

Roll No. \_\_\_\_\_

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**SVIS-N 326 A-18**  
**B.Sc VIth Semester Degree Examination**  
**MATHEMATICS**  
**(Numerical Analysis)**  
**Paper : 6.1**  
**(New)**

Time : 3 Hours

Maximum Marks : 80

**Instructions to Candidates:**

- 1) Answer all the Sections
- 2) Non - programmable scientific calculators may be used.

**SECTION - A**

Answer any TEN of the following :

(10×2=20)

1. The number 17.031753 contains five valid digits. Find its absolute error.
2. Find the relative error in the product of approximate numbers 137.2 and 372.5 given that they are correct to 4 significant figures.
3. Evaluate  $(\Delta - 1)(2\Delta + 1)(x^2 + x + 2)$  Interval of differencing being unity.
4. Express  $f(x) = x^4 + x + 10$  in factorial notation.
5. State Newton's - Gregory forward interpolation formula.
6. Construct a table of divided difference for the data.  

x :	0	1	4	5
f(x) :	8	11	68	123
7. If  $u_0 = 3, u_1 = 12, u_2 = 81, u_3 = 200, u_4 = 100$  and  $u_5 = 8$  Find the value of  $\Delta^5 u_0$ .
8. State Simpson's three - eight rule.

9. Using trapezoidal rule evaluate  $\int_0^6 y dx$  for the data.

x:	0	1	2	3	4	5	6
y:	0.146	0.161	0.167	0.190	0.204	0.217	0.230

10. Evaluate  $\int_{0.2}^{1.4} y dx$  using weddle rule for the data.

x:	0.2	0.4	0.6	0.8	1.0	1.2	1.4
y:	0.199	0.389	0.565	0.717	0.841	0.932	0.985

11. Solve  $y_{x+2} - 5y_{x+1} + 6y_x = 0$ .

12. Solve  $9y_{x+2} - 6y_{x+1} + y_x = 0$

### SECTION - B

Answer any **FIVE** of the following :

(5×6=30)

1. In a triangle ABC,  $b = 2.5$  cm  $c = 4.5$  cm and  $A = 30^\circ$  find the allowable errors in  $b$ ,  $c$  and  $A$  such that the area of a triangle may be determined to the nearest square centimeter.
2. Using the method of false position find a real root of  $x^3 - 4x + 1 = 0$  over the interval  $(0,1)$  correct to 3 places of decimal.
3. Use Gauss - Seidal method to solve

$$\begin{aligned}5x - y &= 9 \\ x - 5y + z &= -4 \\ y - 5z &= 6\end{aligned}$$

4. From the table find the value of  $f(8.2)$  by using Newton's Gregory forward interpolation formula.

x:	8.0	8.5	9.0	9.5	10.0
f(x):	50	57	64	17	78

5. Find the polynomial  $f(x)$  which takes the values

x	0	1	2	3	4
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f(x)	3	6	11	18	27
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6. Using Newton's divided difference formula, find the value of f(5) from the following table.

x:	-2	1	3	7	8
f(x):	10	4	40	424	620

7. Given

x:	3	7	9	10
f(x):	168	120	72	63

Find f(6) using Lagranges formula

8. Find  $\frac{dy}{dx}$  and  $\frac{d^2y}{dx^2}$  at x = 1.6. given that

x	1	1.1	1.2	1.3	1.4	1.5	1.6
y	7.989	8.403	8.781	9.129	9.451	9.750	10.031

### SECTION - C

Answer any FIVE of the following questions:

(5×6=30)

1. Using

i) Trapezoidal rule

ii) Simpson's  $\frac{1}{3}$ rd rule evaluate  $\int_4^{5.2} \log x dx$  by dividing the interval (4,5.2) in to six equal parts.

2. Using picards Method find the solution of  $\frac{dy}{dx} = x^2 + y^2$  Subjected to the condition  $y(0) = 0$  up to third approximation and obtain y at x = 0.4.

3. Using Euler's modified method solve  $\frac{dy}{dx} = y - x^2$  where  $y(0) = 1$  in three steps with  $h = 0.2$ .

4. Use Runge - Kutta method solve  $\frac{dy}{dx} = x + y^2$ , Given  $y(0) = 1$  for x = 0.2 (0.2) 0.4.

5. Solve  $y_{x+2} - 5y_{x+1} + 6y_x = x^2$

6. Solve  $y_{x+2} - 2y_{x+1} + y_x = 2^x$  with  $y_0 = 2, y_1 = 1$ .

7. Solve  $y_{x+1} - e^{2x-1}y_x = 5xe^{x^2}$

8. Solve  $y_{x+2} - 4y_{x+1} + 4y_x = \sin x$  with initial condition  $y_0 = y_1 = 0$ .