20000389

20000389

Reg. No.....

Name.....

M.Sc. DEGREE (C.S.S.) EXAMINATION, MAY 2020

Fourth Semester

Faculty of Science

Branch III—Pure Chemistry

CH4 E01—ADVANCED INORGANIC CHEMISTRY

(2012 Admission onwards)

Time : Three Hours Maximum Weight : 30

Section A

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

1. What is meant by isomer shift in Mossbauer Spectroscopy ?
2. Comment on the phrase 'writing with atoms'.
3. Distinguish between 1^0 and 2^0 air pollutant.
4. What are nanocomposites ?
5. Explain ligand field states.
6. What happens to V_{CO} stretching frequency in the IR spectrum of acetylacetone on co-ordination with metal ions ?
7. Explain the principle involved in the determination of nitrate in water.
8. Explain 'Photolysis of water'.
9. Calculate ESR frequency in the magnetic field of 25,000 Gauss; if $g = 2$ and $\beta = 9.271 \times 10^{-24}$ JT^{-1}.
10. What is meant by photochromism ?
11. Draw the different modes of vibrations of CO_2 and explain why some vibrations are unobserved in IR.
12. The V_{CO} values for $[V(CO)_6]$, $[Cr(CO)_6]$, $Mn(CO)_6]^+$, are observed at 1860, 2000, 2090 $cm.^{-1}$ respectively. Justify this observation.
13. What is Severe Plastic Deformation ?

$(10 \times 1 = 10)$

Turn over

Section B

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

14. Describe the sources of error encounter in the sample decomposition.

15. Describe the synthesis and properties of carbon nanotubes.

16. Describe the different methods employed in the sampling.

17. Write a short note on oxide nanoparticles.

18. Describe the principle involved in ESR spectroscopy.

19. Describe the photochemistry of $[Ru(bipy)3]^{2+}$.

20. Describe the classifications of inorganic nanomaterials.

21. Define *g* value. What are the factors affecting *g* value ? Explain the determination of *g* value in EPR spectroscopy.

(5 × 2 = 10)

Section C

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

22. Write notes on the following :—

    (a) Microwave decomposition.

    (b) Moisture in sample.

23. Describe hard soft classification of acids and bases. Explain HSAB principle and its application.

24. Write notes on following :—

    (a) Application of fluxes.

    (b) Reagents used for open vessel decomposition of inorganic analytical sample.

25. Give the principle of Mossbauer spectroscopy. How it is helpful in the study of Fe(III) complexes.

(2 × 5 = 10)