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P – 3860

Reg. No. :

Name :

Third Semester B.Sc. Degree Examination, January 2023.

First Degree Programme under CBCSS

Chemistry

Core Course – II

CH 1341 – INORGANIC CHEMISTRY II

(2020 Admission onwards)

Time : 3 Hours

Max. Marks : 80

SECTION – A

Answer **all** questions in a word or one or two sentence. Each question carries **1** mark.

1. Mention the hybridisation and geometry of SF₆ molecule _____
2. What is the magnetic property of B₂ molecule?
3. Which is more Ionic - BeCl₂ or BaCl₂? Give reason.
4. Name two dibasic oxyacids of phosphorous.
5. Draw the geometry of XeF₄ molecule.
6. Give any two examples for pseudohalogens.
7. How many α particles will be emitted in the change ${}_{92}^{238}\text{U}$ to ${}_{82}^{206}\text{Pb}$?
8. What are isotones?

P.T.O.

9. Name a nanomaterial used in Li ion batteries.

10. What are nano sensors?

(10 × 1 = 10 Marks)

SECTION – B

Answer **any eight** questions. Each question carries **2** marks

11. Which is paramagnetic- CO or NO? Why?

12. Define lattice energy. Why lattice energy of ionic solid is high?

13. Predict the geometry of IF_7 molecule on the basis of VSEPR theory.

14. The effect of H-bonding in NH_3 is less than that of H_2O . Why?

15. Give a suitable example of dipole-dipole interaction.

16. State and explain Fajan's rule.

17. What is tracer technique?

18. Explain artificial transmutation with an example.

19. Discuss neutron activation analysis.

20. What are quantum dots?

21. Write a method for the preparation of Au nanoparticles.

22. What is inorganic benzene. Why is it called so?

23. Draw the structure of P_4O_6 and P_4O_{10} .

24. How is diborane converted to boron nitride?

25. What are polyphosphazines?

26. What is the peculiarity of pyrex glass?

(8 × 2 = 16 Marks)

SECTION – C

Answer **any six** questions. Each question carries **4** marks

27. Define dipole moment. Explain how is it helpful in predicting the geometry of molecules.
28. What is LCAO? Discuss this in the formation of HF molecule.
29. Compare VB theory with MO theory.
30. Calculate the binding energy per nucleon of ${}^9_4\text{Be}$ nucleus in both MeV and Joule. Given mass of proton = 1.008 amu, mass of neutron = 1.009 amu and mass of Be isotope is 9.012 amu.
31. How radioisotopes are useful in medical diagnosis and radiotherapy? Give examples.
32. Explain the structure of diborane.
33. Write a short note on refractory materials.
34. Write a short note on carboranes and boron nitrides.
35. Discuss the applications of different noble gases.
36. What are pseudohalogens?
37. What are the different types of carbon nanotubes?
38. Write a note on fullerenes.

(6 × 4 = 24 Marks)

SECTION – D

Answer **any two** questions. Each question carries **15** marks

39. (a) What are the applications of radioisotopes?
(b) One microgram of Na-24 was injected into the blood of a patient. How long will it take for the radioactivity to fall to 10% of the initial value? The half-life of Na-24 is 14.8 hours.

40. (a) Sketch the MO diagram of O_2 molecule. 7
- (b) Arrange O_2 , O_2^+ , O_2^- and O_2^{2-} in the increasing order of their stability. 4
- (c) Comment on their magnetic behaviour. 4
41. Discuss different types of silicates with suitable examples.
42. Discuss the structures of different oxyacids of halogens.
43. Write a note on
- (a) Kuroll's salts 4
- (b) Silicones 7
- (c) Zeolites 4
44. Explain the following methods for the synthesis of nanoparticles with suitable examples.
- (a) Sol-gel 7
- (b) Combustion 4
- (c) Ball milling 4

(2 × 15 = 30 Marks)
