

Seat No. : 410

DA-113

December-2018

M.Sc., Sem.-I

**401 : Chemistry
(Inorganic Chemistry)**

Time : 2 :30 Hours]

[Max. Marks : 70

1. (A) State four postulates of quantum mechanics. Explain two of them. 14

OR

(i) Calculate the first order correction term for the Eigen function by using perturbation method. 7

(ii) Explain the application of variation method on H atom. 7

(B) Answer in one or two lines (any four out of six) : 4

(i) Using commutator relationship, prove the Heissenberg's uncertainty principle.

(ii) Define Hermitian operator.

(iii) Why is $\sin^{-1} x$ not a well behaved wave function in the interval $(-1, 1)$?

(iv) Give expressions for Ladder Operators.

(v) What does the results from the variation method mainly depend on ?

(vi) Give the expression for perturbation.

2. (A) State Great Orthogonality Theorem. Give its five important rules about irreducible representations by taking the example of C_{3V} point group. 14

OR

(i) Show that p_x and p_y orbitals of nitrogen-atom in ammonia, described by the following eigen function $p_x = R\sin\theta \cos\phi$; $p_y = R\sin\theta \sin\phi$; provide a basis of the irreducible representation E. 7

(ii) Give an example of symmetric matrix with explanation. 7

(B) Answer in one or two lines (any four out of six) : 4

(i) Give an example of diagonal matrix.

(ii) What is Kronecker delta ?

(iii) In area III of the character table, what do understand when function x and y are written as (R_x, R_y) and not as R_x, R_y representation ?

(iv) When are the two matrices conformable for multiplication ?

(v) What is significance of direct product ?

(vi) An energy integral $\int \Psi_i H \Psi_i dt$, may be non-zero only if.. ...

3. (A) Discuss the basic terms of Magneto-chemistry. 14

OR

- (i) Write a note on paramagnetism. 7
 (ii) Discuss in detail antiferromagnetism. 7
 (B) Answer in **one** or **two** lines (any **three** out of Five). 3
 (i) Calculate the χ_{dia} for Copper(II) acetate hydrate.
 (ii) What is Larmor precession ?
 (iii) What is Meissner effect ?
 (iv) Give the equation for spin-only formula.
 (v) Write the definition for Neel temperature.

4. (A) Write a detailed note on Vitamin B12 and Zinc metalloenzymes. 14

OR

- (i) Give the full name of Cis-DDP and discuss its discovery, synthesis and mode of action. 7
 (ii) Write a note on Antibacterial agents. 7
 (B) Answer in **one** or **two** lines (any **three** out of five) : 3
 (i) Define the term Bio-inorganic chemistry.
 (ii) What is T conformational state in Hb ?
 (iii) Write the advantages of MRI.
 (iv) Write the biological function of Chromium.
 (v) What is Bohr effect ?

Character Table :

C_{3v}	E	$2C_3$	$3\sigma_v$		
A_1	1	1	1	z	$x^2 + y^2, z^2$
A_2	1	1	-1	R_z	
E	2	-1	0	$(x, y) (R_x, R_y)$	$(x^2 - y^2, 2xy) (xz, yz)$