

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

SVIS-N-116-B-21  
B.Sc. VI Semester Degree Examination  
MATHEMATICS  
Numerical Analysis - II  
Paper : BMDSE6CT  
(New)

Maximum Marks : 80

Time : 3 Hours

*Instructions to Candidates:* Answer ALL Sections.

SECTION-A

$(10 \times 2 = 20)$

I. Answer any TEN questions.

1. Define Numerical Differentiation of First Derivative by using NFIF.
2. Write the Formula to get the value of  $f'$  and  $f''$  at the initial Point  $x_0$ .
3. By using Newton's Backward interpolation formula, Write the Formula to get the value of  $f'$  &  $f''$  at end point  $x=x_n$ .
4. Using General Quadrature Formula, Write the Trapezoidal Rule.
5. Define Simpson's One-third Rule for Numerical Integration.
6. Define Simpson's Three-Eight Rule.
7. Define Picards Method of Successive Approximations to solve ODE.
8. Write the Formula Taylor's series Method for IVP.
9. Define second-order Runge-Kutta formula to solve IVP(Initial Value Problem - IVP).
10. Write Adams-Bash forth Predictor Formula for the value is  $y_{(t+1)}(P)$ .
11. Define Boundary Conditions.
12. Write the Boundary Conditions of the First Kind and Second Kind.

### SECTION - B

**II.** Answer any THREE of the following.

**(3×5=15)**

- Find  $f'(0.4)$  given table below.

x	0.1	0.2	0.3	0.4
$f(x)$	1.10517	1.22140	1.34986	1.49182

- Given:

x	1.96	1.98	2.00	2.02	2.04
y	0.7825	0.7739	0.7651	0.7563	0.7473

Find  $y'$  and  $y''$  at 2.03.

- Evaluate  $y'(0)$  and  $y''(0)$  from the data.

x	0	1	2	3	4	5
y	4	8	15	7	6	2

- Find  $f'(1.1)$  and  $f''(1.1)$  using the table:

x	1	1.2	1.4	1.6	1.8	2.0
$y = f(x)$	0	0.128	0.544	1.296	2.432	4

### SECTION - C

**III.** Answer any THREE of the following.

**(3×5=15)**

- Evaluate  $\int_{-3}^3 x^4 dx$  by Trapezoidal rule by choosing  $h=1$ .

- By Simpson's 1/3<sup>rd</sup> rule to evaluate  $\int_0^6 \frac{dx}{(1+x)^2}$  correct to 3-places decimal in the step of 1 unit.

3. Evaluate  $\int_3^6 y_i dx$  using Weddle's rule from the following data.

$x$	3	3.5	4	4.5	5.0	5.5	6.0
$y_i$	0.4771	0.5440	0.6020	0.6532	0.6996	0.7404	0.7782

4. Evaluate  $\int_0^1 \frac{x}{1+x^2} dx$  by using Simpson's 3/8<sup>th</sup> rule.

### SECTION - D

V. Answer any THREE of the following. (3×5=15)

1. Solve  $\frac{dy}{dx} = x^2 + y^2$ ,  $y(0) = 0$  at  $x = 1$  by Taylor's Method.

2. Use Euler's Method to approximate  $y$  when  $x=0$  given that  $\frac{dy}{dx} = \frac{y-x}{y+x}$  with  $y=1$  for  $x=0$ .

3. Solve the initial value problem  $\frac{dy}{dx} = y - x$   $y(0)=2$  at the points  $x=0.1$  and  $0.2$  correct to Four decimal places.

4. Given  $\frac{dy}{dx} = \frac{1}{x+y}$   $y(0)=1$  for  $x=0.5(0.5)$  by Runge-Kutta Fourth Order Method.

### SECTION - E

V. Answer any THREE of the following. (3×5=15)

1. Given  $\frac{dy}{dx} = x^2(1+y)$  and  $y(1)=1$   $y(1.1)=1.233$ ;  $y(1.2)=1.548$ ;  $y(1.3)=1.979$  Evaluate  $y(1.4)$  by using Adams-Bashforth Method.

2. Given  $\frac{dy}{dx} = x(x^2 + y^2)e^{-x}$ ,  $y(0)=1$  Find  $y$  at  $x=0.102$  and  $0.3$  by Taylor's Series Method and compute  $y$ , at  $0.4$  by Milne's Method.

(3)

[Contd....]

3. Find  $y(0.4)$  for IVP  $\frac{dy}{dx} = xy + y^2$ ,  $y(0) = 1$  by the Milne's Method Given that  
 $y(0.1) = 1.1169$ ;  $y(0.2) = 1.2773$ ;  $y(0.3) = 1.5049$ ;
4. Using Finite difference method, Solve the boundary value problem  $y'' = x + y$ ,  $y(0) = 0$ ;  
 $y(1) = 0$  by choosing  $h = \frac{1}{4}$ .
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