



SB-3426

M. Sc. (Part-I) (Self-Finance) Examination

March / April – 2011

Inorganic Chemistry : Paper-I

(Old Course)

Time : 3 Hours]

[Total Marks : 52

Instructions :

(1)

नीचे दशांशों के निशानों वाली विंगतों के उत्तरवही पर अवश्य लिखनी. Fillup strictly the details of signs on your answer book.	Seat No. :
Name of the Examination :	<input type="text"/>
<input type="checkbox"/> M. SC. (PART-I) (SELF-FINANCE)	<input type="text"/>
Name of the Subject :	<input type="text"/>
<input type="checkbox"/> INORGANIC CHEMISTRY : PAPER-1 (OLD)	<input type="text"/>
Subject Code No. : <input type="text"/> 3 <input type="text"/> 4 <input type="text"/> 2 <input type="text"/> 6	<input type="text"/>
Section No. (1, 2,.....): <input type="text"/> Nil	
	Student's Signature

- (2) Answer to the two sections should be written in the separate answer books.
- (3) Figures to the right indicate full marks of the questions.

SECTION - I

- 1 (a) Obtain energy expression of a particle in the surface of sphere. **9**
- (b) Write short note on shaft operators.
- (c) Obtain the quantum-mechanical expression's for eigen functions and eigen value of a rigid-rotator.

OR

- 1 (a) "Eigen values of a Hermitian operator are real". **9**
—Justify.
- (b) Define operator and give it's significance in quantum chemistry.
- (c) What is linear harmonic oscillator ? Show that total energy of the oscillator in one dimensional oscillation is

$$E = \frac{1}{2}kA^2.$$

- 2 (a) Construct character table for C_{3V} symmetry point group. 9
 (b) State and explain orthogonality theorem. Give its importance consequences.
 (c) What is similarity transformation ? Using matrices for symmetry operations C_{3V} of point group. Show that $6_{V(a)}$, $6_{V(b)}$, and $6_{V(c)}$ belong to the same class.

OR

- 2 (a) State the relation between reducible and irreducible representation. 9
 (b) Construct character table for C_{2V} symmetry point group.
 (c) Derive matrix transformation for plane of symmetry.

- 3 (a) Describe Null deflection method for determining magnetic anisotropy of a single crystal. 8
 (b) Explain the origin of paramagnetism.
 (c) Define :
 (i) Magnetic induction
 (ii) Pole strength
 (iii) Paramagnetism.

OR

- 3 (a) What is diamagnetism ? Describe Gouy method for determining magnetic susceptibility of a substance. 8
 (b) Derive the following expression for diamagnetic susceptibility,

$$X_{M(dia)} = \frac{-Ne^2}{6mc^2} \sum \overline{r^2}$$

- (c) Explain Curie-Weiss law with suitable examples. Indicate the significance of the Weiss constant.
- 4 (a) Describe π -bonding in phosphine complexes. How it differs with metal carbonyl bonding ? 9
 (b) What is metal carbonyls ? Give classification of metal carbonyls.
 (c) Write short note on "miscellaneous nitrosyl".

OR

- 4 (a) What is EAN ? State "18 electron rule". 9
 (b) Explain use of vibrational spectroscopy to determine geometrics of metal carbonyls.
 (c) Discuss structure and bonding in $Ni(C)_4$.

- 5 (a) What is supramolecular chemistry ? 9
Give classification of common host-guest compounds of neutral hosts.
- (b) Explain the chiral recognition by Crown ethers.
- (c) Give structure and formation mechanism of cell membranes.

OR

- 5 (a) Write short note on macrocyclic polyamines. 9
- (b) Explain supramolecular chemistry through Fuzzy interaction.
- (c) Explain the chemistry of molecular recognition.

- 6 (a) What is polymer ? What are the schemes for synthesizing polysilanes ? Discuss the physical properties. 8
- (b) What is crystallinity of polymers ? What are the importance and requirements of crystallinity of a polymer ?
- (c) Write short note on glass transition temperature of polymers.

OR

- 6 (a) Write short note on coordination polymer. 8
- (b) Give the synthesis, properties and application of polymeric sulphur and polysilanes.
- (c) Discuss the importance and the properties of the inorganic polymer.
