

**GOVERNMENT COLLEGE FOR WOMEN(AUTONOMOUS),SRIKAKULAM
REACCREDITED WITH NAAC 'A' GRADE**

**B.Sc (Regular) Semester-V
(2022-23 Admitted Batch)**

**Paper : Numerical Methods
Marks : 60**

**Time : 3 Hrs
Date : 28-11-2024**

SECTION - A

I. Answer ALL the questions.

5 x 10 = 50

- 1) a) If $f(x) = a_0x^n + a_1x^{n-1} + a_2x^{n-2} + \dots + a_n$, then prove that $\Delta^n f(x) = a_0 h^n n!$ (Or)
b) Find the missing term in the following Table.

x	1	2	3	4	5	6	7	8
$f(x)$	1	8	-	64	-	216	343	512

- 2) a) Apply Gauss forward formula to find the value of $f(9)$ if $f(0)=14, f(4)=24, f(8)=32, f(12) = 35, f(16) = 40$. (Or)
b) State and prove Lagrange's interpolation formula.
- 3) a) Using the given table, find $\frac{dy}{dx}$ and $\frac{d^2y}{dx^2}$ at $x = 1.2$.

x	1.0	1.2	1.4	1.6	1.8	2.0	2.2
y	2.7183	3.3201	4.0552	4.9530	6.0496	7.3891	9.0250

(Or)

- b) Find $f'(5)$ from the following table using Newton's divided difference formula.

$x :$	1	2	4	8	10
$f(x) :$	0	1	5	21	27

- 4) a) Derive Simpson's $\frac{1}{3}$ rd and $\frac{3}{8}$ Rules. (Or)
b) Evaluate $\int_0^6 \frac{dx}{1+x^2}$ by Simpson's $\frac{1}{3}$ Rule.
- 5) a) Solve $\frac{dy}{dx} = 1 + y^2, y(0) = 0$ picard's method. (Or)
b) Solve $\frac{dy}{dx} = y - x$ with $y(0) = 2$, find $y(0.1)$, and $y(0.2)$ using R-K fourth order method.

SECTION - B

Answer Any FIVE questions.

5 x 5 = 25

- 6) If $u_0 = 3, u_1 = 12, u_2 = 81, u_3 = 200, u_4 = 100, u_5 = 8$, find the value of $\Delta^5 \mu_0$.
- 7) Find the function whose difference is $9x^2 + 11x + 5$.
- 8) Compute $f(1.1)$ from the following data

$x :$	1	2	3	4	5
$F(x) :$	7	12	29	64	123

- 9) Use stirling's formula to find y_{28} , given $y_{20} = 49225, y_{25} = 48316, y_{30} = 47236, y_{35} = 45926, y_{40} = 44306$.
- 10) From the Table

x	5	6	9	11
$f(x)$	12	13	14	19

by larrange's interpolation formula, find the value of y at $x = 10$.

- 11) Find $f'(1.5)$ from the following table.

$x :$	0.0	0.5	1.0	1.5	2.0
$f(x) :$	0.3989	0.3521	0.2420	0.1245	0.0540

- 12) Evaluate $I = \int_0^1 \frac{dx}{1+x}$ correct three decimal places by trapezoidal rule. with $h = 0.5$.
- 13) Evaluate the integral $\int_0^6 \frac{dx}{1+x^2}$ by Weddel's Rule.
- 14) Using the Taylor series expansion to find the solution of the differential equation $\frac{dy}{dx} = x - y^2$ with $y(0) = 1$.
- 15) Solve the equation $y' = -y$ with condition $y(0) = 1$ for $x = 0.04$ in four steps using Euler's method.