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BCG-2356-R Seat No._____

M. Sc. (CA & IT) (Sem. III) Examination

April/May - 2014

301 : Numerical Methods

Time : **3** Hours] [Total Marks : **70**

1 a Discuss the various types of errors that occur while performing numerical computations. **3**

b Explain the algorithm of Bisection Method. **4**

c Describe the advantages of Gauss seidal iterative Method. **3**

2 Attempt any three: **15**

a Find the root of the equation

$\sin x = 1 + x^3$ between $(-2, -1)$ to 3 decimal places by iteration method

b Derive the Newton Raphson formula to find the root of function $f(x) = 0$.

c Find a root of the function

$f(x) = \cos x + 2 \cdot \sin x + x^2$ with an accuracy of 3 digits using secant method.

d Explain Regula falsi method and how it is better in the comparision of bisection method.

3 a Derive the language's interpolation formula **5**

OR

a Derive the Newton gregory backward difference interpolation formula when function is given by tabulated values at equal interval **5**

b Solve the following system of equations using Gauss Elimination method **4**

$$2x + 3y - z = 5$$
$$4x + 4y - 3z = 3$$
$$-2x + 3y - z = 1$$

c Evaluate $y(84)$ for given table of values **6**

X	40	50	60	70	80	90
Y	204	224	246	270	296	324

OR

c Solve using Gauss Seidal Iterative Method **6**

$$15x + 3y - 2z = 85$$
$$2x + 10y + z = 51$$
$$x - 2y + 8z = 5$$

4 Attempt any three: **15**

a Derive the formula to obtain the numerical integration of a quadratic function.

b Evaluate $\int_4^{5.2} \log x.dx$ by taking 7 ordinates using simpson's $\frac{1}{3}^{rd}$ Rule

c Use Trapezoidal Rule to evaluate $\int_0^{12} \frac{dx}{1+x^2}$ using 6 subintervals.

d By using Simpson's $\frac{3}{8}^{th}$ rule, evaluate $\int_0^{1.2} e^x dx$ by taking 6 intervals.

5 Attempt any three:

a Using the Runge Kutta second order method solve the differential equation $\frac{dy}{dx} = x + y$ at $x = 0.1$ where initial condition is $y(0) = 1$.

b Explain Runge Kutta fourth order method of finding numerical solution of an ordinary differential equation.

$$\frac{dy}{dx} = f(x, y);\ y(x_0) = y_0$$

c Find the values of $y(0.3)$ correct to three decimal places given that $\frac{dy}{dx} = x \cdot y$ with $y(0) = 1$ using Eulers method where step size is 0.1

d Using Taylor series find the solution of $y(0.1)$ where $\frac{dy}{dx} = x.y + 1$ with $y(0) = 1$.