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SVIS 363 A-2K12

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) The absolute error of the number $x = 305.1796$ is 0.3 find out which of the digit of x is valid and round off the number x having only valid digits.

2) If the absolute error is 0.005 and Relative error is 3.264×10^{-6}. Find the true value and percentage error

3) State Newton - Raphson's method for solving a non - linear equation $f(x) = 0$

4) Evaluate, $\Delta \tan^{-1}(ax)$

5) Prove that, $\Delta - \nabla = \Delta\nabla$ with usual notation.

6) If, $u_0 = 4, u_1 = 8, u_2 = 21, u_3 = 75, u_4 = 32, u_5 = 16$ and $u_6 = 10$, find the value of $\Delta^6 u_0$

7) Prove the identity $u_4 = U_3 + \Delta U_2 + \Delta^2 U_1 + \Delta^3 U_1$

8) Represent $3x^2 + 2x - 5$ in factorial notation

9) State Lagrange's interpolation formula for unequal intervals

10) State Newton's divided difference formula

11) Using Trapezoidal rule evaluate $\int_0^1 e^x dx$ given that

x :	0	0.2	0.4	0.6	0.8	1.0
y_x :	1	1.2114	1.4918	1.8221	2.2255	2.7183

12) Using Picard's method of successive approximations, find the solution of $\frac{dy}{dx} = 1 + xy$ subject to the condition $y = 0$ when $x = 0$, upto second approximation.

Section - B

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

1) Find the product 346.1 and 865.2 and state how many figures of the result are trust-worthy, given that the numbers are correct to 4 significant figures.

2) Solve, $x^3 + 2x^2 + 10x - 20 = 0$, by Regula - falsi method, given that the root lies between 1 and 1.5

3) Solve by Gauss elimination method
$$2x + y + 4z = 16$$
$$3x + 2y + z = 10$$
$$x + 3y + 3z = 16$$

4) Find the polynomial whose first difference is $g(x) = 9x^2 + 11x + 5$

5) Prove that, $u_0 + xC_1 \Delta u_1 + xC_2 \Delta u_2 + ...$
$$= u_x + xC_1 \Delta^2 u_{x-1} + xC_2 \Delta^4 u_{x-2} + ...$$

6) Estimate population for the year 2006 from the following table

Year :	1971	1981	1991	2001	2011
Population in Crores :	46	66	81	93	101

7) Use Newton - Gregory formula to find a polynomial in x for the data.

x :	0	1	2	3
$f(x)$:	2	3	12	35

Section - C

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

1) Find $f(x)$ and $f''(x)$ of the function $f(x)$ at $x = 1.5$ given

x :	1.5	2.0	2.5	3.0	3.5	4.0
$f(x)$:	3.375	7.000	13.625	24.000	38.875	59.000

2) The following table gives the temperature θ in degrees centigrade of a Cooling body at different instants of time t in seconds

θ	:	1	3	5	7	9
t	:	85.3	74.5	67.0	60.5	54.3

Find the rate of cooling at $t = 8$ seconds.

3) Using Simpson's $\frac{1}{3}$ rule, evaluate, $\int_0^3 \frac{dx}{1+x}$ by dividing the interval (0, 3) into Six equal ports.

4) Evaluate $\int_{0.2}^{1.4} e^{2x} dx$, using Weedle's rule with seven ordinates.

5) Using Picard's method of successive approximation obtain a solution upto fifth approximation of the equation $\frac{dy}{dx} = x + y$, given $y = 1$ when, $x = 0$. Find the value of $\frac{1}{3}$ for $x = 0.2$ and $x = 0.4$

6) Using Taylor's series find the seduction of $x\frac{dy}{dx} = x - y$, $y(2) = 2$ at $x = 2.1$ correct to five decimal places.

7) Solve, $\frac{dy}{dx} = x + y^2$ for $x = 0(0.2)0.4$, given that y = 0 when $x = 0$ by Runge Kutta method.
