



K23U 3414

Reg. No. : .....

Name : .....

III Semester B.Sc. Degree (C.B.C.S.S.-O.B.E.-Regular/Supplementary/  
Improvement) Examination, November 2023  
(2019 to 2022 Admissions)  
COMPLEMENTARY ELECTIVE COURSE IN CHEMISTRY/POLYMER  
CHEMISTRY  
3C03CHE/PCH(PS) : Chemistry (For Physical Science)

Time : 3 Hours

Max. Marks : 32

*Instruction : Answer the question in English only.*

## SECTION – A

Very short answer type. **Each** carries 1 mark. Answer **all 5** questions. (5×1=5)

1. Arrange the following in the increasing order of energy-Radio waves, Microwaves, IR and Cosmic rays.
2. Define closed system.
3. Define isochoric system.
4. Write the molecular formula of a coordination compound of Cobalt with ligand as  $\text{NH}_3$  and  $\text{Cl}^-$  and coordination number 6.
5. Expansion of GSC, LLC.

## SECTION – B

Short answer type. **Each** carries 2 marks. Answer **any 4** questions out of 6. (4×2=8)

6. Write and express the entropy criteria for irreversible process.
7. Express the criteria for spontaneous process.
8. What is a zero order reaction ? Give one example.
9. Define isotopes and isobars with one example.
10. Define mass defect and binding energy.
11. Mention two applications of column chromatography.

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## SECTION – C

Short essay type. **Each** carries 3 marks. Answer **any 3** questions out of 5. (3×3=9)

12. Explain stretching and bending modes of vibrations using a linear molecule.
13.  $\Delta H$  and  $\Delta S$  for the reaction :  $2 \text{NO}(\text{g}) + \text{O}_2(\text{g}) \rightarrow 2\text{NO}_2(\text{g})$  at 720 K are  $-120 \text{ kJ}$  and  $-150 \text{ J/K}$  respectively. Calculate the Gibbs energy change and predict whether the reaction is spontaneous or not at 720 K.
14. Explain Werner's coordination theory using the example –  $[\text{CoCl}(\text{NH}_3)_5]\text{Cl}_2$ .
15. Differentiate between molecularity and order.
16. Compare one merit and demerit of column, planar and gas-liquid chromatography.

## SECTION – D

Long essay type. **Each** carries 5 marks. Answer **any 2** questions out of 4. (2×5=10)

17. a) Explain spin spin split in NMR using suitable examples.  
b) Write a brief note on electronic spectra.
18. What is meant by the EAN rule ? Calculate and express which of the following compounds obey EAN rule  $[\text{Ni}(\text{NH}_3)_6]^{2+}$ ,  $[\text{Ni}(\text{CO})_4]$ ,  $[\text{Fe}(\text{CN})_6]^{3-}$ ,  $[\text{Fe}(\text{CN})_6]^{4-}$ .
19. Derive integrated rate equation for first order reaction. Explain with suitable examples how activation energy and catalyst are related. (3+2)
20. Define and express nuclear fission and fusion. Explain detection of isotopes using Aston's mass spectrograph. (2+3)