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RE-3451-52

M. Sc. (Part - I) Examination

April / May – 2010

Inorganic Chemistry : Paper - I

Time : 3 Hours] [Total Marks : 54

RE-3451

Instructions :

(1)

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

Name of the Examination :

☛ M. Sc. - 1

Name of the Subject :

☛ INORGANIC CHEMISTRY - 1

☛ Subject Code No. : 3 4 5 1 ☛ Section No. (1, 2,.....) : 1

Seat No. :

Student's Signature

(2) Answers to the two sections should be written in separate answer books.

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

1 (a) Prove that the eigen values of Hermitian operator are real. **9**

(b) Obtain energy expression of a particle on the surface of sphere.

(c) Define and explain operator algebra.

OR

1 (a) Define angular momentum operator. Give operators for the components of angular momentum in terms of r and p. **9**

(b) State and explain selection rules for harmonic oscillator.

(c) Derive the expression for kinetic energy of a rigid rotator.

2 (a) Define similarity transformation and give an example. **9**

(b) Construct character table for C_{3v} point group.

(c) Find out fundamental modes of vibrations in SO_2 molecule. Give their symmetry, IR and Raman activity.

OR

2 (a) Give properties of irreducible representations. **9**

(b) Write transformations for p_x, p_y, p_z atomic orbitals in C_{2v} point group.

(c) State and explain orthogonality theorem along with its consequences.

3 (a) Define the term inert and labile complexes. Discuss some factors affecting labileness of the complexes. **9**

(b) Explain photometric method to follow rate of reaction in a metal complex.

(c) Discuss interpretation of rate data with reference to the effect of temperature.

OR

3 (a) Justify "There is no relation between lability and stability of metal complex". Give examples. **9**

(b) Give application of spectrophotometric method in determining rate of ligand substitution reaction.

(c) Give an account of quenched flow method for fast reaction techniques.

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Name of the Examination :

☛ M. Sc. - 1

Name of the Subject :

☛ INORGANIC CHEMISTRY - 1

☛ Subject Code No. : 3 4 5 2 ☛ Section No. (1, 2,.....) : 2

Seat No. :

Student's Signature

(2) Answers to the two sections should be written in separate answer books.

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

4 (a) What is dimagnetism? Give Faraday method for determining magnetic susceptibility of a substance. **9**

(b) Define :

(i) Pole strength

(ii) Magnetic permeability

(iii) Magnetic induction

(c) Describe Null deflection method for determining magnetic an isotropy of a single crystal.

OR

4 (a) Explain the terms ferromagnetism and anti-ferrmagnetism. Distinguish between the properties of the compounds exhibiting such phenomenon. **9**

(b) Give an account of temperature independent paramagnetism with suitable example.

(c) Explain Curie law and Curie-Weiss law with example.

5 (a) Explain chemical properties of metal carbonyl with reference to **9**

(i) substitution reaction

(ii) action of NaOH

(iii) action of halogens.

(b) Give preparation and properties of nitrosyl halides of iron.

(c) What is EAN rule? Calculate EAN for any two from the following :
(i) $Ni(CO)_4$
(ii) $Co_2(CO)_8$
(iii) $Cr(CO)_6$

OR

5 (a) Discuss structure and bonding in $Fe_2(CO)_9$. **9**

(b) Describe π-bonding in phosphine complexes.

(c) Write note on complexes of molecular nitrogen.

6 (a) Define polymerisation. Give classification of inorganic polymers. **8**

(b) Explain viscometry method for determination of molecular weight of an inorganic polymer.

(c) Give importance and properties of inorganic polymers.

OR

6 (a) Give a method of preparation, properties and applications of polyphosphazenes. **8**

(b) Give an account crystallinity of inorganic polymer.

(c) Give applications of polysiloxmes.
