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

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

[M. Sc. (MACS)]

Term-End Practical Examination

June, 2025

MMT–007(P)(Set-I) : 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.*

(ii) Answer both of them.

(iii) Remaining 10 marks are for Viva-Voce.

(iv) Symbols have their usual meanings.

1. Write a programme 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 step.

2. Write a program in 'C' language to solve the equation :

$$\frac{\partial u}{\partial t} = \frac{\partial^2 u}{\partial x^2},\quad 0 \le x \le 1, t > 0$$

$$u(x,0) = 2x^2, \mathrm{u}(0,t) = 0, u(1,t) = 2$$

using Crank-Nicolson method with step length $h = \frac{1}{3}$ and mesh ratio $\lambda = \frac{1}{2}$. 15

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