**UNIT 4 INTERPOLATION,NUMERICAL DIFFERENTIATION AND NUMERICAL INTEGRATION**

NUMERICAL SINGLE INTERGRATION USING SIMPSON'S 13RD RULE

$= \frac{1}{3}[4.04] = 1.346.$

2. find the value of $\log_e 5$ from $\int_0^5 \frac{dx}{4x+5}$

by Simpson's $\frac{1}{3}$rd Rule $(n=10)$

$y(x) = \frac{1}{4x+5}$ $\quad h = \frac{b-a}{n} = \frac{5-0}{10} = \frac{5}{10} = 0.5$

| $x$ | 0 | 0.5 | 1 | 1.5 | 2 | 2.5 | 3 | 3.5 | 4 | 4.5 | 5 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| $y$ | 0.2 | 0.142 | 0.111 | 0.090 | 0.076 | 0.066 | 0.058 | 0.052 | 0.047 | 0.043 | 0.04 |

By Simpson's $\frac{1}{3}$rd Rule

$$\int_0^5 \frac{dx}{4x+5} = \frac{0.5}{3}\left[(0.2+0.04) + 4(0.142+0.090+0.066+0.052+0.043) + 2(0.111+0.076+0.058+0.047)\right]$$

$$= \frac{0.5}{3}\left[0.24 + 4(0.393) + 2(0.292)\right]$$

$$= \frac{0.5}{3}\left[2.396\right]$$

$$= 0.166 \times 2.396$$

$$= 0.397$$

$$\int_0^5 \frac{dx}{4x+5} = \left[\frac{\log(4x+5)}{4}\right]_0^5$$

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