Paper code: 13512
1512
B.Sc. (Computer Science) (Part 2)
Examination, 2017
Paper No. 1.3
NUMERICAL ANALYSIS

Time: Three Hours] **[Maximum Marks: 50**

Note: Attempt *five* questions. All questions carry equal marks.

1. (a) Use Lagrange's formula to find f(6) from the following table:

x	f(x)
2	18
5	180
7	448
10	1210
12	2028

(b) The population (in thousands) of a town in the year 1931, ..., 1971 are as ahead:

Year	Population
1931	15
1941	20
1951	27
1961	39
1971	52

Find the population of the town in 1946 by applying Gauss's backward formula.

2. (a) Use the Milne's method to solve the equation $y' = x - y^2$ with y(0)=0 from x=0 to x=1.

(b) Use the Runge-Kutta method to approximate y when x=0.1 given that x=0 when y=2 and \frac{dy}{dx}=y-x.

3. (a) Find a real root of the equation $x = e^{-x}$ using the Newton-Raphson method.

(b) Find the cube root of 10 correct to three decimal places by Regula-Falsi method.

4. (a) Evaluate $\int_0^6 \frac{1}{1+x^3}$ by Simpson's one-third rule by dividing the interval into 6 parts.

(b) Evaluate $\int_0^6 t \sin t dt$ by Trapezoidal rule.

5. (a) Solve the following equations by Gauss Elimination method:

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

$$3x + 2y + 3z = 18$$

$$x + 4y + 9z = 16$$

(b) Solve by Jacobi iteration method the system of equations:

$$4x + y + 3z = 17$$

$$x + 5y + z = 14$$

$$2x - y + 8z = 12$$

6. (a) State and prove Newton's-Gregory formula for backward interpolation.

(b) Apply Newton's dividend difference formula to find the value of f(8) if f91)=3, f(3)=31, f(6)=223, f(10)=1011, f(11)=1343.

7. (a) Find the function u_x in powers of x-1 given that

$u_0 = 8, u_1 = 11, u_4 = 68, u_5 = 123$.

(b) Write short notes on the following:

1. Relative Error and Absolute Error
2. Percentage Error and Round Off Error

8. (a) Solve the system linear of equations by the Gauss-Seidel method (4 iterations):

$$2x_1 + 7x_2 + x_3 = 19$$

$$4x_1 + x_2 + x_3 = 3$$

$$x_1 + 3x_2 + 12x_3 = 31$$

(b) Solve the following:

(i) Prove that:

$$(1 + \Delta)(1 - \nabla) = 1$$

(ii) Prove that:

$$E = (1 - \nabla)^{-1}$$

.....END.....