

**SRM Institute of Science and Technology**  
**Department of Mathematics**  
**21MAB206T- Numerical Methods and Analysis**  
**Unit V: - Numerical Solution of Partial Differential Equations**  
**Tutorial Sheet – I**

1. Classify the partial differential equation  $xf_{xx} + yf_{yy} = 0, x > 0, y > 0$
2. Classify the partial differential equation  $x^2 f_{xx} + (1 - y^2) f_{yy} = 0$
3. Solve  $\nabla^2 u = 0$  at the nodal points for the following square region given the boundary condition

50				50
0				0
0				0
0				0
	0		0	

4. Solve  $\nabla^2 u = 0$  for the square region with the given boundary conditions

	20		30	
20	u <sub>1</sub>	u <sub>2</sub>	40	
30	u <sub>3</sub>	u <sub>4</sub>	50	
	40		50	

5. By Iteration method, solve the Laplace equation  $u_{xx} + u_{yy} = 0$ , over the square region, satisfying the boundary conditions.

$$u(0, y) = 0, 0 \leq y \leq 3$$

$$u(3, y) = 9 + y, 0 \leq y \leq 3$$

$$u(x, 0) = 3x, 0 \leq x \leq 3$$

$$u(x, 3) = 4x, 0 \leq x \leq 3$$