



Shaikh Sir's Diploma Classes

Engineering Maths(M-II)

I SCHEME

UNIT-V Numerical Integration

Shaikh sir's Reliance Academy, Shahupuri, Kolhapur.

Subject : Maths – I (I-Scheme)

Types of Problems

No.	Type of Problem	Importance	Revision
1	Trapezoidal Rule	***	
2	Simpson's 1/3 rule	***	
3	Simpson's 3/8 rule	*****	

IN QUESTION PAPER

Q 1) f)2 Marks

Q 6)12 Marks

14 Marks

FORMULAS

To find the value of integral $\int_a^b f(x) dx$ by dividing into 'n' Intervals

$$h = \frac{b-a}{n}$$

x	a	a+h	a+2h	a+3h	a+4h	a+5h	a+6h			b
Y= f(x)										
	y_0	y_1	y_2	y_3	y_4	y_5	y_6			y_n

Trapezoidal Rule

$$\int_a^b f(x) dx = \frac{h}{2} \{ (y_0 + y_n) + 2(y_1 + y_2 + y_3 + \dots \text{all remaining}) \}$$

Simpson's 1/3 Rule

$$\int_a^b f(x) dx = \frac{h}{3} \{ (y_0 + y_n) + 2(y_2 + y_4 + y_6 + y_8 \dots \text{even}) + 4(y_1 + y_3 + y_5 \dots \text{odd}) \}$$

Simpson's 3/8 Rule {n must be multiple of 3}

$$\int_a^b f(x) dx = \frac{3h}{8} \{ (y_0 + y_n) + 2(y_3 + y_6 + y_9 + \dots \text{multiple of 3}) + 3(y_1 + y_2 + y_4 + y_5 \dots \text{all remaining}) \}$$

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NUMERICAL PROBLEMS

1) Evaluate: $\int_2^7 \frac{1}{x} dx$,by using Trapezoidal rule and by dividing the interval

[2,7] into five equal sub-intervals

{Ans: 1.2714}

2) Evaluate: $\int_0^1 \frac{dx}{1+x^2}$ by Trapezoidal rule taking n= 4 .

{Ans: 0.7828}

3) the following values of f(x) are given . Using Trapezoidal rule, find the $\int_0^6 f(x) dx$.

x	0	1	2	3	4	5	6
f(x)	0.146	0.161	0.176	0.190	0.204	0.217	0.230

{Ans: 1.136}

4) Find $\int_0^{\pi/2} \cos x dx$ using Trapezoidal rule y dividing the interval $[0, \frac{\pi}{2}]$ into three equal parts.

{Ans: 0.977}

5) Compute $\int_1^5 \frac{dx}{x+2}$ using Simpson's 1/3 rule . Divide the interval [1,5] into 4 equal sub-intervals.

{Ans: 0.8476}

6) Given :

x	0	$\frac{1}{2}$	1	$\frac{3}{2}$	2
$Y = e^{-x}$	1	0.6064	0.3676	0.2231	0.1353

Evaluate : $\int_0^2 e^{-x} dx$ by using Simpson's 1/3 rule {Ans : 0.86475}

7) Using Simpson's 1/3 rule ,evaluate $\int_0^{\pi/2} \sqrt{\cos x} dx$. Divide the intervals into eight equal sub-intervals. {Ans : 1.1911}

8) Compute $\int_0^9 (1+x^3) dx$ using simpsons 3/8 rule. {Ans : 6.25 }

9) Evaluate $\int_0^1 \frac{dx}{1+x}$ using Trapezoidal rule. Divide intervals $[0,1]$ into eight equal sub-intervals. {Ans : 0.694125}

10) Evaluate $\int_1^7 f(x) dx$ using Trapezoidal rule from given data .

x	1	2	3	4	5	6	7
y	2.105	2.808	3.614	4.604	5.857	7.451	9.467

{Ans : 30.12}

11) Given :

x	0	$\frac{\pi}{8}$	$\frac{\pi}{4}$
tan x	0	0.4141	1.0

Find $\int_1^{\pi/4} \tan x dx$ Trapezoidal rule. {Ans 0.3592 }

12) Using Simpson's 1/3 rule evaluate $\int_1^5 y dx$ using the following table

x	1	2	3	4	5
y	10	50	70	80	100

{Ans : }

13) Using Simpson's 3/8 Rule to find $\int_0^{0.6} e^{-x^2} dx$ by taking seven ordinates .

{Ans: }

14) Using Simpson's 1/3 rule find the area under the curve $y = \sin x$ from $x=0$ to $x=\pi$ taking $\frac{\pi}{6}$ as the common width of strip . .

{Ans: }

