PARUL UNIVERSITY
FACULTY OF ENGINEERING AND TECHNOLOGY
DEPARTMENT OF APPLIED SCIENCE AND HUMANITIES
4th SEMESTER B. TECH PROGRAMME
PROBABILITY, STATISTICS AND NUMERICAL METHODS (303191251)
ACADEMIC YEAR 2024-25

Tutorial: Finite Differences and Interpolation

1 Write forward difference table if

x:	10	20	30	40
y:	1.1	2.0	4.4	7.9

2 With the usual notations, show that
(i) $\nabla = 1 - e^{-hD}$ (ii) $(1+\Delta)(1-\nabla) = 1$

3 Given $\sin 45^o = 0.7071$, $\sin 50^o = 0.7660$, $\sin 55^o = 0.8192$, $\sin 60^o = 0.8660$. Find $\sin 52^o$ using Newton's forward formula.

4 Find f(22) from the following data using Newton's backward formula

X	20	25	30	35	40	45
f(x)	354	332	291	260	231	204

5 Construct Newton's forward interpolation polynomial for the following data :

X	4	6	8	10
Y	1	3	8	16

Hence evaluate y for x=5.

6 Use Gauss's forward formula to evaluate y_{30}, given that y_{21}=18.4708, y_{25}=17.8144, y_{29}=17.1070, y_{33}=16.3432 and y_{37}=15.5154.

7 Using Gauss backward difference formula, find y(8) from the following table:

x	0	5	10	15	20	25
y	7	11	14	18	24	32

8 Find the polynomial f(x) by using Lagrange's formula and hence find f(3) for

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

9 Use Lagrange's formula to find the form of f(x), given

x:	0	2	3	6
f(x):	648	704	729	792

10 Using Newton's divided difference formula, evaluate f(8) and f(15) given:

x:	4	5	7	10	11	13
f(x):	48	100	294	900	1210	2028