No. of Printed Pages : 2 **MMT–007(P)(Set-II)**

M. SC. (MATHEMATICS WITH APPLICATIONS IN COMPUTER SCIENCE) [M. SC. (MACS)]

Term-End Practical Examination

June, 2025

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

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

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

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

(iii) Symbols have their usual meanings.

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

$$y'' = xy' + 2y \quad 0 \le x \le 1$$

$$y'(0) = 1, \; y'(1) = \left(e^2 + e^{-1}\right)/2$$

using the shooting method. Use second order Taylor series method to solve the resulting initial value problem. Take user input for step length within the range of 0.1 to 0.05.

2. Write a program in 'C' language to find the solution of : 15

$$\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = 0 \text{ in D : } 0 \le x \le 1, 0 \le y \le 1 .$$

subject to the boundary condition $u(x, y) = x - y$ on the boundary of D, using the five point difference formula. Take uniform step length $h = \frac{1}{3}$ along both the axes.

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