23144

Name : ....

Reg. No. : ....

EIGHTH SEMESTER B.TECH DEGREE EXAMINATION, DECEMBER 2011

EC/IC/AI 04 705 F – NUMERICAL ANALYSIS

(2004 Admission)

Time : Three Hours

Maximum : 100 Marks

Answer all questions

I 1. Solve by the method of iteration : $e^x - 3x = 0$

2. Derive the iterative formula of Newton – Raphson method.

3. Solve by Gauss-Jacobi's method (3 iteration only)

$10x - 5y - 2z = 3$; $4x - 10y + 3z = -3$

$x + 6y + 10z = -3$

4. Explain the differences among Gauss elimination method, Gauss-Jacobi method and Gauss-Seidal method.

5. Evaluate $\int_0^6 \frac{dx}{1+x}$ by Simpson's one third rule.

6. Fit a paralola of the form $y = ax^2 + lx + c$ passing through $(0,0)$, $(1,1)$ and $(2,20)$ using lagrange's interpolation formula.

7. Solve $\frac{dy}{dx} = 1 - y$ given $y(0) = 0$ using modified Euler method at $x = 0.1$

8. Using Taylor serils method find $y(0.1)$ given $\frac{dy}{dx} = x^2 - y$ and $y(0) = 1$ correct to 4 decimal places.

$(8 \times 5 = 40)$

II (a) Perform one iteration of the Bairstow method to extract a quadratic factor from the polynomial equation $x^4 + x^3 + 2x^2 + x + 1 = 0$

(Or)

(b) Solve $x^3 - 9x^2 + 18x - 6 = 0$ by Graffe's method (3 squarings)

III (a) Using power method, find all the eigen values of

$$\begin{pmatrix} 5 & 0 & 1 \\ 0 & -2 & 0 \\ 1 & 0 & 5 \end{pmatrix}$$

(Or)

(b) Solve by Crout's method :

$x + y + z = 3$; $2x - y + 3z = 16$; $3x + y - z = 3$

IV (a) Using Newton's divided differences formula find $f(2)$ and $f(8)$ given the data below.

x	:	4	5	7	10	11	13
y	:	48	100	294	900	1210	2028

(Or)

(b) From the following data find θ at $x = 43$ and $x = 84$, by using proper interpolation formula.

x :	40	50	60	70	80	90
θ :	184	204	226	250	276	304

V (a) Solve $\dfrac{dy}{dx} = \dfrac{3x+y}{x+2y}$, $y(1) = 1$ at $x = 1.1$ using

(i) using Runge-Kutta method of 4th order

(ii) Solve $\dfrac{\partial^2 u}{\partial x^2} + \dfrac{\partial^2 u}{\partial y^2} = 0$, $0 \le x, y, \le 1$

With $u(0, y) = 10 = u(1, y)$ and

$u(x,0) = z0 = u(x,1)$

(Or)

(b) (i) Compute $y(0.25)$ by modified Euler method

Given $\dfrac{dy}{dx} = 2xy$, $y(0) = 1$

(ii) Solve $\dfrac{\partial^2 u}{\partial x^2} = 16\dfrac{\partial u}{\partial t}$, $0 < x < 1$, $t > 0$

Given $u(x,0) = 0$, $u(0,t) = 0$, $u(1,t) = 100t$

Compute u for one step in t direction

Taking $h = \frac{1}{4}$

$(4 \times 15 = 60)$

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