(b) Using Gauss's backward interpolation formula. Find population of the year 1936. 7½

Year	1901	1911	1931	1941	1951
Population	12	15	27	39	52

OR

7. (a) State and prove Newton Gregory's Forward Interpolation Formula. 7½

(b) Find Cubic Lagravge's Interpolation Polynomial for : 7½

x	0	1	2	5
f(x)	2	3	12	147

Unit-IV

8. (a) Find f'(1.1) for following table : 7½

x :	1.0	1.2	1.4	1.6	1.8	2.0
f(x) :	0.0	0.1280	0.5540	1.2960	2.4310	4.0000

(b) Solve using Euler's Modified method :

$$\frac{dy}{dx} = x + |\sqrt{y}| = f(x, y)$$ 7½

with initial values y = 1 at x= 0 for rang $0 \le x \le 0.6$ in steps of 0.2.

OR

9. (a) Use Taylor series method to solve : 7½

$\frac{dy}{dx} = x + y$; $y(1) = 0$ Numerically upto x=1.2 while h = 0.1.

(b) Given $\frac{dy}{dx} = y - x$, y(0) = 2, find y(0.1) and y(0.2) correct 0 four decimal places by using fourth order Range-Kutta method. 7½

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Roll No. _____

SFS-4706

B.C.A. (Semester-IV) Examination, May 2015

(Old Course)

Fourth Paper

Computer Oriented Numerical Methods

(BCA-404)

Time Allowed : Three Hours] [Maximum Marks :100

Note : Answer five questions in all. Question No. 1 is compulsory and attempt one question from each unit. Scientific calculator may be allowed.

1. (a) What is Error? Describe different types of errors in Numerical system. 4×10=40

(b) Find solution of the following equation using floating point arithmatic.

$$x^2 - 1000x + 25 = 0$$

(c) Write the algorithm for bisection method.

(d) Find x_1, x_2, x_3 by Gauss Elimination method.

$$x_1 + x_2 + x_3 = 6$$
$$x_1 + 2x_2 + 3x_3 = 14$$
$$x_1 - 2x_2 + x_3 = 2$$

(e) Solve using matrix inversion method :

$$x_1 + 4x_2 + 9x_3 = 16$$
$$2x_1 + x_2 + x_3 = 10$$
$$3x_1 + 2x_2 + 3x_3 = 18$$

(f) Show that $\mu = \frac{1}{2}(E^{1/2} + E^{-1/2})$ & $E = e^{hD}$

(g) Estimate the missing term of following :

x	0	1	2	3	4
f(x)	1	3	9	?	81

(h) Apply Gauss's Forward formula to find value of u_9 if $u_0=14$, $u_4=24$, $u_8 = 32$ $u_{12}=35$, $u_{16}=40$.

(i) Evaluate $\int_0^6 \frac{dx}{1+x^2}$ by Simpson's 3/8 Rule.

(j) $\int_0^{\pi/2} \sin x\, dx$ by Euler Maclaurin formula.

Unit-I

2. (a) Prove that bisection method alway Converges. 7½

(b) Find the smallest root of following Equation using Interation Method. 7½

$$1 - x + \frac{x^2}{(2!)^2} - \frac{x^3}{(3!)^2} + \frac{x^4}{(4!)^2} - \frac{x^5}{(5!)^2} + \ldots = 0$$

OR

3. (a) Solve $x^3 - 5x + 3 = 0$, using Regular Falsi method. 7½

(b) Find real root of $x = e^{-x}$ using Neton Rophson Method. 7½

Unit-II

4. (a) Solve using Gauss Jordan Elimination Method : 7½

$$9x_1 - 3x_2 + 2x_3 = 23$$
$$6x_1 + 3x_2 + 14x_3 = 38$$
$$4x_1 + 2x_2 - x_3 = 35$$

(b) Solve using Gauss Siedel Iteration Method : 7½

$$10x_1 - 2x_2 - x_3 - x_4 = 3$$
$$-2x_1 + 10x_2 - x_3 - x_4 = 5$$
$$-x_1 - x_2 + 10x_3 - 2x_4 = 27$$
$$-x_1 - x_2 - 2x_3 + 10xy = -9$$

OR

5. (a) Solve using LU Decomposition method :

$$\begin{bmatrix} 2 & 1 & 1 \\ 1 & 3 & 1 \\ 1 & 1 & 4 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix} = \begin{bmatrix} 3 \\ -2 \\ -6 \end{bmatrix}$$ 7½

(b) Etablish Jaeobl Iteration Method to solve a system of Linear Equation when the coefficient matrix is diagonally dominant. 7½

Unit-III

6. (a) From following table find value of $e^{0.24}$:

x	0.1	0.2	0.3	0.4	0.5
e^x	1.10517	1.22140	1.34986	1.49182	1.64872