

- viii) The error in Runge-Kutta method of 4th order is
- a) $O(h^2)$ b) $O(h^3)$
c) $O(h^4)$ d) $O(h^5)$.
- ix) If the n th order forward difference of a polynomial is 0, then the degree of the polynomial will be
- a) n b) $(n - 1)$
c) $(n + 1)$ d) None of these.
- x) Regula-Falsi method is
- a) conditionally convergent
b) linearly convergent
c) divergent
d) none of these.
- xi) Modified Euler's method has a truncation error of the order of
- a) h b) h^2
c) h^3 d) h^4 .
- xii) The rate of convergence of secant method is
- a) 2 b) 1
c) 0.62 d) 1.62
e) None of these.

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GROUP - B

(Short Answer Type Questions)

Answer any three of the following. $3 \times 5 = 15$

2. Solve the following equations using Gauss-Seidel Method ;

$3x + y + 5z = 13$, $5x - 2y + z = 4$, $x + 6y - 2z = -1$ continue up to 3 successive approximation.

3. Find $f(5)$ using Newton's divide difference formula, for the following data :

X	0	2	3	4	7	.8
f(x)	4	26	58	112	466	668

4. Find a negative root of the equation $x^3 - 3x - 5 = 0$ using Bisection method correct up to three decimal places.

5. Evaluate $\int_1^3 \frac{x dx}{x^2 + 3}$ by Simpson's $\frac{1}{3}$ rule taking 7 ordinates and find the value of $\log_e \sqrt{3}$.

6. Using Taylor's series method find $y(0.2)$ correct up to three decimal places from $\frac{dy}{dx} = 2x + 3y^2$ given $y(0) = 0$ taking $h = 0.1$.

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GROUP - C

(Long Answer Type Questions)

Answer any *three* of the following. $3 \times 15 = 45$

7. a) Apply Lagrange's interpolation formula to find $f(x)$ if $f(1) = 2, f(2) = 4, f(3) = 8, f(4) = 16$ and $f(7) = 128$.
- b) Solve the equation $x^3 - 3x - 5 = 0$ within $(1, 2)$ by Bisection method correct to three decimal places.
- c) Deduce Newton's Backward Interpolation formula.

$5 + 5 + 5$

8. a) Solve by Euler's method the following differential equation $\frac{dy}{dx} = x^2 - y, y(0) = 1$, for $x = 0.3$ taking $h = 0.1$, correct up to four decimal places. 8
- b) Use Regula-Falsi method to evaluate the smallest real root of the equation $3x - \cos x - 1 = 0$, correct to three decimal places. 7
9. a) Solve the following system of equations by LU Factorization method. 6

$$2x - 3y + 4z = 8$$

$$x + y + 4z = 15$$

$$3x + 4y - z = 8$$

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- b) Obtain the order of convergence of Newton-Raphson method. 4
- c) Solve the following system of equations by Gauss-Jacobi iteration method correct up to 3 significant figures. 5
- $$20x + 5y - 2z = 14$$
- $$3x + 10y + z = 17$$
- $$x - 4y + 10z = 23$$
10. a) Use Runge-Kutta method of order 2 to calculate $y(0.1)$ for the equation correct up to 4 decimal places. 4
- $$\frac{dy}{dx} = x + y^2, y(0) = 1$$
- b) Given $\frac{dy}{dx} = x^2 + y^2, y(1) = 2.3$, calculate $y(1.1)$ by modified Taylor Series method correct up to 4 decimal places. 6
- c) Find a real root of the equation $x = 2x - 3$ correct up to 3 decimal places by iteration method. 5
11. a) Solve the system of equation by Gauss elimination method : 7
- $$x + 3y + 2z = 5$$
- $$2x - y + z = -1$$
- $$x + 2y + 3z = 2$$

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b) The following table gives the distance in nautical miles of the visible horizon for the given heights in feet above the earth's surface :

Height (x)	100	150	200	250	300	350	400
Distance (y) :	10.66	13.06	15.07	16.84	18.45	19.93	21.3

Find the value of y when $x = 120$ ft and $x = 390$ ft. 8
