

2003000204040055
EXAMINATION FEBRUARY-MARCH 2024
BACHELOR OF SCIENCE (FOURTH SEMESTER)
GROUPS OF SYMMETRIES-II-LEVEL 4

[Time: As Per Schedule]

[Max. Marks: 50]

Instructions:

1. Fill up strictly the following details on your answer book
 - a. Name of the Examination : **BACHELOR OF SCIENCE (FOURTH SEMESTER)**
 - b. Name of the Subject : **GROUPS OF SYMMETRIES-II LEVEL 4**
 - c. Subject Code No : **2003000204040055**
2. Sketch neat and labelled diagram wherever necessary.
3. Figures to the right indicate full marks of the question.
4. All questions are compulsory.

Seat No:

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Student's Signature

Q.1 Check the validity of the following statements. (Any six)

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- 1) The group of symmetries of an isosceles triangle is a group of order 4.
- 2) The group of symmetries of trans N_2-F_2 contains Rotation symmetry of order 2.
- 3) The multiplicative group of the fourth-roots of unity is isomorphic to group of symmetries of an equilateral triangle.
- 4) The group of symmetries of a rectangle is a cyclic group.
- 5) PCl_3 is a planer molecule.
- 6) The group of symmetries of a rectangle is isomorphic to that of NH_3 .
- 7) In a group of symmetries of PCl_3 each element is self inverse.
- 8) The group of symmetries of H_2S is isomorphic to that of a rectangle.

9) The group of symmetries of H_2O_2 is isomorphic to that of a square.

Q.2 Attempt any Two.

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- 1) Show that the symmetries of a rectangle is a group under composition of symmetry. Is it abelian group?
- 2) Discuss all possible symmetries of an equilateral triangle using figures. Does there exist a generator?
- 3) Discuss about the different types of symmetries of a geometric figure of Square.

Q.3 Attempt any Two.

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- 1) Show that the set of all possible symmetries of H_2O is a group under composition of symmetry. Is it cyclic group?
- 2) Show that the set of all possible symmetries of $\text{H}_2\text{-O}_2$ is a group under composition of symmetry.
- 3) Explain by drawing figures, different types of symmetries of a molecule NH_3 .

Q.4 Attempt any Two.

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- 1) Explain Isomorphism of two groups with illustration.
- 2) Check whether the multiplicative group $G = \{6,12,18,24\}$ with X_{30} is isomorphic to group of symmetries of a rectangle.
- 3) Show that the group of symmetries of an equilateral triangle is isomorphic to that of CHCl_3 .
