

- 3 (a) If G be the group of integers under addition, H a subset of G consisting of all the multiples of 3, then show that H is a subgroup of G . 8

OR

- (a) Show that a non-empty subset H of a group G is a subgroup of G if and only if $a, b \in H \Rightarrow ab^{-1} \in H$. 8
- (b) Attempt any one. 7
- (1) Define subgroup. Show that $(\mathbb{Q}, +)$ is a subgroup of $(\mathbb{R}, +)$.
- (2) Explain the general idea of symmetry with illustrations.
- 4 (a) Define : symmetry operation , order of an element. 8
Explain Inversion symmetry with illustration.

OR

- (a) Explain Rotation symmetry with illustration. 8
- (b) Attempt any one. 7
- (1) Show that the set of all square roots of unity is a group under operation of multiplication. Is it a cyclic group?
- (2) Explain Reflection symmetry with illustration.
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