G 2368 (Pages : 2) Reg. No.....

Name.....

M.Sc. DEGREE (C.S.S.) EXAMINATION, JUNE 2015

Fourth Semester

Faculty of Science

Branch III : Chemistry—Pure Chemistry

CH 4E 01—ADVANCED INORGANIC CHEMISTRY

(2012 Admission onwards)

[Regular/Supplementary]

Time : Three Hours Maximum Weight : 30

Section A

Answer any **ten** *questions.*
Each question carries a weight of 1.

1. Illustrate with examples the use of nano composites in biomedicine.
2. Enumerate the application of nano materials in consumer goods. Cite appropriate examples.
3. How self assembled monolayers are formed on Gold surface ?
4. Give the characters for the representation of transformation of P_y and P_z orbitals in C_{2v} point group.
5. What is vanishing integral ? What are the conditions under which they vanish ?
6. Write down the irreducible representation of each of the fundamental vibrations of trans $[PtCl_2Br_2]^{2-}$ which are IR active.
7. Distinguish between fluorescence and phosphorescence.
8. What is PAN ? What is its significance in atmospheric pollution ?
9. What are leveling effect of solvents ?
10. Liquid ammonia solutions are blue in colour. Explain.
11. Give an example of a photo substitution reaction in complexes.
12. Name a substance each used for the decomposition and dissolution of samples containing :
    (i) Silicates ; (ii) Metals ; (iii) Alloys; and (iv) Organometallic compounds.
13. What happens to the C = N stretching frequency in N-salicylidene aniline on complexation with metal ion ? Give reasons.

(10 × 1 = 10)

Turn over

Section B

Answer **five** *questions.*
Each question carries a weight of 2.

14. What are the properties of quantum dots that make them useful as detectors and luminescent materials ? Why they are called quantum dots ? How can they be prepared ?
15. What are the important properties and applications of Carbon nanotubes ?
16. Describe the biochemical effects of sulphur-di-oxide. How can the emission of sulphur-di-oxide be controlled ?
17. What is isomer shift in Mossbauer spectroscopy ? How it is related to Curie temperature of Iron ?
18. Explain the use of IR and Raman spectroscopy in the elucidation of the structure of co-ordination compounds.
19. Give a brief account of metal sensitizers.
20. Discuss briefly the Hard-Soft acid principle.
21. Write a note on electrolytic precipitation.

(5 × 2 = 10)

Section C

Answer any **two** *questions.*
Each question carries a weight of 5.

22. What are nanoshells ? How are they classified ? Discuss its applications and methods of characterization.
23. Describe the principle of EPR spectroscopy. Define *g* value and what are the factors which affect tits value ? Calculate the *g* value of the methyl radical which shows an EPR peak at 3300 G in a spectrometer operating at 9240 MHz.
24. Analyze the IR and Raman spectra of BF_3 molecule using group theory.
25. Construct MO diagram for $[CoF_6]^{3-}$ and the hypothetical $[Co(PR_3)]^{3+}$ including all π, σ and nonbonding electrons.

(2 × 5 = 10)