R09

Code No: C0405

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M.Tech I - Semester Examinations March/April-2011
NUMERICAL METHODS FOR PARTIAL DIFFERENTIAL EQUATION
(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 Nicolson method
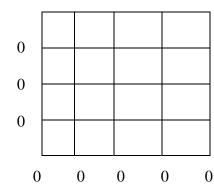
 $\dfrac{\partial u}{\partial t} - \dfrac{\partial^2 u}{\partial x^2} = 0, \quad 0 < x < 1, 0 < t$

 Subject to the conditions

 $u(0,t) = 0 , \quad u(x, 0) = x , u(1, t) = 0.$ [12]

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

 $u(x, 0.1) = 50x, u(0,y) = 0, \; u(x, 0) = 0, u(0.5, y) = 50y.$ [12]

3. Solve the Partial Differential equation $u_{xx} + u_{yy} = 0$ given that

 $u(x, 0) = x^2 , 0 \leq x \leq 1$
 $u(0,y)=(y - 1)^2 , \; u(x, 0) = (x - 1)^2 , u(1, y) = y^2 , 0 \leq y \leq 2.$ [12]

4. Solve $u_{xx} + u_{yy} = 0$ for

 [12]

5. Solve the Partial Differential equation $16 \dfrac{\partial^2 u}{\partial x^2} = 0, \quad 0 < x < 1, 0 < t$

 Subject to the conditions
 $u(0,t) = 0 , \quad u(x, 0) = x(2 - x)$
 $u(4, t) = 0, \quad \text{taking } h = 1.$ [12]

6.   Derive five point formula by ADI method.   [12]

7.   Solve the boundary value problem
$y'' + y + 2x(1-x) = 0$, $0 < x < 1$, $y(0) = y(1) = 0$ by Galerkin method.   [12]

8.   Solve the boundary value problem
$y'' + 2 = 0$, $0 < x < 1$, $y(0) = y(1) = 0$ by Galerkin method.   [12]

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