MCA–953 **MCA–08**

M.C.A. DEGREE EXAMINATION — JANUARY 2015

First Year

COMPUTER ORIENTED NUMERICAL METHODS

Time : 3 hours Maximum marks : 75

SECTION A — ($5 \times 5 = 25$ marks)

Answer any FIVE questions.

All questions carry equal marks.

1. Find the smallest positive root of the question $x^3 - 5x + 1 = 0$ by bisection method.
2. Briefly discuss the different types of errors.
3. Solve the following system of equations by Gauss-elimination method.

$x + 2y + z = 3$

$2x + 3y + 3z = 10$

$3x - y + 2z = 13$

4. Solve the following system of equations by Gauss-Jordan method.

$10x + y + z = 12$

$2x + 10y + z = 13$

$x + y + 5x = 7$

5. Explain the principle of least squares.

6. Find the annual premium at the age of 30 from the data given below.

Age :	21	25	29
Premium :	14.27	15.81	17.72

7. Obtain the value of y at $x = 0.1, 0.2$ using Runge Kutta second order method for the differential equation $y' = y$, given $y(0) = 1$.

SECTION B — ($5 \times 10 = 50$ marks)

Answer any FIVE questions.

All questions carry equal marks.

8. (a) Find a positive root of the equation $x^3 - 5x - 7 = 0$ by false position method.

(b) Find the root of the equation $e^x - 3x = 0$ using secant method.

9. (a) Find a positive root of the equation $x^3 - x - 1 = 0$ using bisection method.

   (b) Find a positive root of $x - \cos x = 0$ by Newton's method.

10. Solve the following system of equation by Gauss-seidel method.

$$12x_1 + 3x_2 - 5x_3 = 1$$
$$3x_1 + 7x_2 + 13x_3 = 76$$
$$x_1 + 5x_2 + 3x_3 = 28$$

11. Using suitable interpolation formula, find $f(27)$ from the data given below:

x :	14	17	31	35
$f(x)$:	68.7	64.0	44.0	39.1

12. Find the first and second derivative of $f(x)$ at $x = 60$ from the data given below :

x :	60	75	90	105	120
$f(x)$:	28.2	38.2	43.2	40.9	37.7

13. Evaluate $\int_0^1 \frac{dx}{1+x^2}$ using Trapezoidal rule with $h = 0.2$.

14. Determine the value of $y(0.4)$ using predictor, corrector formula given that $y' = xy + y^2, y(0) = 1$ .Use Euler method to get the values of $y(0.1), y(0.2), y(0.3)$.