J-0877

Second Year B. Sc. Examination

March/April – 2013

Mathematics (IDS)

(Group of Symmetries)

(Old Course)

Time : Hours] [Total Marks : **35**

Instructions :

(1)

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

Name of the Examination :
☛ **S. Y. B. Sc.**

Name of the Subject :
☛ **Mathematics (IDS) (Old)**

☛ Subject Code No. : **0 8 7 7** ☛ 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 (a) Check the validity of the following statements. **4**

(1) Order of Reflection symmetry operation is I.

(2) The group of symmetries of a square is a cyclic group.

(3) Trans N_2F_2 is a planer molecule.

(4) Improper rotation symmetry keeps a line fixed.

(b) Fill in the blanks, selecting proper choice. **3**

(1) The order of group of symmetries of a regular hexagon is ______. (8,10,12)

(2) The inversion symmetry keeps a _______ fixed. (point, line, plane)

(3) The identity symmetry operation is denoted by ______. (I,E,C)

2 (a) Define inverse of an element in a group. Prove that $(aob)^{-1} = b^{-1}oa^{-1}$. **4**

(b) Show that the set G = {6, 12, 18, 24} is a group with respect to operation multiplication modulo 30. Is it a cyclic group ? **5**

(c) Explain the general idea of symmetry with illustration. **5**

OR

2 (a) Define : Group, order of a group. Show that cancellation laws hold in a group. **4**

(b) Show that the set G={ma : a$\in$Z, m is a fixed non-zero integer} is an infinite abelian group with the operation of addition. **5**

(c) Explain Reflection symmetry with illustration. **5**

3 (a) Explain by drawing figures all possible symmetries of a molecule NH_3. **4**

(b) Show that the symmetries of a rectangle is a group under composition of symmetry. **5**

(c) Discuss all possible symmetries of C_3H_4. **5**

OR

3 (a) Explain by drawing figures, different types of symmetries of a square. **4**

(b) Show that the set of all possible symmetries of N_2-F_2 is a group under composition of symmetry. **5**

(c) Explain Isomorphism of two groups with illustration. **5**