

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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- Solve the Partial Differential equation by Crank Nicolson method

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

Subject to the conditions
 $u(0,t) = 0, \quad u(x, 0) = x, \quad u(1, t) = 0.$ [12]
- Solve the Partial Differential equation $u_{xx} + u_{yy} = 0$ given that
 $u(x, 0.1) = 50x, \quad u(0,y) = 0, \quad u(x, 0) = 0, \quad u(0.5, y) = 50y.$ [12]
- Solve the Partial Differential equation $u_{xx} + u_{yy} = 0$ given that
 $u(x, 0) = x^2, \quad 0 \leq x \leq 1$
 $u(0,y) = (y-1)^2, \quad u(x, 0) = (x-1)^2, \quad u(1, y) = y^2, \quad 0 \leq y \leq 2.$ [12]
- Solve $u_{xx} + u_{yy} = 0$ for

50	100	100	100	50	
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0	0	0	0	0	0
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[12]
- Solve the Partial Differential equation $16 \frac{\partial^2 u}{\partial x^2} = 0, \quad 0 < x < 1, 0 < t$

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]

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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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