North Gauhati College

Department of Mathematics

Sessional Examination 2021

Numerical Methods (MAT-HC-4026)

QUIZ #1

Full Marks: 30 Time Duration: $1\frac{1}{2}$ hour

INSTRUCTIONS TO CANDIDATES

1. This question paper contains **Six (6)** questions and comprises **Two (2)** printed pages.
2. Answer all the questions.
3. Write your **Name**, **GU Roll No.**, and **Registration Number** .
4. Submit the solutions as a single **PDF** file through the online portal of our college website under section "**Assignments**".

---

1. Answer the following questions : [1×5]
   (a) Evaluate $\Delta \tan^{-1} x$.
   (b) Prove that $\Delta \log x = \log\left[1 + \frac{\Delta f(x)}{f(x)}\right]$.
   (c) Evaluate $\Delta^2\left(\frac{1}{x-1}\right)$ taking $h = 1$.
   (d) What do you mean by numerical integration ?
   (e) Find $f(6)$, it is given $f(0) = -3,\ f(1) = 6,\ f(2) = 8,\ f(3) = 12$ the third difference being constant.
2. Given $\sin 45° = 0.7071,\ \sin 50° = 0.7660,\ \sin 55° = 0.8192,\ \sin 60° = 0.8660$, find $\sin 52°$ by using any method of interpolation. Mention why you have chosen the particular method. [5]
3. Establish the Newton-Raphson formula

$$x_{n+1} = x_n - \frac{f(x_n)}{f'(x_n)}$$

Mention two situations where the formula fails to give a solution.

4. The velocity v(km/min) of a car which starts from rest, is given at fixed intervals of time t(min) as follows:

t :	2	4	6	8	10	12	14	16	18	20
v :	10	18	25	29	32	20	11	5	2	0

   Establish approximately the distance covered in 20 minutes. [5]

5. A second degree polynomial passes through $(0, 1)$, $(1, 3)$, $(2, 7)$ and $(3, 13)$ .Find the polynomial. [5]

6. Evaluate $\int_0^6 \frac{1}{1+x^2}$ using Simpson's $\frac{3}{8}$th rule . [5]

END OF PAPER