

(2)

- (a) Explain conjugacy relation and classes. 6
- (b) The character table of D_3 point group is given below. By direct product method determine the product $E \times E$ and reduce it into the sum of irreducible representations. 8

D_3	E	$2C_3$	$3C_2$
A_1	1	1	1
A_2	1	1	-1
E	2	-1	0

- (c) Evaluate the products σ_v , σ_y and $C_2\sigma_v$ for a C_{2v} point group. 6

Unit-II

2. (a) Describe ligand group orbitals and symmetry matched metal atomic orbitals appropriate for σ bonding in an octahedral ML_6 complex. 5
- (b) Explain uses of IR Spectra to determine structure of metal carbonyls. 10
- (c) Explain nephelauxetic effect. 5

OR

- (a) Using MOT explain why F^- is a weak ligand. 7
- (b) Describe preparation, properties and structure of $Ni(CO)_4$. 7

(3)

- (c) Write method of preparation and structure of dinitrogen complex. 6

Unit-III

3. (a) Describe spectrophotometric method for the determination of stability constant and composition of a complex. 7
(b) Explain structure of isopoly and heteropoly acids of W. 8
(c) Write a short note on silicides. 5

OR

- (a) What is chelate effect? Explain the factors affecting it. 7
(b) Describe classification of silicates with example. 7
(c) Write a short note on nitrides. 6

Unit-IV

4. (a) Explain structure of higher boranes. 8
(b) Explain structure of tetrameric phosphazenes. 6
(c) Write a short note on trinuclear, tetranuclear metal clusters. 6

OR

- (a) Describe method of preparation and structure of carboranes. 7
(b) Explain chain catenation and heterocatenation. 7
(c) Explain structure of borazines. 6