Reg.No : | | | | | | | | | | | |

D.K.M. COLLEGE FOR WOMEN (AUTONOMOUS), VELLORE-1

SEMESTER EXAMINATIONS

NOVEMBER – 2016 **15CPMA3E**

ELECTIVE : NUMERICAL ANALYSIS

Time : 3 Hours **Max. Marks : 75**

SECTION – A (5 x 6 = 30)

Answer ALL the questions.

1. *(a) Evaluate* $f(x) = \frac{1-\cos x}{x}$, *for* $x = 0.01$ *using 5 digit decimal arithmetic.*

(Or)

(b) Solve $x^3 - 3x + 1$, *starting with* $x_0 = 0.5$, *using Newton's Method.*

2. *(a) Solve the following system of equations by Crout's method.*

$$x_1 + x_2 - 2x_3 = 2.5$$
$$4x_1 - 2x_2 + x_3 = 5.5$$
$$3x_1 - x_2 + 3x_3 = 9.$$

(Or)

(b) Find the inverse of the Matrix $A = \begin{bmatrix} 1 & 1 & -2 \\ 4 & -2 & 1 \\ 3 & -1 & 3 \end{bmatrix}$.

3. *(a) Find the interpolating polynomial in Lagrange form for* $f(-1)$.

x	-2	0	1	3
f	7	3	1	27

(Or)

(b) Find the Oscillatory interpolating polynomial for the data

$$f(-1) = -2,\ f'(-1) = 13,\ f(0) = 3,\ f'(0) = 0,\ f''(0) = -8 \text{ and } f(2) = 19.$$

Hence interpolate $f(-0.5)$.

4. *(a) Evaluate* $\int_1^2 \frac{e^{2x}}{1+x^2}\,dx$, *using Composite Trapezoidal rule with* $h = 0.2$.

(Or)

(b) Using 3 - Point Gauss - Chebyshew quadrature, evaluate the integral $\int_{-1}^{1} \frac{(1+x)e^x}{\sqrt{1-x^2}}\,dx$.

5. *(a) Solve the difference equations* $y_{n+2} - 3y_{n+1} + 2y_n = 2^n$.

(Or)

(b) Solve $\frac{dy}{dx} = x^2 + y^2,\ y(2) = 3$, *using 3 - rd order Taylor's series method, compute* $y(2.1)$.

SECTION – B (3 x 15 = 45)

Answer any THREE of the following questions.

6. *Do two iterations of Muller's method to find the real root of* $f(x) = x^3 + 2x - 1 = 0,$ *starting with values 0.5, 1, and 1.5.*

7. *Solve the system of linear equations, by Gauss - elimination method with scaling, partial pivoting, storing multipliers and 5 digit arithmetic with rounding.*

$$0.6x_1 + 3x_2 + 2x_3 = 6.2$$
$$x_1 + 0.5x_2 + 2x_3 = -0.5$$
$$2x_1 + 4x_2 + 0.7x_3 = 14.6.$$

8. *Generate the forward difference table and find interpolating polynomial for the data.*

x	*0*	*0.2*	*0.4*	*0.6*	*0.8*
f	*0.12*	*0.46*	*0.74*	*0.9*	*1.2*

Find $f(0.1)$.

9. *Evaluate the integral* $\int_{-1}^{3}\int_{-2}^{1}(x^2 + xy + y^2)\,dydx$ *by using Composite Simpson's rule with spacing* 0.5 *along x - axis and y - axis.*

10. *Solve* $\frac{d^2y}{dx^2} + y\frac{dy}{dx} + y = 2x,\ y(1) = 1$ *and* $y'(1) = 1,$ *using Runge - Kutta method of order 4 to find approximate values of* $y(1.1)$ *and* $y'(1.1)$ *with spacing h = 0.1.*

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