



**JB-3200**

**Second Year B. Sc. (Sem. - IV) Examination**

**April/May - 2013**

**Group of Symmetries - II**

*(IDS - Mathematics)*

Time : 3 Hours]

[Total Marks : 70

**Instructions :**

(1)

नीचे दृशावेक निशानीवाणी विगतो उत्तरवाडी पर अवश्य कपवी. Fillup strictly the details of signs on your answer book.	Seat No. :
Name of the Examination :	<input type="text"/>
Second Year B. Sc. (Sem. - IV)	<input type="text"/>
Name of the Subject :	<input type="text"/>
Group of Symmetries - II	<input type="text"/>
Subject Code No. : <input type="text"/> 3 <input type="text"/> 2 <input type="text"/> 0 <input type="text"/> 0	Section No. (1, 2,.....) : <input type="text"/> Nil
Student's Signature	

- (2) All the Questions are compulsory.  
(3) Figures to the right indicate marks of the corresponding question.

- 1 Check the validity of the following statements. 6
- (1) The order of group of symmetries of  $H_2O$  is 2.
  - (2) The group of symmetries of a square is a cyclic group.
  - (3) The order of group of symmetries of a rectangle is four.
  - (4) The group of symmetries of  $H_2O_2$  is isomorphic to that of an equilateral triangle.
  - (5) The group of symmetries of a rectangle is a commutative group.
  - (6)  $PCl_3$  is a planar molecule.

- 2 (a) Show that the set of all possible symmetries of  $H_2O$  is a group under composition of symmetry. 8

**OR**

- (a) 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 ? 8
- 2 (b) Attempt any **one**. 8
- (1) Explain by drawing figures, different types of symmetries of an equilateral triangle.
  - (2) Explain all possible symmetries of a square.

- 3 (a) Show that the set of all possible symmetries of a rectangle is a group under composition of symmetry. 8

OR

- (a) Show that the set of all possible symmetries of an equilateral triangle is isomorphic to that of  $\text{PCl}_3$ . 8
- (b) Attempt any **one**. 8
- (1) Explain Isomorphism of two groups with illustration.
- (2) Show that the multiplicative group of the fourth-roots of unity is isomorphic to group of symmetries of a rectangle.
- 4 (a) Show that the set of all possible symmetries of  $\text{trans N}_2\text{F}_2$  is a group under composition of symmetry. 8

OR

- (a) Show that the set of all possible symmetries of  $\text{H}_2\text{O}_2$  is a group under composition of symmetry. 8
- (b) Attempt any **one**. 8
- (1) Show that the group of symmetries of  $\text{H}_2\text{S}$  is isomorphic to that of a rectangle.
- (2) Show that the multiplicative group  $G=\{1,3,5,7\}$  with  $X_8$  is isomorphic to group of symmetries of a rectangle.

- 5 (a) Explain all possible symmetries of a molecule  $\text{PCl}_3$ . 8

OR

- (a) Explain all possible symmetries of a molecule  $\text{NH}_3$ . 8
- (b) Attempt any **one**. 8
- (1) Show that the multiplicative group of the square-roots of unity is isomorphic to group of symmetries of an isosceles triangle.
- (2) Show that the group of symmetries of  $\text{trans N}_2\text{F}_2$  is isomorphic to that of a rectangle.