Roll No. _____

SVIS 331 A-2K13

B.Sc. VIth Semester Degree Examination

Mathematics

(Numerical Analysis)

Paper - 6.1

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. If 0.667 is the approximate value of $\frac{2}{3}$ find the absolute relative and percentage errors.
2. Find the relative error of the approximate number x=2.354 if all its digits are valid.
3. Define Absolute and Relative errors.
4. Find the relation between α, β and γ in order that $\alpha+\beta x+\gamma x^2$ may be expressible in one term in the factorial notation.
5. Find the function whose first difference is e^x.
6. Prove that $(1+\Delta)(1-\nabla)=1$
7. Prove that

   $\Delta^4 y_0 = y_4 - 4y_3 + 6y_2 - 4y_1 + y_0$
8. If $u_0=3, u_1=12, u_2=81, u_3=200, u_4=100, u_5=8$ find the value of $\Delta 540$.
9. Define Interpolation and extrapolation.
10. Write Newton's divided difference formula.
11. Evaluate $\int_0^4 \frac{dx}{1+x^2}$ by dividing the interval into five equal parts.
12. State simpson's 1/3 rule for numerical integration of $f(x)$.

Section - B

Answer any **five** of the following: **(5×6= 30)**

1. Find the product of 349.4 and 752.5 and state how many the result are trust worthy, given that the numbers are correct to 4 significant figures.

2. Solve, $x^3 - 2x - 1 = 0$, by Regula falsi method. Given that the root lies between 1 and 2.

3. Solve by Jocobi's iteration method, the equations.

$$20x + y - 2z = 17$$
$$3x + 20y - z = -18$$
$$2x - 3y + 20z = 25$$

4. Express $f(x) = 2x^3 - 3x^2 + 3x - 10$ in factorial notation and also find its successive differences.

5. Prove the identity

$$u_1x + u_2x^2 + u_3x^3 + \ldots\ldots\ldots to\ \infty = \frac{x}{1-x}u_1 + \frac{x^2}{(1-x)^2}\Delta u_1 + \frac{x^3}{(1-x)^3}\Delta^2 u_1 + \ldots\ldots\ldots to\ \infty$$

6. Given

x	1	2	3	4	5	6
$f(x)$	1	8	27	64	125	216

Estimate f(2.5).

7. The following table is given

x	0	1	2	5
f(x)	2	3	12	147

what is the form of $f(x)$?

Section - C

Answer any **five** of the following **(5×6= 30)**

1. Find, dy/dx and d^2y/dx^2 at $x = 3.5$ from the table.

x:	2	3	4	5	6
$y=f(x)$	0.3010	0.4771	0.6020	0.6990	0.7781

2. The following table, gives the values of $\sin\theta$ for different values of θ.

θ	0°	10°	20°	30°	40°
$\sin\theta$	0.000	0.1736	0.3420	0.5000	0.6428

Find the value of Cos10°.

3. The co-ordinates (x,y) of points on a curve y = f(x) are given in the following table.

x	0	0.2	0.4	0.6	0.8	1.0	1.2
y	1	1.1	1.3	1.5	1.6	1.4	1.3

Using Simpson's 3/8th rule find the volume of revolution obtained when the curve is bounded by the lines x = 0 and x=1.2 is rotated about x-axis through 2π radians.

4. Calculate $\int_4^{5.2} \log x\,dx$ by using weedle, s rule with seven ordinates.

5. Using Picards method of successive approximation find the solution of the equation $\frac{dy}{dx} = 1 + xy$, subject to the condition $y = 0$ when x=0, upon third approximation and obtain y when $x = 0.2$.

6. Find by Taylor's series method the value of y at x = 0.2 correct to four decimal places if y(x) satisfies, $dy/dx = x - y^2$ and y(0)=1.

7. Solve $dy/dx = 1 + xy$ with initial condition y(3)=5 for x = 5 by Runge kutta method.
