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**Reg. No. : .....**

**Name : .....**

**Third Semester B.Sc. Degree Examination, October 2019**

**First Degree Programme under CBCSS**

**Complementary course for Botany**

**CH 1331.3 – PHYSICAL CHEMISTRY**

**(2017 Admission onwards)**

Time : 3 Hours Max. Marks : 80

SECTION – A

Answer **all** questions Answer in one word to maximum two sentences.
**Each** question carries **1** mark

1. Write any two examples of Lewis acid.
2. Define azeotrope.
3. What is pH of a solution?
4. Define molarity.
5. Write any two factors that influence rate of a reaction.
6. What is Critical Micelle Concentration (CMC)?
7. How are $\tau$ and $\delta$ scales in NMR related?
8. What are isotonic solutions?

9. Draw the low-resolution NMR spectrum of $CH_3CH_2Br$.

10. What is homogenous catalysis?

**(10 × 1 = 10 Marks)**

## SECTION – B

Short answer type. Answer any **eight** questions from the following.
**Each** question carries **2** marks

11. The boiling point of 2.5 molal solution of glucose in water is 101.3° C. Calculate the molal boiling point elevation constant of water.

12. What is the significance $\lambda_{max}$ in UV-visible spectrum of molecules?

13. What is Hardy-Schulze rule?

14. State and explain Raoult's law.

15. What is zeta potential? What is its significance?

16. Define osmotic pressure.

17. Identify the NMR active nuclei from the following:

$^{1}_{1}H$, $^{4}_{2}He$, $^{14}_{7}N$, $^{19}_{9}F$, $^{12}_{6}C$

18. What are the postulates of collision theory?

19. Derive the expression for acid dissociation constant ($K_a$) of $CH_3COOH$.

20. State distribution law.

21. If a solution has a $p^H$ of 5.50 at 25° C, calculate its molar concentration of $[OH^-]$.

22. What is a zero-order reaction? Give an example.

**(8 × 2 = 16 Marks)**

## SECTION – C

Short essay type. Answer any **six** questions from the following.
**Each** question carries **4** marks

23. Discuss the principle of steam distillation.

24. What is Arrhenius equation? What are the methods to calculate Arrhenius parameters?

25. Explain spin-spin coupling in NMR using $CH_3CH_2Cl$.

26. What is reverse osmosis? Discuss an application of reverse osmosis.

27. How do you purify the colloids using ultra-filtration and electrodialysis?

28. What is buffer solution? Discuss the buffer action of acidic buffer.

29. What are the differences between order and molecularity?

30. Derive Henderson equation.

31. Discuss the principle behind the working of ultramicroscope?

**(6 × 4 = 24 Marks)**

## SECTION – D

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

32. (a) Derive the integrated rate law for a first order reaction; $A \rightarrow P$.

    (b) Discuss the Lowry-Bronsted concept of acids and bases.

    (c) What are the differences between auxochromes and chromophores?

33. (a) What is critical solution temperature? Discuss the variation of mutual solubility of Phenol-Water and Nicotine - Water systems with temperature.

    (b) What is freezing point depression? Derive an expression to calculate the molecular mass of solute from depression in freezing point?

34. (a) Discuss the intermediate compound formation theory of catalysts.

(b) What is hydrolysis of salts? Discuss the hydrolysis of $NH_4Cl$.

(c) Discuss different types of electronic transitions possible in molecules.

35. (a) Draw the vapor pressure – composition and boiling point – composition curves of completely miscible binary solutions.

(b) Explain the applications of colloids.

**(2 × 15 = 30 Marks)**

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