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RF-5365-66

M. Sc. (Part - I) Examination

April / May – 2010

Inorganic Chemistry : Paper - I

Time : **3** Hours] [Total Marks : **52**

RF-5365

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. : 5 3 6 5 ☛ Section No. (1, 2,.....) : 1

Seat No. :

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.

1 (a) What is linear harmonic oscillation? Derive expression for energy of a linear harmonic oscillator. **9**

(b) Define :
(i) Hamiltonian operator
(ii) Linear operator
(iii) Rigid rotator.

(c) Show that "Eigen Functions belonging, to different eigen values 'a_1' and 'a_2' of hermitian operator are orthogonal.

OR

1 (a) Obtain energy expression of a particle in the surface of sphere. **9**

(b) What do you understand by commutation relationship in operators? Prove that two components of angular momentum operator of a moving body do not commute.

(c) Write note on shift operators.

2 (a) Define character table and construct character table for C_3V point group. 9

(b) Explain the shape of S and P orbitals on the basis of their symmetry properties.

(c) Prove the ortogonality of two wave functions.

OR

2 (a) Explain reducible and irreducible respresentations. Write reducible representations of each element of BF_3. 9

(b) Write orthogonality theorem. Discuss, in brief, its consequences.

(c) What is point group? Prepare multiplication table for C_2U point group.

3 (a) Describe any one method to determine magnetic suceptibility. 8

(b) Explain the terms ferromagnetism and antiferromagnetism. Distinguish between the properties of the compound exhibiting such phenomena.

(c) What is diamagnetism? Give the cause of magnetism.

OR

3 (a) Define the terms : 8

(i) Pole strength

(ii) Magnetic permeability

(iii) Magnetic induction.

(b) Derive Van-Vleck equation and give its importance.

(c) Explain temperature independent paramagnetism.

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Name of the Examination :

☛ M. Sc. - 1

Name of the Subject :

☛ INORGANIC CHEMISTRY - 1

☛ Subject Code No. : 5 3 6 6 ☛ Section No. (1, 2,.....) : 2

Seat No. :

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.

4 (a) Explain any two isomerism in coordination compound. **9**

(b) Explain the crystal field effect in tetrahedral stereochemistry.

(c) Justify, transition metal complexes with NO ligand are considered as nitrosonium salts.

OR

4 (a) Give physical and chemical properties of metal carbonyl. **9**

(b) Describe metal π-bonding in phosphine complexes. How it differs from carbonyl bonding?

(c) What is CFSE? Give the assumptions of CFT.

5 (a) Write short note on supramolecular chemistry. **9**

(b) Explain the chiral recognition by crown ethers.

(c) Give classification of common host-guest compounds of neutral hosts."

OR

5 (a) Write short note on crown ethers. **9**

(b) Explain the chemistry of molecular recognition.

(c) Explain the supramolecule chemistry with suitable example.

6 (a) Give the synthesis, properties and application of polymeric sulphur and polysilanes. 8

(b) Write short note on crystallinity of inorganic polymer.

(c) Write short note on Glass Transition Temperature polymer.

OR

6 (a) Give properties and application of organometallic polymers. 8

(b) Discuss about coordination polymers.

(c) Why scientists are interested in the synthesis of inorganic polymer ?