HDV-003-1103008 Seat No. _____

M. Sc. (Sem. III) (CBCS) Examination

November / December – 2017

Inorganic Chemistry

(C(I)-302 : Symmetry & Group Theory)

Faculty Code : 003

Subject Code : 1103008

Time : $2\frac{1}{2}$ Hours]   [Total Marks : **70**

Instructions :

(1) All questions are compulsory.

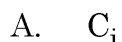(2) All questions carry equal marks.

1 Answer the following : (any **seven**)   **14**

    (a) Give the point group of given molecule.

        A. BF_3 B. $Cis\text{-}N_2F_2$

    (b) Explain improper axis of rotation (S_n)

    (c) What are symmetry Operations ?

    (d) Give the example of following point group

        A. C_i B. D_{4h}

    (e) Discuss the multiplication of Matrices with suitable example.

    (f) Define group and class in group theory.

    (g) Explain molecules which are highly symmetric.

    (h) Give the difference between reducible and irreducible representation.

    (i) Give 'Sine' Formula.

2 Answer the following : (any **two**)   **14**

    (a) Construct the character table for C_{2V} point group.

    (b) Give the Matrix representation of C_{3v} point group.

    (c) Using character table find out the number of irreducible representation (Γ_R) for T_d point group

        (Γ_σ = 4   1   0   0   0)

3 Answer the following : (any **two**) **14**

(a) Find out the number of vibrations in H_2O using character table and predict the Geometry and Hybridization using character table

C_{2V}				
Γ_{3N}	9	−1	1	3

(b) Give the section rule of Raman and IR spectra.

(c) Using sine formula show that 'D' term spits in to T_{2g} and E_g in Octahedral field.

4 Answer the following : **14**

(a) Find out the number of IR and Raman active bands in trans-N_2F_2 using character table

C_{2h}				
Γ_{3N}	12	0	0	4

(b) Explain the method to determine point group of any molecule.

5 Answer the following : (any **one**) **14**

(a) Derive Sine formula for splitting of orbital or energy levels in different symmetries.

(b) Write note on Great Orthogonality theorem.

———————