

1903000203040054
EXAMINATION NOVEMBER 2024
BACHELOR OF SCIENCE (NON-NEP) (THIRD SEMESTER)
GROUPS OF SYMMETRIES – I - 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 (NON-NEP) (THIRD SEMESTER)**
- b. Name of the Subject : **GROUPS OF SYMMETRIES – I - LEVEL 4**
- c. Subject Code No : **1903000203040054**

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 four)

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1. Define: Generator in a group, Order of a group.
2. Show that in a group inverse of an element is unique.
3. Check the validity of the following statements:
 - (a) Rotation symmetry operation keeps a line fixed.
 - (b) Identity symmetry operation keeps a point fixed.
4. Explain Identity symmetry operation.
5. State the respective angles of Rotation in the symmetry operations C_2 , C_6 , C_4 .
6. In a group (G, \circ) Show that $(aob)^{-1} = b^{-1} oa^{-1}$

Q.2 Answer the following. (Any Two)

14

1. Show that the set of all possible square roots of unity is a group under operation of multiplication.
2. Show that the set of all complex numbers with operation of addition is an infinite abelian group.
3. Show that the set $G = \{6, 12, 18, 24\}$ is a group with respect to operation multiplication modulo 30.

Q.3 Answer the following. (Any Two)

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1. Show that a non-empty subset H of a group G is a subgroup of G if and only if $a, b \in H \Rightarrow ab^{-1} \in H$
2. Explain the general idea of symmetry with illustrations.
3. If G be the group of integers under addition, H a subset of G consisting of all the multiples of 5, then show that H is a subgroup of G .

Q.4 Answer the following. (Any Two)

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1. Explain Rotation symmetry with illustration.
2. State different types of symmetries. Also explain inversion symmetry operation.
3. Discuss about the all possible symmetries of an English capital letter 'H'.
