

# **SNS COLLEGE OF ENGINEERING**

Kurumbapalayam (Po), Coimbatore – 641 107



#### AN AUTONOMOUS INSTITUTION

Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai

### Tutorial

## **Two-D Laplace equation**

- 1. Solve  $u_{xx}+u_{yy}=0$ ;  $0 \le x$ ,  $y \le 1$  with u(0,y)=10=u91,y) and u(x,0)=20=u(x,1). Take h=0.25 and apply Liebmann method to 3 decimal accuracy.
- 2. By Iteration method, solve the Laplace equation  $u_{xx}+u_{yy}=0$ , over the square region, satisfying the boundary conditions.

 $u(0,y)=0, \quad 0 \le y \le 3$ 

- $u(3,y)=9+y, 0\leq y\leq 3$
- $u(x,0)=3x, 0 \le x \le 3$
- $u(x,3)=4x, \quad 0\leq x\leq 3$
- 3. Solve the elliptic equation  $u_{xx}+u_{yy}=0$  for the following square mesh with boundary values as shown:
  - 0 500 1000 500 0



### **Two-D Poisson equation:**

4. Solve the Poisson equation  $\nabla^2 = -10(x^2+y^2+10)$  over the square mesh with sides x=0, y=0, x=3 and y=3 with u=0 on the boundary and mesh length 1 unit.