ASSIGNMENT 3.

(NUMERICAL METHODS)

Q1: Solve the given equations by (i) Bisection method (ii) Newton Raphson method.

(a) $x^3+x-1=0$ [Ans $x=0.682$]

(b) $x^4-4x-10=0$ [Ans $x=1.741$]

(c) $x^3-18=0$ [Ans $x=2.621$]

[Find answer correct upto three decimal places]

Q2: Use Newton Raphson method to find an iterative method for finding a cube root a positive integer N. Hence find $(128)^{1/3}$ upto 3 decimal places.

Q3: Evaluate the integral $\int_3^5 \frac{4}{2+x^2}dx$ using Simpson's $\frac{1}{3}$ rule and using 8 intervals. Compare the results with Trapezoidal rule also [.4662]

Q4: For the integral $\int_a^b \frac{1}{1+x^2}dx$, taking width of sub-interval $h=1$, put a tick(✓) against the method which can be used for numerical integration and (✗) cross for the method which is not. Also write number of ordinates

Name of the Method → / Range of interval ↓	Trapezoidal Rule	Simpson's 1/3 Rule	Simpson's 3/8 Rule	No. of ordinates
[0,6]				
[0,7]				
[0,8]				
[0,9]				

Q5: Calculate an approximate value of $\int_0^{\pi/2} \sin x\,dx$ using [.99798]

(i) Trapezoidal Rule (ii) Simpson's $\frac{1}{3}$ rule taking 11 ordinates.

Q6: The velocity v(m/min) of a cycle which starts from rest, is given at fixed intervals of time t(min) as follows:-

t	0	2	4	6	8	10	12	14	16	18	20
v	0	10	18	25	29	32	20	11	5	2	0

Estimate approximately the distance covered in 20 minutes.

(309.33 m)

Q7: Calculate by using Simpson's $\frac{3}{8}$ rule an approximate value of $\int_{-3}^{3} x^4 dx$ by taking seven ordinates. & compare result with actual one.

Q8:- Find relation between (i) Δ and E (ii) ∇ and E (iii) δ and E.

Q9:- Show that (i) $\Delta + \nabla = \frac{\Delta}{\nabla} - \frac{\nabla}{\Delta}$ (ii) $\Delta\nabla = \Delta - \nabla$ (iii) $\nabla = \Delta E^{-1}$

Q10: Show that $\nabla^5 y_5 = y_5 - 5y_4 + 10y_3 - 10y_2 + 5y_1 - y_0$

Q11: Evaluate (i) $\Delta^n(e^x)$ (ii) $\Delta^2(ab^x)$ difference of interval being unity.

Q12: Show that degree of interpolating polynomial for the following data has degree 2.

x	-1	0	1	2	3	4
y	9	3	1	3	9	19

Q13: Find the missing values in the following data:

x	0	5	10	15	20	25
y	6	10	–	17	–	31

Q14: From the following table estimate the number of students who obtained marks between 40 and 45

Marks	30-40	40-50	50-60	60-70	70-80
No. of students	31	42	51	35	31

[Ans: 48 app.]

Q15: Find the cubic polynomial which takes the following values:-
$y(1) = 24$, $y(3) = 120$, $y(5) = 336$, $y(7) = 720$ [Ans: $x^3 + 6x^2 + 11x + 6$]

Q16: If $y = \sin x^\circ$ and

x	30°	35°	40°	45°	50°	55°
y	0.5	0.5736	.6428	.7071	.7660	.8192

Ans [.7137]

Find $\sin 54^\circ$ using Newton's Backward interpolation formula