

Roll No. _____

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SVIS - N 325 A-17
B.Sc. VIth Semester Degree Examination
Mathematics
(Numerical Analysis)
Paper : 6.1
(New)

Time : 3 Hours

Maximum Marks : 80

Instructions to Candidates :
Answer all Sections.

SECTION - A

I. Answer any Ten of the following : (10 × 2 = 20)

- 1) If 0.182 is the approximate value of $\frac{2}{11}$, find the absolute, relative and percentage errors.
- 2) If 0.2222 and 0.5174 are approximate values of two numbers $\frac{2}{9}$ and $\frac{4}{7}$ respectively, then find absolute and relative error in their sums.
- 3) If $f(x)$ and $g(x)$ are any two functions then prove that
$$\Delta \left\{ \frac{f(x)}{g(x)} \right\} = \frac{g(x)\Delta f(x) - f(x)\Delta g(x)}{g(x+h)g(x)}$$
- 4) If $\Delta^3 \{(1 + \alpha x)(1 - 2x)(1 + 4x)\} = -144$ for $h = 1$, find α .
- 5) State Newtons-Gregory forward interpolation formula.
- 6) Construct a forward difference table for the following data

x :	8.0	8.5	9.0	9.5	10
$f(x)$:	50	57	64	70	78

7) Construct a Newtons Divided difference table for the following data

$x:$	0	1	4	5
$f(x):$	8	11	68	123

8) State Trapezoidal rule for Numerical integration of $f(x)$.

9) Use Trapezoidal rule to evaluate $\int_4^{5.2} y_x dx$ given

$x:$	4	4.2	4.4	4.6	4.8	5.0	5.2
$y_x:$	1.386	1.435	1.482	1.526	1.569	1.609	1.649

10) Evaluate $\int_0^6 \frac{dx}{1+x^2}$ by using Weddle's rule.

11) Solve $y_{x+2} - 2y_{x+1} - 3y_x = 0$.

12) Solve $16y_{x+2} - 8y_{x+1} + y_x = 0$.

SECTION - B

II Answer any Five of the following :

(5 × 6 = 30)

1) Given $R = \frac{r^2}{2h} + \frac{h}{2}$. If the error in R is not allowed to exceed 0.4%, find percentage error, allowable in r and h when $r = 5.1$ cm and $h = 5.8$ cm.

2) Solve $x^3 - 9x + 1 = 0$ over the interval (2, 4). Find the root correct to three places of decimal by the method of false position.

3) Solve by Gauss elimination method

$$x + y + z = 6$$

$$3x + 3y + 4z = 20$$

$$2x + y + 3z = 10.$$

4) From the table find the value of $e^{0.24}$ by using Newtons-Gregory forward interpolation formula.

$x:$	0.1	0.2	0.3	0.4	0.5
$y:$	1.10517	1.22140	1.34986	1.49182	1.64872

5) Find the cubic polynomial which takes the following values

$x:$	0	1	2	3
$f(x):$	1	2	1	10

6) The following table gives the normal weights of babies during the first few months of life.

Age in months :	2	5	8	10	12
Weight in Kgs :	4.4	6.2	6.7	7.5	8.7

7) By constructing a difference table find the 10th term of the sequence 3, 14, 39, 84, 155, 258,

8) A function is specified by the following table

$x:$	1.00	1.05	1.10	1.15	1.20	1.25	1.30
$f(x):$	1.00	1.0247	1.0488	1.0723	1.0954	1.1180	1.1401

Find y' and y'' at $x=1$.

SECTION - C

III Answer any five of the following.

(5 × 6 = 30)

1) Using

i) Trapezoidal rule

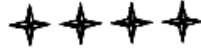
ii) Simpson's $\frac{1}{3}$ rule,

Evaluate $\int_0^3 \frac{dx}{1+x}$ by dividing the interval (0, 3) into six equal parts.

2) 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 third approximation and obtain y when $x = 0.2$.

3) Using Eulers modified method, solve $\frac{dy}{dx} = x^2 + y$ where $y = 0.94$ when $x = 1$ for $x = 0.1$.

- 4) Find the approximate solutions at $x = 1.2$ of the equation $\frac{dy}{dx} = xy$. Given $y(1) = 2$ by Runge Kutta method.
- 5) Solve the non-homogeneous linear differential equation $y_{x+1} - 2y_x = x + 1$.
- 6) Solve $y_{x+2} - 5y_{x+1} + 6y_x = 36$.
- 7) Solve $y_{x+2} - 7y_{x+1} + 10y_x = 12(4^x)$.
- 8) Solve $y_{x+1} - xy_x = x^2$, given that $y_0 = 1$.



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