RAN-2003000204040055

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S. Y. B. Sc. (Sem. - IV) Examination April - 2023

Mathematics : G.E.

Elective Generic (Group of Symmetries - 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:

☛ **S. Y. B. Sc. (Sem. - IV)**

Name of the Subject :

☛ **Mathematics : G.E. Elective Generic (Group of Symmetries - II) (New Course)**

Subject Code No.: **2003000204040055**

Seat No.:

Student's Signature

(2) All questions are compulsory.

(3) Figures to the right indicate marks of the corresponding question.

Q. 1. Check the validity of the following statements. (Any six) **06**

1. The group of symmetries of a rectangle is a cyclic group.
2. NH_3 is a planer molecule.
3. The multiplicative group G = {1,3,5,7} with X_8 is isomorphic to group of symmetries of a rectangle .
4. The group of symmetries of an Equilateral triangle is an abelian group of order 2.
5. The group of symmetries of a square is an abelian group of order 4.
6. The multiplicative group G = {6,12,18,24} with X_{30} is isomorphic to group of symmetries of a rectangle.
7. The group of symmetries of $H_2 - O_2$ is a cyclic group.
8. The multiplicative group of the square-roots of unity is isomorphic to group of symmetries of an isosceles triangle.

Q. 2. **Attempt any Two.** **14**

1. Explain by drawing figures, different types of symmetries of an equilateral triangle. Also write the order of each of these symmetries.
2. Show that the set of all possible symmetries of an isosceles triangle is a group under operation of composition of symmetries. Is it a cyclic group?
3. Explain by drawing figures, different types of symmetries of a square. Also write the order of each of these symmetries.

Q. 3. **Attempt any Two.** **16**

1. Explain all possible symmetries of Trans N_2-F_2. Prepare Composition table. Write order of each symmetry operation.
2. Discuss the all possible symmetries of a molecule $CHCl_3$ using figures.
3. Show that the set of all possible symmetries of H_2S is a group under composition of symmetry. Is it Abelian group?

Q. 4. **Attempt any Two.** **14**

1. Show that the group of symmetries of Trans N_2-F_2 is isomorphic to that of a Rectangle.
2. Show that the group of symmetries of an equilateral triangle is isomorphic to that of PCl_3.
3. Check whether the multiplicative group of the forth-roots of unity is isomorphic to group of symmetries of a rectangle or not.

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