

**Subject: Probability statistics & Numerical Analysis (MA0314)**  
**and Integral Transforms & Numerical Methods (MA0315)**

**B.Tech.-All Branches SEM-3**

**Tutorial- UNIT-3 Interpolation**

**Q.(1)** Use **newton's forward interpolation formula** find the approximate value of  $f(2.3)$  from the following data:

x	2	4	6	8
f(x)	4.2	8.2	12.2	16.2

**Answer:- 4.8**

**Q.(2)** Use **newton's forward interpolation formula** find the value of  $f(218)$  from the following data:

x	100	150	200	250	300	350	400
f(x)	10.63	13.03	15.04	16.81	18.42	19.90	21.27

**Answer:- 15.6993**

**Q.(3)** The population of a town is given below. Estimate the population for the year 1895 and 1930 using **suitable interpolation**.

Year x	1891	1901	1911	1921	1931
Population(in thousand) y	46	66	81	93	101

**Answer:- 54.8528, 100.4705**

**Q.(4)** Using **Stirling's formula**, estimate the value of  $\tan 16^\circ$ .

x	$0^\circ$	$5^\circ$	$10^\circ$	$15^\circ$	$20^\circ$	$25^\circ$	$30^\circ$
y = tanx	0	0.0875	0.1763	0.2679	0.3640	0.4663	0.5774

**Answer:- 0.2867**

**Q.(5)** Compute  $f(4)$  from the tabular values given:

x	2	3	5	7
---	---	---	---	---

f(x)	0.1506	0.3001	0.4517	0.6259
------	--------	--------	--------	--------

Using **Lagrange's interpolation formula**.

**Answer:- 0.3896**

**Q.(6)** Find the **Lagrange interpolation polynomial** from the following data:

x	0	1	4	5
f(x)	1	3	24	39

**Answer:-  $\frac{1}{20}(3x^3 + 10x^2 + 27x + 20)$**

**Q.(7)** Using **Newton's divided difference interpolation** evaluate f(9) using the following table:

x	5	7	11	13	17
f(x)	150	392	1452	2366	5202

**Answer:- 810**

**Q.(8)** Using **Newton's divided difference interpolation** find a **polynomial** from the given data:

x	1	2	4	7
f(x)	10	15	67	430

**Answer:-  $2x^3 - 7x^2 + 12x + 3$**

**Q.(9)** Evaluate  $\int_1^2 \frac{dx}{1+x^2}$  taking h = 0.2 using **trapezoidal rule**.

**Answer:- 0.3228**

**Q.(10)** Calculate  $\int_0^1 2e^x dx$  with n=10 using **trapezoidal rule**.

**Answer:- 3.4394**

**Q.(11)** Evaluate  $\int_0^5 \frac{dx}{4x+5}$  by using **Simpson's 1/3 rule**, taking n=10.

**Answer:- 0.4026**

**Q.(12)** Evaluate  $\int_0^6 \frac{dx}{1+x^2}$  by using (i) **trapezoidal rule** (ii) **Simpson's 1/3 rule**  
(iii) **Simpson's 3/8 rule**

**Answer:- (i) 1.4108 (ii) 1.3662 (iii) 1.3571**

**Q.(13)** Given the following table of x and y

x	1.00	1.05	1.10	1.15	1.20	1.25	1.30
y	1.000	1.025	1.049	1.072	1.095	1.118	1.140

Find  $\frac{dy}{dx}$  **and**  $\frac{d^2y}{dx^2}$  at  $x = 1.05$ ; Applying Newton forward differentiation formula

**Q.(14)** Given the following table of x and y

x	1.00	1.05	1.10	1.15	1.20	1.25	1.30
y	1.000	1.025	1.049	1.072	1.095	1.118	1.140

Find  $\frac{dy}{dx}$  **and**  $\frac{d^2y}{dx^2}$  at  $x = 1.25$ ; Applying Newton Backward differentiation formula