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Question Paper Code: Q 2294

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2009.

Sixth Semester

(Regulation 2004)

Computer Science and Engineering

MA 1011/MA 1251 - NUMERICAL METHCAS

(Common to Chemical Engineering, Information Technology, Electronics and Communication Engineering, Mechanical Engineering and Automobile Engineering)

Time: Three hours Maximum: 100 marks

Answer ALL questing.

- 1. Show that Newton-Raphson formula is find \sqrt{a} can be expressed in the form $x_{n+1} = \frac{1}{2} \left(x_n + \frac{a}{x_n} \right)$, n = 0, 1, 2, .
- State the condition for convergence of Jacobi's iteration method, for solving a system of simultaneous algebraic equation.
- 3. Obtain the function whose first difference is $2x^3 + 3x^2 5x + 4$.
- 4. Form the divided difference table from the following data

Find y'(0) from the following table:

State Trapezoidal rule of numerical integration.

- 7. Which of the following formula is a particular case of Runge-Kutta formula of the second order?
 - (a) Taylor series formula.
 - (b) Euler's modified formula.
 - (c) Milne's predictor corrector formula.
- 8. State the Adam's predictor corrector formula.
- 9. Write down the standard five point formula to solve the laplace equation $\nabla^2 u = 0$.
- 10. Give the Crank-Nicolson difference scheme to solve a parabolic equation.

 (a) Using Gauss-Seidel iteration method, solve the system of equations upto four decimals.

$$10x - 2y - z - w = 3$$

$$-2x + 10y - z - w = 15$$

$$-x - y + 10z - 2w = 27$$

$$-x - y - 2z + 10w = -9$$

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(b) Determine, by power method, the largest eigenvalue of the matrix

$$A = \begin{bmatrix} 2 & -1 & 0 \\ -1 & 2 & -1 \\ 0 & -1 & 2 \end{bmatrix}$$

12. (a) Use Lagrange's for wall to find the form of f(x), given

$$f(x)$$
: 648 704 729 792

hence f(5).

Or

(b) In the following table, the values of y are consecutive terms of a series of which 12.5 is the 5th term. Find the first and tenth terms of the series.

x: 3 4 5 6 7 8 5

y: 2.7 6.4 12.5 21.6 34.3 51.2 72.9

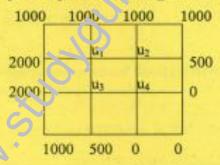
The velocity v of a particle at a distance s from a point on its path is given 13. (a) by the following table:

Estimate the time taken to travel 60 ft using Simpson's 1/3 rule. Compare the result with Simpson's 3/8 rule.

- Evaluate $\int \frac{1}{1+x} dx$ correct to three decimal places using Romberg's method. Hence find the value of log, 2.
- Apply fourth order Runge-Kutta method to find an approximate value of y when x = 0.2, given that $\frac{dy}{dx} = x + y^2$ and y = 1 when x = 0.

 Or

- Or (b) Given $\frac{dy}{dx} = x^2(1+y)$ and y(1) = 1, y(1.1) = 1.233, y(1.2) = 1.548, y(1.3) = 1.979, evaluate y(1.4) by Milne's predictor corrector method.
- (a) Given the values of u(x, y) on the boundary of the square given in the figure. Evaluate the function v(x, y) satisfying the Laplace's equation $\nabla^2 u = 0$ at the pivotal points of this figure.



Or

Find the values of u(x, t) satisfying the parabolic equation $\frac{\partial u}{\partial t} = 4 \frac{\partial^2 u}{\partial t^2}$ with boundary conditions u(0, t) = 0, u(8, t) = 0 and $u(x, 0) = 4x - \frac{1}{2}x^2$ at the points x = i, i = 0, 1, 2, 3,...7 and $t = \frac{1}{8}j$; j = 0, 1, 2, 3,....5.