Seat No. : 239

D-408

December-2011

Sem-I

Time : 3 Hours] [Max. Marks : 70

Instructions : Character table will be given if required.

1. (a) Compare Hermitian and Unitary operators. 3

(b) Derive the first order perturbation equation for degenerate level of a time-independent perturbation. 4

(c) Discuss the solutions of 0 and Φ equations and correlate with quantum number. 4

(d) Apply the Schrodinger wave equation for a particle on a ring (rigid rotator). 3

OR

(a) With the help of second postulate of quantum mechanics get the eigen values of angular momentum operators. 3

(b) Show that $[L_x, L_y] = iL_z$ 4

(c) What is meant by step-up and step-down operators ? 4

(d) Explain the importance of spherical harmonics. 3

2. (a) In area IV of the character table where all the squares and binary functions are shown, what do you understand when function x and y are written as x, y and not as (x, y) belonging to one representation. 3

(b) Explain the significance of every portion of character table. 4

(c) State the reduction formula used for reducing any reducible representation into its irreducible components. 3

(d) Illustrate with an example about the condition of conformability for multiplication of two matrices. 4

OR

(a) State the condition for an integral, containing two three or more functions, to be non-zero. 3

(b) Use five important rules about irreducible representations and their characters for the construction of character table of C_{3v} point group. 4

(c) For a point with a coordinate x, y, z show the matrix for symmetry operation S_n. 3

(d) Give an example of real matrix with explanation. 4

3. (a) Derive the basic equation for diamagnetic susceptibility. 5

(b) Write a note on ferromagnetism and antiferromagnetism. 5

(c) Explain orbital magnetic moment. 4

OR

(a) Discuss the importance of Pascal constant and its utility. 5

(b) Explain Curie Law and Curie Weiss Law. 5

(c) Give a brief account on intramolecular and intermolecular antiferromagnetism. 4

4. (a) Define various zinc enzymes and discuss their function. 5

(b) Discuss the toxic effect of lead and arsenic on living system. 5

(c) Explain the use of platinum and gold in medicine. 4

OR

(a) What is Chelation therapy ? Discuss the role of EDTA, Cryptates and Aurinetrycarboxylic acid as chelating agents. 5

(b) Discuss the function of iron in biological system. 5

(c) Discuss the importance of essential trace elements in biological system. 4

5. Answer the following : **(1 mark each)**

(a) The quantum number j is known as _____ .

(b) The vibration frequency of a simple harmonic oscillator, ν_0 = _____ .

(c) The symmetry of P orbital is 'ungerade', True or Flase.

(d) The orbital angular momentum of an electron in the 'S' orbital is _____ .

(e) How do we designate all one dimensional representation in character table ?

(f) What will be the character of the matrices of non degenerate or singly degenerate representation under identity operation ?

(g) Fluoride in excess amount cause _____ .

(h) Give the full name of BAL.

(i) Arsenic has much affinity towards _____ .

(j) Give the names of two platinum compounds which possess anticancer activity.

(k) The ideal Curie paramagnets are _____ .

(l) A diamagnetic substance will have P<1 ; True or False.

(m) The deficiency of zinc ion in diabetes can be cured by _____ .

(n) Give the full name of Vitamin B-12.