



K22U 3614

Reg. No. :

Name :

Third Semester B.Sc. Degree (CBCSS – OBE – Regular/Supplementary/
Improvement) Examination, November 2022
(2019 Admission Onwards)

COMPLEMENTARY ELECTIVE COURSE IN CHEMISTRY/POLYMER
CHEMISTRY CORE
3C03CHE/PCH(PS) : Chemistry (For Physical Science)

Time : 3 Hours

Max. Marks : 32

Instruction : Answer the questions in **English** only.

SECTION – A

Very short answer type. **Each** carries 1 mark. Answer **all 5** questions :

1. How many NMR signals will be observed in the spectrum of acetone ?
2. The system in which there is no exchange of matter or energy is _____
3. Atoms that have same mass number but different atomic number are called _____
4. What is the full form of HPLC ?
5. What is the unit of rate constant for a zero order reaction ?

SECTION – B

Short answer type. **Each** carries 2 marks. Answer **any 4** questions out of 6 :

6. State Group Displacement Law.
7. What is n/p ratio and how does it affects the stability of a nuclei ?
8. Define Free energy and what is its physical significance ?
9. What is meant by EAN ? Calculate the EAN of $[\text{Fe}(\text{CN})_6]^{3-}$.
10. What is the principle of TLC ?
11. Differentiate between homogeneous and heterogeneous catalysis with examples.

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SECTION – C

Short essay type. **Each** carries 3 marks. Answer **any 3** questions out of 5 :

12. The rate constant k for a first order reaction is $8.9 \times 10^{-3} \text{ s}^{-1}$ at 276 K and $7.1 \times 10^{-2} \text{ s}^{-1}$ at 308 K. Calculate the energy of activation of the reaction.
13. For the reaction $\text{CaCO}_3(\text{s}) \rightarrow \text{CaO}(\text{s}) + \text{CO}_2(\text{g})$, enthalpy change is 177.8 kJ and entropy change is 0.159 kJ/K at 298 K. Predict whether the reaction is spontaneous or not at 298 K.
14. What is the necessary and essential conditions for a molecule to give
(a) Rotational spectrum, (b) Vibrational spectrum ?
15. Write a note on problems associated with the disposal of nuclear waste.
16. Using Valence Bond theory, account for the geometry and magnetic properties of $[\text{Ni}(\text{CN})_4]^{2-}$.

SECTION – D

Long essay type. **Each** carries 5 marks. Answer **any 2** questions out of 4 :

17. a) Describe briefly the principle of Raman Spectroscopy. 2
b) What is meant by spin-spin splitting in NMR ? Explain with an example. 3
18. a) State and explain II law of thermodynamics and explain the criteria for spontaneous process in terms of entropy change. 3
b) What is a ligand ? What are the different types of ligands ? Explain with examples. 2
19. a) Describe the radiocarbon dating technique. 2
b) Discuss the principle of ion exchange chromatography. 3
20. a) Derive an integrated equation for the rate constant of a first order reaction and obtain the expression for half-life. 3
b) Discuss collision theory of reaction rates. 2