

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

December, 2024

**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,
totalling 30 marks. Answer both of them.*

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

(iii) *Symbols have their usual meanings.*

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

$$x^2 y'' - 2y + x = 0$$

$$y(2) = 2$$

$$y(3) = 0$$

[2]

using the shooting method. Use the Taylor's 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 $h = .25$ to solve the resulting initial value problems.

2. Write a program in 'C' language to solve the equation : 15

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

$$u(x, 0) = \sin(\pi x), \quad 0 \leq x \leq 1$$

$$u(0, t) = 0 = u(1, t), \quad t > 0$$

with step length $h = \frac{1}{3}$ and mesh ratio $\lambda = \frac{1}{6}$ by using Schmidt method.

× × × × × × ×