R09

Code No: C0405

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M.TECH I - SEMESTER EXAMINATIONS APRIL/MAY-2012
NUMERICAL METHODS FOR PARTIAL DIFFERENTIAL EQUATIONS
(CAD/CAM)

Time: 3hours **Max.Marks:60**

Answer any five questions
All questions carry equal marks
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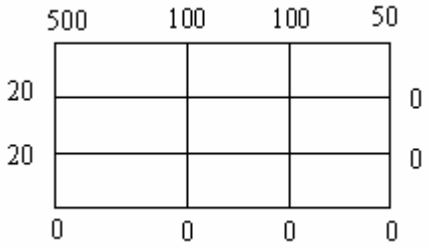
1. Solve the Partial Differential equation by Crank Nicholson method $\frac{\partial^2 u}{\partial x^2} = \frac{\partial u}{\partial t}$, $0 < x < 1, 0 < t$
Subject to the conditions
$u(0,t) = 0, u(1, t) = 0$, $u(x,0) = 100(x - x^2)$, taking $h = \frac{1}{4}$.

2. Solve the Partial Differential equation $u_{xx} + u_{yy} = 0$



3. Define and give examples
a) Local truncation error
b) Global rounding error.

4. Solve $u_{xx} + u_{yy} = x^2 + y^2$ given that u = 2 on the four boundaries, dividing the square into 16 sub squares of unit length.

5. Solve the Partial Differential equation by Crank Nicholson method $\frac{\partial u}{\partial t} - \frac{\partial^2 u}{\partial x^2} = 0$, $0 < x < 4\ 0 < t$
Subject to the conditions u(0,y)=10 u(x, 0) =0, u(4, y) = y taking h = k = 1.

6. Solve $\frac{\partial u}{\partial t} = 4\frac{\partial^2 u}{\partial x^2}$ with the boundary conditions
u(0, t) = u(8, t) = 0, u(x, 0) = $4x - \frac{x^2}{2}$ at x = 1, 2, 3…….8 and
y = 1, 2, 3, 4, 5, 6, 7 and 8.

7. State and prove the necessary and sufficient condition for convergence of iterative methods.

8. Solve the boundary value problem
y" + y = -2x, $0 < x < 1$, $y(0) = y(1) = 0$ by Galerkin method.

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