

North Gauhati College

Department of Mathematics

Sessional Examination 2021

Algebra (MAT-HG-2016/MAT-RC-2016)

QUIZ #1

Full Marks: 30

Time Duration:  $1\frac{1}{2}$  hour

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INSTRUCTIONS TO CANDIDATES

1. This question paper contains **Five (5)** questions and comprises **One (1)** printed page.
  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**”.
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1. Answer the following questions : [5+5=10]
  - (a) Prove that set of natural number is a group with respect to addition.
  - (b) Show that a cyclic group is abelian.
2. Solve the equation  $x^3 - 5x^2 - 16x + 80 = 0$ , the sum of two of its roots being zero. [5]
3. The equation  $x^4 + 4x^3 - 2x^2 - 12x + 9$ , has two pairs of equal roots, find them. [5]
4. Obtain the inverse of the following matrix, if exists using elementary row operations:

$$A = \begin{bmatrix} 0 & 1 & 2 \\ 1 & 2 & 3 \\ 3 & 1 & 1 \end{bmatrix}$$

[5]

5. Suppose that  $A$  is invertible, show that  $A^T A$  is invertible and  $A^{-1} = (A^T A)^{-1} A^T$ . [5]

**END OF PAPER**