

2403000503043001
EXAMINATION NOVEMBER 2024
BACHELOR OF SCIENCE (NEP) (THIRD SEMESTER)
MH-MDC-301 GROUP OF SYMMETRIES - 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 (NEP) (THIRD SEMESTER)**
 - b. Name of the Subject: **MH-MDC-301 GROUP OF SYMMETRIES - LEVEL 4**
 - c. Subject Code No: **2403000503043001**
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 Answer the following: (Any Ten)

10

- 1) Write the order of Identity Symmetry Operation.
- 2) What is order of group of symmetries of a square?
- 3) check the validity of the statement: PCl_3 is a planer molecule.
- 4) Define: Abelian Group
- 5) The order of group of symmetries of NH_3 is same as that of _____
(an isosceles triangle, a rectangle, an Equilateral triangle)
- 6) Define: Cyclic Group
- 7) Define: Isomorphism of two groups.
- 8) Write all possible symmetries of molecule H_2S .
- 9) The multiplicative group of the square-root of unity is isomorphic to group of
Symmetries of _____
(an isosceles triangle, a rectangle, an Equilateral triangle)
- 10) State all possible symmetry elements in a space.
- 11) Check the validity of the statement: The Rotation symmetry operation is Denoted by R.
- 12) Show that the Identity elements in a group is unique.

Q.2 Answer the following: (Any Two) 10

- 1) Show that the set of all fourth roots of unity is a group with respect to the Operation of multiplication.
- 2) Define subgroup. Show that $(\mathbb{Q}, +)$ is a subgroup of $(\mathbb{C}, +)$.
- 3) Show that the set $G = \{ m^a : a \in \mathbb{Z}, m \text{ is a fixed non-zero integer} \}$ is an infinite Abelian group with the operation of multiplication.

Q.3 Answer the following (Any Two) 10

- 1) Explain Reflection symmetry with illustration.
- 2) Explain the general idea of symmetry with illustrations.
- 3) Discuss about the all possible symmetries of an English capital letter 'E'

Q.4 Answer the following (Any Two) 10

- 1) Explain by drawing figures, different types of symmetries of an equilateral triangle.
- 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? Justify your answer.
- 3) Obtain the Group table of trans N_2-F_2 under composition of symmetry. Is it Commutative group? Justify your answer.

Q.5 Answer the following (Any Two) 10

- 1) Check whether the multiplicative group $G = \{ 6, 12, 18, 24 \}$ with X_{30} is isomorphic To group of symmetries of a rectangle or not.
- 2) Show that the group of Symmetries of a rectangle is isomorphic to that of H_2-O_2 .
- 3) Explain Isomorphism of two groups with illustration.
