

Roll No.

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S-250

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B. A./B. Sc. (Fourth Semester)

EXAMINATION, 2019

MATHEMATICS

(Algebra)

(SOS/Maths/DSC-004)

Time : Two Hours]

[Maximum Marks : 70

Note : (i) Attempt any *five* questions from Section A and any *three* questions from Section B.

(ii) Answer each question of Section A within 50 words.

(iii) Limit your answers within the given answer book. Additional answer book (B-Answer book) should not be provided or used.

Section—A

Note : Attempt any *five* questions. Each question carries 5 marks.

1. If in a group G , $a^5 = e$, $aba^{-1} = b^2$ for $a, b \in G$, show that $o(b) = 1$ if $b = e$ and $o(b) = 31$ if $b \neq e$.

(B-21) P. T. O.

- Define modulo system and also find remainder of 2^{1008} by 7 with the help of modulo system.
- Define simple group with an example.
- Define Ring. Give example of a ring without unity element.
- Define permutations with example and also find order of this permutation $f = \begin{pmatrix} 1 & 2 & 3 & 4 & 5 & 6 \\ 1 & 6 & 5 & 3 & 4 & 2 \end{pmatrix}$.
- Define group of a symmetry with an example.
- Prove that intersection of two subgroups of a group is a subgroup.

Section—B

Note : Attempt any *three* questions. Each question carries 15 marks.

- State and prove Lagrange's theorem.
- Every finite group (G) is isomorphic to its permutation group. <https://www.hnbguonline.com>
- Prove that the set $R = \{0, 2, 4, 6, 8\} \pmod{10}$ is a ring with unity with respect to addition and multiplication.
- Give an example of a ring which is not an integral domain.
- Give an example to show that the union of two subrings is not necessarily a subring.

(B-21)

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13. Define the following with example :

- (a) Quotient group**
- (b) Field**
- (c) Ideal**
- (d) Cosets**
- (e) Normal subgroup**

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