



**RAN-0951**

**B.Sc. (Sem.-IV) Examination**

**March / April - 2019**

**Mathematics -MTH - 402**

**Numerical Analysis-II (New Course)**

**[ Total Marks: 50**

**સૂચના : / Instructions**

(1)

નીચે દર્શાવેલ નિશાનીવાળી વિગતો ઉત્તરવહી પર અવશ્ય લખવી.  
Fill up strictly the details of signs on your answer book

Name of the Examination:

**B.Sc. (Sem.-IV)**

Name of the Subject :

**Mathematics -MTH - 402**

Subject Code No.: **0 9 5 1**

Seat No.:

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Student's Signature

(2) All questions are compulsory.

(3) Follow usual notations.

(4) Figures to the right indicate total marks of the question.

(5) Use of Scientific non-programmable calculator is allowed.

**Que:1 Answer any FIVE as directed.**

**[10]**

(1) Use divided difference interpolation formula to obtain the function  $y(x)$  for the given data (1, -5) and (2, -3).

(2) If  $y(x) = \frac{1}{x}$ , then find the value of  $[x_1, x_2, x_3]$ .

(3) Prove that  $[x, y] = [y, x]$ .

(4) Write the Lagrange's formula for unequally spaced values of argument.

(5) Construct the divided difference table for the following data:

<b>x:</b>	-1	2	3	6
<b>y:</b>	-4	2	10	16

(6) Write the formula to find the first and second derivatives at the point  $x = x_n$ .

(7) Write all the subintervals of  $[0,18]$  for applying Simpson's Rule, taking  $n = 6$

(8) Define : Initial Value Problem

**Que:2 Attempt any TWO.**

**[10]**

(1) If the arguments be equally spaced, then prove that the  $n^{th}$  divided difference would be a constant.

(2) Use Lagrange's Interpolation Formula to obtain the value of  $y(6)$ :

<b>x:</b>	5	7	11	13	21
<b>f(x):</b>	15	39.2	145.2	236.6	970.2

(3) Express the rational function  $f(x) = \frac{x^2 + x - 3}{x^3 - 2x^2 - x + 2}$  as a sum of partial fraction.

**Que:3 Attempt any TWO.**

**[10]**

(1) Derive the formula to find the second order differentiation at the point  $x = x_0$ .

(2) Find  $\left[ \frac{dy}{dx} \right]_{x=3}$  from the tabulated values:

<b>x:</b>	3	3.2	3.4	3.6	3.8
<b>y:</b>	-14	-10.032	-5.296	-0.256	6.672

(3) The following table of values  $x$  and  $y$  is given, find the value of the second derivative when  $x = 2.2$  :

<b>x :</b>	1.4	1.6	1.8	2.0	2.2
<b>y:</b>	4.0552	4.9530	6.0496	7.3891	9.0250

**Que:4 Attempt any TWO.**

**[10]**

- (1) State and prove Simpson's  $\frac{3}{8}$  rule.
- (2) Use Trapezoidal rule to find the integral  $\int_0^{\frac{\pi}{2}} \sqrt{\sin \theta} d\theta$ ; where  $n = 6$
- (3) Use Simpson's  $\frac{1}{3}$  rule to evaluate the integral  $\int_1^3 \frac{1}{x^2} dx$  by taking nine intervals.

**Que:5 Attempt any TWO.**

**[10]**

- (1) Explain Picard's method to solve the initial value problem,  
 $\frac{dy}{dx} = f(x, y)$ , where  $y(x_0) = y_0$ .
- (2) Using Taylor's series method solve the initial value problem,  
 $\frac{dy}{dx} = y + x^2$ ,  $y(0) = 1$ . Obtain  $y$  for  $x = 0.01, 0.02$
- (3) Using Euler's method solve the initial value problem,  
 $\frac{dy}{dx} + 2y = 0$ ,  $y(0) = 1$ . Obtain  $y(0.1)$ ,  $y(0.2)$  and  $y(0.3)$ .

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