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DMM-3103

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

March / April - 2016

Group of Symmetries - II

(EG - Mathematics)

(New Course)

Time : **2** Hours] [Total Marks : **50**

Instructions :

(1)

નીચે દર્શાવેલ ☛ નિશાનીવાળી વિગતો ઉત્તરવહી પર અવશ્ય લખવી.
Fillup strictly the details of ☛ signs on your answer book.

Name of the Examination :

☛ **Second Year B. Sc. (Sem. IV)**

Name of the Subject :

☛ **Group of Symmetries - II (EG - Mathematics) (New)**

☛ Subject Code No. : **3 1 0 3** ☛ Section No. (1, 2,.....) : **NIL**

Seat No. :

Student's Signature

(2) All questions are compulsory.

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

1 Check the validity of the following statements : (Any **five**) **5**

(1) The multiplicative group of all forth roots of unity are isomorphic to group of symmetries of a rectangle.

(2) The order of group of symmetries of an isosceles triangle is 2.

(3) The group of symmetries of a square is a commutative group of order 4.

(4) PCl_3 is a planer molecule.

(5) The group of symmetries of H_2O is a cyclic group.

(6) The group of symmetries of a rectangle is an abelian group of order 6.

2 (a) Explain different types of symmetries of an equilateral triangle by drawing figures. **8**

OR

(a) Show that the set of all possible symmetries of a rectangle is a group under operation of composition of symmetries. Is it a cyclic group ? **8**

(b) Attempt any one : 7

(1) Explain by drawing figures different types of symmetries of a square.

(2) Show that the set of all possible symmetries of an isosceles triangle is a group under operation of composition of symmetries.

3 (a) Check whether the multiplicative group $G = \{6,12,18,24\}$ with X_{30} is isomorphic to group of symmetries of a rectangle or not. 8

OR

(a) Explain by drawing figures, different types of symmetries of NH_3. 8

(b) Attempt any one : 7

(1) Show that the set of all possible symmetries of trans N_2-F_2 is a group under composition of symmetry.

(2) Show that the set of all possible symmetries of H_2O is a group under composition of symmetry. Is it a commutative group ?

4 (a) Check whether the multiplicative group of the forth-roots of unity is isomorphic to group of symmetries of a rectangle or not. 8

OR

(a) Show that the multiplicative group of the square-roots of unity is isomorphic to group of symmetries of an isosceles triangle. 8

(b) Attempt any one : 7

(1) Show that the group of symmetries of an equilateral triangle is isomorphic to that of $CHCl_3$.

(2) Show that the group of symmetries of a rectangle is isomorphic to that of trans H_2-O_2.
